Reconstructing Prehistoric Social Organization:
A Case Study From the Wansan Site, Neolithic Taiwan

By

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Abstract

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The purpose of this dissertation project is to identify characteristics of social organization among the Neolithic people in Taiwan. Specifically, this dissertation aims to examine the potential social differentiation at the inter-household level. Archaeological materials from the Wansan site (ca. 3,500-2,700 B.P.) are analyzed through examining the spatial distribution of house structures and archaeological artifacts. This dissertation explicitly utilized the House Society concept to examine how prehistoric Wansan people organized themselves and explore how and why there were differences among the houses. The House Society concept can offer archaeologists a framework to understand how the prehistoric people organized themselves, and assists us to interpret the differences of the quantity and quality of artifacts which might exist at the house/House level. In this dissertation, various archaeological implications derived from the House society concept were proposed and examined using the archaeological material excavated from the Wansan site in northeastern Taiwan.

The results of this analysis illustrate that the residential houses in the Wansan society was not only a place where people resided and interacted with other members on a daily basis, but also where the lives of the living members intertwined with the ancestors through situating of deceased members around the residential houses. Furthermore, the correlation between the presence of possible ancestor symbols and the variations of the artifacts among houses suggests that the social differentiation of the Wansan society was probably related to the people's ability to claim their association with the ancestors.

Inspired from the concept of House Society, I thus propose that these residential houses in the Wansan society probably constituted several Houses. The House, which could probably assure their connections with the ancestors, had better knowledge regarding how to manipulate local resources. At the same time, the House could construct a wider social network to share

similar artifacts with other Houses in the society. On the contrary, Houses without the ancestral connections lacked the capability to fully explore local resources and were limited to certain options. As a result, the House's disparate technological tradition expressed in the artifacts resulted from social differentiation that emerged with differential ability to affirm connections with their ancestors.

Dedicated to my parents, Sheng-kuei Chiang (江深貴) and Wen-ying Peng (彭文英),

for their unconditional love and support

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CHAPTER I

INTRODUCTION

I remember vividly the first time I went to the Wansan site in 1998. It was a cloudy morning and the chilly cold front directly hit the barrierless Wansan hill. It was the first time that I experienced the icy air from the Pacific Ocean. The rescue excavation had already been going on for more than a month with an excavation team composed of local school teachers, local farmers, students and archaeologists from the urban city of Taipei. I came to the site as a research assistant from the city, an outsider whose knowledge of local language was too limited to communicate with local workers. Not only was I new to this place, but also to this type of large-scale excavation. The large-scale rescue excavation consisted of several groups of workers and a special type of social organization was thus formed through this archaeological process. The excavation lasted for almost six months, beginning with the cold winter and lasting until the hot summer. Although my language ability was still not good enough to catch all the local jokes, at the end of the excavation I was complimented as having a local accent.

That six-month excavation not only taught me how to conduct this type of archaeological work, but also let me experience the process of being integrated into a community through daily interactions. Everyday we had to hike to the top of the hill, and spent eight hours working there; no matter whether it was rainy, chilly, hot or humid. In the beginning and middle of every month, we would pay our respects to the deceased of the hill by performing a traditional ancestral worship ritual. After the ritual, we would take a short break together and enjoy the offerings prepared for the ritual. During the excavation period, I gradually learned the local language, the intricate social network of the local workers, and the unique local traditions and history through these daily excavations and numerous dinners with my “local colleagues”. I felt like it was my new home.

It was a unique and unforgettable experience that helped me to imagine how a group or groups of people who came to the Wansan hill almost 3,500 years ago might build their connections with other people and the landscape. How did these early Wansan people interact with their environment and what kind of daily life did they have? Did the process of traveling up and down the hill, hunting, fishing, making tools, and participating in rituals together make these people feel like a big family? How did these early residents choose the “right place” to build their homes? How did they interact with their “neighbors”? Were they afraid of the unpredictable summer typhoon? How did they organize themselves when certain work had to be performed collaboratively?

When I began to analyze the artifacts from the site, my imagination of these people centered on those questions. Pictures of the daily life of these different groups of people that lived on the small hill formed in my head. Since the various house structures constituted important features on the landscape, life centered on these houses thus became the nexus of this exploratory journey.

Therefore, the concept of House Societies offered me a venue to approach the prehistoric Wansan society.

1.1 The House Society

Drawing from the concept of House Society, the purpose of this project is to identify characteristics of social organization among the Neolithic people in Taiwan. Specifically, this dissertation aims to examine the potential social differentiation at the inter-household level. Archaeological materials from the Wansan site (ca. 3,500-2,700 B.P.) are analyzed through examining the spatial distribution of house structures and archaeological artifacts. The House Society concept offers us a framework to understand how the prehistoric Wansan people organized themselves, and assists us to interpret the differences of the quantity and quality of artifacts which might exist at the house/House level.[1]

The theoretical framework that will guide this project is derived from the anthropological study of the so-called "House society." The concept of the "House society," which was first proposed by Lévi-Strauss (1975), can be defined as a society in which a "House" as a property holding unit is the most salient social unit. A "House" unifies a group of people in the name of "kinship" or "hypothetical ancestry," and the importance of House continuity is emphasized through the transmission of House titles, properties, and goods from generation to generation (Gillespie 2001, 2007; Lévi-Strauss 1975). Although "House" does not necessarily infer its members live under the same roof, in a small-scale society, their residences may be located in proximity and further form a cluster (Fox 1993; Reuter 2002). The sense of belonging to the same House is enhanced through day-to-day activities and by participating in certain ritual activities together (Carsten and Hugh-Jones 1995). Moreover, the continuity of the House can be further reassured through these rituals. Thus, a physical house might function as the ritual center of each House (Fox 1993; Gillespie 2001; Kirch 2001).

Unlike other social theories that emphasize how the rigid analytical kinship system structures society, the concept of "House Society" stresses the importance of material media in the process of forming different social groups (Carsten and Hugh-Jones 1995; Gillespie 2001, 2007). A variety of material media are utilized, including physical building structures, property in land, heirlooms, tombs, crests, and named objects. The concept of "House society", thus, not only redirects the way socio-cultural anthropologists investigate social organization, but also provides archaeologists a link by which to infer social organization and understand the processes of social differentiation from the archaeological record.

When Lévi-Strauss first proposed the idea of House society in the 1970s, he defined "House" as:

[1] Throughout this dissertation I have used the convention adopted by others who apply the House Society concept; namely, House, with H capitalized, refers to the social House in the "House Society" model whereas house, lowercase "h," refers to the actual physical house.

> A corporate body holding an estate made up of both material and immaterial wealth, which perpetuates itself through the transmission of its name, its goods, and its titles down a real or imaginary line, considered legitimate as long as this continuity can express itself in the language of kinship or of affinity and, most often, of both. [1982:174]

House members are not only unified by physical house buildings or specific material objects associated with the House group, but are also devoted to ensuring the continuous existence of the House through naming, maintaining, and manipulating these physical architectural structures or material objects. The concept of "House society" specifically points out the role of the actual physical houses in the process of forming different social groups. In addition to the actual house buildings, a particular type of material object associated with the house can also be used to organize people into different social groups. House members identify themselves as belonging to the same House and express their identity through manipulating the material media associated with the House. In other words, the idea of "House Society" explicitly links human social organization with material culture and, at the same time, emphasizes the importance of the long-term development of the Houses.

1.2 House Societies in Taiwan

In Taiwan, the present-day indigenous societies are composed of various groups of the so-called Austronesian-speaking peoples. Although the earliest historical documentation of their presence in Taiwan can only be traced to the 17th century, their occupation on the island probably stretches back to the early Neolithic period based on their oral tradition and archaeological research (Chang 1969; Li 1980; Lien 2001). The ethnological research has already recognized the importance of the actual house building and its relation to the formation of social groups in different Taiwanese Austronesian societies (Chijiiwa 1988; Chiang 1995; Chen 1995; Huang 1995; Huang 2002; Ye 2002). Recent studies have even explicitly proposed employing the "House Society" model to re-examine several Taiwanese Austronesian peoples' social organization (Chiang 1991, 1999; Chiang and Li 1995; Huang 2002; Tan 1992, 2004; Ye 2002). At the same time, rich linguistic research on reconstructing early Austronesian societies also suggests the possible antiquity of viewing the house as a social unit in these societies (Blust 1995, 1996; Green 1998; Kirch and Green 2001). These studies thus show the possible long history of the existence of House society tradition in Taiwan. Even though the amount of archaeological research on houses or social organization in Taiwan is rare, the presence and importance of houses at different archaeological sites has long been recognized. At the Wansan site, the discovery of postholes, stone walls, and hearths implies the existence of several house structures. These house structures, together with large amounts of lithic and ceramic artifacts, offer archaeologists multiple lines of evidence through which to investigate the potential social differences between each house unit.

At the Wansan site, 35 radiocarbon dates and thick, uninterrupted cultural deposition from different excavation units indicates long-term occupation, from 3,500 to 2,700 years ago. The 800-year occupation, along with the abundant material remains, implies the repetitive utilization

of the same area for habitation sites. At the same time, burials with specific jade goods surrounding each cluster of houses show the house members' intention to create and emphasize the connection between the houses and their deceased ancestors. In several contemporary "House Societies," one of the most important practices is to signify the continuous existence of the House (Bloch 1995; Gillespie 2000; Kirch 2000; McKinnon 2000; Waterson 1990, 1993, 2000). Thus, I argue that these house structures in prehistoric Wansan society acted more than concrete structures for housing people's daily life, these houses probably played more active roles in terms of organizing people into distinct social groups. The House Society concept thus can facilitate us to explore this dynamic relationship between physical houses, social memories, and social relations in prehistoric Wansan society.

1.3 Questions

Because of the explicit association between the actual material objects and physical structures with the social organization and the emphasis on the long-term continuity, archaeologists have utilized the "House society" model to examine different societies around the world (e.g., Ames 2006; Chiu 2005; Joyce 1999, 2000; Kirch 2000; Kirch and Green 2001; Marshall 2000, 2006). Among these research efforts, there are two different approaches to utilizing this model (Gillespie 2001). One is to consider "House society" as *a particular type* of social organization which can be identified through archaeological remains (e.g., Ames 2006; Gonzelas-Ruibal 2006; Kahn 2005, 2007; Kirch 2001); and the other is regarding "House society" as a heuristic device which can inform archaeologists about the *relationship* between architecture, material objects, and social relations (e.g., Carsten and Hugh-Jones 1995; Gillespie 2001; Tringham 2001). No matter which approach is taken, this model promotes a "house-based" approach which puts the actual house buildings or material objects in the foreground when investigating processes of prehistoric social organization (Carsten and Hugh-Jones 1995). Thus, several questions can be addressed regarding the Wansan site. Do house buildings or clusters of buildings at the Wansan site constitute different social Houses? Aside from the particular burial practice, are there any other lines of archaeological evidence suggesting the importance of houses? If these houses or clusters of houses do not represent different Houses in the context of House society, then are there other kinds of relationship between these houses? Does each house or cluster of houses merely represent different domestic groups? Is there any difference between these domestic groups in terms of wealth or status? Or, do these houses just simply have different functions? And if so, what are those functions?

Ethnological research on several societies in Southeast Asia does observe a number of common characteristics among the so-called "House societies," such as the indoor burial, the spatial layout within and between houses, specific artifacts associated with the houses, and ritual practices associated with the house, which can be used in archaeological examination. Based on these common characteristics, it is possible to form a testable hypothesis for archaeologists to employ in investigating prehistoric social relations centered on the house structures.

1.4 Methods

In this dissertation, I focus on analyzing the spatial distribution of lithic and clay artifacts and archaeological features, such as hearths, postholes, burials and stone walls. Through spatial analysis of archaeological data, different clusters of house structures and activity areas can be identified. Furthermore, comparing the spatial distribution of these archaeological data among different house structures can answer questions regarding the potential difference among house structures.

As a result, in this research, I propose to examine several archaeological implications that can be drawn from ethnographic works conducted in various so-called House Societies from the world, especially recent studies conducted in the Southeast Asian islands and Taiwan. These implications are: 1) repetitive utilization of the same place for houses; 2) ancestral ritual activities practiced in houses or house groups; 3) images or writings depicted in personal belongings or structures; 4) movable and immovable material objects signifying symbolic relevance; 5) artifacts related to everyday life in each houses or house groups; 6) the variability of the artifact in terms of quantity or quality. These implications thus offer several lines of archaeological evidence to not only examine whether people organize themselves centered around residential dwellings, but to also investigate whether there is any differences of quantities and qualities of artifacts between these residential houses at the Wansan site.

1.5 Results

Examining the spatial distribution of features and artifacts excavated from the Wansan site thus suggests following results. First, the arrangement and substantial construction of the structures, such as stone walls, possible storage pits, the presence of artifact clusters and lithic tool workshops, and the abundance and variety of artifacts, suggest long-term occupation. There seems to have been a deliberate emphasis on maintaining the positions of both settlements and of individual buildings from one generation to another.

Second, the artifact distribution around the houses indicates that similar activities were performed in the majority of houses. Most artifact classes were present in every house. Each house had ground and chipped stone tools and pottery, and all but one house had jade ornaments.

The repeated occurrence of basic activities indicates that each house and house group functioned as a separate social and residential unit for the carrying out of certain repetitive aspects of daily life. Crafting, such as weaving or ornament making, and the production of useful implements, such as lithic tools, occurs in every house and house group. Added to this mix of activities and interactions that are tied to economic production and social reproduction is an emphasis on repeated, shared mortuary rituals. Burials are placed around all houses, which implies that the participation in rituals and the shared memory of the presence of the burials reinforced the solidarity of house residents.

The presence of possible ancestor-related objects found in each house/house group signifies the connection between the living members and the dead ancestors. The association of the burials

and the zoo-anthropomorphic objects highlights the affiliation between the dead members and the history of the house.

The variation in the presence and quality of certain artifacts among the buried members of the houses testifies to the enduring nature of differences in rank within the society. The people living in these houses, at any particular moment, were enmeshed in repeated acts of daily life, ritual, and cooperation that would have created a sense of common or shared identity. At the same time, differences might also exist due to variations in status, wealth, role, gender, age, and so on.

1.6 Interpretation

The results from the "house-centered" approach assist us to identify several house structures and the association between structures and material objects. Drawing inspiration from the concept of House Society, the relationships between physical structures, material objects and prehistoric social relations can thus be explored.

In the initial phase of the Wansan settlement, each identified house is an independent economic unit and the house inhabitants conduct their daily activities inside the house. This was probably the time when different groups of people came to the Wansan hill and began to construct their houses and settled in.

After the initial inhabitants settle on the Wansan site for a period of time, and probably gradually explore new resources, the sense of belonging to the same group centered on the houses begins to grow. In other words, the presence of Houses became clear in the second phase of the settlement. Prehistoric Wansan people probably stressed the existence and continuity of their Houses through the manipulation of multiple material media. The house residents probably formed a sense of belonging to the same group through carrying out their daily lives together in a space that had been marked by concrete physical structures or landscape features, such as the houses and terraces, at the Wansan site (Carsten 1997; Carsten and Hugh-Jones 1995). Furthermore, the practice of placing the deceased members around the residential houses expressed and enhanced their attachment to the landscape and the prominence of the physical structures (Grove and Gillespie 2002; Waterson 1990). During this mortuary ritual, a specific material object which strongly signified members' intentionality to stress their affiliation with ancestors was placed inside the burials. The connection between the Houses with their ancestors was thus established. This close association between Houses and their ancestral history implied the importance of social memory in terms of tracing and displaying their bond with the past. Even though multiple Houses might exist at the same time, the differentiation between Houses can also be observed from their material world. One specific House, which did not possess the material medium to highlight its connection with the past, showed clear evidence of dissimilar artifacts from other Houses. In other words, the differentiation probably lied in the disparate ability of each House to make the connection with ancestors (McKinnon 1991, 2000, Reuter 2002).

1.7 Dissertation organization

This dissertation contains nine chapters. In this chapter, I lay out the questions of this project and theoretical framework and methods that will be employed in this dissertation. A preview of the general results of analysis is also presented in this chapter. This chapter intends to give readers a general picture of the whole dissertation.

In Chapter 2, I further explore the theoretical framework that directs this project: the concept of House Society. Although it is originally derived from socio-cultural anthropological studies, its impact on archaeological research has been increasing, and the concept is being applied worldwide. This chapter retraces the development of this concept in socio-cultural anthropology, especially in terms of understanding the social organization of the Austronesian societies. Most importantly, I scrutinize several characteristics of the House Society generalized from the ethnographic examples. At the same time, I examine how this concept has been applied to the research of prehistoric social relations in archaeology. Archaeologists approach the House Society from two approaches which can be further categorized into three different perspectives. Two of them view House Society as a specific social organization which can be tested by archaeological data, and the other perspective treats the concept of House Society as a heuristic device. Although these three approaches address the House Society from different viewpoints, they all greatly contribute to our understanding of the complex relationship between social relations and material culture.

Following the outline of the theory framework, the justification of applying this framework in prehistoric Taiwan is elaborated on in Chapter 3. First, the accumulation of Neolithic research in Taiwan demonstrates a rough picture of the peoples' lives during this period of 6,500 to 2,000 years ago (Tsang 1999:38). These people gradually adopted a more sedentary life style; they utilized wooden material to construct more stable houses; they cultivated certain grain plants; hunting and fishing were still part of their daily life; and they made pottery and lithic tools using both local and imported materials (Chang 1969; Li 1974; Liu 2002; Tsang 2006). Most importantly, they began to bury their deceased ancestors inside their houses or around the houses. These houses thus became arenas for ritual activities. In other words, houses acted as more than roofed areas for housing people; they also became increasingly significant in the Neolithic period. Secondly, several linguists working in the Austronesian-speaking societies have demonstrated provocative evidence pointing to Taiwan as the homeland of the Austronesian-speaking societies (Blust 1985; Haudricourt 1954; Shutler and Marck 1975). Based on linguistic reconstruction of the early Austronesian societies, the emphasis on "house" acting as social unit thus offers an "emic" perspective, meaning early Austronesian peoples probably identify themselves as House members (Kirch and Green 2001). Lastly, socio-cultural anthropologists working in the Taiwanese indigenous societies have long been puzzled by the unclear kinship system, and have found the importance of house in these societies since the beginning of the research. Taiwanese socio-cultural anthropologists initially argued for a "house-center" approach to address the indigenous social organization in the early 1980s, and then recent research has further proposed the application of the concept of House Society to re-examine their social organization. Drawing from ethnographic, linguistic, and archaeological evidence, I argue that the House Society model could to be a productive model through which to explore prehistoric social relations in Taiwan.

The introduction of the Wansan site is elaborated in Chapter 4, which includes the history of the research of the site, the natural and cultural environment that surrounded the site, and most importantly, the process and results of the 1998 rescue excavation. Though the site had undergone several surveys and excavations before 1998, this dissertation mainly focuses on the data from the 1998 excavation. The reasons for choosing the 1998 excavation material are explained in Chapter 5. In addition, a general picture of the excavation size, stratigraphy, radiocarbon dates, and the quantity and quality of lithic and pottery artifacts are depicted.

In Chapter 5, I pose the main research questions about the prehistoric Wansan societies: how prehistoric Wansan people organized themselves into different social groups and how these different social groups interact with each other. Several archaeological correlates are formulated based on the ethnographic research on the House Society. These archaeological correlates thus constitute multiple lines of evidence that I search for from the Wansan archaeological assemblages. I propose to employ various spatial analyses of archaeological features and artifacts; first to identify actual houses from the Wansan site; second, to scrutinize the association between identified houses, burials, and grave goods; third, to examine the distribution of artifacts and identified houses to see if any specialization of houses exists; and lastly, to analyze the distribution of artifact attributes between houses. The methods of these analyses are also explained.

Chapter 6 to Chapter 8 comprise the main body of data analysis. The analysis begins by estimating the possible number and extent of physical houses based on the distribution of postholes. The distribution of other subsurface features and artifacts is also examined to see if there is temporal change of the artifacts and features associated with houses. The results indicate that these houses probably began to form collaborative groups after their inhabitants familiarized themselves with the Wansan hill. Some houses commenced to share some spaces for the disposal of daily debris, and some activities, such as tool production, started to be conducted in certain houses within the house group.

Chapter 7 examines and compares various activities being practiced inside and around different physical houses from the distribution of artifacts. The artifact distribution reveals that each house should have been a residential structure where people resided and had daily interaction. There is no difference in terms of types of activities being practiced in each house. At the same time, the association between the houses and burials is investigated by superimposing the distribution map. The burials are all located in close proximity to the houses, either in front of the houses or surrounding the houses. I also plot the distribution of one type of grave good, the jade zoo-anthropomorphic object, in relation to houses on the map. On the basis of ethnographic examples from Taiwanese indigenous societies, I argue that the close association between these objects and the houses implies that the house members intend to build and display their close connections with ancestors through burying their deceased ancestors encircling their houses. Furthermore, certain members of the house groups had the privilege of being buried with a symbol of the ancestor, the zoo-anthropomorphic object, thus suggesting possible differential statuses within the house groups.

Subsequently, in Chapter 8, different attributes of the artifacts among different houses will be explored in order to understand possible social differentiation. First, the distribution of jade artifacts is examined. The presence of stone tool workshops and large amounts of unfinished tools, raw materials, and debitage in each house/ house group suggest tool production is a common activity performed inside every house/ house group at the Wansan site. However, the absence of related jade production tools implies that jade artifacts were imported from outside. Furthermore, chemical analysis of jade objects found at multiple sites in Taiwan indicates that all jade material were acquired from the same quarry, which is more than one hundred kilometer away from the Wansan site. Thus, the differential ability to possess jade artifacts in the Wansan society may demonstrate that the social distinction between house groups had already emerged. Combining the attribute distribution of other lithic and pottery artifacts further manifests the differentiation between house groups.

In the last chapter, Chapter 9, a picture of the prehistoric Wansan socity is elaborated. The spatial association between various house structures, burials, features, lithic and pottery artifacts could be understood through lens of the House Society model. Inspired from the House Society concept, how social relations was established and organized and how social differentiation was emerged could be explored. In the conclusion, a number of considerations for future research are proposed to enable further exploration of the issue of social relations in prehistoric Taiwan.

CHAPTER II

THEORETICAL FRAMEWORK: THE HOUSE SOCIETY

The theoretical framework that will guide this dissertation is the concept of House Society that derived from anthropological studies. Originally proposed by Lévi-Strauss in the 1970s, the concept of House Society abandoned the traditional way of categorizing human society based on descent and affinity. Lévi-Strauss initially criticized traditional anthropologists for viewing houses as mere building structures and overlooking the multifaceted meanings and functions of the houses themselves in the society. He emphasized the importance of residential factors in the formation of different social groups and further integrated the residential principle with the notions of descent and affinity to argue for the existence of the House Society.

Not only did Lévi-Strauss put forward another approach to understanding human social organization, but he also proved its applicability to various societies in different time periods throughout the world. Although his main interest was to discover how material and immaterial property was transmitted from generation to generation in hierarchical societies, his research demonstrated that this concept could also be used to understand egalitarian societies.
Aside from broadening our knowledge of this particular type of social organization, Lévi-Strauss also provided a concept through which to illustrate the interesting relationship between intangible social relations and tangible material objects: the House. When talking about the houses of the Atoni of Timor, he specifically pointed out:

> The wealth of decoration, the complicated architecture, the symbolism attaching to each element in the total construction, the arrangement of furniture and the distribution of its inhabitants make of the house a veritable microcosm reflecting in its smallest detail an image of the universe and of the whole system of social relations. [1987:156]

The houses in these House Society are not just roofed areas where a group of related people resides and has day-to-day interaction. The house also serves as a marker, which people use to unify and organize themselves into social groups. As seen in the Atoni society, from the decoration on the house posts to the distribution of its dwellers, each is interwoven with the social relations of its inhabitants and the microcosm of the society. In other words, the actual house buildings signify a particular form of social organization, and the intriguing social relations that existed between different Houses can be observed from the house buildings themselves. The connection between the physical house itself and social relations has thus captured the attention of archaeologists and made them consider the utility of the House Society model in archaeology. From the late 1990s, a series of archaeological studies has been conducted to explore the effectiveness of the House Society in discussing prehistoric societies, especially in the areas where the House Society existed in historic or ethnographic documents, such as Mesoamerica, northwest America and the South Pacific (e.g., Ames 2006; Chiu 2003, 2005;

Gillespie 2000; Joyce 1999; Kahn 2005, 2007; Kirch 2000; Kirch and Green 2001; Marshall 2000).

The archaeological application of the House Society is composed of three main perspectives. The first perspective views the House Society as a particular type of social model, which can be tested through archaeological data. This perspective is most typically applied in the areas where the House Society can be found in ethnographic or historic documents, such as Island Southeast Asia. By proving the possible continuous ties with the documented cultures, the House Society model augments the investigation of ancient societies. Take Austronesian studies for example. Linguists first identified much linguistic evidence to argue for the possible existence of the House Society in prehistoric times. Numerous archaeological studies in this area then adopted this idea and tried to employ archaeological evidence to prove the possible existence of the House Society in prehistoric times (e.g., Chiu 2003, 2005; Kahn 2005, 2007 ; Kirch 2000; Kirch and Green 2001).

The second perspective in archaeological research is to regard the concept of the House Society as a heuristic device which links the architecture with the social relations that occurred within and between the structures. This approach was first pointed out by Carsten and Hugh-Jones when they tried to apply this concept to investigate the Southeast Asian and lowland South American societies. They claimed that viewing the House Society as another type of social organization was problematic since the heterogeneity which existed among these societies was too great to constitute an analytical model (Carsten and Hugh-Jones 1995:19). Gillespie (2000) also doubted the effectiveness of treating the House Society as simply a typological label. Instead, she argued for investigating the "interconnectedness of pragmatic actions and strategic motivations that link persons over time to and through objects or places and thereby serve to define a social group, enable its relations with other persons and groups, and facilitate its social (and accompanying material) reproduction"(Gillespie 2000:50).

The third perspective is to view the House Society as one type of social organization that existed during the process of social evolution. Since the material correlates of the House Society can be inferred from Lévi-Strauss' initial definition, archaeologists can further testify to the presence of this type of society in prehistoric times by examining these correlates from archaeological material (see Gonzolaz-Ruibal 2005). Different from the studies that have been conducted on prehistoric Austronesian-speaking societies, this approach does not emphasize the continuous presence of the House Society from prehistoric times until the ethnographic present. Instead, the House Society was viewed as a particular type of social organization or s stage of social evolution which could be found around the world throughout different time periods.

Whether utilized as a social model which can be tested through archaeological data or viewed as a heuristic device to inspire archaeological interpretation on the relationship between physical dwellings and social relations, the applicability of the concept of House Society in archaeology has received the attention of various archaeologists from around the world. In Taiwan, based on ethnographic and archaeological research, I argue that the House Society model can be used as a testable model to examine whether this type of social organization exited

in the Neolithic period, specifically the late Neolithic period (ca. 3,700 to 2,500 BP.). At the same time, the concept of the House Society also provides an explanatory mechanism to elucidate the process of prehistoric social differentiation.

Therefore, in this chapter, I will review the development of the concept of House Society in socio-cultural anthropology and how archeologists have been inspired to employ this concept to archaeological research. In the following chapter, I will elaborate on why and how the House Society can be used to understand prehistoric Taiwanese society. I believe that, inspired by the concept of House Society, we should be able to address new questions and propose new directions of investigation to gain a deeper understanding of prehistoric Taiwanese societies.

2.1 Lévi-Strauss and the House Society

2.1.1 Lévi-Strauss: the concept of the House Society

The concept of "House Society" was first proposed by Lévi-Strauss in the late 1970s. While studying the Kwakiutl society, he faced difficulty trying to apply traditional anthropological concepts to describe its social structure and kinship system (Lévi-Strauss 1987). An earlier Kwakiutl expert, Franz Boas, had also run into this same difficulty. Initially, Boas tried to divide the Kwakiutl society into different tribes which consisted of clans and septs (1966), and then he renounced these terms and proposed the utilization of the Kwakiutl term *numayma* to refer to the social unit in the Kwakiutl society (1966). The basic social unit in the Kwakiutl society is the numayma and there is no direct Western concept equivalent to convey its meaning. Boas later elaborated further:

> The structure of the *numayma* is best understood if we disregard the living individuals and rather consider the *numayma* as consisting of a certain number of positions to each of which belong a name, a 'seat' or a 'standing place,' that means rank and privileges. Their number is limited, and they form a ranked nobility. [1966:50]

Lévi-Strauss suggested that a similar type of institution existed not only in the Kwakiutl society, but also in the Austronesian societies, medieval Europe, some societies in Africa, and Japan of the Heian and periods that followed. The existence of this particular institution among these societies impeded the ability of socio-cultural anthropologists to investigate the social organization of these societies. In his research on the Yurok society, Kroeber (1925:3) even argued that the Yurok is an aggregation of individuals and "there is no society, no social organization of this group of people at all."

As a result, Lévi-Strauss proposed the abandonment of the traditional typology and argued for the existence of the "société à maisons" (House Society). He thus defined Houses as:

> A corporate body holding an estate made up of material and immaterial wealth, which perpetuates itself through the transmission of its names, its goods, and its titles down a

> real or imaginary line, considered legitimate as long as this continuity can express itself in the language of kinship or of affinity and, most often, both.
> [1982: 174]

Also, the conflicting obligations that resulted from a dual membership in a group with bilateral descent and in a residential unit can commonly be observed in these societies. Lévi-Strauss recognized that filiation and residence constitute a common feature of societies "with houses." Thus, he further explained that:

> On all levels of social life, from the family to the state, the house is therefore an institutional creation that permits compounding forces which, everywhere else, seem only destined to mutual exclusion because of their contradictory bends. Patrilineal descent and matrilineal descent, filiation and residence, hypergamy and hypogamy, close marriage and distant marriage, heredity and election: all these notions, which usually allow anthropologists to distinguish the various known types of society, are reunited in the house, as if, in the last analysis, the spirit (in the eighteenth century sense) of this institution expressed an effort to transcend, in all spheres of collective life, theoretically incompatible principles. [1982:185]

In other words, the concept of "house" in these societies is not just a roofed area where people reside, but also a place where various social relations occur. These social relations, which used to be regarded as contradictory and mutually exclusive, can all co-exist within the houses at the same time. Moreover, the social relations within and outside the house are closely associated with the material surroundings; these can either be movable material objects or immovable physical structures. Thus, the "houses" in these societies also imply the "objectification of social relations" (Bloch 1995; Lévi-Strauss 1987; Waterson 1995).

In several lectures from 1951 to 1982, Lévi-Strauss spent considerable time trying to apply the concept of "House Society" to Austronesian-speaking societies. Like the Kwakiutl and Yurok societies, the social structure of these societies has long been an intriguing problem for socio-cultural anthropologists. They cannot place them into the traditional anthropological categories of patrilineal, matrilineal, or bilateral societies. However, when employing the concept of "House Society," the social organization of these societies becomes clearer. Furthermore, a number of shared themes in architecture styles and the ways people talk about houses demonstrate the possibility of shared Austronesian origins (Waterson 1995). As Waterson points out, "house" in these societies is a key social unit, functioning less as a dwelling than as an origin-place, ritual site, holder of ritual offices, or storage-place for heirlooms. Moreover, the relations between different houses are often expressed and understood in terms of kinship relations, reflected in the emphasis on sibling relationships (Blust 1987; Carsten 1987, 1993, 1996; Errington 1987; Headley 1989; Rodman 1985; Fox 1993).

2.1.2 Beyond Lévi-Strauss

The idea of "House Society" was not fully appreciated until the late 1970s when a group of ethnologists began to apply it to the study of Austronesian social organization (Carsten 1987, 1995, 1997; Errington 1979, 1987; Headley 1987). Initially, ethnologists questioned its applicability because the definition proposed by Lévi-Strauss emphasized the hierarchical nature of these societies, while some Austronesian societies contained more egalitarian forms of social organization. Also, it is acknowledged that a great amount of variation existed in these societies (see Carsten and Hugh-Jones 1995; MacDonald 1987). Thus, even though the significance of the "house" in these societies had been recognized, to equate these societies with "House Society" was still problematic.

Instead of rejecting the whole idea of "House Society", other ethnologists suggested the need to have a more flexible definition in order to really grasp the nature of Austronesian social organization (Waterson 1995). This is because the importance of the "house" and its association with social relations in these societies was too obvious to be denied. This "house-centereded" approach enables both socio-cultural anthropologists and archaeologists around the world to expand and deepen their understanding of the concept of the "House Society."

Ever since ethnologists have started to apply the concept of "House Society" to the study of Austronesian societies, the pictures of the House Society has become even clearer and variations among them are better understood. Derived from its original definition by Lévi-Strauss and strengthened by ethnographic work in the Austronesian-speaking societies, several characteristics of the House Society have been recognized. These characteristics have not only enriched our understanding of contemporary societies, but have also provided links related to archaeological interpretations. First, instead of viewing a house as merely an architectural entity on the landscape, the house is regarded more as a social unit (Carsten 1993, 1995; Errington 1987; Gillespie 2000; Hugh-Jones 1993, 1995; Kirch and Green 2001; Monaghan 1996; Waterson 1995). The second characteristic is the emphasis on the continuity of the House and the ritual aspect of Houses (Ellen 1986; Fox 1993; Gillespie 2000; Lévi-Strauss 1987; McKinnon 2000; Sather 1993). Among the House Society, the continuity of the house is guaranteed by the transmission of the dwelling, the title of the house, portable heirlooms or certain posts or furniture within the house (Joyce 2000). This aspect of continuity gives the house some sort of sacred power and causes it to be viewed as a living organism. Therefore, the house is also a ritual site where different kinds of rituals are preformed within or for the houses. The emphasis on the continuity of this social unit and its close association with materiality has received the attention of archaeologists and profoundly inspired archaeological interpretations (Chiu 2003; Gillespie 2000; Joyce 2000; Kirch 1997; 2000; Tringham 2000). On the other hand, the long-term perspective that archaeological research has typically taken resonates with the prominence of the diachronic viewpoint that the House Society concept has stressed. Accordingly, archaeological studies further elaborate on our knowledge of the House Society. The last characteristic is that the spatial layout within the house or between houses in a village usually serves as a microcosm of the inhabitants. Especially in the research on Austronesian House Society, certain themes are believed to be shared. These observed principles of current Austronesian societies could thus be helpful in terms of interpreting past societies (Bloch 1995; Bourdieu 1973; Ellen 1986; Cunningham 1973; Carsten and Hugh-Jones 1995;

Carsten 1995; Fox 1993; Gibson 1995; Waterson 1995). These principles act as social structures being acted and reproduced through house inhabitants' everyday interaction with the physical structures. Thus, even though similar principles are shared among these societies, it does not imply that these societies will go through the same developmental process. Instead, it was argued that each instance of social transformation should be historically contingent and context dependent (Beck 2007:16), and the archaeological research offers a unique opportunity to explore these aspects of the Houses.

2.2 House Society: some characteristics

The history of anthropological interest in architecture is not as old as its interest in social organization. Most of its research of architecture focused on technological aspects, such as the house material, building techniques, decoration, and the spatial arrangement of furniture inside, and attributed the variations among these structures to functional differences. However, some research did acknowledge other dimensions of the physical structures. Duly (1979:13) in his 1979 work on "The Houses of Humankind" had already argued that humans' perception of social relationships is far more important than technological skills and environmental restriction in terms of arranging their physical surroundings. Furthermore, he also pointed out the importance of symbolic, functional, and ritual aspects of the houses.

It was after Lévi-Strauss' formulation of the House Society that scholars' attention was redirected towards the houses and their explicit and implicit connection to various social relations (MacDonald et al. 1987). More specifically, a series of ethnographic research projects conducted in several Southeast Asian and lowland South American societies initiated a thorough examination of Lévi-Strauss' concept of House Society (see Carsten and Hugh-Jones 1995; Waterson 1990). These ethnographic works brought about a "house-centered" approach (Gillespie 2007) which emphasized two important aspects of the houses. The first aspect stresses that "house" is a native category referring to a social group which has close association with the ritual construct. This ritual construct is "related to ancestors, embodied in names, heirlooms, and titles brought out and displayed in ritual contexts, and objectified in a temple or domestic dwelling which temporarily takes on this quality" (Carsten and Hugh-Jones 1995:45). However, Carsten and Hugh-Jones (1995:45) stressed that the more important aspect of the house that these ethnographic works intended to support is the everyday practices centered on the domestic sphere. They argued that people's everyday mundane activities are what define a house, something that anthropological research tended to ignore.

This "house-centered" approach has challenged traditional anthropological understanding about kinship, cultural categories, and so on. It has caused ethnologists to focus their attention not only on the physical dwelling structures, but also the processes and variations of the composition of the Houses under different social, political, and economic environments (see Howell and Sparks 2003). Nevertheless, doubts about the presence of House Society as a type of social organization and what the House Society still exists.

The solution to these doubts became possible when archaeological research began to participate in the discussion of the concept of House Society. The earliest archaeological work concerning the House Society commenced from the works in prehistoric Oceanic societies (Green 1998; Green and Kirch 1997; Kirch 1997). Inspired by linguistic reconstructions regarding the social organization of prehistoric Austronesian-speaking societies, archaeologists working in this area endeavored to identify and prove the existence of the House Society in ancient times. Furthermore, echoing the socio-cultural anthropologists' proposal, archaeologists began to concentrate on the link between different social relations and the physical dwellings. Also, as Lévi-Strauss (1987) argued, the Houses are best understood through historical processes, which are most apparent in the interactions between the Houses. Since the long-term process is one of the focuses of archaeological research, along with a concern about the material culture and social relations, archaeologists are in a good position to contribute to the research of House Society.

Through socio-cultural anthropological and archaeological efforts to elucidate where and what the House is, we would be able to see the Houses in regards to social differentiation and understand the interactions between Houses. Below are the elaborations of these common characteristics about the Houses, derived from the ethnological and archaeological understandings.

2.2.1 House as a social unit: rethinking the meaning of kinship

One of the most important aspects of the "House Society" concept is the emphasis on regarding the house as a social unit and questioning the traditional classificatory approach to categorizing social structure. In House Society, a house is treated less as a dwelling than as a "corporate body" composed of members through consanguinity, affinity, or adoption. Thus, it can "enable anthropologists to move beyond kinship as a 'natural' and hence privileged component of human relationships" (Gillespie 2000).

Ethnographic research shows that the concept of House Society promotes an indigenous perspective, as it uses emic terms and concepts (Kirch and Green 2001:203-5; Hugh-Jones 1993:95). The House Society stresses that the sense of belonging to the same group, demarcated by certain physical properties, is established through daily activities or so-called "shared/common substance," such as cooking in the same hearth, co-eating, or sleeping in the same room (Carsten 1993, 1995; Hugh-Jones 1995; Monaghan 1996; Waterson 1995). The interactions between individuals within houses are dynamic processes. Identities and allegiances are not fixed from birth and can be fluid through the life cycle (Waterson 1995:216; Gillespie 2000:1). The exercises of kinship claims are often strategic and can involve an attempt to transform one kind of relationship into another (Waterson 1995: 216).

When Lévi-Strauss talked about the "House Society," one of his main concerns was the way in which wealth, power, and status were transmitted through the house from generation to generation, particularly in hierarchical societies. The "House Society" examples he mentioned all came from societies having clear social differentiation based on wealth and status. When Macdonald et al. (1987) tried to apply this concept to other societies in Southeast Asia, they

found that many of these societies were actually egalitarian. However, some Southeast Asian ethnographers found that the importance and usefulness of the concept could be applied not only to stratified societies, but also to egalitarian societies in the Austronesian cultural area. These applications favored viewing the "House" as a prominent social unit rather than focusing on aspects of hierarchical status. Thus, Waterson questioned the pervasiveness of social hierarchy in House Society and suggested that a broader definition and more flexible approach were desirable (Carsten and Hugh-Jones 1995; Waterson 1995).

Considering the house as a social unit and grasping the relationship between houses provides ethnographers with a better way to understand how these societies work and how their social network is incorporated in their social organization. In most Austronesian societies, the relationship between houses employs a botanical metaphor of relationship between "trunk" and "tip" (Carsten 1995a, 1995b, 1996, 1997; Carsten and Hugh-Jones 1995; Cunningham 1973; Fox 1987, 1993, 1995; Headley 1987b; Howell 1995; McKinnon 1995; Sather 1993; Waterson 1993, 1995, 2000). This metaphor is a way of expressing hierarchy where status can be transmitted over time, as power remains concentrated in older origin-houses (Waterson 1995). This "trunk" and "tip" relationship also defines the exchange relationships between houses. However, in some Austronesian societies, the botanic metaphor might emphasize horizontal relationships. Different houses are related with each other in terms of different "branches" generated from the same "trunk." Houses in these types of relationships treat each other as siblings. Errington (1987) thus considered that the different emphases, whether put on the vertical or on the horizontal dimension, could be related roughly with the different degrees of social hierarchy present in the society. Those relatively egalitarian societies, like the Iban, track broad and horizontal social relationships among houses, while the elite or more hierarchical societies, like the Luwu, trace deep and vertical connections between houses (Errington 1987:419).

As a result, the existence of House Society challenges the traditional concept of kinship originated from the descent theory of African societies. Instead of thinking of social relations as static threads bending together following certain rules, the concept of House Society stresses the dynamic processes of social formation. People form social groups through everyday practices within physical structures, and not by certain rules defined by anthropologists.

2.2.2 House continuity and social memory

In his original formulation, Lévi-Strauss (1982) emphasized the importance of house continuity in the form of keeping house names, titles, estates or certain kinds of house-owned material goods. The transmission of these names, titles, estates, and heirlooms assured the existence and continuity of the House. The members within the House could also claim their membership by inheriting or continuing the House names, titles, and heirlooms. Thus, tracking and remembering origin-houses and their relationship with each other constitute a form of social networking. The strong emphasis on origins and the maintenance of continuity with the past are also essential for social identity and social differentiation in the House Society (Gillespie 2000).

The stress on House continuity connected with land or material objects is one characteristic of House Society. For many Austronesian houses, the focus on the posts of the house is a

significant feature (Fox 1993; McKinnon 1991; Waterson 1990). These posts not only play an important role in the ceremonies associated with the building process, but they are also preserved, if possible, when older houses are taken down, to be part of the new houses. This tradition of keeping the original post represents the idea of trying to continue the house's life (Fox 1993). Instead of keeping the posts of the original houses, some houses preserve heirlooms or bury the deceased house members within the houses in order to keep their association with the origin-houses and to reaffirm their source of other-worldly power (Gillespie 2007; Joyce 2000; McKinnon 2000).

In sum, the emphasis on the continuity of Houses and the active manipulation of material media to confirm this perpetuation marks the difference between Houses and households. The material media, including features of the landscape, the physical house itself, and the curated heirlooms, become the loci of social memory and provide physical evidence of a specific continuity with the past. These cultural materials represent the "objectification or fetishization of a relationship among house members, a relationship through time" (Gillespie 2000). Moreover, the uneven ability to assure the continuity of the Houses through accumulation of tangible and intangible signifies a difference between the Houses.

2.2.3 House as a ritual site

In the House Society, the house is the prominent feature on the landscape in terms of both its social function and ritual significance. In addition to this, some contemporary temples are recognized as being houses of the ancestors. The tendency to regard houses as having sacred power can be derived from some of the characteristics of the houses. First, the house, as initially defined by Lévi-Strauss, possesses a domain consisting of material and immaterial wealth and even includes goods of supernatural origin (Lévi-Strauss 1987:152). This supernatural origin centers the house as a locus of different ritual activities. Thus, certain objects and features within the house can be called "ritual attractors" (Fox 1993). Second, a house is often regarded as a living thing; thus, characteristics of the house are often expressed in anthropomorphic terms (Ellen 1986:26). As a living entity, the house passes through different stages of the life cycle. In the House Society, these life cycles are emphasized in terms of various ritual ceremonies. In the Iban longhouse in Indonesia, "space is transformed by rituals of birth and death from the familiar mundane setting of everyday social life to a symbolically organized landscape, displaying basic social distinctions and mirroring a series of superimposed realities, both seen and unseen" (Sather 1993:103). Moreover, the house members' most important obligation is to maintain the existence and growth of the house. Since the composition of the house is not only from cognatic kin, the relationship between house members and different houses is fluid. In order to enhance and confirm house membership, rituals are held within or between houses. From the native's perspective, houses are closely connected with rituals due to the belief that houses have supernatural power, which accumulates generation by generation. Rituals actually can serve to intensify the connections between members within the house as well as between houses.

2.2.4 House as microcosm

Ethnographers believe that the body and the house in Austronesian societies are the "loci for dense webs of signification and affect and serve as basic cognitive models used to structure,

think and experience the world" (Cartsen and Hugh-Jones 1995:3). The emphasis on the symbolic meaning of the house and the view of the house as a microcosm can be seen in Bourdieu's (1973) analysis of the Berber houses in the early 1970s. He first observed that a Berber house was organized according to a set of homologous oppositions, such as cooked: raw; fire: water; high: low, and so forth. This opposition existed not only between houses as a whole, but also in the rest of the universe, as this opposition principle was pervasive among the whole Berber society. This principle was reflected in the layout of the house and was mirrored within the cosmological system of the Berber. Cunningham also used the Atoni house to illustrate that the "house – with its constituent parts, divisions, form, symbols, and prescriptions concerning order, arrangement, and the behavior of those included and excluded – may be like a model of the cosmos as conceived by a people"(Cunningham 1973: 234). In other words, house arrangement is organized according to the cosmos shared by people.

For example, in the Austronesian-speaking societies, there are two common practices which can be observed from the layout and construction of the house. First, the house is viewed as a "living" thing (Gibson 1995; Waterson 1995; Carsten and Hugh-Jones 1995). More specifically, the house is often regarded as an animate body. As mentioned before, instead of emphasizing consanguinity, the house members are gathered through the shared or common substance created from daily activities within household. Thus, the development of the house is more like an ongoing process rather than a static entity. The stress on the dynamic process can be likened to living bodies which have certain life cycles: birth, growth, decay, and death. In Zafimaniry, for example, a house is not really complete unless there is a couple and their children living there. When the number of descendants increases through time, the house is believed to be growing. On the contrary, when the number of house members decreases, the house is believed to be on its way to demise (Bloch 1995).

The second theme that repeatedly occurs is the stress on ordered structure. In the Austronesian societies, the layout of the house may follow a fixed order and certain features within the house may constitute points of reference (Fox 1993: 14). The layout of the houses not only reflects the physiological requirements of its inhabitants, but is also embedded with cultural meaning. In Austronesian houses, for example, the most significant orders are the distinctions between inside-outside and female-male. Errington had already pointed out that there were two principles which can differentiate Southeast Asian societies: dualism and centrism. The former, which mainly existed in eastern Indonesia, highlights the separation between brother and sister, while the latter, which existed in Centric Archipelago, stresses the importance of the unity of cross-sex siblings. These principles can also be seen in the houses. In the Rotinese houses in Indonesia, which can be viewed as emphasizing dualism, the gender associations between the "inner" and "outer" sections of the house imply a clear distinction between brother and sister (Fox 1993). However, in the Langkawi houses in Malaysia, where the emphasis was put on unity, space tended to be unified rather than differentiated (Carsten 1995).

2.3 House Society and archaeological research

Archaeological discussions of the House Society have rapidly been increasing since the late 1990s. Ethnographic research from Southeast Asia stimulated these archaeological applications. Although the concept of House Society was proposed in the late 1950s, our understanding of this concept was restricted by insufficient research. When the idea was first proposed, Lévi-Strauss was primarily concerned with the transformation of hierarchical societies. This premise kept early ethnographers from further inquiry, even though the significance of the houses in terms of their social and ritual function was undeniable in several societies. As more ethnographic data were accumulated, the image of the House Society became clearer and the utility of the concept became more appreciated, particularly by archaeologists.

The emphasis on long-term change and materiality in the House Society model provides archaeologists with a way to understand social relations through material culture. In House Society, the continued existence of a house is dependent on the successful maintenance of the house estate, titles, or heirlooms – a process that is best understood over the long term (Lévi-Strauss 1983, 1987; Gillespie 2000). While most of the cultural anthropological work has emphasized a synchronic point of view, Lévi-Strauss noticed the importance of historical processes. He believed that a historical analysis with a diachronic view could provide a better understanding of the nature of House Society. The concept of "House Society" not only aids anthropologists to grasp the nature of the social structure in a synchronic dimension, but also clarifies long-term changes in these societies. Since archaeological data are the result of a long time span of human activities, this emphasis on the diachronic perspective augments archaeological analyses. Gillespie noted:

> Diachronic investigations of houses emphasize the differential success of long-term strategies for acquiring, keeping, or replacing resources that are the basis for the status and power, strategies whose outcome constitute hierarchy and result in historical change….the interpretation of enduring social formations as mediated by substantial material constructions, such as houses, allows for the incorporation of archaeological information, vastly increasing the time depth available to understand the variability and evolutionary trajectories of specific social systems. [2000:2]

Another archaeologically significant characteristic of the House Society model is the emphasis on materiality. Houses transmit titles and trace house origins immaterially through memory, yet the continuation of the houses can also occur through material avenues: the inheritance of different heirlooms and the decoration or rebuilding of the houses (Joyce 2000). The use of material objects to signify social relations over temporal and spatial dimensions thus provides archaeologists with another means of detecting dynamic social relations.

In this way, the concept of the House Society bridges the gap between ethnologists and archaeologists. As Gillespie said:

> The house can serve as a nexus for the meaningful convergence of ethnography and archaeology, with ethnographers fleshing out the rich contextual details of the immaterial aspects of life not immediately accessible to archaeologists as well as providing examples of the diversity of cultural forms, while archaeologists supplement the recent past with knowledge of configurations no longer extent, enlarge on the life histories of physical houses, and detail the sequential progression and transformation of House Society in various world areas. Both fields of endeavor are needed to write the "biographies of build forms." [2000:14]

Even though the idea of House Society was first taken up by socio-cultural anthropologists, recent archaeological research has further elaborated on the concept and contributed a lot to our understanding of it. However, archaeologists have been approaching the House Society from quite different perspectives.

The earliest archaeological research on the House Society focused on arguing the long-term tradition of this form of social organization, especially in the Austronesian-speaking societies (Kirch 1997). Drawing on rich ethnographic examples and linguistic reconstruction of the prehistoric social organization of these societies, it is suggested that the existence of the House Society has long-term history in Austronesian societies. Thus, the archaeological research of Austronesian societies takes this assumption to hypothesize and testify the continuous presence of House Society.

The second perspective resonates with the "house-centered" approach and argues for viewing the concept of House Society as a heuristic device, which socio-cultural anthropologists had advocated. This "house-centered" approach not only challenges the traditional way of viewing house structures, but also explores the complex relationships between social relations, social memory, and material culture. Since most archaeological data are tangible objects, archaeologists have received great inspiration from this perspective.

Re-examining Lévi-Strauss' idea and focusing on the particularity of the House Society, some archaeologists treat Houses as unique social units which can be identified from archaeological data around the world. The House has specific qualities that differentiate it from other social groupings, such as the emphasis on its continuity and the ritual aspect, and can be observed from the interaction between different Houses through long-term processes. It can be sought in the Neolithic Chaco Canyon (Heitman 2007), the Iron Age Europe (Gonzalez-Ruibal 2005), or even the 18th century Cherokee towns in North America (Rodning 2007).

While these perspectives approach the House Society differently, several themes in archaeological research have been repeatedly argued. The first concerns the attempt to build up the association between the tangible archaeological materials and the intangible social relations and social memory. Whether treated as a heuristic device or a type of social organization to be attested, the concept of House Society offers several interactive links between material correlates

and social relations. Secondly, the ethnographical research of House Society illustrates a new way of conceptualizing gender relations in prehistoric societies. Traditionally, women had been regarded as closely connected with household activities and thus, had been neglected from academic research since household had been treated as static entity irrelevant to larger socio-political conditions (Hendon 1996; Carsten 1997). The concept of House Society, however, redirects our attention towards this long-overlooked arena and recognizes the importance of gender relations within both the household and the larger society. The third type of archaeological research centers on the idea that the house reflects the cosmology of the members of the society (Fox 1993; Lévi-Strauss 1987;Waterson 1990). Recent understandings further argue that the House should be viewed as a "particular, cross-culturally recurring form of social-structure" (Beck 2007:13) and through the investigation of the long-term changes of Houses, archaeologists are able to explore the process of social transformation. Furthermore, the ritual aspect of the House also encourages numerous archaeological explorations.

Because of the emphasis on materiality and diachronic perspective of the House Society, archaeologists find it useful in terms of proposing hypotheses or provoking new interpretations. The following sections provide examples to illustrate how the concept of House Society challenges traditional understanding and constructs new ways of gaining more insight into human societies of the past.

2.3.1 House, heirloom, grave, and social relation and memory

In archaeological studies of "House Society," the topic most elaborated on is the association between houses, heirlooms, graves, and social relations and memory (Gillespie 2000; Joyce 2000; Tringham 2000). This can be related to the focus on continuity in House Society. Some societies stress continuity of the house itself, while others stress certain kinds of movable objects as heirlooms, and others underline the importance of the graves. No matter what practices these societies emphasize, they all serve to continue the existence of the House.

Movable material objects unearthed from archaeological sites, such as pottery vessels, stone artifacts, and ornaments, also manifest the ability to pass on the knowledge of social memory and relations. When dealing with the significance of the dentate-stamped pottery in the Lapita culture, archaeologists first inferred the function from the reconstructed vessel forms to argue that these vessels were used for food display and consumption, or as "items of representation of ancestors, of elite status, of spiritual power of houses" (Kirch 1997, 2000; Sand et al. 1998). Then further inference was made regarding the social relations between different social units, as Kirch stated that these vessels might have functioned both as material symbols of the ancestors and as "objects of reciprocal exchange among related kinship groups at the same time" (Kirch 2000:104). Chiu also used the example of the Northwest Coast Indians to illustrate that this dentate-stamped pottery functioned not only as a food-presenting dish, but also as a "representation of status and wealth, an object that speaks of house origins and crest prerogatives" (Chiu 2003:343). In other words, this specific type of pottery served as an active medium through which to produce and maintain the social relations within the Lapita society.

On the other hand, the composition of each house is not solely based on biological relationships. In some cases, the members within a house are not kinsmen at all. As Joyce (2000:194) commented, "common to House Society is the ability to define a physical estate through which members conceptualize themselves as a single group." Since material objects, on which the establishment and continuation of this social unit are based, are the most abundant data which archaeologists can obtain from the field, the usefulness of this concept in archaeological research is clear.

The flexible process of forming and maintaining a social group through material objects and features connects invisible social relations with visible material objects or features. This connection enables archaeologists to explore prehistoric social relations with material culture. Furthermore, contrary to the traditional concept of the relationship between material culture and social organization, the "House Society" model offers a different perspective in terms of viewing material culture as an active medium for the construction of social relations through time. The social relations within and between the houses are not fixed in any period. These social relations can be generated and continued through material culture, but material culture can also be produced and maintained through social relations (Gillespie 2000; Joyce 1999; Marshall 2000; McKinnon 1995).

In articles dealing with social relations in the ancient Maya society, Joyce and Gillespie (Gillespie 2001; Joyce 1999, 2001) utilize the "House Society" model to interpret the archaeological data from Maya sites. Material evidence of mortuary and commemorative rituals indicates "the importance and complexity of social identity as both created and deconstructed in a lengthy process" (Gillespie 2001:99). The burial goods in these Maya societies are not simply expressions of the status or wealth of the dead. Instead, Gillespie believes that the material culture or different rituals accompanying mortuary exhibits the "innovative and self-reflexive decisions made to maintain the house and increase its prestige" (Gillespie 2001:101). The material culture and human actions are not a passive reflection of past societies. On the contrary, they actively engage in the reproduction and transformation of social relations.

2.3.2 Gender relations

Although the assignment of specific gender to particular items is an ongoing debate for archaeologists, recent gender research suggests that we should alter our questions. Instead of trying to figure out which sex made, used, or possessed the material objects, we should view gender as " a relationship that structures organizing concepts and operations in other domains" (Gillespie & Joyce 1997:190-191). Gillespie and Joyce also point out that "the gendering of objects is part of the complex negotiations through which social relations are formed in any particular society" (Gillespie and Joyce 1997:207).

However, how can we understand gender relations from archaeological data? Using the Indonesian House Society as a comparative example and other lines of material evidence, Gillespie and Joyce (1997) attempted to demonstrate that the structure of gender complementarity, which motivated the assignment of male and female genders to the

wife-receiver and wife-provider houses, was the cosmological principle among the ancient Maya society. Thus, the gender relations and ideologies in the ancient Maya society constitute major arenas of social complexity which archaeologists cannot overlook.

In addition to the relationships between material culture and gender relations, ethnologists have found that the spatial arrangement within the house also shapes the gender relations of those who inhabit it. In regard to space and social relations, Waterson notes:

> Rules about the uses of space provide one of the most important ways by which the built environment can be imbued with meaning; reflexively, that environment itself helps to mould and reproduce a particular pattern of social relationships. This production of meaning may take place, firstly, through the positioning and manipulation of objects in space, and secondly, through the human body itself-its placement in, movement through, or exclusion from a particular space, or in people's spatial interactions with each other. Through rules about how space is to be used, people are obliged to act out their relations to each other in a particularly personal and immediate way. [1997:167]

By understanding rules about how space is to be used, archaeologists can investigate how people structure their relations to one another. Since the spatial arrangement of cultural materials is an expertise of archaeologists, combining spatial data from archaeological sites with ethnographic data enhances archaeologists' ability to investigate past gender relations. Because the house is a place of daily interaction, it is an important place for understanding gender relations. There are two perspectives of spatial arrangement and gender relations in the Austronesian House Society (Carsten 1995, 1997; Errington 1987; Fox 1993; Waterson 1993). The first is the complementarity of male and female and their coming together in fertile fusion. The second is the distinction between "inner" and "outer" and its association with gender.

In Austronesian House Society, the house is usually the basic unit of production and consumption where women typically play significant roles in agriculture and household production. Since the house is a prominent and central feature of kinship and ritual systems in Austronesian societies, the assumption of hierarchical implications of gender status cannot be applied without some consideration. In a number of cases, the more meaningful contrast of spatial arrangements in Austronesian House Society is the distinction between "inner" and "outer" parts; women are often connected with the "inner" portion of the house due to the association between women and the womb (Waterson 1993:227). However, the inner-outer distinction does not imply superiority-inferiority in terms of power relations. At the same time, it would also be improper to regard the house as being outside the sphere of politics since the importance of house units in political processes is apparent (Carsten 1997; Waterson 1993).

In sum, we can infer from these observations that there is no simple division between male and female spaces, or between "front" and "back" as superior-inferior. Although we may not be able to assign particular material objects or places to specific genders, we can argue, based on Austronesian House Society data, that women played active roles in the economic, ritual, and

political spheres since the house is not opposed to or isolated from the public sphere. Furthermore, rather than seeing the house as a means of hiving off women's capacities as birth-givers and nurturers within the constricted domain of denigrated domesticity, the association of the house with the womb is the starting point for a wide-reaching web of ideas about life processes and the reproduction of social groupings (Waterson 1993:197). These observations force us to reconsider the relationship between spatial arrangement, material objects, and gender relations in Austronesian House Society and indicate that archaeologists must use multiple lines of evidence to interpret past gender relations in Austronesian House Society.

2.3.3 House as a microcosm

In the discussion of Austronesian houses, one common tradition among those houses is their ordered structure. As pointed out, there often is a cosmological orientation within which the house must be positioned (Fox 1993:14). Every object and feature as well as the spatial layout within the house and the village has a certain fixed order and symbolic meaning in Austronesian houses. Levi-Strauss highlighted the Karo Batak and Atoni in Indonesia:

> The wealth of decoration, the complicated architecture, the symbolism attaching to each element in the total construction, the arrangement of furniture and the distribution of its inhabitants make of the house a veritable microcosm reflecting in its smallest detail an image of the universe and of the whole system of social relations. [1987:156]

The emphasis on the association between concrete objects, the spatial arrangement of the features, and abstract ideas makes the concept of the "House Society" useful in archaeology, especially in the Austronesian societies. These structured orders within Austronesian houses are not just generated by functional needs, but are produced by a microcosm which was shared by society members. This microcosm influenced the way people arranged their house layout and gave meaning to their physical world. The organization of house space, through ritual performance, procession, and invocation, integrated its architectural and areal features to display a series of microcosmic images (Sather 1993: 104).

Archaeologically speaking, house layout and the locations of activities performed within the house can be inferred from artifact distribution patterns. However, the hidden, symbolic meaning or microcosm behind these spatial arrangements must be explored using ethnographic data. Our knowledge of the Austronesian microcosms is increasing rapidly because of the study of Austronesian House Society (Fox 1993; Howell 1995; Janowski 1995; Riviere 1995; Sather 1993; Waterson 1993) and thus, can be of great help in understanding past microcosms.

The association between the House and the microcosm of its inhabitants is also explored in other areas (Heitman 2007). The research on the Houses in Chaco Canyon in Southwest America testified to the productivity of this approach (Heitman 2007). Integrating Puebloan ethnography and cross-cultural comparisons, Heitman (2007:266) uses the example from Chaco Canyon in southwest America to argue that a detailed investigation of the variability of small houses and great houses would shed light on what these houses meant in a cosmological sense.

On the other hand, recent archaeological work places emphasis on exploring the dynamic interaction between everyday practices and the social structure. Instead of viewing house as a unified and static entity, integrating the concept of House Society and the practice theory, the house is believed to be composed of knowledgeable, active, practicing agents who produce and reproduce the structure (Joyce 1999, 2000). Moreover, this perspective argues that the structural change is both historically contingent and context dependent (Beck 2007:16). There is no universal trajectory shared by all societies, and each society has to be investigated individually within its own social context. This perspective proposes a more intricate understanding of the society and rejects the idea of treating houses as one single entity. Unlike earlier understanding, which treats the house as a fixed structure shared by all members, this new perspective stresses the generative interaction between the social agents and structure. Therefore, it provides a mechanism through which to explore the process of social change and differentiation (Boric 2007; Chesson 1998; Fleisher and La Violette 2007; Gerritsen 2007; but see also Joyce 1999, 2000).

2.3.4 Temple as "ritual attractor," as "holy houses"

The other topic which has been the most elaborated on in archaeology is the ritual aspect of the House. Since the House is viewed as incorporating multiple facets (e.g., economic, ritual, social, and political) of human daily life, it challenges traditional assumptions which separate ritual and residential sites. At the same time, several practices that can be observed at archaeological sites display differences in mundane everyday activities, thus suggesting a possible ritual significance of these practices. The House members, on the one hand, actively form, negotiate, and consolidate their sense of belonging through participation in rituals. On the other hand, these rituals further ensure and enhance the House's continuity.

Integrating ethnographic examples and archaeological inferences, various lines of evidence at archaeological sites are thus recognized as ritual activities closely related to the formation and continuation of Houses, such as the placement of deceased ancestors associated with residential structures (e.g., Chesson 1999; Düring 2007; Lopiparo 2007), the building and rebuilding processes of house structures (e.g., Gerritsen 2007; Trigham 2000), and objects possibly related to ritual (e.g., Chiu 2003; 2005; Heitman 2007; Lopiparo 2007).

One of the hypotheses about the house transformation derived from this ritual aspect of Houses exemplifies the productivity in terms of realizing social change. Inspired by the observation of the modern Austronesian societies, Kirch (2000) suggested that there is a pervasive and presumably "ancient cultural pattern" which can be tested archaeologically among these societies. His hypothesis situates the process of house transformation: from a house of the living to the house of the dead and to a final transformation to "holy houses" or "temples." The tradition of burying the deceased house members within the house can be observed in many Austronesian societies (Bloch 1995; Waterson 1995). The house becomes more sacred as it gathers more ancestors within it. Kirch uses the archaeological data from the Tikopia as a "type case" to show that this transformation process can also be seen in the Polynesian societies.

Ethnographic research demonstrates that modern Tikopia society is a House Society. Oral history reveals the tradition of transforming ordinary houses to holy houses. Kirch (2000) conducted limited excavations on a contemporary temple site in order to test his hypothesis. The stratigraphy disclosed that, before becoming a holy temple, the area was used as domestic place where the deceased were buried under the living floor. As more and more ancestors inhabited the place, it became a center of ritual activity and its residential function declined until it was fully transformed into a temple.

In Polynesian societies, the architectural elaboration of ritual spaces acts to differentiate these types of sites across the landscape. Thus, the hypothesis regarding these ritual spaces has great potential to be tested here.

2.4 Discussion

The emphasis on materiality of the House Society model affords archaeologists a link to explore the material culture with social relations. The perspectives on the continuity of the House, social relations, and the social memory associated with the material culture constitute the most important elements of archaeological research on House Society. In modern ethnographic research, most of the studies on House Society focused on the Austronesian, Mesoamerican, South American, and Northwest American societies (e.g., Ames 2006; Carsten and Hugh-Jones 1993; Gillespie and Joyce 2000; Sparkes and Howell 2003). The abundance of ethnographic, ethno-historic, and linguistic research in these areas signifies the long-term existence of the House Society. As a result, most archaeological research on House Society is concentrated in these areas.

Although both the Austronesian and Mesoamerican societies show the presence of House Society ethnographically, archaeological research in these two areas demonstrates different development. In Austronesian societies, archaeological research emphasizes the continuity of the presence of House Society based on historical linguistic evidence. Different models derived from ethnography were proposed and examined through archaeological data (Kahn 2005, 2007; Kahn and Kirch 2007; Kirch 2000). The purpose was to seek the “ancient cultural pattern” of the Austornesian societies (Kirch 2000: 114).

In Mesoamerica, the concept of House Society is regarded as a heuristic device which stimulates archaeologists to think about the association between material culture and social relations through different perspectives. Archaeologists also use this concept to reconsider or criticize various traditional arguments, such as identity (e.g., Hendon 2007; Joyce 2001, 2007), social evolution (Lopiparo 2007), gender, and symbolic systems (Gillespie and Joyce 1997). This is probably one of the most important contributions of the research of the House Society, both to archaeological and anthropological studies. As Gillespie succinctly pointed out:

> The société à maisons provides a means to understand collective forms of agency and strategizing without having to fall back on such taxonomic categories as “elites” and “commoner”, categories that lack emergent properties. It overcomes the artificial

> separation of agency from materiality and the essentialist analytical division of society into static and redundant corporate groups. Another advantage is that it allows researchers to link household-, community-, polity-, and regional-level processes in multiscalar fashion…. Importantly, it can become central to the study of social transformations in history as cumulative effects of the strategic action of houses. [2007:43]

Moreover, some archaeologists integrate Giddens and Bourdieu's idea of social structure and social practices into the discussion of the House Society. They regard the House as a "particular, cross-culturally recurring form of social structure" (Beck 2007:13) or consider the relationship between this social structure with people's everyday practices (e.g., Brereton 2005; Lopiparo 2003). In other words, unlike research in the Austronesian societies, Mesoamerican archaeologists view the "House Society" model more as a social theory which explores the relation between social structure and human agency. Better than other social theories, the House Society underlines the connection between material culture and social relations. Thus, it gives archaeologists a better angle from which to approach prehistoric societies.

When Levi-Strauss defined the House Society, he first elaborated the relationship between House Society and material culture. Later, socio-cultural anthropologists further enhanced the discussion of the material aspect. These studies thus assist archaeologists to build a "House Society" model which can be tested through archaeological data. More archaeologists began to apply this social model to prehistoric societies around the world, not limited to areas where the presence of House Society can be observed ethnographically. In other words, the House Society is viewed as a type of social organization that existed in small-scale societies. Therefore, the presence of this type of social organization in prehistoric time should be examined around the world (e.g., González-Ruibal 2005). These studies also respond to Levi-Strauss' claim that House Society is a type of social organization which could be found before the emergence of a class-based society.

The concept of House Society also offers Taiwanese archaeologists a fresh venue through which to examine the social relations of the prehistoric Taiwanese societies. In the following chapter, I will examine why and how the concept of the House Society can advance our understanding of prehistoric Taiwanese societies.

CHAPTER III

HOUSE SOCIETIES IN TAIWAN

The current population of Taiwan consists of diverse ethnic groups who have arrived during different time periods from different places since the Paleolithic period. The exact date of the earliest human occupation in Taiwan is still unclear. However, recent excavation at the Baxian cave disclosed a series of radiocarbon dates concentrated around 20,000 BP (UDN News, July 24, 2009). Currently, at least three groups of people are recognized: the Austronesian-speaking Indigenes, numbering 490,000, who live in the mountainous areas and the east coast; the Plain Indigenes, of unknown numbers, found along the west coast for the most part; and the Han Chinese, of Hakka and Fukienese descent. After 1950s, the number of Han Chinese was greatly increased by immigrants from China.

The earliest historical document about the peoples in Taiwan was written by a Chinese Official, Chen Di, in the early 17th century. He carefully recorded the customs of the peoples in the Tainan Plain area in Southwestern Taiwan (Zhou 2003). These peoples are now recognized as numerous groups of the Austronesian-speaking peoples, also known as Plain Indigenous Peoples. Due to several waves of colonial power intervention, some of the so-called Plain Indigenous Peoples have been gradually losing their cultural identity since the 17th century. However, the political movements in the 1990s promoted several Plain Indigenous Peoples to search for the lost past (Ku 2005). These peoples are now in the process of fighting for their legal status. Even though the number of current Plain Indigenous Peoples is under great debate politically, their presence on the western plain areas before the 17th century is undisputed (Liu and Pan 1998).

The Austronesian-speaking peoples of the mountainous areas, east coast, and Lanyu Island, on the other hand, still maintain their cultural identity. Moreover, their official status as Aboriginal Peoples was acknowledged by the Taiwanese government in the 1990s. Officially, 14 groups of Aboriginal peoples have been recognized. Our knowledge of these peoples initiated during the Japanese colonial era. During that time, the Japanese government systematically conducted research in these indigenous societies for colonial administration. Later, the Chinese Nationalist government in Taiwan continued the Japanese efforts of studying these peoples and "recording their vanishing cultures" (Huang 1999). The research on both the Plain and Mountainous indigenous peoples suggests that they have been settled in Taiwan for a long time. Moreover, the diversity of their cultures before the advent of non-Austronesian peoples is acknowledged. More importantly, our knowledge of these peoples offers us several clues which can be used to understand the prehistoric social organization of these indigenous societies.

In this chapter, I begin by reviewing archaeological, linguistic, and ethnographic research on early Austronesian societies in Taiwan. The research illustrates that houses probably have been an important factor in organizing social groups and consolidating social identities in Austronesian societies. More importantly, anthropologists have gradually realized the feasibility

of utilizing the concept of House Society to reexamine the social organization of Taiwanese Austronesian societies. Since the concept of the House Society explicitly considers the process of how social identity and relations are formed and organized through objects or places (Carsten and Hugh-Jones 1995; Gillespie 2000), I argue that archaeologists should also benefit from this concept and the rich ethnographic research.

In the second part of this chapter, I propose that the concept of House Society can be a productive model to explore social relations of prehistoric Taiwanese societies. Traditionally, archaeologists have viewed archaeological features and artifacts recovered from Neolithic Taiwan as markers of specific cultural entities or as evidence of intergroup exchange. However, the House Society concept offers an alternative interpretation to understand these features and artifacts. More importantly, the House Society concept could not only provide a possible mechanism to explain social differentiation of these early societies, but also assist us to explore prehistoric social relations.

3.1. Research on Neolithic social organization in Taiwan

Although the research on the social organization of Taiwanese indigenous societies has attracted numerous socio-cultural anthropologists since the Japanese colonization period, archaeological research of prehistoric social organization is rare. This is largely due first, to the over-emphasized research interest focused on establishing an overarching temporal-spatial framework for Taiwanese prehistoric cultures and second, to the suspicion of investigating intangible social organization from the archaeological record without the evidence of direct historical continuity. Therefore, except for the research of Neolithic OLP (O-Luan-Pi) culture in the 1970s, any discussions of Taiwanese Neolithic social organization were only implicitly mentioned.

Nevertheless, the abundance and diversity of archaeological features and artifacts uncovered from Neolithic sites offer archaeologists an excellent opportunity to explore prehistoric social organization. More importantly, recent large-scale excavation resulting from modern construction presents incredibly rich archaeological material and thus, should compel archaeologists to begin to systematically examine the social aspect of prehistoric societies.

3.1.1 The prehistoric OLP society

The first archaeological work which clearly demonstrated its ambition to investigate prehistoric social organization through archaeological material was the research on a Neolithic society, the OLP (O-Luan-Pi) society (ca. 5000-4500 B.P.), in southern Taiwan. Citing North American archaeology of the 1960s (specifically Longacre 1968; Hill 1968; and Deetz 1968) which utilized the patterned archaeological data to infer residential and descent rules, Li Kuan-chou (1974) argued for the existence of a matrilocal and matrilineal society in Neolithic southern Taiwan based on the examination of net sinkers and pottery vessels. At the OLP site, the net sinkers show great diversity in style, while the pottery vessels are more consistent. Li believed that this evidence suggests that the men are married into the society, while women remain with their original family when they get married. Based on an ethnographic example

from the Amis society, one of the indigenous groups living in the same area, women were the pottery makers and men are responsible for the fishing implements. Furthermore, the Amis society was then recognized as a typical matrilineal society. Therefore, Li concluded that the diversity of these net sinkers at the archaeological site indicated that men came from different net sinker traditions. On the contrary, women were pottery makers, so the pottery vessels were more uniform. Accordingly, this society must have been a matrilineal society wherein men married into the society, while women remained in their original society (Li 1974).

Although this research was conducted in the early 1970s, it has remained the only archaeological study to specifically target Neolithic social organization in Taiwan. However, Li's analysis has not been seriously examined or referred to by later archaeologists. Social-cultural anthropologist Huang Ying-kuei once criticized his simplistic reading of Amis social organization (Huang 1997). The suspicion of using ethnographic analogy to construct a hypothesis on prehistoric social organization makes Taiwanese archaeologists reluctant to further explore Li's research despite the intriguing archaeological patterns found at the OLP site: the heterogeneity of the net sinkers and the homogeneity of the pottery.

3.1.2 The prehistoric Peinan (卑南) society and the Ciyubin (曲冰) society

Two large-scale excavations in the 1980s, the Peinan and Ciyubin excavations, exemplified another approach to addressing Neolithic social organization in Taiwan. Both of these excavations are large-scale excavations which uncovered numerous archaeological artifacts and features. Since both of the excavations disclosed a great number of exotic goods and burials with grave goods, archaeologists attempted to infer the social organization of these societies.

The Peinan site was discovered during the Japanese colonial period and had been famous for its unique upright stone slates on the landscape. The excavation of the Peinan site was first initiated in 1980, due to railway construction, and continued for another nine years. The excavation area was about 10,000 square meters. The date of the Peinan site is still under debate. The earliest radiocarbon date from the site suggests the emergence of the Peinan society can be traced back to 5,500 years ago (Lien 2008). However, later research disclosed more dates all concentrated around 3,500 years ago (Tsang 2008). The excavations uncovered abundant pottery and lithic artifacts, more than 1,600 slate coffins, and stone structures which provide archaeologists with a variety of evidence for exploring prehistoric social organization (see Lien 2001, 2006; Sung and Lien 2004).

Based on the evidence from the skeletal remains, the prehistoric people practiced head hunting, betel nut chewing, teeth extraction, and indoor burials. Customs similar to these had long been recognized practices in several indigenous societies until they were forced to abandon them during the Japanese colonial period. Thus, archaeologists projected that the Peinan 3,500-year-old society was one of the ancestors of the current indigenous peoples (Lien 2008).

The large amount of archaeological data unearthed suggests that a certain level of social differentiation likely existed. According to the differences among the grave goods, Lien Chao-mei believed that this society was a highly specialized and probably hierarchical society

(Lien 2008). Some archaeologists even argue that a certain type of chiefdom had already formed in this society (Tsang 2008).

The excavation of the Ciyubin site was also initiated in the early 1980s. Located in the mountainous area of the central part of Taiwan, the 3,700-square-meter excavation at the Ciyubin site uncovered abundant pottery and lithic artifacts, house structures, and more than 160 stone coffins. Even though the close association between house structures and stone coffins suggests similar mortuary practices between the Ciyubin and the Peinan societies, no human remains or grave goods were present in the coffins at the Ciyubin site. Thus, Chen Chung-yu only tentatively suggested that some sort of social organization might have existed (Chen 1994: 207). Interestingly, Chen not only noticed the close association between the stone coffins and house structures, but also illustrated the presence of stone tool workshops associated with the house structures. Accordingly, he further proposed that the lithic tool production in the Ciyubin society was probably controlled by a specific "family" (Chen 1994:207).

Both the Peinan and Ciyubin excavations were conducted in the 1980s and uncovered large amounts of artifacts and features, especially house structures and burials. While certain inferences of the social organization were implied, none of the reports contained a clearly formulated discussion of the social organization of those societies. Aside from inferring a certain level of social stratification from the burial context, archaeologists did not intend to say any more about the social environment, since it was intangible. A similar omission can also be seen in several syntheses of Taiwanese prehistory (see Liu 1996; Tsang 1999; Tsang et al. 2006).

3.1.3 The impact of rescue archaeology

Large-scale rescue excavations became common after the mid 1980s due to rapid economic development in Taiwan (e.g., Liu 2000a, 2002; Liu et al. 2001; Tsang et al. 2006). These excavations have not only unveiled numerous archaeological materials, but also revealed further contextual evidence with which to examine prehistoric social organization. Most importantly, these excavations disclosed patterns of a large amount of burials and house remains. Particularly, the burial goods are either absent or consistently similar within each site, except for some different types of artifacts based on different sex (Tsang et al. 2006). This provides an argument against the idea of hierarchical societies existing in Neolithic Taiwan. At the same time, the close spatial association between the house and burials in most of the sites further suggests that it is probably a common practice among Neolithic populations (Tsang et al. 2006:306).

3.1.4 Summary

The archaeological excavations in Taiwan for the past two decades have strengthened our knowledge of Taiwanese prehistory in terms of the temporal-spatial variations of the material cultures (Lien 2008; Liu 2002; Tsang et al. 2006). Recent research on faunal and floral remains also yields valuable information about their foodways and the surrounding natural environment (see Lin 2004, 2007; Li 1993, 1994, 2000, 2002; Li 2003; Chen et al. 2005). However, our understanding of prehistoric societies is still severely lacking.

The interest in prehistoric social organization did increase as more areal excavations were conducted. However, most of the inferences made were still based on the burial data (e.g. Ho 1996). The assumption is that the burial data, especially the differences among the grave goods and the data revealed from human skeletons, is a direct reflection of prehistoric social organization. If uneven grave goods were observed, then it means that a certain level of social differentiation had already emerged (Lien 2008; Tsang 2008; Tsang et al. 2006). Otherwise, archaeologists are unable to say anything about social organization based on material remains. This assumption is implicitly suggested in all of the discussions of prehistoric Taiwanese societies, except for the research on OLP society by Li in the 1970s. He is the first and, so far, the only archaeologist who has proposed the systematic investigation of prehistoric social organization based on archaeological artifacts, drawing direct historic analogy from the ethnographic data in Taiwan.

Due to the fact that attention has only been focused on burials, Taiwanese archaeologists have unfortunately ignored the rich archaeological data that could potentially be used to explore prehistoric social relations. At the intra-site level, more fine-grained contextual data are now available, and the distribution of features and artifacts is better understood and analyzed. At the inter-site level, the presence of common artifacts and the distributional pattern of archaeological features are also established. Both of these lines of evidence imply that different levels of social relations played important roles in prehistoric societies.

Most importantly, a systematic analysis of the large amount of artifacts from the house context is lacking. Ethnographic research on Taiwanese indigenous societies suggests that the house is not only the basic social unit of the economic, social, and political activities, but has multiple meanings interrelated with the society (Chiang 2001; Huang 1999; Tan 2004; Yeh 2002). In these societies, along with the burials, the house is a place where the process of social differentiation can be observed. Archaeologically speaking, the evidence of the presence of house structures, such as postholes, is prominent in almost every site in Taiwan. Therefore, archaeologists have every opportunity to discuss the social relations, at least at the household level.

Huang Ying-kuei, a Taiwanese socio-cultural anthropologist, thus argued that the problem with Taiwanese archaeologists is their unfamiliarity with current social theories (Huang 1997:134). For example, one basic assumption of Li's OLP research was the presence of matrilineal descent system in the indigenous society. However, this matrilineal descent system was later challenged by socio-cultural anthropologists as lacking in native perspective and thus portraying an inaccurate picture of its social organization (Chen 1986). Accordingly, Li's whole argument lost justification. Huang (1997) thus urged Taiwanese archaeologists to familiarize themselves with contemporary social theories and to further assist constructing social theories with a deep temporal framework.

3.2. Linguistic reconstruction of the prehistoric Austronesian society

The second line of evidence that guide some archaeologists working in the Austronesian societies is the linguistic reconstruction of prehistoric Austronesian societies. Adopting the direct historic approach, several archaeologists working on Austronesian-speaking societies have been utilizing the prehistoric social models derived from linguistic reconstruction since the late 1990s (Chiu 2003, 2005; Green 1998; Kirch 1997; Kahn 2005). Based on linguistic evidence, they argue that linguists can, in addition to reconstructing the material world that prehistoric peoples encountered, also provide possible pictures of prehistoric people's social and religious life; and the latter is where archaeological work has been of great benefit (Kirch and Green 2001).

In Taiwan, however, the relationship between archaeological and linguistic research is not as linked as in other Austronesian societies. Taiwanese archaeologists only cited the linguistic conclusion of the diversity of Taiwanese Austronesian languages to attest that Taiwan is the homeland of Austronesian-speaking societies around the world (Chang 1995; Liu 2007; Tsang 1995, 2007, 2009). Unlike the archaeological research in the South Pacific, which heavily relied on the linguistic reconstruction of early Austronesian societies to test and broaden our understanding of prehistoric social and religious life (Chiu 2003, 2005; Green 1998; Green and Kirch 2000; Kahn 2006, 2007; Kirch 1995, 2000, 2001), Taiwanese archaeologists still avoid the studies of any intangible aspects of prehistoric peoples.

Though the validity of applying linguistic reconstruction directly to interpret archaeological material is still under debate (see Dye 1987; Terrell 1987)), linguistic reconstruction does offer another venue for establishing models about prehistoric societies, especially to inform us about their social and religious life. Moreover, the linguistic reconstruction of early Austronesian societies encompasses every aspect of prehistoric life, such as material culture, natural environment, foodways, social structures, religious practices, and so on.

Among these, especially pertinent to this dissertation, is the reconstruction of prehistoric social organization of the early Austronesian-speaking societies. Notably, the linguistic reconstruction of prehistoric Austronesian social organization reaches inferences similar to current ethnographic research: the importance of houses in the social formation process. Therefore, both linguistic and ethnographic evidence indicate that a "house-centered" approach might be a productive model for exploring the prehistoric societies in Taiwan. Furthermore, "House" transmits an emic perspective which gives archaeologists the chance to retrieve a "native" point of view (Kirch and Green 2000).

3.2.1 The Austronesian languages in Taiwan

The diversity of the Austronesian languages in Taiwan suggests its possible long-term development on the island (Ferrell 1969:73). Moreover, it probably causes the unsettling classification of Taiwanese Austronesian languages. Systematic classification of the Taiwanese Austronesian languages was initiated during the Japanese colonial period (1895-1945). The main purpose was to categorize these Austronesian-speaking peoples for effective colonial administration. Thus, linguistic data has been combined with ethnographic evidence to classify these "mountainous" peoples since then (Ferrell 1969).

Based upon lexicostatistical analysis of Taiwanese Austronesian languages spoken in the mountainous areas, Dyen classified them into three groups (Dyen 1963). Later, Ferrell further emphasized that the Atayalics and Tsoulics are two distinct languages, while the rest of the languages are too diverse to clearly separate out (Ferrell 1969:23). However, these classifications might be incomplete and biased since they focused only on "mountainous" peoples and ignored the other languages spoken in the plain areas.

The exact linguistic picture of Taiwan is not clear due to the vanishing speaking population. However, linguists have agreed that the diversity of the languages is so evident that Taiwanese Austronesian languages can be classified into at least three major subgroups of Austronesian languages (Blust 1980, 1995; Bellwood 1996; Li 2003). The other Austronesian languages spoken in the rest of the Austronesian world can be assigned to one major subgroup: the Malayo-Polynesian (Blust 1980, 1995; Bellwood 1996). Since Taiwan has the most diverse Austronesian languages, it is proposed that Taiwan might be the homeland of the Austronesian language (Blust 1985; Haudricourt 1965; Shutler and Marck 1975).

3.2.2 The social organization of early Austronesian society: linguistic reconstruction

Using comparative methods, linguists have tried to reconstruct the early Austronesian cultural history, including the natural environment, dwelling, clothing, subsistence activities, settlement, social relations, and so on (e.g., Blust 1980, 1994,1995, 1996; Fox 1994; Green and Pawley 1998, 1999; Li 1994, 2003; Zorc 1994). These reconstructions have been used to examine archaeological data in several early Austronesian societies in the South Pacific (Chiu 2003; Green and Pawley 1999; Kahn 2007; Kirch and Green 2001).

The linguistic reconstruction of early Taiwanese Austronesian social organization is not as profuse as in the Oceanic groups. Most of our understanding of early Taiwanese Austronesian societies from a linguistic perspective is still from Blust's early studies. The major concern among the Taiwanese linguists is the migration of the Austronesian peoples inside and outside of Taiwan (Li 1996, 1997, 2003). Furthermore, the effort put into researching the long-neglected "plain" indigenous peoples along the west coast is in hopes of providing a more thorough picture of the early Taiwanese Austronesian languages.

Notably, the linguistic reconstruction of the Austronesian social organization also illustrates that the term "house" , **Rumaq*, refers to "lineage" in several early Austronesian societies (Blust 1980:211). Moreover, the reconstructed terms demonstrate the significance of several features inside the house, such as the post and ladder, ridge-pole and hearth. These features are often marked as the "foci of rituals for the house" (Fox 1993: 14). Although linguistic evidence suggests that the house also refers to certain social group in the Austronesian-speaking societies, whether it can replace descent systems in these societies is still under debate (see Blust 1980, 1995 and Fox 1994). Nevertheless, the "house" in prehistoric Austronesian societies could have been one criterion by which to arrange people into different social groups with ritual significance. The "House" thus can express an "emic" social category in early Austronesian societies (Kirch and Green 2001).

3.3. Ethnographic research on social organization of the Austronesian societies in Taiwan

Another way to approach prehistoric Taiwanese societies is to draw inspiration from rich ethnographic research on the Austronesian socieities in Taiwan. Since the Japanese colonial period, socio-cultural anthropologists working in Taiwan have been puzzled by the diversity of the indigenous societies. Before the 1980s, both Japanese and Taiwanese socio-cultural anthropologists tried to classify these indigenous societies following traditional analytical categories. The debate as to whether the presence of unilineal, bilateral, ambilateral or even multilineal societies can be identified, or whether a specific society is more hierarchical or egalitarian has never been settled among socio-cultural anthropologists in Taiwan (Chen 1975; Huang 1986; Wang 1986 [1965]).

The yearning for research which could express an "emic" perspective of indigenous societies appeared in the 1970s (Li et al. 1975). From the late 1980s, Taiwanese anthropologists began to re-examine the utility of these analytical categories defined by early anthropologists. They criticized these traditional typologies as being Western-biased and not being able to fully grasp the "native" perspective. Therefore, a series of ethnographic studies focusing on exploring issues such as personhood, sense of space, and material culture from an "emic" perspective was conducted among indigenous societies as well as in other ethnic groups in Taiwan (e.g., Huang 1995, 1999b, 2004).

One of the new approaches is the "house-centered" approach (Huang 1999). Before the Lévi-Straussian concept of House Society had been noticed or even proposed, anthropologists interested in Taiwanese indigenous societies, such as Southeast Asian anthropologists, had already recognized the importance of the physical residential structures in the formation of social groups. Furthermore, the term "house" was being used interchangeably to refer to both the social group and physical dwellings in several indigenous societies, such as the Amis (Huang 2002). In Taiwan, "house" also transmits an "emic" perspective in these Austronesian-speaking societies, like other Austronesian-speaking societies around the world (Kirch and Green 2001).

The following review thus centers on how social anthropologists since the Japanese colonial era have addressed the social organization of Taiwanese indigenous societies. The two main focuses of this review are to show how our understanding of these societies has changed and how these changed perspectives can contribute to archaeological research in Taiwan.

3.3.1 Lineage-centered approach

The research on Taiwanese indigenous societies began around the early 20th century. At that time, Japanese scholars had already recognized that indigenous societies in Taiwan were small-scale societies; each village constitutes an independent social unit. Concluded by Mabuchi in 1960:

> The aboriginal peoples of Taiwan have achieved only a minimal level of political integration….An institutionalized chiefdomship with hereditary succession has developed only in the south, and even here its evolution, with occasional exceptions, has fallen short of achieving the integration of a number of villages. Only in the center are communities

> effectively organized into subtribes. The cohesion of that, however, not on chiefship, but on a network of affinal kin relationships through which it has been found possible to maintain a measure of law and order over areas comprising a considerable number of settlements.[Mabuchi 1960:139]

Based on Mabuchi (1960), before the intervention of modern state power, the indigenous societies had not formed any unified political entities. Even in the plains area, where several villages might be loosely organized into a larger group, most villages still kept their independent status. Thus, how people organized themselves within and between the villages constitutes an important research question. Following descent theory from the kinship studies in socio-cultural anthropology, ethnographers working in Taiwan also applied the lineage-centered approach to the study of indigenous social organization. However, the mixed or unclear descent systems of these indigenous societies aroused numerous debates, similar to the debate in other Austronesian societies in Southeast Asia. As Mabuchi described:

> Unilineal kin groups have evolved in only two of the six clusters into which we have classed the Formosan peoples [refers to the Austronesian-speaking peoples in Taiwan]– the matrilineal Ami and the patrilineal Bunun cluster. Elsewhere kinship is bilateral, and kinsmen form either personal kindreds, as among the Yami, or some kind of unit characterized by an ambilateral or multilineal mode of affiliation, exemplified most clearly in the ritual groups of Puyuma. Inheritance assumes a unilineal form mainly among the matrilineal Ami and the patrilineal Bunun cluster. In the bilateral societies it is variably and tends strongly to depend upon the choice of marital residence, which is always to some extent optional and which commonly reflects the relatively amounts of arable land available to the bride's and the groom's families. [Mabuchi 1960:139]

Based on Mabuchi (1960), only two of the indigenous societies can be regarded as unilineal societies. Moreover, he noticed that the residential factor is important in determining how different social groups are organized, and the formation process is rather flexible. However, applying the strict “lineage-centered” approach to Taiwanese indigenous societies still dominated the study of these indigenous societies until the 1980s. Nevertheless, the importance of different social groups organized by age, ritual, or economic factors in several indigenous societies kept challenging this lineage-centered classification (Wang 1986). Like Kroeber’s comment on the Yurok as having no social organization, Liu Pin-Hsiung also once stated that the Yami social organization was a fuzzy one which is hard for an inexperienced anthropologist to recognize (Liu 1994).

Although the dominance of the lineage-centered approach persisted in Taiwanese anthropological studies until the 1980s, criticism had already emerged in the 1960s (Chen 1976; Huang 1983; Wang 1965). Wang argued that although the Atayal and the Yami both were recognized as bilateral societies, the most important principle by which to organize these

societies is not the bilateral system. Instead, it is the religious activity that organizes the Atayal society, and the Yami society is arranged by various economic activities (Wang 1986 [1965]). It was further proposed that the use of this kinship relationship to understand the formation of different social groups in the indigenous societies should be abandoned (Chen 1975).

3.3.2 House-centered approach

In the 1980s, socio-cultural anthropologists began to propose different approaches to addressing indigenous social organization (Chen 1976; Chen 1986a, 1986b, 1999; Huang 1986). They argued that the earlier lineage-centered approach could not fully grasp the principle and characteristics of indigenous social organization since there are so many variations among these indigenous societies. However, this is not to suggest that these societies do not have any structures. Instead, we need to cease categorizing these societies and begin to understand the indigenous societies from an "emic" perspective.

When the House society model was first proposed, most of the research was applied to explore the social organization of Southeast Asian societies. There was recognition that local people identify the house as the basic and the most important social unit. The indigenous societies in Taiwan also have the same perception and social practice. Earlier ethnographic research had already observed the importance of residential factors in arranging social relations in addition to the consanguinity principle (Goodenough 1955; Mabuchi 1960; Murdock 1960). Therefore, recent studies specifically employed the house as an analytic unit by which to understand the social relations of these indigenous societies (Chiu 2001; Chen 1995; Chiang and Li 1995; Huang 1995).

One of the indigenous societies, the Paiwan society in southern Taiwan, exemplifies the typical nature of a "House Society" as originally defined by Lévi-Strauss. In Paiwan societies, the house is the prominent social unit. It owns land, resources, privileges and rights, names and titles of its own, and portable properties, such as glass beads, pottery, and daggers. The differential ability to control the past through material media, such as pottery and anthropomorphic carvings on the central post and beams, differentiates high-ranking houses from lower ranking ones (Chiang and Li 1995; Jen 1959; Chiu 2003:67). More importantly, the House expresses an "emic" perspective in the Paiwan society and different social relations were created based on the relations between Houses (Chiu 2001:27-8).

The importance of the house and its significance in organizing social relations has long been noticed and emphasized in Paiwan studies. When the concept of House society was first proposed, the Paiwan societies were identified as typical examples of House societies (Waterson 1990). Some of the other indigenous societies, on the other hand, were not recognized as House societies initially, due to their unstratified social structures, but the importance of their houses started to gain recognition in the 1980s. For example, traditionally, the Amis societies had been viewed as a typical example of matrilineal society (Mabuchi 1960; Wei 1961). However, since the early 1980s, several studies not only criticized the inadequacy of the traditional classification (Chen 1984,1987), but also argued for investigating how the *Ruma?h* was understood in the Amis society to capture the real mechanism that structures the Amis society. *Ruma?h* is the basic

social unit in Amis society; it includes the granary and a place for ancestral worship (Chen 1986). Claiming to belong to the same *Ruma?h* is done not only through daily practices in the same house, but also through sharing the same obligations during certain ritual activities. For the Amis people, it is the relationship between different *Ruma?h* that structures the society. Although these studies did not specifically argue that the Amis society was a type of House society, the prominence of the house in the formation of the Amis society was recognized. In a review of the book, "Colonial contact and imperial periphery: history of the Austronesian population of Hualien from the 17th century to the 19th century," Huang also suggested that the Amis vocabulary, "Talleroma," was derived from the word "*toda loma'*" which meant big house. Since Talleroma was referred to as different village names in the historical documents, Huang (2005) thus proposed that the essence of the village identity of the Amis in Hualien area probably originated from their house identity.

The emphasis on "native perspective" has redirected Taiwanese anthropologists' attention towards investigating the importance of the houses and how the houses can actually assist us to understand the process of social formation. At the same time, Taiwanese anthropologists began to notice the utility of the concept of House society in understanding the social organization of Taiwanese indigenous societies (Huang 2001; Yeh 2002). As Chiang argued:

> The "house society" does provide a solution to the puzzles and difficulties involved in the kinship studies of Taiwan aborigines. It emancipates the study of social formation and continuation from the strictly defined notion of kinship and allows us to take on the questions of how persons, groups, and material objects are mutually defined as well as defining. [2001:223]

The anthropologists in Taiwan have long perceived the inadequacy of applying the strict lineage principle to categorize Taiwanese indigenous societies and the importance of the houses in these societies. Applying the concept of House society to study Taiwanese indigenous societies thus offers anthropologists another venue for approaching indigenous societies from an "emic" perspective.

The previous discussions show that archaeological, linguistic, and ethnographic studies of Austronesian societies in Taiwan all provide evidence of the importance of the house structure in social life. The generalized model of House Societies relies on similar demonstrations. My use of a House Society model is consistent with these lines of evidence. I use this model as a kind of general analogy (Gould 1982; Stahl 1993; Tringham 1978;Wylie 1985, 1988). The demonstration of the utility of this model comes when it is applied to my case study. It directs me to observe certain kinds of evidence as potential evidence of the processes through which continuity over generations within the same house structures could have been created using such things as ritual, heirlooms, and shared everyday practices.

3.4. House society model as an interpretive framework for exploring Neolithic Taiwanese societies

A review of archaeological, ethnographic, and linguistic studies on early Austronesian societies in Taiwan illustrates that the House society model can be a productive model in Taiwan in terms of exploring how prehistoric people organized themselves into different social groups and how and why these groups differentiated from each other. The importance of "houses" in Taiwanese Austronesian societies can be observed in their social, political, and ritual life based on linguistic and ethnographic evidence. More importantly, the presence of house structures and the close spatial association of domestic houses and the burials in archaeological context suggest that the houses were not just areas for people's routine everyday life. Prehistoric people also arranged their deceased members in close concentration with their domestic houses.

Furthermore, the presence of several archaeological features and artifacts suggests that Neolithic peoples in Taiwan had already cultivated a close relationship with the landscape by constructing stable houses on the landscape, and gradually enhanced their connection with their houses by burying their deceased members in close proximity with the house. The emphasis on exploring how social relations are structured and how social identity are formed through material objects and house structures thus make the House Society concept a useful framework to interpret these archaeological data and broaden our understanding of these early societies. In the following section, these features are further elaborated to demonstrate how the concept of House Society can assist us to explore the issues regarding prehistoric social relations and the mechanisms of social differentiation.

3.4.1 House structures

One of the common archaeological features at Taiwanese Neolithic sites is the presence of clustered postholes. These postholes indicate the presence of house structures at these sites. However, a contextual analysis of these postholes with other archaeological material is rarely proposed (e.g., Chu 2000). In other words, postholes are viewed as postholes, not as evidence of houses for human activities.

In the Austronesian societies, houses are often the most prominent features on the landscape (Waterson 1990). These houses are often constructed of wooden material and most of the built forms are variants of a post-and-beam system of construction (Dumarçay 1987; Gibbs 1987; Izikowitz 1982; Waterson 1997). Even though most of Austronesian peoples live in a tropical environment where organic material cannot be preserved archaeologically, the postholes resulting from the construction of posts underground have a better chance of being perceived at archaeological sites.

There are only a few examples of ethnographic work specifically focusing on house structures of Taiwanese indigenous societies. Most of the works were drawings depicting indigenous peoples' lives (Tu 1998), or just simple descriptions supplementary to the ethnography (e.g., Li et al 1962,1963). However, these works still present rich material to think about interpretive approaches in archaeological research.

Most importantly, the only specialized book on indigenous architectures, “The Houses of Taiwanese Kaosa (the Mountainous Peoples),” explicitly described the house forms of different indigenous societies living in the mountainous areas and on the east coast. Written by a Japanese architectural professor, Chijiiwa Suketaro during Japanese colonial era, the book focuses on the layout and building techniques of house structures in sixty-five settlements belonging to seven different cultural groups. Based on Chijiiwa (1960), a household unit is usually composed of a main residential dwelling and a granary, either inside or outside of the residential dwelling. Two styles of residential dwellings are common to these societies: the ground and semi-subterranean dwellings (Chijiiwa 1960: 77). The granary is usually smaller and constructed above the ground. The material used to build these structures (i.e., wood, bamboo, and slate) varied. However, regardless of which material was used, the main post, usually made of wood, is the most important structure inside the house. Even in southern Taiwan, where the slate houses are constructed, the most significant feature inside the house is a wooden post bearing carvings depicting human figures.

The rich data that Chijiiwa presented focus on the indigenous societies during the Japanese colonial era. However, the houses that were built in the western plain areas by indigenous societies before had already vanished due to more intense cultural contact with different colonial powers. As a result, our understanding of their houses is limited, except for the scattered descriptions in foreign journals or drawings. Notably, the use of pile-dwellings as residential houses seemed to exist in some of the plain's indigenous societies (Tu 1998). Though this type of house form is very common in the Austronesian societies in Southeast Asia, it was only built as a granary by Taiwanese indigenous societies inhabiting the mountainous and eastern coastal areas.

Archaeologically speaking, it is more common to find postholes than solid stone structures at archaeological sites in Taiwan. Most areal excavations in Taiwan encounter various clusters of postholes. Based upon the above-mentioned ethnographic examples, these postholes are one line of evidence to argue for the presence of house structures. However, early studies only viewed these postholes as evidence of the presence of house structures. The actuality of people living in these houses and their social relationship within and between these houses have long been neglected in Taiwanese archaeology. As discussed in Chapter 2, the concept of House Society emphasizes that houses are not just a roofed area where people reside and have everyday interaction. The houses structures also act as markers to distinguish different social groups. The close association of daily refuse with house structures in most of archaeological sites in Taiwan suggests that most of these early houses were probably buildings affiliated with people’s daily life. Further analysis of these artifacts thus may provide other lines of evidence to explore whether the residents of houses manipulate their everyday goods to differentiate each residential group. At the same time, the comparison of artifact assemblages among houses can also suggest whether certain social differentiation existed at the house level.

3.4.2 Burials

Ethnographic evidence from the House society indicates that one of the most significant practices among these societies is ritual activity emphasizing the connection with the house ancestors. Contemporary practices reveal how the ritual recognition of ancestors is tied to the

construction of social identity and the delimitation of a corporate group, sometimes at the level of an entire community, but also for individual residential groups. Waterson (1990: 209) also observed that in Southeast Asian societies, the sense of closeness between the living members with the house ancestors is prominent. One of the common practices is the close association between domestic structures and mortuary rituals. More importantly, the deceased often transformed into ancestors, burials in close proximity to the domestic houses can serve as reference point to maintain the spatial contiguity between the living house members with their ancestors (Grove and Gillespie 2002: 13). Gillespie also pointed out:

> The deposition of burials or parts of human remains on house land, with or without the building of elaborate tombs, and the use of heirloomed costume ornaments and other valuables that are indexical signs of ancestral personages are means by which archaeologists can demonstrate the perpetuation of the house. [2007:35]

In Taiwan, burying the deceased family members inside or close to the house had also been an important tradition in most of the indigenous societies until the early 20th century. The earliest evidence of this practice in Taiwan can be traced back to the earliest Neolithic culture, the Tapenkeng culture, around 5000 years ago (Tsang et al. 2006). Although its meaning and significance in prehistoric Taiwanese societies have not yet been explored, ethnographers have already pointed out the relationship between the house and the burials. As in the Bunun society in central Taiwan, Huang (1986:380) argued that "family members confirm their right to inherit the land by burying their deceased members inside the house. Their house represents the society, and the acquiring of the house also signifies their identity towards the society." Furthermore, the members of Paiwan society, an indigenous society in Southern Taiwan, also connect with the past by burying their deceased members inside the living houses (Chiang 1999: 383). In other words, the house with burials demonstrates the claim of House property ownership by making this connection with its past. Thus, the continuity of the house is ascertained through this process.

This close association between residential houses and burials is evident in most of the archaeological sites in Taiwan. In other words, this particular practice has persisted for thousands of years in the Taiwanese indigenous societies. There are, however, variations in terms of the exact location and mortuary processes among societies (e.g., Huang 1989; Chiang and Li 1999). The distribution of burials in the prehistoric societies is closely associated with the houses, either superimposed upon the houses, such as at Peinan (Lien 2008) and Ciyubing sites (Chen 1994), or around the houses, such as in the Wansan site (Liu Unpublished). However, ethnographic examples clearly indicate that some of the house members placed their deceased members directly under the house grounds (e.g., Chiang and Li 1999; Huang 1989; Li et al. 1963). Whether this could imply that the relationships between the living and the dead were more stressed in some societies than in others could serve as another future research topic.

3.4.3 Anthropomorphic motif, inalienable possessions, heirloom valuables

The other practice among the Austronesian-speaking societies to indicate the association between the ancestor and the houses is the use of anthropomorphic motifs on different material media in specific ritual practice or daily life (Mckinnon 2001; Wasterson 1990). For example, the *tavu*, a wooden construction in the form of a human figure that stands in the center of certain noble houses in the Tanimbar society in Indonesia, is argued to be "the house (as a structural group) rooted in, and supported by, a particular individual human form (the actions and powers of both the founding ancestor and the present head of the house)" (McKinnon 2000:92). This human figure was not intended to refer to a specific person, instead, the image on the *tavu* are "so playfully abstracted, that it is difficult to say not only whether they might have represented a particular (perhaps the founding) ancestor, but also whether they represented a male or female form" (Mckinnon 1987:7). More significantly, the *tavu* represented the connection between the ancestors and thus constituted the essential identity of the house itself which set it apart from other houses (McKinnon 1987, 1991, 2000).

Based on ethnographic studies conducted in House societies, one of the most significant characteristics is the emphasis on the connection between ancestors and the Houses (see Chapters 2 and 3). Specifically, the privilege to claim the close association with the ancestors often distinguishes one House from the other. Furthermore, a certain material object related to the ancestors can act as an "inalienable possession." The possession can affirm rank, authority, power, and even divine rule because it can represents a group's historical or mythical origins (Weiner 1992:51). Unlike other material objects which can be circulated in the society or between societies, the "inalienable possession" should be kept in the original group and cannot be exchanged.

In various Taiwanese indigenous societies, the material object with an anthropomorphic design is also often used to symbolize the ancestors and is utilized during certain rituals (Ferrell 1969; Hu 2001; Li et al. 1963; Lin 1958). In the Vataan Amis society, for example, twelve posts inside the shrine are carved with an anthropomorphic design. Each image portrays family ancestors, harvest gods, or some heroic figures in their history (Liu et al. 1963). In one of the Northeastern Plain indigenous groups, an ancestral effigy was erected at the right entrance of the house (Hu and Tsui 1998).

In the village of Patjalinuk, one of the Eastern Paiwan societies in Taiwan, the most significant architecture on the landscape is the ancestral house. In the Paiwan society, a real ancestral house should serve as a house, not only for the living but also for the deceased members of the house, before becoming an ancestral house (Lin 1958). The most important feature of the ancestral house is the main post carved with ancestral images (Tan 2004). Inside the ancestral house, numerous artifacts associated with daily life were displayed. Tan Chang-kwo argued that placing these used objects inside the ancestral house confirmed its authenticity in being related to ancestors (Tan 2004:133). Moreover, using the concept of "inalienable possessions" (Weiner 1992), Tan stressed that the main post inside the ancestral house acts as an inalienable possession in the Patjalinuk society (Tan 2004:135). The main post of the ancestral house offers "cosmological authentication" to verify the close connection between the owner and

their ancestor. At the same, the possession of the main post differentiates the owner's house from those of others. For the Patjalinuk people, the importance of the ancestral image is not who exactly the ancestor is, but a representation of the ancestors (Tan 2004:127).

This close association between the anthropomorphic motif and ancestral worship is also considered in studies of other prehistoric Austronesian societies. For example, the anthropomorphic motif inscribed on pottery vessels was used to argue for the existence of the House Society in one of the pre-Austronesian societies, the Lapita society, in the South Pacific (Chiu 2003, 2005; Kirch 1997). Chiu argued that the vessel that bore the human face design was an object that "speaks of house origins and crest prerogatives" and acts as a "sign of history," an inalienable possession owned by Houses (Chiu 2003:343).

These ethnographic and archaeological studies suggest a possible connection between the anthropomorphic design and the house ancestors. As indicated in the ethnographic House Society model and case studies, the ownership of the material medium which bears a particular image consolidates the house members' identity through the stress on their common connection with the ancestors. At the same time, it also sets a house apart from others. This anthropomorphic design probably could be considered a type of "inalienable possessions," which acts as a "vehicle for bringing past time into the present, so that the histories of ancestors, titles, or mythological events become an intimate part of a person's present identity" (Weiner 1985: 210). Furthermore, the creation and possession of this motif is thus a "major step in sustaining marked, hierarchical relations between individuals and groups" (Weiner 1985: 224).

In Taiwan, the discovery of material objects or features bearing anthropomorphic designs from Neolithic sites is quite rare. It could be due to material mediums that are perishable and therefore unable to survive archaeologically. Nevertheless, anthropomorphic designs in archaeological sites began to emerge from the late Neolithic period (3,500 B.P to 1,800 B.P.). The most noticeable object with this anthropomorphic design is the jade zoo-anthropomorphic object discovered in the burials of the late Neolithic period.

Jade is the common material used to produce tools and ornaments in Neolithic Taiwan. These tools and ornaments can be associated with daily life, and can also be utilized as grave goods. Since only one jade quarry has been identified in Taiwan and most of the jade objects are determined to be from the same quarry based on chemical analysis (Hung 2004; Hung et al. 2006), the ability to acquire the jade objects may imply the differential social networks each individual or group possesses. Most importantly, this specific zoo-anthropomorphic object is only recovered from burial contexts associated with residential dwellings at archaeological sites. The anthropomorphic design, with its special quality of jade material, limited accessibility, and archaeological context suggest that this zoo-anthropomorphic object probably served as more than mere goods buried with the deceased. However, its meaning in prehistoric society has not been fully discussed. The only published interpretation treats this object as a type of totem related to prehistoric religious practices (Ku 1994).

Drawing inspiration from the House Society concept and the rich ethnographic literature in Taiwan, I argue that these jade zoo-anthropomorphic objects could be a type of "inalienable object" described by Mills (2004) as being closely connected to ancestral images. This object "acts as transcendent treasures, historical documents that authenticate and confirm for the living the legacies and powers associated with a group's or an individual's connections to ancestors and gods" (Weiner 1992:3). This object obviously could not be circulated unrestrictedly since it was only unearthed in limited numbers from contemporaneous sites. In other words, only specific individuals or groups could claim the ownership of this object in Neolithic Taiwan. The differential ability to possess these objects thus indicates uneven social status.

Since these objects were closely associated with burials and the burials were in close proximity with domestic houses, the objects may also have the potential to be considered as House heirlooms. As in Tanimbarese Houses, the "named" Houses retained heirlooms as a sign of history, status and weight (McKinnon 2000:172). The difference between the named and unnamed Houses lies in the inability of unnamed Houses to establish or maintain their connection with the founding ancestors. Moreover, the House heirloom valuables could be exchanged between allied Houses during public ceremony, such as mortuary rituals, and these valuables exemplify the resources employed by House members in competition with other Houses (Joyce 2000:210). In other words, in Neolithic Taiwan, one interpretation of the zoo-anthropomorphic objects could be a claim of close relationship between ancestors and descendant community members of a house. This interpretation is one of several possibilities as noted above, but highlights the utility of a House Society model perspective.

3.5 Conclusion

In this chapter, I reviewed the development of archaeological, linguistic and ethnographic understanding of the social organization of Taiwanese Austronesian societies. These different disciplines all suggest the importance of the houses in these societies. From ethnographic and linguistic examples, the house as a prominent social unit may not only constitutes an anchor point for anthropologists to investigate indigenous social organization, but also expresses an "emic" perspective.

As discussed in Chapter 2, the House Society model offers flexible and ethnographically grounded means to interpret prehistoric social relations from archaeological data. In Taiwan, the concept of House society has facilitated socio-cultural anthropological and linguistic studies to attain a better understanding of how indigenous peoples organize themselves into different social groups. Both of these lines of research illustrate that the concept of House society can be a useful model for understanding Taiwanese Austronesian societies.

Different from studies conducted in other House societies, most Taiwanese socio-cultural anthropologists only stress exploring the issues of social relations that the House encompasses and lacks any discussion about the role played by actual physical houses. The emphasis on the continuity of houses is also not fully considered in Taiwanese examples. Most research only focuses on the synchronic aspect of the House. Therefore, I would argue that this is where the

archaeological research on Taiwanese Neolithic society can better contribute to our understanding of these Austronesian societies.

In the following chapters, I utilize the house-centered approach, which emphasizes systematic analysis of the content and differences of the material remains of houses, to investigate prehistoric Wansan society. Inspired from the House Society perspective, I propose an alternative way to interpret archaeological material from Wansan society, focusing on how people's identity was formed and how the built structures and material objects shape or constrain prehistoric social relations.

CHAPTER IV

RESEARCH BACKGROUND: THE WANSAN SITE AND THE 1998 EXCAVATION

In this chapter, I briefly summarize previous research conducted on the Ilan Plain where the Wansan site is located. The research of the Ilan Plain provides preliminary understanding of the natural and cultural environment that prehistoric Wansan people had encountered. Although four archaeological excavations had been conducted, this dissertation focuses on the analysis of the fourth excavation: the 1998 excavation. Therefore, I outline the empirical findings of the 1998 excavation in the second part of this chapter.

4.1 The Ilan Plain and the Wansan site

The Wansan site is located in Dongshan Township, Ilan County, in northeastern Taiwan, about 4.5 km southwest of the Luodong Township, lat. 24°38´25˝ N, long. 121°45´25˝ E. The Wansan site is situated on a small hill called by local as Yuansan. This small hill is at the front edge of the intersection of the Ilan Plain and the Central Mountain Range (Figure 4.1).

The hill descends gradually toward the surrounding plain area that is about 8-10 meters above sea level. The north and south sides of the hill are steeper while the west and east sides of the hill form gentle slopes that are suitable for human settlement and agricultural activities.

The Yuansan hill is a rather isolated hill on the landscape. There is a couple of creeks in the surrounding plain, Old Liao Creek, the headwater of the Dongshan River and its tributary, New Liao Creek (Figure 4.2). Moreover, there are plenty of springs in the mountainous area close to the hill. Clearly, there are abundant water resources in this area for prehistoric Wansan people to acquire.

The Wansan site, first discovered in 1963, has been through four excavations. The first three excavations focused on investigating the size and content of the site. Only the forth time was the excavation area large enough to uncover multiple postholes, stone coffins and a large amount of lithic and clay artifacts. Since this dissertation aims to employ spatial analysis to understand social relations, the data set is from the fourth excavation from which complete areal data set is available.

The concentration of the artifacts and features on top of the hill indicates this excavation area is a habitation area. This area is about 600 meters long and 300 meters wide. The major axis is toward east-west direction, and the highest point is at the center of the hill, about 60 meters above sea level.

The results of the surface surveys and excavations indicate that the range of the site covers the whole Yuansan hill above the 15-meter contour line. The four excavations generated

39 radiocarbon dates. These dates point out that the site had been occupied from 3,500 to 2,500 years ago.

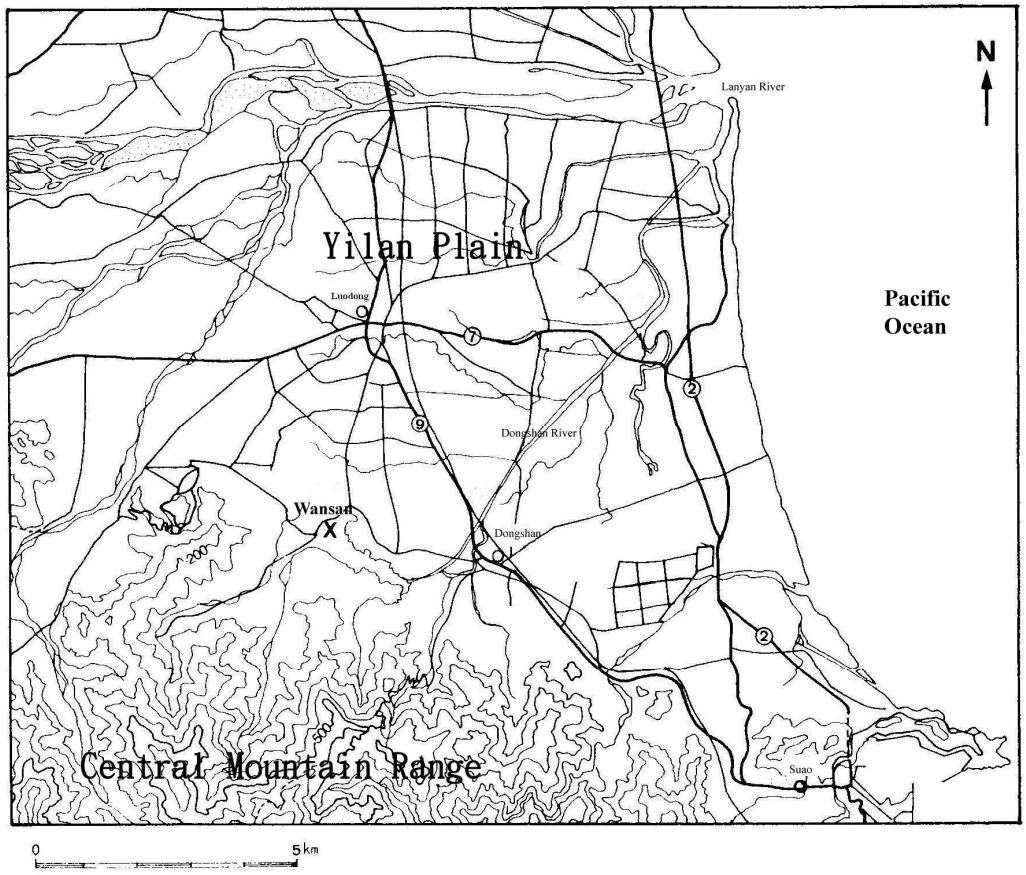

Figure 4.1 Map of the location of the Wansan site (Revised from Liu 1996)

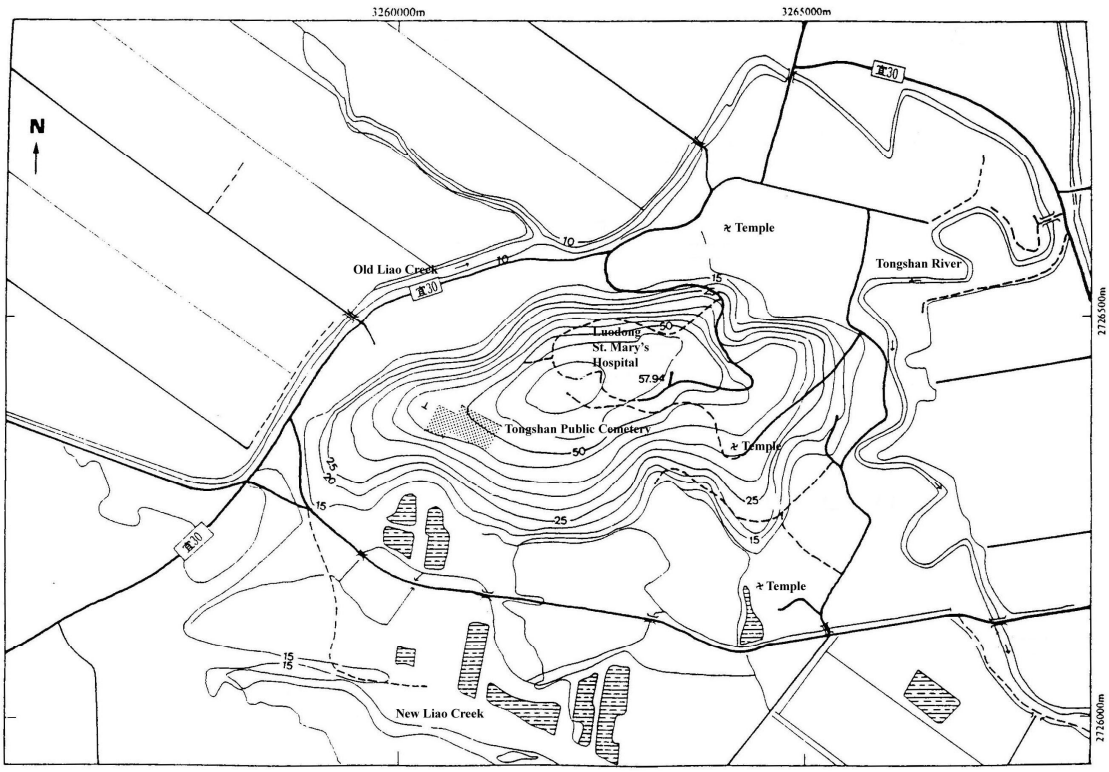

Figure 4.2 Contour map of the Wansan site (Revised from Liu 2000)

Previous palaeoenvironmental (Chen *et al* 2005) studies indicate that the site was much closer to the coast around three thousands years ago, and this distance was less than 10 km. This implies that prehistoric Wansan inhabitants were easily able to acquire marine resources. At the same time, the closer distance to the sea means that in addition to the road route, seafaring offers another venue for the Wansan people to contact with the outside world.

4.1.1 Natural environment: geologic formation, climate, Holocene transgression

The Wansan site is in the southwestern side of the Ilan Plain. The Ilan Plain is the delta plain between the Syue Mountain Range and Central Mountain Range. Basically the Ilan Plain forms an equilateral triangle and it is a low-lying plain, 100 meters below the average sea level today. The Ilan Plain was formed as a result of the uplifting tectonic movement together with the sedimentation of the Lanyan River. Thus, underneath the plain lies the thick quaternary deposition (Lin 1957). Through systematic core drilling, geologists were able to prove that Ilan Plain was inundated during the Holocene transgression period. About 6000-7000 years ago, the sea level became stable and ancient coastal line started to move eastward (Chen *et al* 2005). And around 3,000 years ago, the Wansan site was about 10 km away from the coast (Figure4.3).

Results of pollen analysis (Lin 2004) indicate that the Ilan Plain went through a small transgression event, which caused the reduction of plain size around 4,000 to 3,500 years ago. The pollen data also suggests that the weather was warmer around 4,200 to 2,300 years ago and comparatively became more humid around 2,300 to 1,950 years ago.

The Central Mountain Range, situated in the southern part of Ilan County, is the ridge of the Island of Taiwan. On its east side is the East Schist Mountain Area and on the west side is the Central Clay Slate Mountain Area (Lin 1957). The two areas thus have different types of lithic resources for prehistoric people to utilize. At the Wansan site, large amounts of lithic artifacts were made from slate. Slate is not available at the site; however, it is one of the main components of the Central Mountain Range. Thus the Wansan people might have acquired the slate either from this area directly, or through trading with other groups of people.

Even though there is no palaeoenvironmental research directly conducted at the Wansan site, the research on the Ilan Plain and the neighboring areas still provides information about the prehistoric environment. The research on the ancient coastal line and weather conditions demonstrates that both the costal line and climate had been fluctuating over the past thousand years. The prehistoric Wansan people lived closer to the coastal line and faced warmer weather. Furthermore, the neighboring mountain areas provide rich resources for their daily life.

Figure 4.3 The change of coastline of the Ilan Plain (Revised from Chen *et al.* 2005)

4.1.2 Current population: the Austronesian peoples in Ilan

Although the Han Chinese is the main population in Ilan County now, the Kavalan, one of the Austronesian populations, was the biggest ethnic group in Ilan County before the 18th century. Along with the Kavalan, there were other Austronesian population, Torobiawan, Qauqaut, Taokas, Papora, Babuza, Hoanya, and Pazeh. (Li 1996:34). However, only the Kavalan and the Atayal groups still live in the Ilan County today.

The Kavalan mostly set up their settlement along the coastal area where marine resources are abundant. Because of the swampy condition of the coastal area, the Kavalan lived in a

special type of building structure: the pile-dwellings. In other words, they built their houses on raised piles over the water. This group of people was good at seafaring and their primary subsistence activity relied on fishing and collecting from the coastal area (Li 1996). The heavy dependence on the marine resource not only can be seen from their daily subsistence activities, but also was reflected on their social and religious activities. 17th and 19th century documents clearly described the Kavalan would travel by canoe up to the north or the south in order to conduct headhunting activity (Chan 2003).

In terms of their social organization, it was believed to be a type of matrilineal society, and no clear social hierarchy existed (Chiou 1999:30). Numerous Kavalan villages were located along the coastal areas in present-day Ilan Plain, and each village is an independent unit. Recent ethnographic studies on the Kavalan ritual activities indicate that the *Lepaw* (family, house) is the basic social organization of the traditional Kavalan society and certain ritual activities probably facilitate the formation of social identity (Liu 2002:160, 2006).

The other existing Austronesian population in Ilan County is the Atayal people. The Atayal live in the mountainous areas and still practiced slash and burn agriculture until the early 20th century. They also carried out hunting, fishing and collecting as their complementary subsistence activities. Their settlements tended to cluster on the river terrace or gentle hills. In the traditional Atayal society, agricultural activity, hunting, religious system and social organization all intertwined together and formed a "complete and unified system" (Li *et al* 1964).

4.1.3 Previous research on the Wansan site

The Wansan site was first discovered in 1963 when Professor Sheng Ch'ing-chi conducted an archaeological investigation in Ilan County. He collected 11 pieces of lithic artifacts, including chopped axes, polished chisels, polished adzes, stone knives, and some unidentified tools. After this preliminary investigation, Sheng categorized this site as a habitation site and attributed the site to the so-called Hsingchen cultural system (Sheng 1963).

During the 1980s, two archaeological surface surveys were conducted in the area. Both of the surveys revealed the presence of lithic artifacts, but the distinct evidence of cultural layers still had not been fount out yet (Huang and Liu 1980; Huang *et al* 1987).

During the early 1990s, a large areal extent of the site was recognized through more systematic surveys. From the distribution of the concentrations of artifacts, archaeologists were convinced that the range of the site covered the whole hill (Lien and Sung 1992). Actual cultural layers and the presence of pottery were not exposed until the mid-1990s. A random sample test excavation was conducted on the hill and a clear cultural layer was revealed on the west side of the hill (Liu 1995). During 1995, two more test excavations were carried out on the west side of the hill due to a pagoda-tower construction (Liu 1995).

After three test excavations, a preliminary picture of the prehistoric Wansan culture can be illustrated. Agricultural and hunting-related tools can reveal the way how prehistoric Wansan

people supported themselves in terms of subsistence. Other than utilitarian tools, they also possessed a variety of lithic ornaments, such as earrings, bracelet, etc. Among these ornaments, the jade zoo-anthropomorphic ornaments and horn-shaped bracelets are quite rare in Taiwan. In terms of ceramic artifacts, due to poor preservation, most of the pottery artifacts are broken potsherds. The two main ware pottery types are: Yellowish Brown Sandy Ware and Brown Sandy Ware. The basic vessel shapes are jars and bowls. Some of the jars have double-side vertical bridge-shaped handles. In addition to these artifacts, the two excavations also uncovered two types of burial customs: stone coffin and urn burial (Liu 1996).

4.2 The 1998 excavation

4.2.1 Rescue archaeology

Given that the range of the site had been identified through several surveys and test excavations, when a local private company decided to build a pagoda-tower at the site, county government asked archaeologists to execute rescue archaeology before the construction began. The actual excavation work lasted for about 6 months from the beginning of February to the end of August in 1998, except for a one-month break due to the shortage of funding.

Recovered from the archaeological efforts, were 906 boxes (20cm*40cm*55cm) of artifacts and several large stone slates disassembled from stone features which cannot be placed in the box. All the artifacts were bagged and shipped back to the Ilan County Cultural Center to be cleaned and catalogued later. It took three years to finish the preliminary cataloging and complete two basic reports summarizing the excavation process and the artifact catalog (Liu 2002).

4.2.2 Excavation

4.2.2.A Excavation area

The 1998 excavation area is on the western gentle slope of the hill. This area is about 54-48 meters above sea level (Fig 4.4). In the past, this area had been used to grow sugarcane, cassava, and other non-irrigated plants. Before the 1998 excavation, grasses and bushes covered this area.

Aligned with previous excavation units, the excavation units were set up towards NE32º direction. Each excavation unit measured 5 meters by 5 meters and was organized into a grid system (Figure 4.5). The datum grid is called T0P0 and T represents the north-south axis while P indicates the east-west direction. As a result, the T0P0 became the center unit and every unit has its distinct numbers. The 5 meters by 5 meters unit was further divided into four 2 meters by 2 meters subunits, naming A, B, C and D clockwise. Each side of the unit has 0.5 meter by 1-meter reference wall. The naming of this wall section is referenced to the unit on the north and west side. For example, the wall on the east side of the T0P0 unit would be called as T0P0Eex.

The 1998 excavation can be separated into two areas: the Northern and Southern Excavation Areas. There are 81 units in the Northern Excavation Area and 14 units in the Southern Excavation Area. The total excavation area was approximately 2,225 square meters.

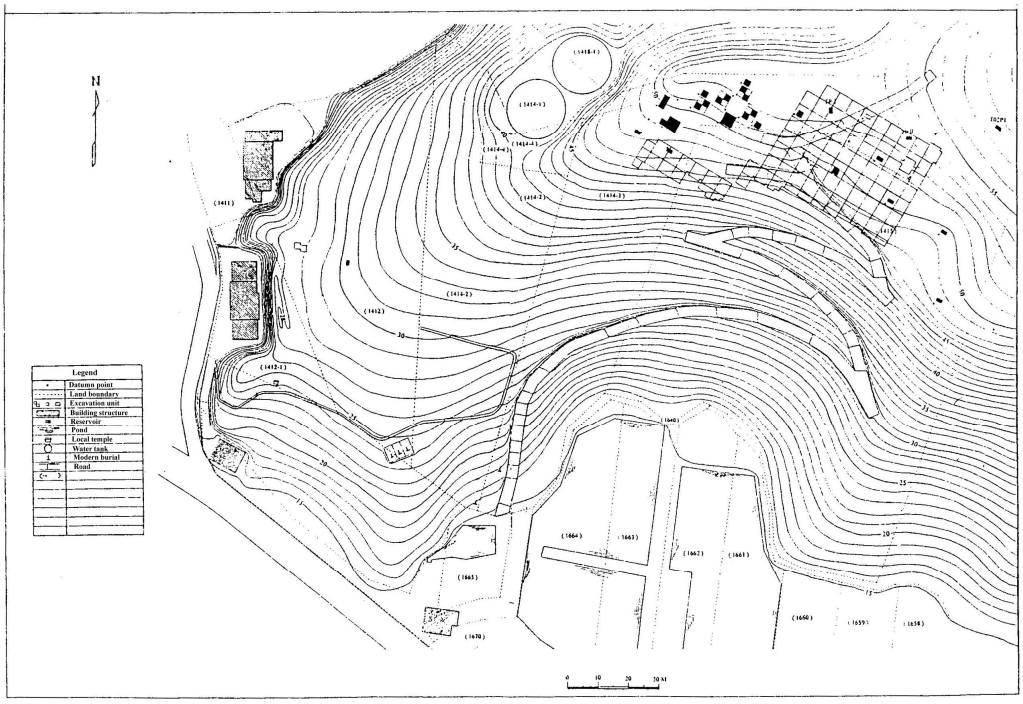

Figure 4.4 Excavation unit at the Wansan site (Revised from Liu 2000)

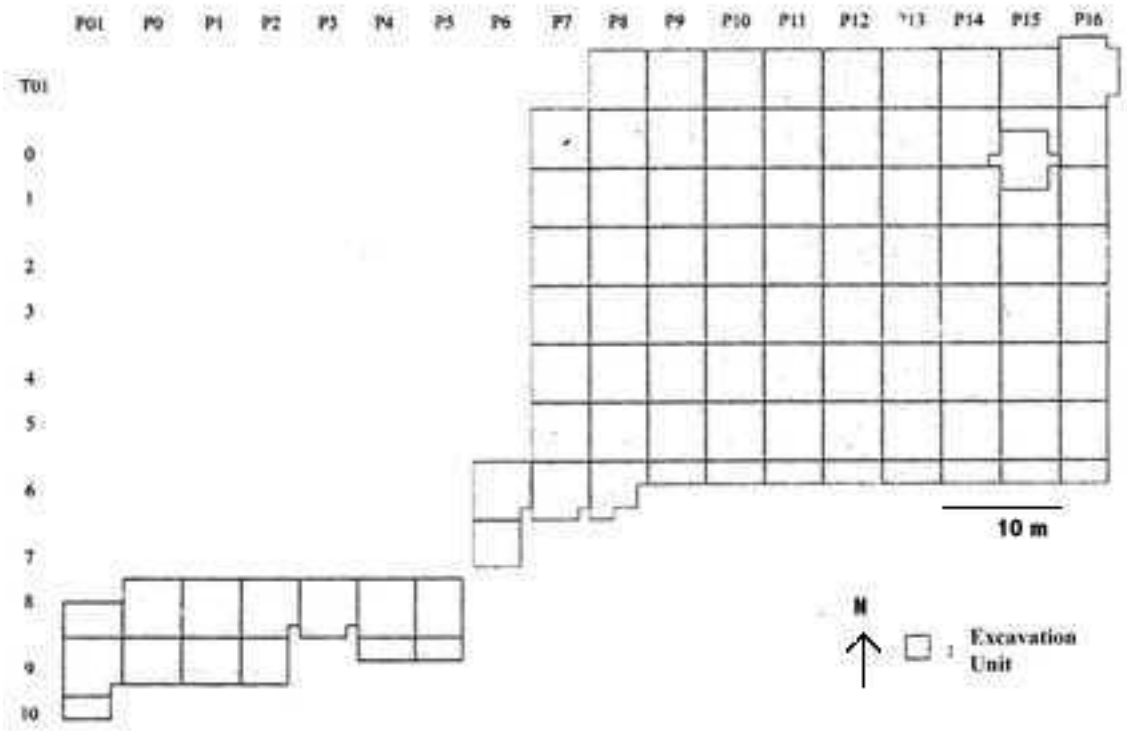

Figure 4.5 The layout of the 1998 excavation units (Revised from Liu 2000)

4.2.2.B Excavation method

In the beginning of the excavation, the excavation crew dug down based on artificial layer and each layer was 10 centimeter in depth to gain familiarity with the nature of the subsoil. When any changes of the texture or color of the soil were observed, the layer would be terminated and noted down. After a few weeks of excavation, the crewmembers began to have better control and understanding of the stratigraphy. Also to accelerate the speed in order to meet the approaching deadline, crewmembers began to dig down according to the natural layer. The top two natural layers are more recent deposition and contain few historical artifacts, thus, crewmembers only took note on the depth of each natural layer. Layer III is the prehistoric cultural layer, and a different excavation strategy was employed. The crew began to remove the dirt every 10 cm in depth and bagged the material individually.

During the excavation, the spatial information of each artifact and feature was written down. Because of the large quantity of potsherds and lithic tools, the precise location of each potsherd and tool was not recorded. Instead, they were bagged according to subunit number. However, all the features and burials were drawn and marked the exact location on engineering paper.

4.2.3 stratigraphy

The stratigraphy revealed during the 1998 excavation is consistent with previous excavations, meaning the all excavation areas basically went through similar depositional processes. There are four layers with some areas lacking one or two layers due to modern agricultural activity and the terrain. Below are the descriptions of each layer:

4.2.3.A The First Layer I (Recent agricultural field)

This layer is between 10-20 centimeters thick, dark brown in color. It is sandy loam, which contains a large number of shale rocks, and small amounts of artifacts, such as pottery, stone tools, porcelain, glazed pottery and modern artifacts. There are also three modern Han Chinese tombs in the excavation area. This layer is heavily affected by modern agricultural activity and covers the whole site.

4.2.3.B The Second Layer

The thickness of this layer is quite different within the site. It is thicker in the south of the excavation area about 40-50 centimeters thick, while in the northern area, it is about 20 centimeters thick. The soil color is brighter than Layer I. The texture is also stickier, but still contains large amount of shale rocks and artifacts. Seven out of nine carbon 14 dates indicate that this layer was probably formed during past two hundred years. Several units show that this layer may have been destroyed by recent agricultural activities.

4.2.3.C The Third Layer(the Second Phase of the Settlement)

This layer is about 30-50 centimeters thick, and it can be as thick as 100 centimeters thick in the southern area. However, some of the units do not have this layer at all, reflecting prehistoric Wansan people's spatial arrangement within the village. The color of this layer is darker and the texture is looser than Layer II. It still contains shale rocks and more concentrated prehistoric

artifacts. Different features, such as stonewalls, stone tool manufacturing loci and some burials, were also found in this layer. At the end of this layer, the soil color is becoming lighter and the evidence of postholes began to emerge in some areas.

4.2.3.D The Fourth Layer (the initial phase of the Wansan society)

This is the layer before hitting the bedrock. Some units did not have this layer since the Prehistoric Cultural Layer was right above the bedrock. The depth of this layer is not consistent throughout the excavation areas. Since this was rescue excavation, only layers containing cultural artifact were excavated. When the excavation crew dug into this layer, if there were no more cultural artifacts revealed for a continuous 30 cm in depth, the excavation was ended.

The soil of this layer is stickier and is yellow in color. On the contrary to the other three layers, this layer contains only very few artifacts. However, most of the burials were found inside this layer. Artifacts found in this layer were evidence of the inception of the human occupation on the Wansan hill. On the other hand, the burials were formed during the second phase of the settlement.

4.2.4 Radiocarbon dates

Fifty charcoal samples, mainly selected from the cultural layer, were sent to the Precision Instrumentation Center in the National Taiwan University in order to get radiocarbon dates. However, only thirty-nine samples yielded exact date. The rest of the samples were either too small to be processed or contaminated. Six samples were shown to be recent, meaning within 200 years (Figure 4.6 and Table 4.1).

Since the excavated area is on a gentle slope (see Figure 4.4), the accumulation of the artifacts concentrated at the south side was expected. However, the radiocarbon dates from the units on the south side indicate this might not affect the stratigraphy as seriously as expected.

Take the northwest subunit of the T5P16 unit for example (Figure 4.7, also see Figure 4.5 for the location of this unit). Layer I is about 20 cm thick and Layer II is 30-40 cm. Layer II is getting thinner toward the south, but not very much. However, Layer III reaches 70-80 cm thick. Underneath Layer III is Layer IV where eleven postholes were revealed.

T5P16 is one of the units located at the southern edge of the excavation area. It is thus expected to find mixed dates from this unit if the earth washed down from the northern units covered it. Five charcoal samples from the unit were sent to the laboratory. These samples were collected individually from 42, 92, 102, 122 and 132 cm below the surface. Except for the last one that belongs to Layer IV, the rest come from Layer III: the second phase of the settlement. The dates before calibration are: 2920 ± 50, 2940 ± 50, 3120 ± 40, 3310 ± 70 and 3480 ± 40 (sample numbers: WSIV-013, WSIV-014, WSIV-015, WSIV-016, and WSIV-017). These dates illustrate that when the sample was collected closer to the surface, the date is later than the samples gathered from the bottom of the layer. Therefore, the post-deposition process caused by the slope of the terrain seemed not to seriously affect the stratigraphy as expected.

Sample Number	Laboratory-Number	Estimated Date (B.P.)
WSIV-001	NTU-3311	3320 ± 70
WSIV-003	NTU-3320	2840 ± 40
WSIV-004	NTU-3315	3310 ± 50
WSIV-005	NTU-3446	2690 ± 60
WSIV-006	NTU-3316	440 ± 40
WSIV-007	NTU-3395	250 ± 40
WSIV-008	NTU-3333	3380 ± 50
WSIV-009	NTU-3375	3420 ± 40
WSIV-010	NTU-3341	3450 ± 60
WSIV-011	NTU-3400	2800 ± 50
WSIV-012	NTU-3349	3530 ± 60
WSIV-013	NTU-3368	2920 ± 50
WSIV-014	NTU-3367	2940 ± 50
WSIV-015	NTU-3327	3120 ± 40
WSIV-016	NTU-3398	3310 ± 70
WSIV-017	NTU-3319	3480 ± 40
WSIV-018	NTU-3381	3000 ± 40
WSIV-019	NTU-3369	2930 ± 50
WSIV-021	NTU-3376	360 ± 40
WSIV-022	NTU-3526	2840 ± 50
WSIV-023	NTU-3521	3420 ± 50
WSIV-024	NTU-3527	3020 ± 60
WSIV-026	NTU-3541	850 ± 50
WSIV-027	NTU-3532	3540 ± 280
WSIV-028	NTU-3546	2910 ± 60
WSIV-029	NTU-3316	440 ± 40
WSIV-030	NTU-3554	2880 ± 50
WSIV-031	NTU-3543	2800 ± 30
WSIV-032	NTU-4474	2380 ± 70
WSIV-034	NTU-4489	3350 ± 50
WSIV-038	NTU-4463	3230 ± 80
WSIV-039	NTU-4469	390 ± 50
WSIV-041	NTU-4452	2600 ± 90
WSIV-043	NTU-4476	3240 ± 100
WSIV-044	NTU-4453	2830 ± 110
WSIV-045	NTU-4471	2730 ± 60
WSIV-047	NTU-4462	2790 ± 120
WSIV-048	NTU-3554	3580 ± 90

Table 4. 1 List of radiocarbon dates

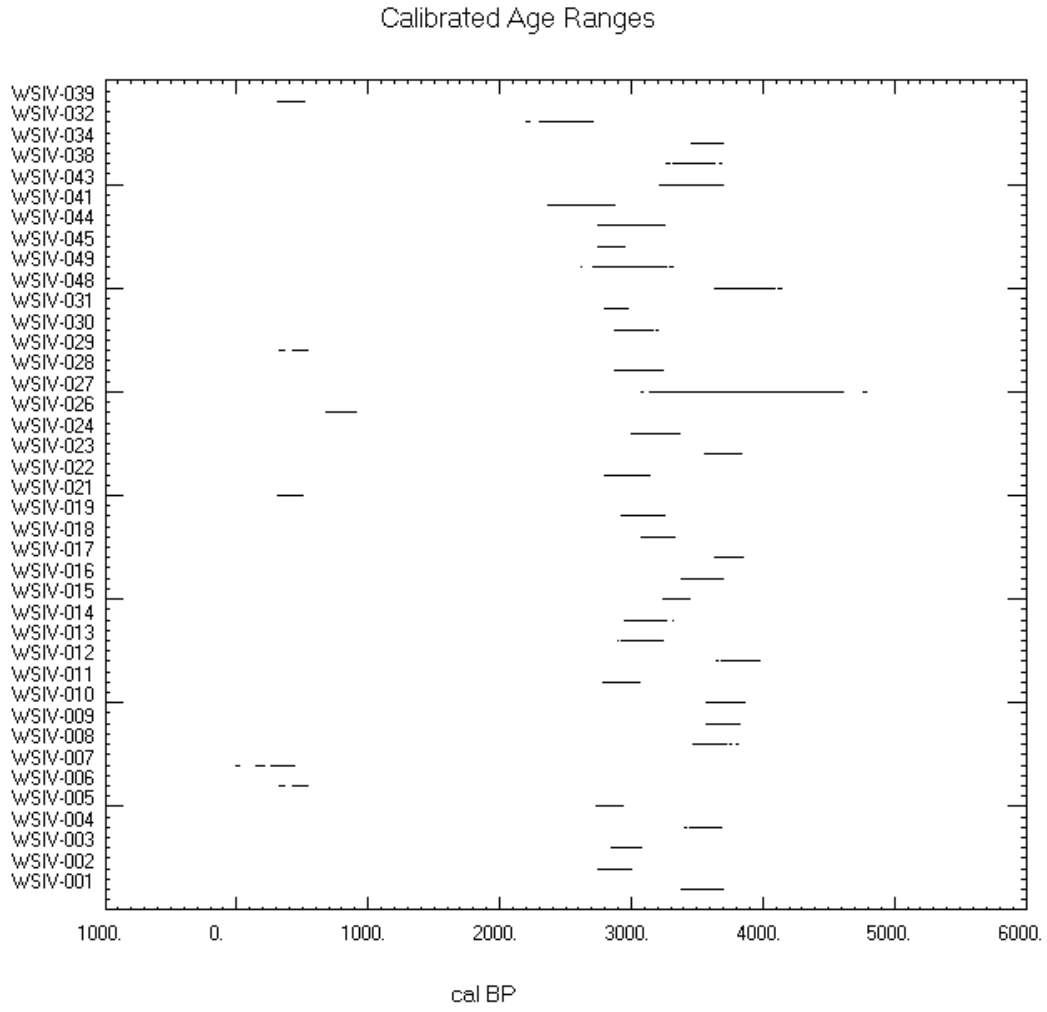

Figure 4.6 39 radiocarbon dates

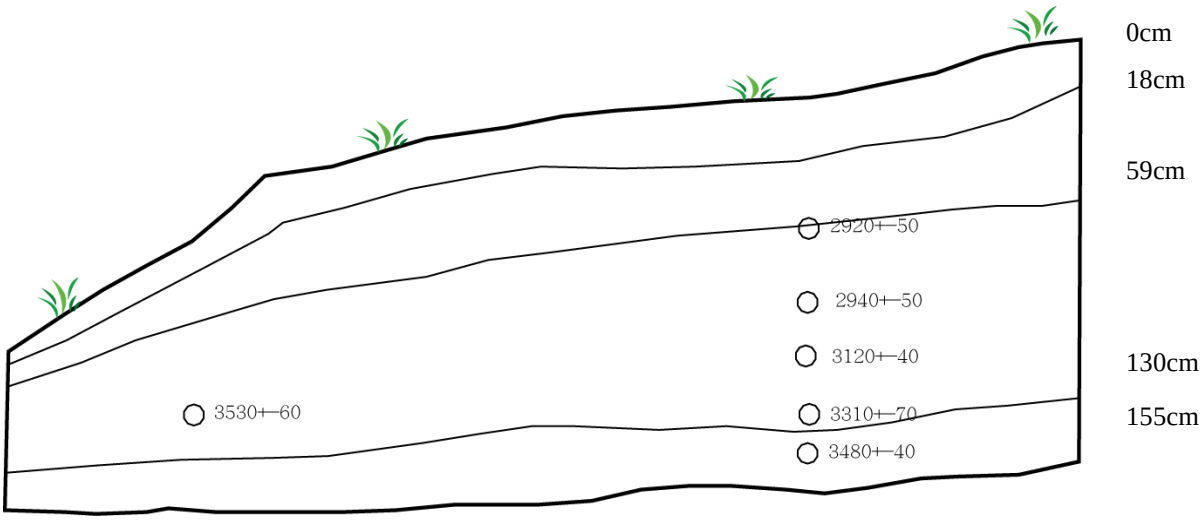

Figure 4.7 Profile of the west wall of the T5P16 unit

4.2.5 Empirical findings

There are a variety of features showing evidence of prehistoric human activities. They include postholes, hearths, stonewalls, slate coffins, urn burials, stone tool workshop, storage pit, and ritual loci. In addition to these prehistoric features, small amounts of historic artifacts and features were also uncovered in the 1998 excavation. The following is a summary of these prehistoric features and artifacts uncovered in the 1998 excavation.

4.2.5.A Features

Posthole

A total of 298 postholes were uncovered from the 1998 excavation area. These postholes are remains of the wooden posts utilized by prehistoric Wansan people. The identification of these postholes relied on the change of soil color and texture between Layers III and IV, and the depth of the postholes can reach as deep as into the bedrock. The distribution of the postholes follows the original natural terrain. To provide a firm structure, prehistoric Wansan people sometimes dug holes down into the bedrock. Most of the postholes are circular in shape but some of them are in oval shape. The largest posthole is 41 cm in radius and the smallest one is 3 cm in radius (Figure 4.8). As demonstrated in Figure 4.8, the radius of most postholes is clustered from 5 to 15 centimeters in radius. The reason for the variation is probably due to whether it is the main or side post. Ethnographical examples illustrate that a house is usually composed of a number of main posts in the middle or corner of the house, while several smaller posts encircle the houses (Chijiiwa 1988).

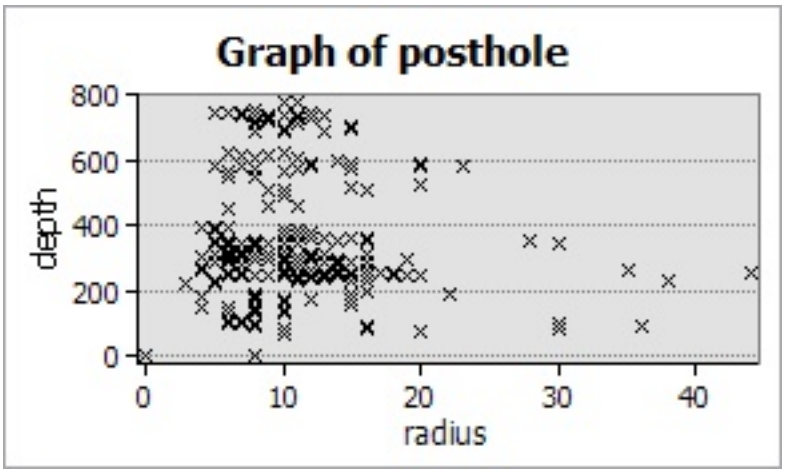

Figure 4.8 Posthole depth and radius

Stone wall

Seven lines of stone walls were uncovered in the Wansan site. Their spatial distribution is closely associated with the postholes. These stone walls, which are made of local shale, form a straight line that is associated with posthole clusters. Table 4.2 is the measurement of the seven stone walls.

Unit Number	Orientation	Length (cm)	Width (cm)
T0P9	NW	440	20-40
T2P9	NW	350	40
T4P15	NW	200	20
T5P13	NE	220	15
T8P3	NS	158	20
T8P4 CS	NW	170	28
T8P4BE	NE	120	45

Table 4. 2 Orientation, length, and width of the stone walls

Hearth

Five hearths were uncovered from the 1998 excavation. Each hearth is ringed with large pieces of shale. The inside of the hearth is filled with charcoal fragments and potsherds. The soil inside the hearth is much darker.

Storage pit

There are four pits carved into the bedrock at the site that are possible storage pits. The main differences between these pits and the postholes are the sizes and the shapes. These pits are much larger and deeper: the largest one is about 120 cm in diameter and 60 cm deep. The shapes of these pits are not the same. The soil in these pits is darker and looser. Since only a very small number of potsherds were found in these pits, these might have been used as storage pits to store organic artifacts or food products. Unfortunately, no soil samples were collected.

Stone coffin

A total of 55 stone coffins were excavated. Each stone coffin consists of four pieces of slate that formed a rectangle. In some cases, the bedrock was carved to form the bottom. In other cases, an additional piece of slate was used as the base. Due to acidic soil, there is no trace of human remains. However, based on the similarity with other contemporaneous sites in Taiwan, plus the associated artifacts found within them, these features should be considered as coffins. Figure 4.9 shows the length and width of these stone coffins.

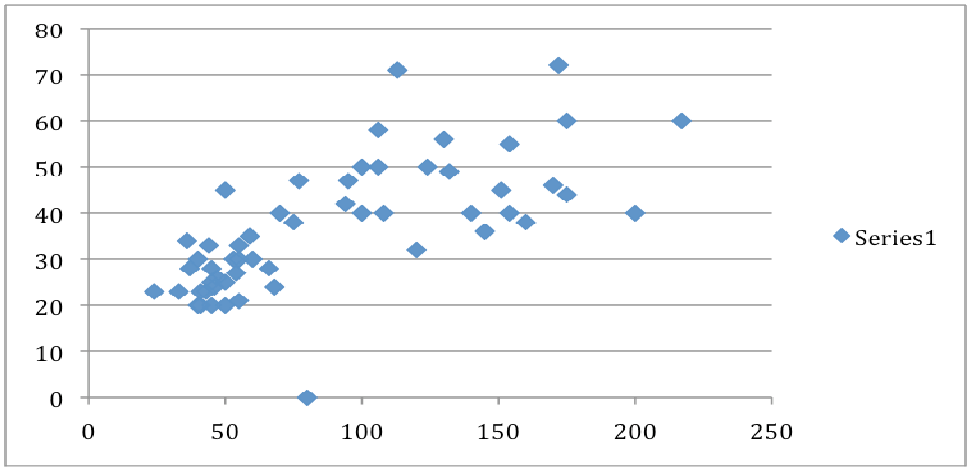

Figure 4. 9 The length vs. width of the stone coffins (cm)

Urn burial

Fourteen urn burials were excavated in 1998. Also due to acidity of the soil, there were no human remains found within these urn burials. Nevertheless, the unique shape, clay type and archaeological context are similar to urn burials in other sites, indicating that these urns were probably used as urn burials.

Eight of the urn burials are made using the same type of pottery, the Light Red Sandy Ware (see next section), and have identical shapes. They are bigger than utilitarian vessels and usually have a piece of slate placed on top of the urn. The other six urns are smaller and their pottery types and shapes are similar to the utilitarian vessels used in everyday life. Nevertheless, based on the context where these urns were discovered, the usage of these urns was not the same as utilitarian vessels. Some of these burials have slate intentionally placed around the urns in order to stabilize the urns and are found close to the stone coffins which suggest an association with the burial context.

Stone tool workshop

Seven concentrations of lithic debitage, unfinished stone tools, broken stone tools, and burned rocks can be interpreted as stone tool workshops. There are seven such recognizable workshops at the site. The width of the short axis is usually about 50 cm. The length of the long axis measured between 1.4-6.2 meters.

Possible ritual locus

Three arc-shaped concentrations of burned shale, slates and sandstone chunks were identified as possible ritual loci. The sizes range between 4-14 square meters. Originally, archaeologists suggested these lithic concentrations were stone tool workshops. However, the arc-shape concentrations, large volume of lithic material, and the rarity of lithic debitage and tools imply that these features are not workshops. Instead, archaeologists attributed these features to be remains of certain ritual activities (Liu 2000).

4.2.5.B Artifacts

Most artifacts are lithic tools and broken potsherds. Due to the site formation process, the artifacts could be found not only in Layers III and IV, but also on the surface and in Layers I and II. This dissertation aims to analyze the spatial organization of artifacts and features from the prehistoric cultural layer: Layers III and IV. The artifacts from these two layers and their distribution are the main focus of this dissertation; thus, they are addressed in Chapter 7, 8 and 9. Below I offer a summary of all the artifacts, regardless of their proveniences, to form the basis of later analysis.

Lithic artifacts

There are a total of 15,755 pieces of lithic artifacts unearthed from the 1998 excavation and 10,747 pieces are identifiable tools or ornaments (Table 4.3). The rest are unidentifiable lithic artifacts, including debitage, unfinished tools, and broken tools. The classification is mainly based on the form of artifacts. For the purpose of reconstructing past human behavior, the classification should follow the usage. However, the function of each artifact cannot be known without systematic ethnoarchaeology, experimental archaeology and use-wear analysis being conducted, and any classification according to what we might think to be the function is likely to be misleading. Nevertheless, consistent formal and physical variations may imply similar usage. I examined the use-wear of lithic tools excavated from the cultural layer using 10× magnifier. Based on the initial observation, the same category of tools has similar use-wear, probably indicating similar usage.

The hoe-axe-adze groups are tools with the use edge at the ends. They are always rectangular on the broad side, relatively flat, and the use edge is either symmetrical or asymmetrical. Traditionally, the axe is regarded as tree-cutting tool, the adze as a woodworking tool, and the hoe as a land clearing tool. However, the difference of form between some hoes and axes or adzes and axes are not obvious and most of the use-wear on the tools are not clear under the 10× magnification. Therefore, I divided this type of rectangular end-use tools into two groups: hoe-axe group and adze-axe group. The presence of one of these tool categories indicates possible woodworking and land clearing.

Summary

The lithic tools reveal several lines of evidence to understand prehistoric Wansan people's subsistence activities. The large number of net sinkers indicates reliance on aquatic resources. The various hoes, axes, knives, sickles and adzes imply certain agricultural or house construction activities. At the same time, the arrowhead and spearhead show evidence of hunting activity. In

other words, prehistoric Wansan people probably had knowledge to explore diverse ecological zones to acquire multiple resources and it is hard to estimate what type of subsistence activity is the most important one based on these lithic tools.

In addition to these tools, a large number of lithic ornaments can also be found and were made from either the slate or the jade. These ornaments include earrings, bracelets and pendants. Also a special type of jade object, the zoo-anthropomorphic objects, was discovered. The exact function of this type of object has long been debated. The archaeological context at the Peinan site in Taitung County, indicate it must have been a kind of earrings (Lien 2006). Due to its peculiar style, scarcity and association with burials, some scholars suggest it is more than decorative earring and burial goods, thus suggesting its social significance (Lien 2006).

The lithic artifacts are mainly made of slate (Table 4.4). The Wansan site is situated on the hill which is mainly composed of shale. However, the lithic artifacts were made from a variety of rocks that are not locally available. Prehistoric Wansan people had to obtain these rocks either through exchange activities or traveled to the quarry directly. These raw materials are located as near as the neighboring riverside just meters away from the site or as far as 100 km away. The uneven access to these materials thus offers possible clue to investigate prehistoric social differentiation.

Type	Number
Hoe-Axe	954
Adze-Axe	677
Taper-shape Tool	7
Point Tool	52
Sickle	60
Knife	519
Scraper	99
Chopper	45
Edge-chopper	25
Arrowhead and spearhead	670
Multi-holes tool	1,271
Perforated disk	722
Net sinker	1,201
Hammer	68
Disk	535
Whetstone	2,591
Mortar	68
Special point tool	8
Ornament	1,175
Total	10,747

Table 4.3 Number of different lithic artifacts

Material	Total %

Andesite	0.04
Chert	0.13
Greenstone	0.63
Jade	6.54
Mudstone	0.78
Phyllite	0.01
Crystal	0.07
Quartzite	0.03
Sandstone	23.13
Schist	0.12
Shale	7.44
Slate	60.98
Other	0.16

Table 4. 4 Raw material of lithic artifacts

Pottery

Potsherds are the most common archaeological data uncovered during the 1998 excavation. There are 56,780 potsherds and they weigh 701 kilograms. The potsherds can be divided into pottery vessels and non-vessels. There are four vessel shapes: jars, bowls, plates, and vases. Also a variety of vessel attachments were discovered, such as foot-rim, handles, and knobs. Non-vessel pottery includes spindle whorls, figurines, bracelets and unidentified objects (Table 4.5). Due to the nature of the soil and the pottery itself, the preservation of the pottery is not very good and most of the decoration and coloration on the surface are disappeared.

The detailed report of the pottery will be published in Chinese in the future. Below is a summary of this report (Liu in press).

Based on the thin section analysis conducted by Dr. Lin in the History and Philology, Academia Sinica, she divided the potsherds into two groups based on the composition of pottery inclusions (Lin 2000, 2002). One is from a local source, while the other is from the outside. The former mostly contains shale, mudstone, sandstone, quartzite and quartz. The latter includes mainly igneous rocks, such as plagioclase, pyroxene, andesite and some other weathered igneous rocks. Within these two categories, each one can be further divided into sub-groups based on texture and color. The first group includes the clay inclusions that are mainly from local sources. It can be divided into Yellowish Brown Sandy Ware and Grayish Black Fine Ware. The second group includes Brown Sandy Ware and Light Red Sandy Ware in which the inclusions show outside source (Table 4.6).

	Type		Form	Numbers	Weight (g.)
Vessel and its accessories	Rim		Jar Bowl Plate Vase	1028 78 3 4	24,163.5 1,830 62 273.5
	Rim subtotal			1,113	26,339
	Unidentified rim parts			12,207	119,141
	Shoulder			535	5,983.5
	Potsherds			38,236	470,325.4
	Bottom and ring-foot			1,345	19,822
	Knob			23	185.4
	Handle and lugs			2,097	36,700
	Vessel holder			3	255
Others	Figurine			17	345.5
	Spindle whorl			509	7,562
	Bracelet			112	155.9
	Unidentified object	Unknown part Special unknown Special object Knife Columnar unidentified Circle unidentified Lump		363 114 57 4 13 10 22	6,332.1 2,138.1 1,818.5 85 2,239 1,690.5 210.5
	Unidentified subtotal			583	14,513.7
	Total			56,780	701,328.5

Table 4. 5 Number of different ceramic artifact

	The first group (local)		The second group (non-local)		
Subtype	Yellowish Brown Sandy Ware	Grayish Black Fine Ware	Brown Sandy Ware	Light Red Sandy Ware	Total
Number	39,831	121	9,783	7,045	56,780
Relative frequency	70.15%	0.21%	17.23%	12.41%	100.00%
Weight	50,843.1	343.6	105,878.2	86,675.6	701,328.5
Relative frequency	72.50%	0.05%	15.10%	12.36%	100.00%

Table 4. 6 Number and weight of different groups of ceramic artifacts

Summary

It is obvious that the prehistoric Wansan people produced various forms of utilitarian and non-utilitarian objects using source available in the Ilan Plain. However, materials from areas outside of the Ilan Plain almost were exclusively used to make specific shapes of pottery jars. In other words, these pottery jars are either made locally using clays exchanging from the outside or more likely imported as a whole vessel into the site. The spatial analysis of these imported pottery artifacts thus can be one line of evidence to explore the possible social differentiation at the Wansan site.

4.3 Discussion

Approximately 3,500 years ago, a group of people moved to the Wansan hill and began to establish a settlement, which lasted for about 1000 years. This group of people brought a set of pottery and stone tool technology to this hill. They gradually expanded their settlement and established a close relationship with this hill through long-term interaction with the landscape. They modified the base rock in order to build their houses and buried their deceased members around the houses.

They not only had close interaction with the hill, but also had a solid knowledge of the neighboring environment. They acquired pottery and lithic raw materials from the Ilan Plain. At the same time, they had different exchange networks with other groups of people outside of the Ilan Plain. Thus, the foreign goods also constituted an important part of the lifeways of the Wansan people.

The lithic tool assemblages from the site indicate that the Wansan people practiced diverse subsistence activities, including fishing, hunting, and farming. Also large amounts of grinding stones as well as the presence of stone tool workshops at the site, illustrated that stone tool production might be an important part of the Wansan people's daily life.

Due to the poor preservation condition of pottery, our knowledge of pottery is seriously limited. The Wansan people produced a large amount of pottery vessels using materials that could have been acquired around the Ilan Plain. Jar is the main vessel form, but bowl, plate and vase are utilized during everyday life. Moreover, the Wansan people also made use of local material to produce spindle whorls, body ornaments and figurines.

Other than pottery source from the Ilan Plain, two types of pottery, the Brown Sandy Ware and the Light Red Sandy Ware, from other areas were also used in the Wansan people's everyday life. However, the pottery was only used to make a certain type of spindle whorls, specific type of vessels, and urn burials. Whether these pottery artifacts were traded into the Wansan site as finished artifacts or as raw material, the restricted use of this pottery thus pose direction to understand possible mechanism of social differentiation in the Wansan society.

In the following chapters, the spatial distribution of these prehistoric features and artifacts will be examined in detail. As described in this chapter, lithic and pottery artifacts are the main

archaeological materials uncovered from the Wansan site. Also they display diverse varieties in terms of styles, usages and raw materials. Therefore, the spatial analysis of these artifacts in relation to features provides several directions to reconstruct prehistoric Wansan houses and to investigate the differential distribution between houses.

CHAPTER V

RESEARCH QUESTIONS, HYPOTHESES, DATASETS, AND METHODS

5.1 Questions and hypotheses

Two research questions are addressed in this dissertation: how did prehistoric Wansan people organize themselves into different social groups and how and why were these social groups differentiated from each other? As discussed in previous chapters, I propose that the anthropological notion of House Society can serve as an efficient model through which to explore these issues.

Linguistic, ethnological, and archaeological research all suggest that "houses" can be a threshold for analyzing prehistoric social organization in Taiwan. The presence of postholes, burials, stone features, and a considerable amount of exotic and locally-made artifacts at the Wansan site suggest that the "house-center" approach can be a productive approach to begin with. Moreover, the concept of House Society can provide further links to interpreting the dynamic social relations through the distribution of these physical properties.

The concept of House Society also assists archaeologists to explore the mechanism of social differentiation. The general consensus about the emergence of social stratification in Taiwan is that it began during the late Neolithic period (3,500-2,000 years ago). The burial data excavated from the Peinan site demonstrate possible social ranking based on the differences of the grave goods (Lien 2005). However, archaeologists neither explained what kind of social ranking this society had nor examined the artifacts from the living floor in order to understand whether the social differences also existed in their daily lives. The "House society" model derived from the anthropological and historical research emphasizes the importance of utilizing the material medium to investigate the process of social differentiation. At the same time, this model advocates the idea that some aspects of ranking are nearly always present in House societies, but range from weakly developed and unaligned (i.e., heterarchy), to elaborated and aligned (i.e., hierarchy), such as the social transformations that occurred between the earlier Lapita stage and that of Ancestral Polynesia (Kirch and Green 2001:203). Thus, through exploring the differences expressed in material culture, whether in terms of quantity or quality, archaeologists can determine the possible social differentiation due to uneven social, political, economic, or ritual status.

Within the House unit, members of the same House claim their membership by participating in different activities associated with the House. The House unit is also where the social differentiation can be observed. However, in the House society, the social differences can be expressed not only in economic activities, but also through the symbolic status practiced in ritual activity. Whether the society is heterarchical or hierarchical, the difference and continuity of each House unit can be observed from the utilitarian objects and artifacts related to ritual activity.

As a result, the House society model can offer us to explore the mechanism of the process of social differentiation at the Wansan site. Given the characteristics of House Society as described in previous chapters, several archaeological implications can be investigated as following:

1) a house or cluster of houses, 2) repetitive utilization of the house site, 3) ancestral ritual activities practiced in each house, 4) images or writings depicted in personal belongings or structures to transmit titles or names 5) artifacts related to everyday life associated with houses, and 6) the variability of the artifacts in terms of quantity or quality among houses.

This dissertation stresses the utility of the "contextual" approach that emphasizes artifact analysis and an understanding of the spatial patterns of the structures and their associated features (e.g., Flannery and Winter 1976; Hendon 1996; Kahn 2005; Lightfoot et al 1998) as the most productive avenues for understanding different aspects of household activities. Comparative analysis of the possible presence of architecture, subsurface features, and artifact patterning at the Wansan site will establish whether certain activities have a generalized distribution among different houses or cluster of houses, while others have a specialized or restricted distribution. These data will offer information about the usage of different house sites not available from the architecture and feature data alone, and will determine what the variation in domestic activities represents in economic, social and political terms.

5.2 Datasets

The dataset of this dissertation is from the 1998 excavation of the Wansan site. The 1998 excavation area is approximately 2,200 square meters which consists of two blocks: the Northern and the Southern Excavation Areas. The Northern Excavation Area is about 40*50 square meters and the Southern Excavation Area is approximately 10*30 square meters. Most of the artifacts and features are recovered from the Northern Excavation Area.

Before the 1998 excavation, three small-scale test excavations were conducted on the Wansan hill. Those excavations revealed the extent and nature of the site. However, it is the 1998 areal excavation that unearthed clear evidence to examine the spatial association between features and artifacts. Although previous excavations also uncovered features such as postholes and burials, they are excluded from this analysis.

Eight types of features were identified, including postholes, stonewalls, hearths, storage pits, stone coffins, and urn burials. Table 5.1 presents the totals of these features, and the details of the features are elaborated in Chapter 6. The presence of these features is used to argue for the distribution of houses and the various activities being conducted.

As mentioned in the previous chapter, two prehistoric cultural layers are identified: the Third and the Fourth Layers. This dissertation focuses on analyzing artifacts from these two cultural layers. Based on the stratigraphy and radiocarbon dating, the Fourth Layer represents the initial stage of the settlement, while the Third Layer indicates the growth of the settlement. The

following analyses separate the two cultural layers in order to examine the temporal change of the Wansan society.

Feature	Number
Stone wall	7
Hearth	5
Stone tool workshop	7
Possible storage pit	4
Possible ritual loci	3
Stone coffin	55
Urn Burial	14

Table 5.1 Number of features

Since no organic remains were recovered, only two types of artifacts are considered: ceramic and lithic artifacts. The total number of lithic artifacts from the Fourth and Third Layers is about 9,648 pieces, including tools, ornaments, unfinished products, possible broken tools, debitage, and raw material. In addition, pottery artifacts, which consist of vessels, bracelets, spindle whorls, figurines, and some unknown artifacts, weigh more than 454 kilograms. The large amounts of lithic and pottery artifacts provide a sufficient database with which to look for distribution patterns.

5.3 Methods

5.3.1 Identifying dwellings from the distribution of postholes

The first stage of data analysis is to identify dwellings based on the distribution of postholes. Postholes are direct evidence of the presence of dwellings at the Wansan site. According to ethnographic work conducted on the Austronesian architecture in Taiwan, there are three types of residential dwellings: the pile-dwelling, the ground building, and the semi-subterranean dwelling (Chijiiwa 1988; Tu 1998). No matter which types of residential houses were constructed, wooden posts are the basic, common component of all the three types of architecture. After setting up the wooden posts as the main structure, different types of materials were used to assemble each dwelling. Therefore, when clusters of postholes are uncovered from archaeological sites, they are considered to be one line of evidence that indicates the existence of dwellings.

The count of posthole clusters is used to argue for the possible number of dwellings and different clusters of postholes are distinguished by the proximity of postholes. Three steps of analysis are conducted. First, an intuitive visual inspection is conducted to estimate the number of posthole clusters. Ethnographic data demonstrate that the distance between posts of Austronesian residential dwellings in Taiwan ranges from 50 to 200 centimeters (Figure 5.1). Most are between 100 to 200 centimeters apart. Thus, by plotting the postholes on a map of the excavation area, several clusters of postholes should be able to be visually identified. The

estimated number reflects the possible number of buildings present during prehistoric time. However, whether these building existed at the same time or not is analyzed with stratigraphic evidence and radiocarbon dates.

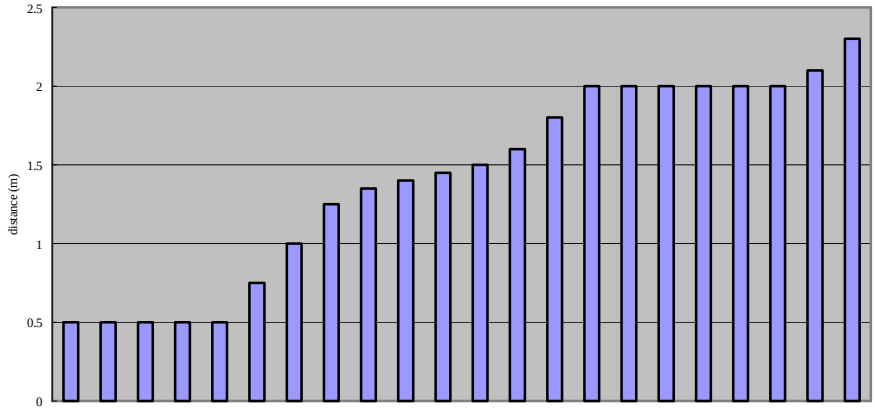

Figure 5. 1 The distance between posts among Austronesian societies in Taiwan (Chijiiwa 1960)

Secondly, the Global Moran's I index (ESRI.com 2009; Anselin 2003) of the depth and distance is calculated in order to see if the cluster of postholes is statistically significant. The Global Moran's I index is used to measure whether a group of features is clustered, dispersed, or random (Lee and Wong 2005). The Global Moran's I is not only computed by the distance between the features, but also by taking the attribute of the features into consideration. This spatial statistic tool in the ArcGIS can calculate the Global Moran's I index value and a *z* score. The I index value is computed as written below:

$$I = \frac{n}{S_0} \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{i,j} z_i z_j}{\sum_{i=1}^{n} z_i^2}$$

The z_i is the deviation of an attribute for feature *i* from its mean, and $w_{i,j}$ is the spatial weight between feature *i* and *j*. *n* is the total number of features, and S_0 is the sum of all the spatial weights.

When the I index value is near +1.0, it usually indicates that these features are clustered. On the contrary, when the value is around –1.0, then the features tend to disperse. Moreover, the Moran's I tool can calculate a Z score and p-value to illustrate whether or not the null hypothesis

can be rejected. In this case, the null hypothesis states that the feature values are randomly distributed. The Z score is the number of standard deviations above or below the mean of its distribution that assists us to decide whether to reject the null hypothesis or not. It is a measure of standard deviation. The p-value is the probability that indicate we falsely rejected the null hypothesis. Both Z score and the p-value are associated with the standard normal distribution. Very high or low Z scores, associated with very small p-values, are found in the tails of the normal distribution. Therefore, when the analysis yields small p-values and either a very high or a very low Z score, it indicates that it is very unlikely that the observed pattern is some version of the theoretical spatial random distribution suggested by the null hypothesis (Anselin 2003; ESRI.com 2009; Mitchell 2005).

In this calculation, the critical Z score values when using a 95% confidence level are -1.96 and +1.96 standard deviation. The p-value associated with a 95% confidence level is 0.05. If the Z score is outside of the -1.96 to +1.96 range, the p-value will be smaller than 0.05, and is, thus, possible to reject the null hypothesis.

Accordingly, the radius of these postholes is used to calculate the Global Moran's I index. If the calculated I index of the radius is larger than +1.0, it is suggested that the similar size of the postholes tends to cluster. At the same time, the depth of the postholes is used to calculate the Global Moran's I index to see if it generates a similar cluster pattern.

Lastly, while the Global Moran's I index is used to examine whether these postholes with different attributes form clusters, the calculation of Anselin Local Moran's I (ESRI. Com 2009, Anselin 2003) can further identify the cluster of features with similar attribute values. Unlike the Global Moran's I index, the Anselin Local Moran's I index can calculate the I value and *z* score for each feature. As a result, each individual feature within the cluster can be examined to see if it is statistically significant. This method used in the ArcGIS software can also recognize the clusters that have similar values and mark them as HH, HL, LH, and LL individually on the map. HH means the features are clustered due to their similar high attribute values, while the LL indicates the clusters are formed because of similar low values. Most important, the *z* score represents the statistical significance of the index value.

The Anselin Local Moran's I statistic is given as the following:

$$I_i = \frac{x_i - \overline{X}}{S_i^2} \sum_{j=1,\, j \neq i}^{n} w_{i,j}\left(x_i - \overline{X}\right)$$

$$S_i^2 = \frac{\sum_{j=1,\, j \neq i}^{n} w_{ij}}{n-1} - \overline{X}^2$$

The x_i is an attribute for feature *i*, and the $\overline{X}$ is the mean of the corresponding attribute. The $w_{i,j}$ is the spatial weight between feature *i* and *j*, and *n* equals the total number of features.

Applying the radius and depth of the postholes to the Anselin Local Moran's I calculation should allow us to re-examine whether each individual posthole inside the identified clusters is statistically meaningful or not. Supposedly, the same building structure should have a consistent size and depth of postholes. If the I index value of the posthole is not similar to other postholes in the same cluster, the reason would need to be further explored based on other contextual information.

In sum, the Global Moran's I index can inform us of whether these postholes with a similar depth and size form a cluster or not, and the Anselin Local Moran's I can further assist us to recognize where the clusters are. Once the posthole clusters are identified, the possible presence of at least one dwelling can be assumed and examined through the distribution of other archaeological material.

5.3.2 Examining the presence of dwelling groups from the distribution of features and artifacts

After identifying dwellings from the distribution of postholes, the distribution of other features and artifact clusters is analyzed to see whether these dwellings further form groups. In addition to the postholes, there are various subsurface features present at the Wansan site. These are stone walls, hearths, stone tool workshops, possible storage pits, possible ritual loci, stone coffins, and urn burials (see Table 5.1). The spatial association of these features and the identified dwellings are investigated to see if any spatial pattern exists among the dwellings. The pattern can indicate whether prehistoric Wansan people resided in different dwellings performing different tasks and whether people in neighboring dwellings collaborated during their daily life. Moreover, features, such as stone walls and burials, can be one line of evidence to argue for the presence of physical boundaries between dwellings.

In addition, the distribution of artifacts can offer insight when exploring the cooperation between dwellings. The Local Anselin Moran's I index can also be used to detect whether these artifacts create any clusters. The formation of artifact clusters implies that, first, prehistoric Wansan people habitually discarded their daily refuse in certain areas. Secondly, the presence of prominent concentration of artifacts probably signifies that the areas had been occupied repetitively for a certain period of time. If neighboring dwellings do form dwelling groups, they would likely share some spaces for daily debris. In addition, members of the dwelling groups would participate certain activities together, such as stone tool production, thus leaving material remains in each dwelling group. On the other hand, if the distribution of features and artifacts demonstrates a more close association with each dwelling, then these dwellings probably do not form a dwelling group.

5.3.3 Examining temporal change

The two superimposed cultural layers which indicate temporal change can be examined. First, whether the change of the artifacts lies in the quality, quantity, or both is analyzed. Based on the stratigraphy and radiocarbon dating, the Fourth Layer represents the initial stage of the settlement. The change of the quantity and quality of the two cultural layers can further illustrate whether the two cultural layers were formed due to the replacement or the expansion of original

society. If the inceptive population was displaced by a newly arriving society, the abrupt emergence of distinctive material culture should be expected. On the other hand, if the different cultural layers were the result of settlement growth, the main change would be observed in the differences of quantity of artifacts.

Secondly, the change of spatial distribution is scrutinized. The differences of spatial distribution of artifacts and features between the two cultural layers also inform us of the temporal change of the settlement. Whether people change locations to build their houses or continuously rebuild their houses at the same spot can be examined through the spatial distribution of features and artifacts. The distribution map of features and artifacts of these two cultural layers will be superimposed in order to see the variation between the two.

5.3.4 Examining the association between ancestral rituals and the dwellings/ dwelling groups

Two types of mortuary practices are uncovered from the Wansan site. One is to place the corpse inside a box-shaped container assembled of slate. The second type of practice is to position the deceased body in a large urn. Although only two forms of burial practices were unearthed, there are variations within these practices in terms of shape, size, and material. Both of the mortuary practices involved exotic goods. The slate used to construct the container is imported from neighboring mountains, while the source of the clay was outside of the Wansan hill. The preparation and actual burying activities required certain efforts for the arrangement and organization of the whole practice. Also, the presence of certain grave goods which have symbolic meaning further enhances the importance of this process. In other words, the burials at the Wansan served as a significant place for ancestral ritual activity.

Moreover, a type of features was identified as remains of possible ritual activities. It is mostly in the form of arc-shaped concentrations of burned shale, slates and sandstone chunks distributed at the Wansan site.

The spatial association between the burials and the identified houses will be examined. A map of burial and house distribution will be superimposed in order to discern the relationship between the burials and houses.

5.3.5 Examining the association between the zoo-anthropomorphic objects with the dwellings/ dwelling groups

Based on ethnographic work conducted in Taiwan and Southeast Asian Austronesian societies (see Chapter 2 and 3), the anthropomorphic motif is often used to act as an inalienable possession which symbolizes the close connection between House members and the House founding ancestors. This motif can be carved on wooden beams and placed in the center of chief's house or on serving containers used in rituals or used as an ancestral effigy carved on a plank erected in front of the chief's house. No matter what type of material objects were used or whether the society is a type of egalitarian or hierarchical society, the importance of this anthropomorphic image is closely tied to ancestral worship. In a House society, the emphasis on possessing certain material medium which bridges the House with its ancestor is used to

consolidate House identity and maintain the continuity of the House. The House which possesses this ancestor-related object might suggest its special social status or difference from other Houses.

At the Wansan site, the zoo-anthropomorphic object is the only material medium carrying this anthropomorphic motif. All of these objects are stylistically consistent: human figurines in a standing position with animals on top of the head. More importantly, all of them are found from a burial context, implying its special role in the process of mortuary rituals.

As argued in Chapter3, the anthropomorphic motif and the archaeological context of this zoo-anthropomorphic object suggest its unique social significance in prehistoric Wansan society. It could act as a type of "inalienable possessions" and probably House heirloom that bore House histories and was used in mortuary rituals to affirm existing relationships or differentiate our Houses from others.

Therefore, the distribution of this special zoo-anthropomorphic object and its association with dwellings/ dwelling groups is examined. The presence and absence of this zoo-anthropomorphic object in dwellings/ dwelling groups can be one line of evidence of to explore whether there existed differential status in prehistoric Wansan society.

5.3.6 Analyzing the variety of artifacts among the dwellings

The spatial analysis of artifacts among the dwellings indicates the variation of activities being practiced among the dwellings. The identified dwellings from the distribution of features and artifacts are treated as an analysis unit. Both the pottery and lithic artifacts are classified according to their forms. The different forms of these artifacts indicate possible differences in the usage of these artifacts.

At the Wansan site, the 1998 excavation unearthed abundant lithic and pottery artifacts, including storing, cooking, and serving vessels and a variety of weaving, hunting, fishing, farming, and tool production equipments. Although there is no clear feature indicating the presence of pottery workshop at the site, the large amounts of pottery artifacts made from local clay suggest that most pottery artifacts were locally made. The possible concentration of artifacts implies that prehistoric Wansan people discarded their broken vessels and tools in certain areas outside of the dwellings. Even though these "dumping" areas are outside of the dwellings, they are in close proximity to dwellings or dwelling groups.

The forms of lithic artifacts are more diverse than the ceramic artifacts. Based on the form and preliminary use-wear observation, these artifacts can be classified into three categories: ornaments, tools, and debitage. Moreover, tools can be further divided according to their possible usages. These include tools related to subsistence activities, such as fishing tools, hunting tools, agricultural tools, and wood working tools. Also, a series of lithic artifacts, such as whetstones, lithic raw materials, and debitage, indicate the process of tool manufacturing and maintenance. Other than tools, a variety of ornaments made from lithic material, such as bracelets, necklaces, and earrings, are also present.

The pottery artifacts include vessels and non-vessels. Determining the exact uses of the vessels requires further chemical and experimental analysis in the future. For the purpose of this dissertation, only four types of vessel forms are distinguished: the jar, bowl, plate, and vase. Based on the rim shapes, the jars can be further classified into four categories: flare rim with reverted lip (A), flare rim (B), flare rim with inverted lip (C), and the others (D). Ethnographic examples inform us that these pottery vessels mainly served as containers for cooking or storing (Chen 1959; Shih 1962).

The distribution of different pottery and lithic artifacts among dwellings will be examined. The purpose is to see if any special-purpose dwelling existed and whether there was any difference of activities being performed in each dwelling. At the same time, if the dwellings do form dwelling groups, whether each dwelling of the same dwelling group specialized in a certain activity is analyzed.

Furthermore, the temporal change will be considered. Plots showing the ratio of different types of artifacts associated with each dwelling in the Third and Fourth Layers will be compared in order to analyze the change among houses and between periods.

5.3.7 Analyzing artifact attributes among dwellings

The last analysis aims to explore whether there is any difference among the dwellings in terms of the technological and stylistic attributes of the artifacts. As suggested in the House Society model, social differentiation can often be discerned at the house level. Moreover, House Society model explicitly indicates that some level of social differentiation always existed, from the presence of an initial heterarchical system to the more official hierarchical institution. This can be expressed through the material culture that house members utilized on a daily basis. Archaeologically speaking, these variations refer to either different activities performed within or between houses or to the diverse technological and stylistic signatures carved on material remains. Therefore, the differences between the material objects among dwellings will also be analyzed.

First I want to examine the attributes of lithic artifacts. In terms of technological attributes, I focus on the source of the material. The prehistoric Wansan people utilized both local and foreign material to fabricate their lithic and pottery artifacts. The ability to acquire exotic goods required social networks so that connections could be made to the source distributors either within or outside of the village. Thus, the differential possession of the exotic goods of each dwelling signifies social distinction.

The second analysis of lithic artifacts focuses on the stylistic attributes of the artifacts. One of the most significant traits of the Wansan sites is the diversification of artifacts. This implies that different social groups probably demarcate their boundaries through the manipulation of the stylistic attributes of artifacts.

In terms of pottery artifacts, due to poor preservation, most of stylistic and technological attributes of the pottery vessels, such as vessel shape and decoration, are hard to distinguish.

However, based on the thin section analysis on the paste of the clay, the pottery artifacts can be grouped into two types. The first type is procured from the local source and the other is imported from other areas (see Chapter 4). Therefore, the distribution of these two different types of pottery artifacts among houses will be compared. The result can demonstrate whether each dwelling has different access to the clay resources, which might indicate that each dwelling has unequal access to these resources.

Unlike the approach to analyzing the pottery vessels, it is better to observe the condition of the pottery bracelets, spindle whorls, and figurines through their stylistic and technological attributes. Thus, the distribution of these different attributes among the identified dwellings will be also plotted and compared.

The preservation condition of the lithic artifacts is much better than that of the pottery artifacts. Although most of the lithic artifacts are tools for utilitarian usage, the presence of non-tool artifacts, especially the distribution of jade artifacts, offers clues for examining the difference among dwellings.

The usage of jade in prehistoric Taiwan can be traced back to the middle Neolithic period in Taiwan: the fine cord-marked ware culture, beginning 4,200 years ago (Liu). In the early period, even though it was used to make tools and ornaments, the majority was used to produce tools, especially adzes. However, the importance of jade ornaments intensified in the later period and then disappeared when iron came into use in daily life. Unlike other lithic artifacts from the Wansan site, jade is not locally available. Furthermore, the absence of processing tools and debitage indicates that the jade artifacts were imported as a complete product from outside, either through direct or indirect exchange networks. Recent research using probe microanalysis to examine the jade artifacts in Taiwan indicates that they are all from the same workshop, Pinglin, in southeast Taiwan (Hung et al. 2007). Therefore, the different jade artifacts these dwellings possess might imply their uneven ability to have access to this particular material due to differences in status, wealth, role, gender, age, and so on.

The jade artifacts at the Wansan site include adzes, arrowheads, and ornaments. Except for the zoo-anthropomorphic object, which is always closely associated with the mortuary context, other jade artifacts can be used as either grave goods or utilitarian objects. Thus, the distribution of the jade adze, arrowhead, and ornament among the dwellings will be compared. The purpose is to examine whether the dwellings may have obtained the jade artifacts differently and whether the difference is reflected in the types of artifacts.

5.4 Conclusion

The concept of House society is proposed to investigate how the prehistoric Wansan people organized themselves into distinct social groups and why and how these social groups are distinguished from each other. Several archaeological implications derived from ethnographic examples of the House society are suggested and scrutinized. In order to examine these archaeological implications, four steps of analysis are offered: identifying dwellings, and

possible presence of dwelling groups; examining temporal change, and the association between dwellings and burials; analyzing the differences in of the variety of artifacts; and observing the diversity of artifact attributes among dwellings.

This house-based analysis thus provides a multiscalar level analysis to investigate the social organization of the Wansan society. Commencing from the identification of the physical houses that offer shelter for human population to comparing the differences among these house structures, the interactions between the residents inside these dwellings can be explored through these proposed analyses.

The result of these analyses can inform us as to whether members of houses constituted distinct social groups in prehistoric Wansan society. In addition, the differences of both the quantity and quality of artifacts among dwellings can be lines of evidence through which to argue for the presence of social differentiation. In a House society, material medium is always manipulated to express certain levels of social differentiation. These distinctions can be based on age, gender, social, political, ritual, or economic differences. The possible activities and differences can be discerned through the comparison of artifact distribution among dwellings at the Wansan site. Artifact distribution can further inform us of whether the differentiation emerges at the dwelling or the settlement level.

CHAPTER VI

SPATIAL ANALYSIS OF FEATURES: IDENTIFYING THE NUMBER AND EXTENT OF DWELLINGS

As discussed in Chapter 2, the House society is characterized by several distinct traits. Archaeological implications derived from the concept of House society were outlined in Chapter 5. In the following three chapters, I will examine whether these archaeological implications can be found. In this chapter, I will examine three aspects of archaeological data at the Wansan site: 1) the repetitive use of the same dwelling or place; 2) the presence or absence of dwellings or dwelling groups; 3) the spatial association of the evidence of ritual activities at the dwellings.

An ethnographic study conducted on Austronesian architecture in Taiwan during the 1940s identified two types of residential dwellings: the ground building and the semi-subterranean dwelling (Chijiiwa 1988). Wooden posts are the basic common component of both two types of architecture. After setting up wooden posts as the main structure, different types of materials were used to assemble each dwelling. Therefore, when clusters of postholes are uncovered from archaeological sites, they are considered to be one line of evidence that indicates the existence of dwellings.

After identifying dwellings through an analysis of the spatial distribution of postholes, the spatial association of ritual activities and ceremonial features of these dwellings will be examined. Certain archaeological features, such as burials, indicate the existence of ritual activities. Also, features such as hearths, stonewalls, storage pits, and stone tool workshops, can help us confirm the possible extent of each dwelling.

In the first part of this chapter, the spatial distribution of postholes is analyzed to identify the possible number of dwellings. Second, other features are examined to figure out the extent of each identified dwelling. Third, an analysis of the spatial distribution of artifacts is performed to examine the relationship between these dwellings. Finally, the distribution of burials is used to examine the ritual aspect of the dwellings. The association between features related to possible ritual activities and the identified dwellings is additionally assessed.

6.1 Identifying the number of dwellings: spatial distribution of postholes

The presence of posthole clusters is used here to argue for the presence of dwellings. The following analysis of posthole distribution indicates that at least twelve dwelling structures were present during prehistoric times. These dwellings are named: Dwelling A, B, C, D, E, F, G, H, I, J, K, and L, respectively.

6.1.1 The distribution of the postholes

The 1998 excavation area can be divided into two smaller areas: the Northern and Southern Excavation Areas. Both of these areas are associated with multiple features and abundant archaeological artifacts. Since the two areas are not spatially connected, they are analyzed as two separate units.

As discussed in Chapters 3 and 5, the distribution of postholes can serve as one line of evidence to indicate the existence of dwellings. Two methods of analysis are conducted in order to determine the possible number of dwellings that existed in the two excavation areas. The first is to assess by visual inspection, and the second method is to employ the spatial statistical program embedded in the ArcGIS software package developed by the ESRI Company. The use of spatial statistics enables us to plot the posthole clusters based on the attributes of the postholes.

6.1.2 Analysis of the horizontal distribution of postholes

Based on an initial visual inspection, eight clusters of postholes are identified at the Northern Excavation Area and two clusters at the Southern Excavation Area (Figure 6.1). At the same time, the Global Moran's I Index calculated from the depth of the postholes from the Northern Excavation Area is 0.71 and the z score is 48.41 (the meaning of the i value and z score is discussed in Chapter 5). This indicates that postholes of similar depth tend to form clusters. Moreover, postholes of similar diameter tend to cluster too.

In the Southern Excavation Area, the Moran's I index of the depth and diameter also suggests clustered distribution (Table 6.1).

		Moran's I Index	Z score
Northern Excavation Area	Depth	0.71	48.41
	Diameter	0.08	5.44
Southern Excavation Area	Depth	0.06	2.88
	Diameter	0.06	2.74

Table 6.1 Moran's I index value and the z score

6.1.2.A The Northern Excavation Area

Ethnographic data demonstrate that the distance between posts of Austronesian residential dwellings in Taiwan ranges from 50 to 200 centimeters (Figure 6.2). Most are between 100 to 200 centimeters apart. Following the ethnographic information, Figure 6.3 shows the areas of postholes with 1-, 1.5-, and 2-meter ranges from the center of each posthole. When 1- and 1.5-meter ranges are used to identify clusters, each of them forms ten clusters: A, B, C, D, E, F, G, H, I, and J. If the 2-meter range is used, only seven clusters are formed. Clusters B and C are combined to form one cluster, as are Clusters G, H and J. I would argue that ten clusters probably represent a more adequate estimation. If seven clusters are considered, then Clusters G, H, and J are grouped into one dwelling. However, based on Figure 6.4, Cluster J is on a lower terrace than Clusters G and H. In other words, Cluster J cannot form a single dwelling with Clusters G and H since they are not on the same level of the terrace.

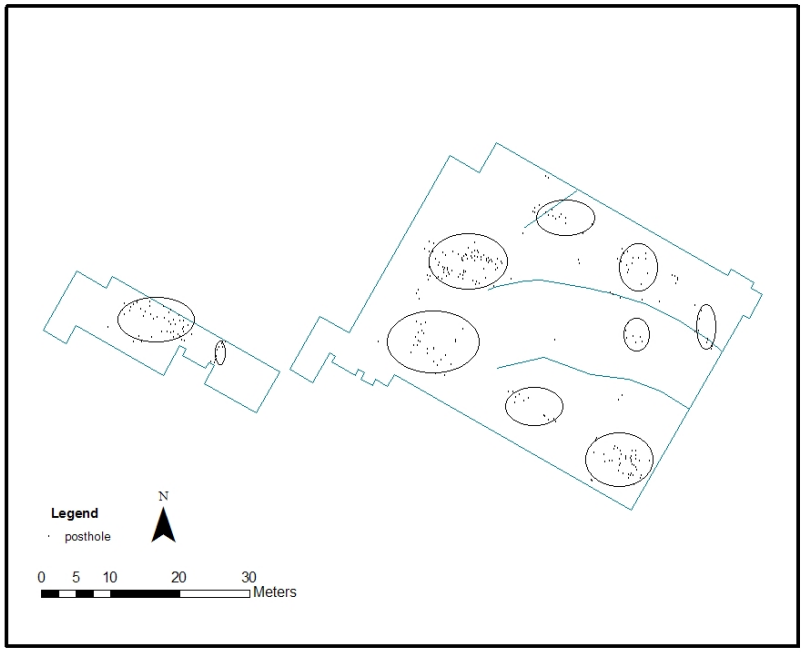

Figure 6. 1 Distribution of posthole clusters

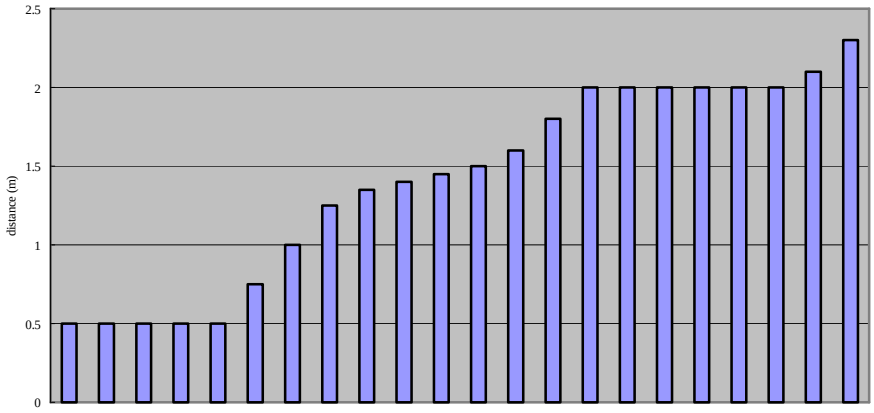

Figure 6.2. Distance between posts among Austronesian societies in Taiwan (Chijiiwa 1988)

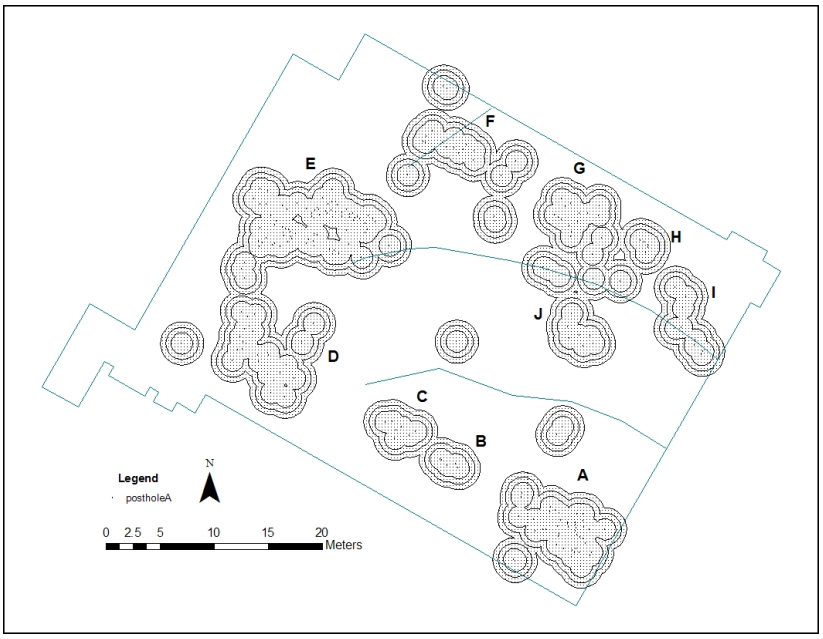

Figure 6.3. Areas of postholes with 1-, 1.5-, and 2-meter ranges from the center of each posthole in the Northern Excavation Area

6.1.2.B The Southern Excavation Area

Fifty-six postholes were identified in the Southern Excavation Area. As mentioned earlier, the initial visual inspection revealed the presence of two clusters of postholes (Figure 6.1). Using the spatial proximity method as described above to estimate the number of clusters, two clusters, Clusters K and L, are identified (Figure 6.4).

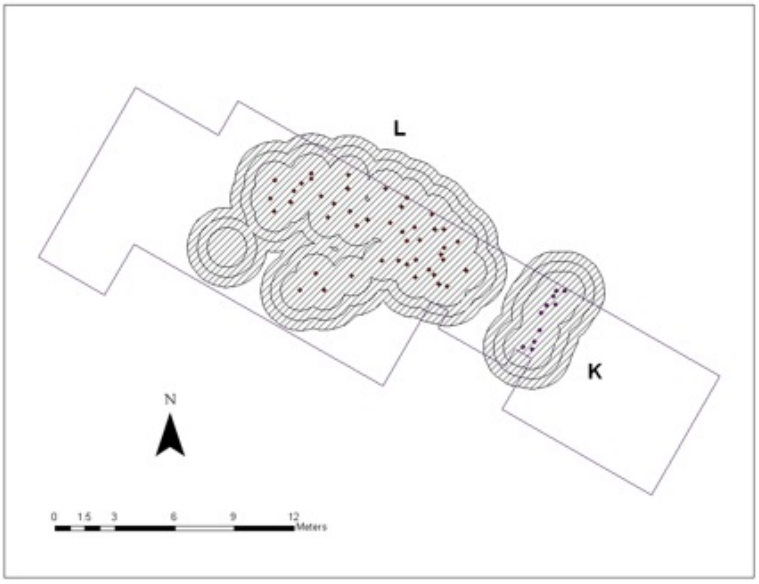

Figure 6.4. Areas of postholes with 1-, 1.5-, and 2-meter ranges from the center of each posthole in the Southern Excavation Area

6.1.3 Analysis of the depth of postholes

6.1.3.A The Northern Excavation Area

Figure 6.5 shows the distribution of the postholes which have positive *i* values and their z scores are one standard deviation above or blow the mean of the distribution based on the Anselin Local Moran's. This means that postholes have similar depth tend to cluster statistically. However, in Cluster E, only three postholes are present in figure 6.5. This indicates that only three postholes have positive I value with the z score indicating statistically significant. At the same time, none of the postholes in Cluster J have statistically significant *i* values.

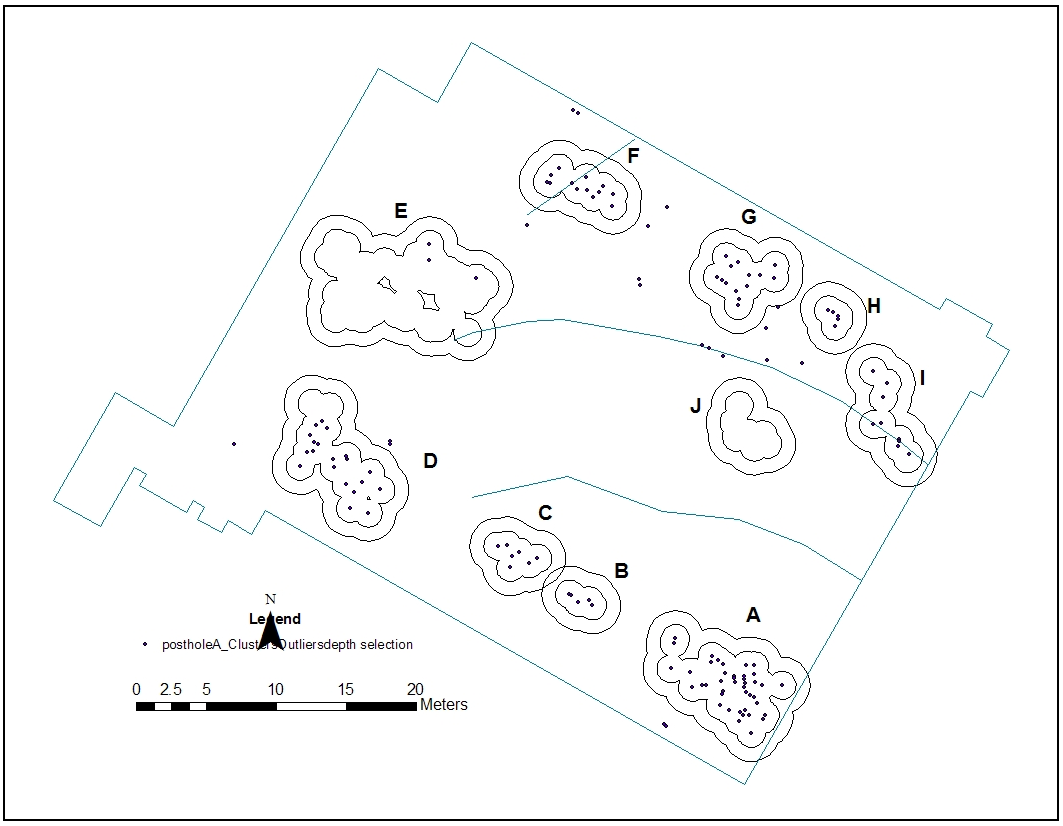

Figure 6.5. Distribution of postholes with positive *i* values in the Northern Excavation Area

6.1.3.B The Southern Excavation Area

Low Anselin Local Moran's I index values calculated from depth and radius indicate that the postholes do not form statistically significant clusters at this scale.

6.1.4 Summary

Based on the visual inspection and the spatial statistics conducted from the depth and radius of the postholes, at least twelve posthole clusters are identified. If each posthole cluster is assumed to represent a dwelling, then there are at least 12 dwellings at the 1998 excavation area. The extent of the dwellings can thus be investigated through the spatial analysis of other features.

6.2 Identifying the extent of the dwellings: the spatial distribution of features

In the previous section, I argue that the presence of posthole clusters indicates that at least 12 dwellings were present. In this section, the distribution of other features serving as further lines of evidence to substantiate my estimation will be explored.

First, the presence of terraces at the Wansan site is a natural boundary that could separate dwellings. No single dwelling can be constructed on different terraces. Second, the distribution of stone walls is evidence of an artificial boundary that distinguishes physical structures. Third, the distribution of hearths and storage pits suggests that several dwellings shared these facilities. Fourth, burials are the second most common features at the Wansan site. The spatial layout of the burials indicates that each dwelling is closely associated with a group of burials. Lastly, the distribution of stone tool workshops and possible ritual loci also show close association with the identified dwellings. Each dwelling seems to house either a stone tool workshop or a possible ritual locus. Combing the distribution of these features, I can confirm the possible existence of at least twelve dwellings at the Wansan site.

6.2.1 The distribution of the features

During the 1998 excavation, eight types of features were recovered. Other than postholes, they are 1) stonewalls, 2) hearths, 3) storage pits, 4) stone coffins, 5) urn burials, 6) stone tool workshops, and 7) possible ritual loci. The identification of these features took place during the excavation and through the artifact analysis conducted after the excavation.

Three small terraces are identified based on the modification of the original bedrock (Figure6.2). The concentration of artifacts and features on these three terraces illustrates that the prehistoric Wansan people intentionally modified the landscape in order to construct their dwellings on this small, isolated hill.

As suggested in the previous section, at least 12 dwellings were identified based on the presence of posthole clusters. Below, the distribution of other features is used to confirm the existence of these dwellings and further estimate the size of the dwellings.

6.2.1.A Stone walls

Six of the stone walls are outside of Dwellings A, B, F, and K, while only one stone wall is inside Dwelling E (Figure 6.6 and Figure 6.7). The distribution of these walls suggests that they could have served as some type of a boundary marker to separate these dwellings.

6.2.1.B Hearths

Three out of the five hearths are distributed in the northwestern part of the Northern Excavation Area and one is located in the Southern Excavation Area (Figure 6.7 and Figure 6.8). The reason why three out of the five hearths were concentrated in the same area is not clear. This might reflect the actual spatial arrangement in prehistoric times, implying that residents of the dwellings shared in the preparation of food. Alternatively, it could be the result of excavation errors. Since the main component of the hearth is made of the local shale, excavators might have missed identifying these features in the early stage of the excavation.

6.2.1.C Stone tool workshop

In terms of distribution, most of the stone tool workshops are inside the dwellings, and only one of them is outside of Cluster J. However, no evidence of the stone tool workshop is found in Dwellings B, C, D, K, and L (Figure 6.9).

6.2.1.D Storage pit: Underground carved holes

The four pits are distributed in close proximity to the posthole clusters; however, the spatial association between the clusters and the pits cannot really be ascertained. It seems that multiple dwellings had to share a storage pit (Figure 6.10).

6.2.1.E Possible ritual locus

Unlike other features, which are mostly located outside the clusters, the possible ritual loci are all situated within the dwellings. Two of them are inside Dwellings B and C, and one is inside Dwelling H. All of these dwellings are small in size and are not associated with any stone tool workshops (Figure 6.11).

6.2.1.F Stone coffins

The distribution of the stone coffins is closely associated with the dwellings (Figure 6.7 and Figure 6.12). These coffins are all outside of the dwellings. More specifically, the coffins surround most of the dwellings. They are either on the edge of the posthole dwellings or just two to three meters away from the edge of the dwellings.

6.2.1.G Urn burials

The distribution of these urn burials is in conjunction with the stone coffins (Figure 6.7 and 6.12). Notably, one urn burial is situated inside Dwelling E, while the rest of the burials are outside of the clusters. This could be a line of evidence to suggest that there was probably more than one dwelling existing within this dwelling.

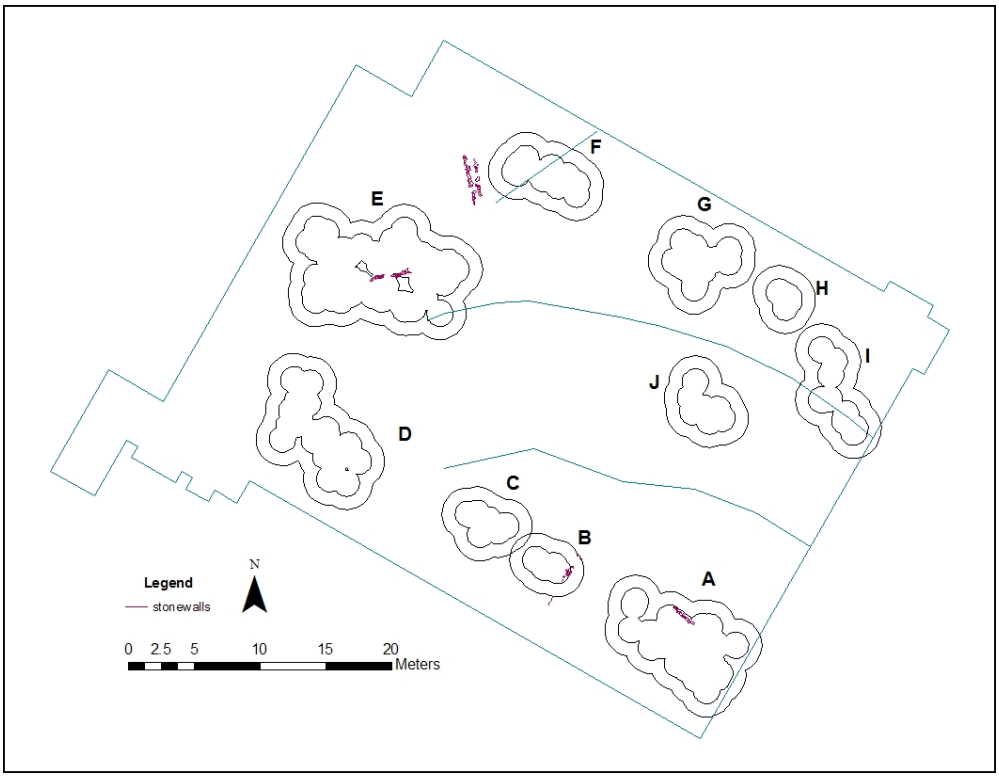

Figure 6.6. Distribution of stone walls in the Northern Excavation Area

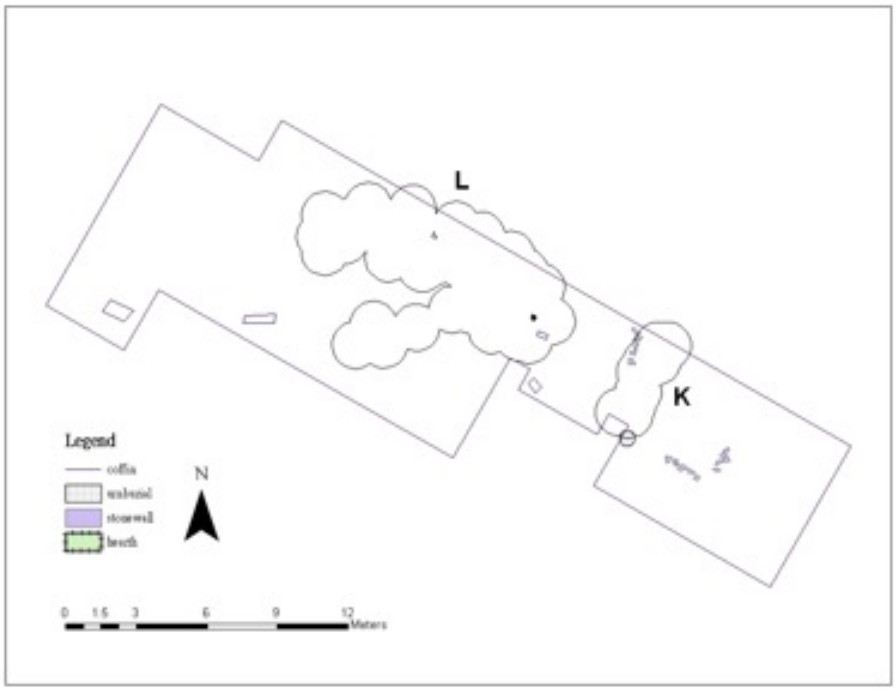

Figure 6.7. Distribution of stone walls, hearths, and burials in the Southern Excavation Area

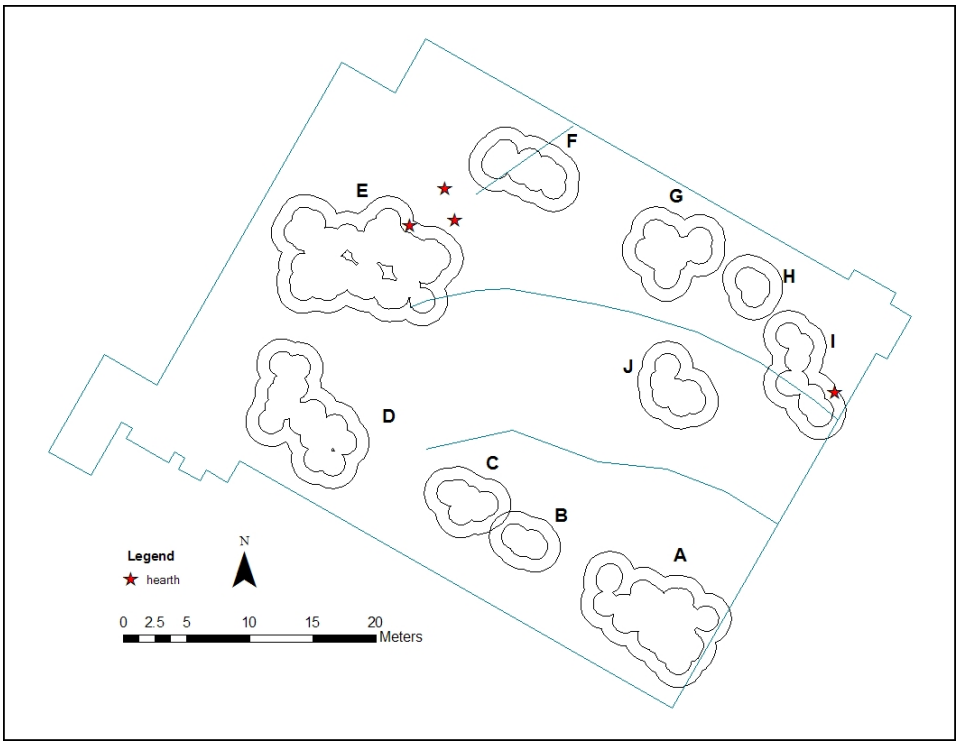

Figure 6.8. Distribution of hearths in the Northern Excavation Area

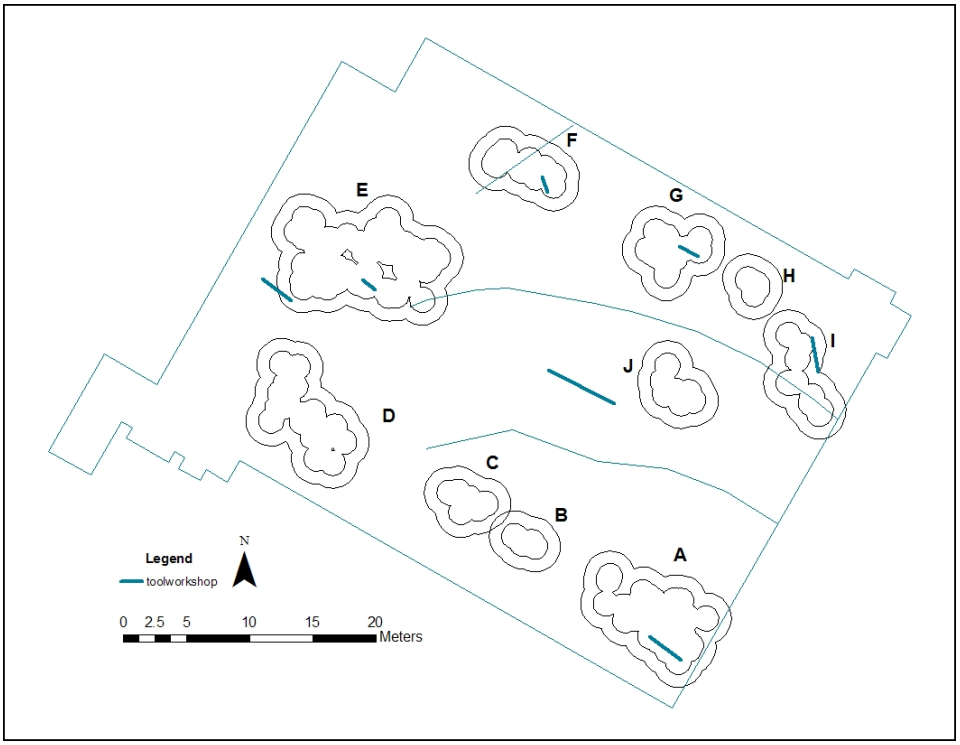

Figure 6.9. Distribution of stone tool workshops in the Northern Excavation Area

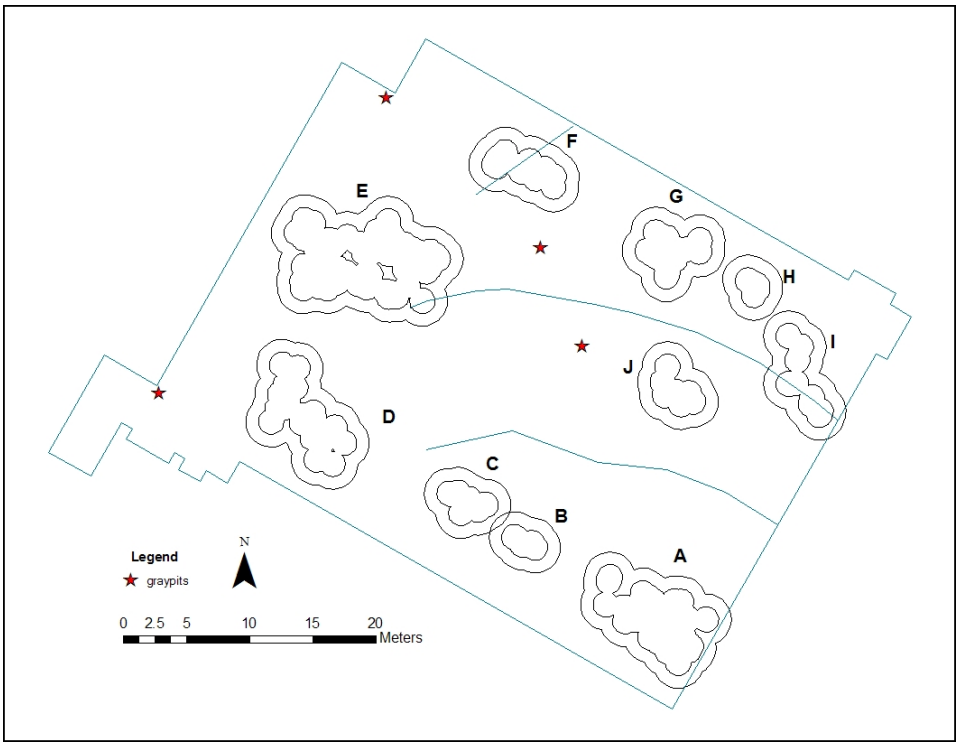

Figure 6.10. Distribution of possible storage pits in the Northern Excavation Area

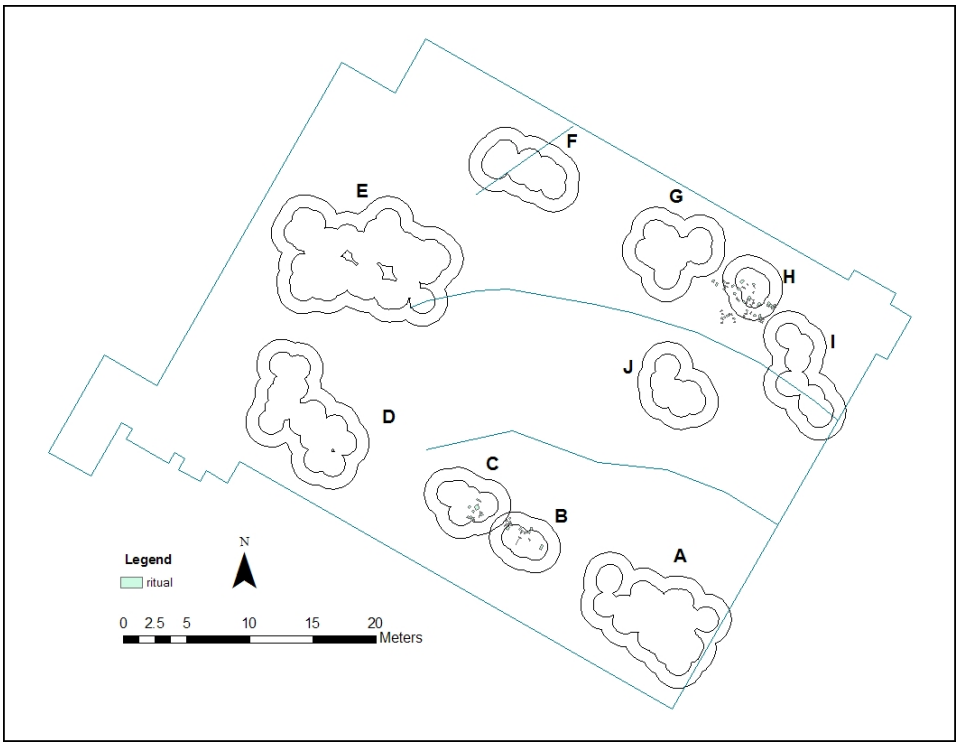

Figure 6.11. Distribution of possible ritual loci in the Northern Excavation Area

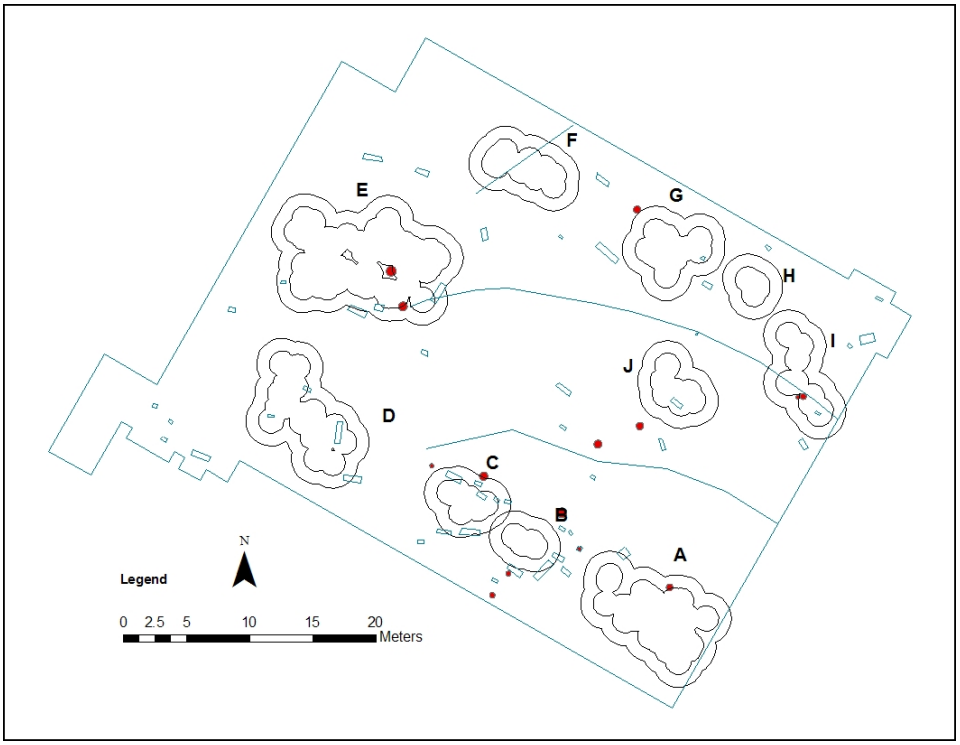

Figure 6.12. Distribution of burials (stone coffins and urn burials) in the Northern Excavation Area

6.2.2 Discussion: the possible number of dwellings

The analysis of postholes indicates that ten clusters can be identified in the Northern Excavation Area and two clusters in the Southern Excavation Area, depending on how far the distance between postholes is set. If each posthole cluster represents a dwelling, to determine whether seven or ten dwellings exist in the Northern Excavation would require further examination. Based on the following lines of evidence, I suggest that there are probably *at least* ten dwellings in the Northern Excavation Area and two in the Southern Excavation Area.

First, the presence of the terrace rejects the possibility of there being only seven dwellings in the Northern Excavation Area. If the 2-meter range is used, the areas of Clusters G, H, and J are regarded as a single dwelling (see Figure 6.3). However, Cluster J is actually on a lower terrace than the other two clusters. Since a dwelling cannot be built on two surfaces, Cluster J should be an independent dwelling.

Second, the distribution of burials points to the possible presence of at least two dwellings in the Cluster E area. The spatial pattern shows that most of the burials are located at the edge of posthole clusters. However, one of the urn burials is situated in the middle of Cluster E. Since the distribution of burials at the edge of the posthole clusters seems to be a pattern, it implies that, originally, Cluster E probably enclosed two posthole clusters. In other words, two dwellings probably coexisted in the Cluster E area.

Moreover, the Anselin Local Moran's *i* values calculated from the depth of postholes show that they are not statistically significant (Figure 6.5). One possible explanation for the diversity of posthole depths is that more than one dwelling might have actually existed in Cluster E. The area represented with a cluster of postholes of similar depth (i.e., Cluster A) is likely to have been a single dwelling that was maintained in the same location over time. The areas where no significant cluster can be formed (i.e., Clusters E and J) might indicate the presence of more than one dwelling in these areas.

Third, most of the stone tool workshops and possible ritual loci are situated inside the ten posthole clusters in the Northern Excavation Area. In other words, each posthole cluster is associated with either a stone tool workshop or a ritual locus. If these posthole clusters represent different dwellings, it points to the possible presence of ten dwellings.

However, Clusters E and J display some distribution patterns that differ from the others. In Cluster E, more than one stone tool workshop is identified; these are distributed inside the cluster and at the edge of the cluster. Also, a stone wall is situated inside the cluster.

In Cluster J, stone coffins and urn burials are more concentrated on the southern side instead of surrounding the posthole clusters as in other clusters. This can probably be attributed to the micro landscape mentioned earlier. If Cluster J represents one dwelling, it is probably built at the north edge of the second terrace (Figure 6.3), and the entrance probably faces southward to a more open area. Since the back of the dwelling is the natural wall formed by the terrace, it is impossible to place any burials. Thus, the southern open area constitutes a suitable locale for the burying of their deceased members.

On the other hand, the posthole clusters in the Southern Excavation Area show a different spatial pattern from those of the Northern Area. Neither of the posthole clusters shows evidence of stone tool workshops or possible ritual activities. Also, like Clusters E and J, the Anselin Local Moran's *i* index value suggests that the depths of these postholes do not form clusters. Possible reasons for the unclustered depth of postholes are, first, more than one dwelling was constructed at the same spot at different times. The reconstructing processes would thus produce differential post depths archaeologically. Second, the same dwelling probably went through several renovations throughout its whole history. The processes likely involved replacing old posts or adding more posts, which resulted in the depth variance. However, the evidence of repetative utilization of these two spots to establish dwellings is obvious. Therefore, the two clusters are regarded as two dwelling units for the current analysis.

In sum, based on the distribution pattern of posthole clusters and the features associated with them, it can be assumed that each posthole cluster likely represents an enclosed area where dwellings had been constructed, renovated and rebuilt. Cluster E, on the other hand, probably represents more than one such area judging from its unusual distribution pattern. Therefore, if each posthole cluster implies the presence of at least one dwelling, then at least twelve dwellings are identified. Although these dwellings share similar distribution patterns, they also demonstrate some variations in terms of their size and associated features and artifacts (Table 6.2).

At the Wansan site, the distribution of features implies certain dwellings probably form groups according to the presence of possible storage pits, ritual loci, and stone tool workshops. The uneven distribution of these features with associated dwellings suggests that certain dwellings probably share the usage of these features. Other evidence to argue for these collaborative activities among dwellings could also be observed from the distribution of the rich artifacts. Therefore, whether the twelve identified dwellings form dwelling groups or not is further analyzed based on the distribution of artifacts in the following section.

Dwellings	Estimated Size (m^2)	Associated Features					
		Stone wall	Hearth	Stone tool workshop	Storage pit	Ritual locus	Burial (Stone coffins & urn burials)
A	43.18	1		1			2
B	7.18	1				1	11
C	11.67					1	10
D	36.31				1		8
E	72.12	1	2	2			11
F	18.12	1	1	1	1		2
G	20			1			4
H	6.26					1	1
I	13.43		1	1			6
J	18.08			1	1		6
K	11.27	2					1
L	58.7						4

Table 6.2. Dwellings with associated features

6.3 Identifying dwelling groups

At the Wansan site, the presence or absence of a storage pit, a possible ritual locus, and a stone tool workshop in each identified dwelling already implied that some dwellings probably form a collaborated group. Furthermore, the close proximity of certain dwellings (such as Dwellings B and C, and Dwellings G and H) indicates that the inhabitants of these dwellings definitely had closer interaction with each other. Therefore, whether these dwellings form groups or not is further examined through the distribution of artifacts.

In this section, the spatial association among concentrations of artifacts with dwellings will be analyzed. As described in Chapter 5, two cultural layers can be identified: the Third and Fourth Layers. Based on the stratigraphy and radiocarbon dating (see Chapter 5), the Third Layer postdates the Fourth Layer. Therefore, different distribution of artifacts between layers can be a line of evidence through which to examine whether the same place has been repetitively occupied by people to construct houses structures.

6.3.1 Distribution of lithic artifacts

Table 6.3 lists the stone tools recovered from the Third and Fourth Layers. In addition, there are 2,217 pieces of lithic artifacts showing traces of human usage, but these artifacts cannot be put into any formal category based on shape. These artifacts might be broken tools, unfinished tools, or debitage.

Differences in both temporal and spatial distribution are explored in this section. The analysis begins with the Northern Excavation Area followed by the Southern Excavation Area. The difference between the initial phase (the Fourth Layer) and the second phase (the Third Layer) is also distinguished.

The results indicate that most lithic artifacts are concentrated around Dwelling Groups I, V, VI, and VII in the Third Layer (the second phase). In the Fourth Layer, the concentration is scattered around most dwellings, except for Dwellings H, I, and J. However, the temporal difference might also be the effect of small sample size of the Fourth Layer.

Tool types	Layer IV		Layer III		Total
	Subtotal	% of Layer	Subtotal	% of Layer	
Net sinker	41	8.2	411	6.9	452
Multiperforated tool	9	1.8	497	8.3	506
Polished perforated disk	2	0.4	114	1.9	116
Sickle	1	0.2	22	0.4	23
Arrowhead and spearhead	15	3.0	262	4.4	277
Whetstone	83	16.6	916	15.3	999
Unfinished artifacts, debitage, raw material	150	30	1,889	31.5	2039
Knife	15	3.0	209	3.5	224
Hoe-axe	39	7.8	368	6.1	407
Anvil	2	0.4	26	0.4	28
Mortar	0	0.0	5	0.1	5
Pestle	0	0.0	9	0.6	9
Hammer	2	0.4	21	0.4	23
Adze-axe	24	4.8	251	4.2	275
Earring/bracelet	87	17.4	471	7.9	538
Chopper	2	0.4	38	0.6	40
Disk	19	3.8	417	7.0	436
Pointer	0	0.0	22	0.4	22
Scraper	9	1.8	47	0.8	56
Grand Total	500	100.0	5995	100.0	5495

Table 6.3. Lithic tools recovered in the Third and Fourth Layers and features and burials

6.3.1.A The Northern Excavation Area

The main concentrations of lithic tools are located in each dwelling (Figure 6.13 and Figure 6.14). The artifacts from the Third Layer are distributed over the excavation area, while the artifacts from the Fourth Layer are more concentrated in the southern part of the excavation area.

The Anselin Local Moran's I index identifies three clusters of lithic artifacts from the Third Layer (Figure 6.15). The largest cluster is associated with Dwellings A and B. The other clusters are outside of Dwellings I and J respectively.

Lithic artifacts from the Fourth Layer form smaller clusters scattered around Dwellings A, B, C, D, E, F, and G (Figure 6.16). The largest cluster is associated with Dwellings A and B.

6.3.1.B The Southern Excavation Area

The lithic tools from the Third Layer are closely associated with the dwellings, while the tools from the Fourth Layer are fewer in quantity and more scattered (Figure 6.17 and 6.18). Moreover, the distribution of the clusters identified by the Anselin Local Moran's I from the Third and Fourth Layers almost overlap (see Figure 6.15 and Figure 6.16). Most of them are located in the northern part of the Dwelling L. This implies that prehistoric Dwelling L residents kept pretty consistent areas for the disposal of their lithic debris.

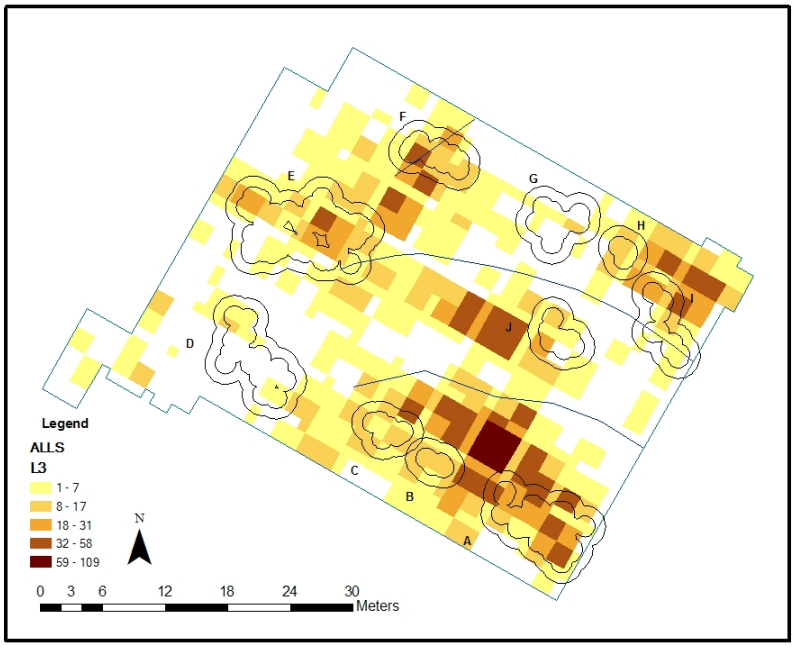

Figure 6.13. Distribution of lithic artifacts in the Third Layer

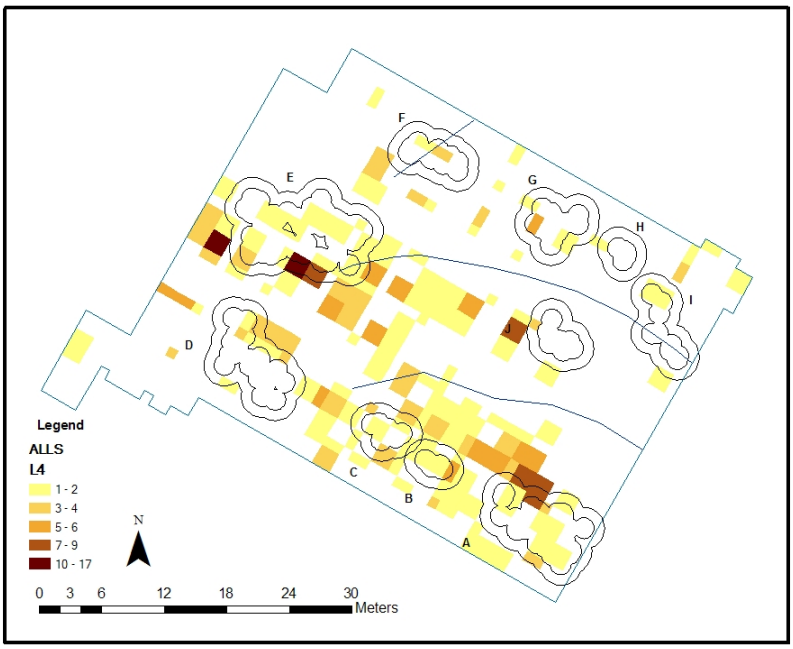

Figure 6.14. Distribution of lithic artifacts in the Fourth Layer

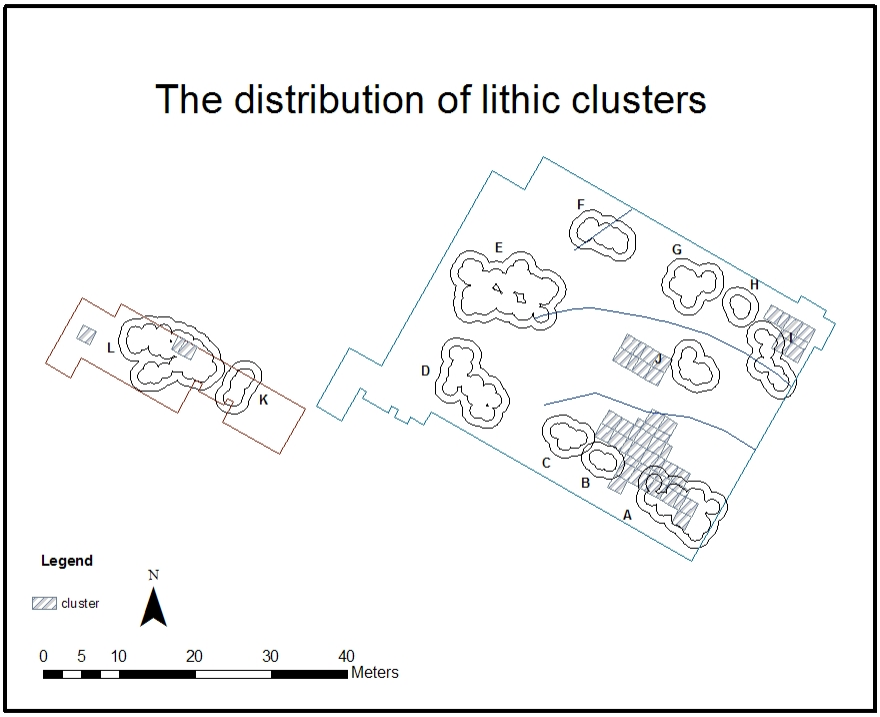

Figure 6.15. Distribution of clusters of lithic artifacts in the Third Layer

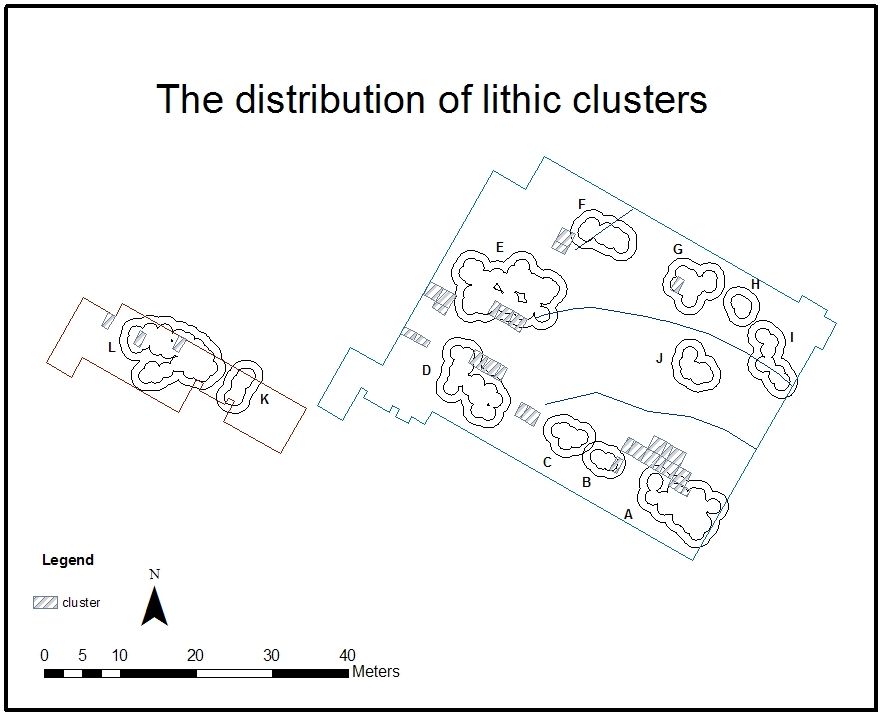

Figure 6.16. Distribution of clusters of lithic artifacts in the Fourth Layer

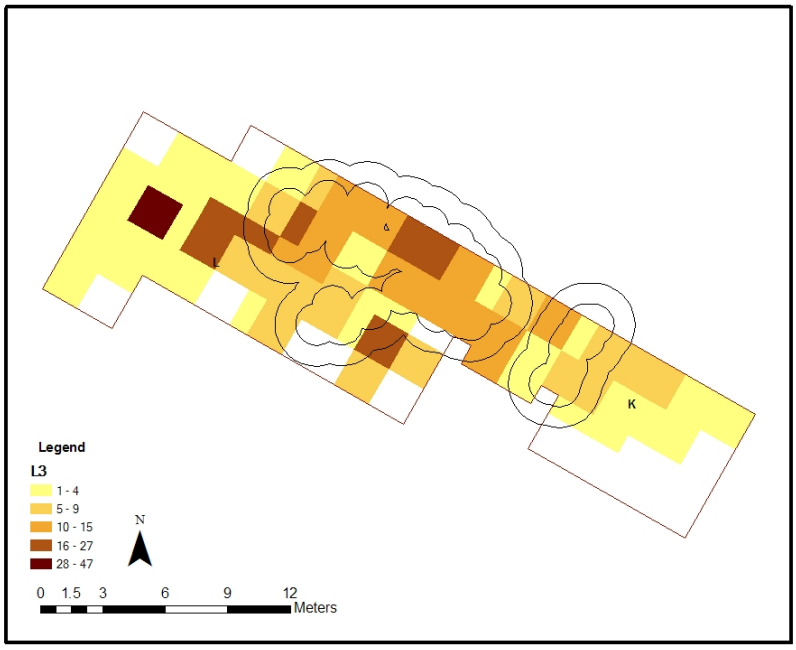

Figure 6.17. Distribution of lithic artifacts in the Third Layer

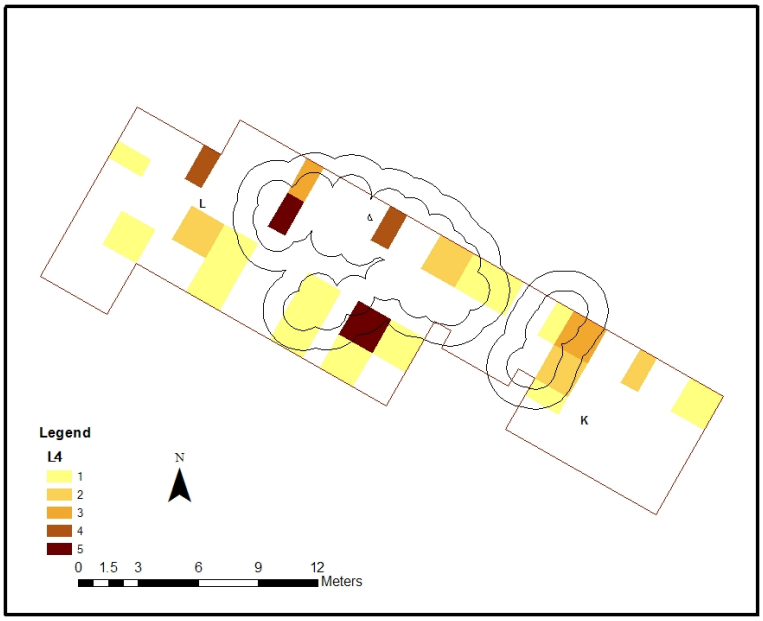

Figure 6.18. Distribution of lithic artifacts in the Fourth Layer

6.3.2 Distribution of pottery artifacts

A total of 35,202 pieces of pottery artifacts were recovered from the Third and Fourth Layers (Table 6.4). These artifacts include different shapes of vessels, handles, lugs, knobs, spindle whorls, bracelets, knives, figurines, and unidentified objects.

Type	The Third Layer	The Fourth Layer
Body	20470	2280
Bottom	38	9
Bowl	53	5
Bracelet	74	7
Figurine	7	2
Ring-foot	774	120
Handle	1113	97
Jar-rim	7921	1192
Knife	2	0
Knob	11	1
Plate	0	1
Shoulder	333	13
Spindle whorl	223	48
Vase	4	0
Unclear	342	63
Grand Total	31365	3838

Table 6.4. Pottery artifacts recovered in the Third and Fourth Layers, features and burials

6.3.2.A The Northern Excavation Area

The pottery artifacts uncovered from the Third Layer show that the Global Moran's I index is 0.54 and the z score is 17.51. This means that the distribution of the pottery artifacts is clustered. The Global Moran's I index for the pottery artifacts excavated from the Fourth Layer is 0.18 and the z score is 6.81. This is much lower than the Third layer and suggests that the pottery artifacts from the Fourth Layer are more scattered.

Figure 6.19 shows the distribution of all the pottery artifacts from the Third Layer along with the identified dwellings. The Dwelling D area shows fewer pottery artifacts due to recent road construction in this area. Therefore, most of the Third Layer in this area has been removed. However, the pottery artifacts from the Fourth Layer (Figure 6.20) show that Dwelling D existed no later than the other dwellings. The differences between the Third and Fourth Layers are the amount of artifacts and the size of the distribution. Most of the artifacts are distributed outside of the dwellings and are concentrated in certain areas. The concentration of pottery in Dwellings A, B, and C seems to be focused at the northern side of the dwellings, and the same is true for Dwellings G, H, and I. On the other hand, the distribution of artifacts associated with Dwellings J, E, and F is more inclined to be found on the southern side of the dwellings. Evidently, each dwelling was associated with pottery usage, and the amount of pottery artifacts increased through time.

Next, I applied the Anseline Local Moran's I index to detect clusters of pottery artifacts from the Third and Fourth Layers. Figures 6.21 and 6.22 show clusters of pottery artifacts from the Third and Fourth Layers. The clusters in these figures represent statistically significant clusters in terms of the presence of high numbers of pottery artifacts.

Based on the distribution of the pottery clusters associated with the identified dwellings, several observations can be made. First, the amount of the pottery clusters increased from the Fourth to the Third Layer. In addition, clusters from the Fourth Layer are distributed at the dwellings in the southern part of the excavation area, while the clusters from the Third Layer were found to be associated with almost every dwelling.

Second, pottery artifacts from the Third Layer form five clusters. The clusters are all associated with the dwellings. Two of the five clusters are associated with multiple dwellings. The other three clusters are related to a single dwelling each.

Third, pottery artifacts from the Fourth Layer form six small clusters. Two clusters are around Dwelling C, and the other two clusters are on the edge of Dwelling E. Dwelling A is the largest among the clusters. No significant cluster is found associated with the dwellings in the northern part of the excavation area, including Dwellings F, G, H, and I. This implies that in the initial phase of the settlement, the population was probably not large enough to dispose of sufficient amounts of potsherds to form any significant clusters.

6.3.2.B The Southern Excavation Area

The distribution of the dwellings with pottery artifacts from the Third Layer (Figure 6.23) illustrates that the concentration of pottery artifacts is not as obvious as it is in the Northern Excavation Area. The Local Moran's I statistic is performed to identify clusters of pottery artifacts. Figure 6.21 shows the distribution of clusters. Two clusters can be recognized. They are closely associated with Dwelling L.

Through the initial visual inspection of this area, the pottery artifacts from the Fourth Layer are more concentrated on the southern edge (Figure 6.24). Only one cluster is recognized from the Fourth Layer (Figure 6.22). It is also closely associated with Dwelling L; however, the cluster is located more towards the south side of Dwelling L.

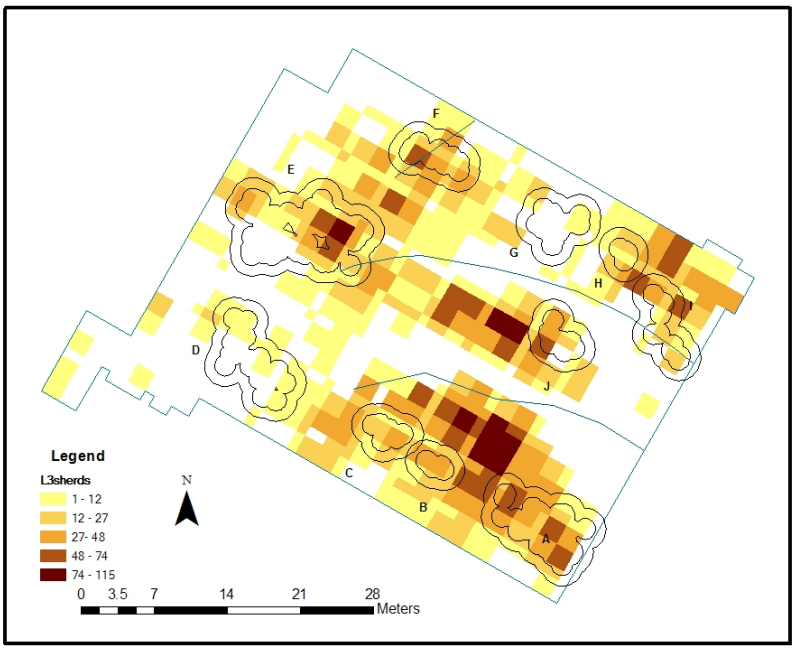

Figure 6.19. Distribution of shards in the Third Layer

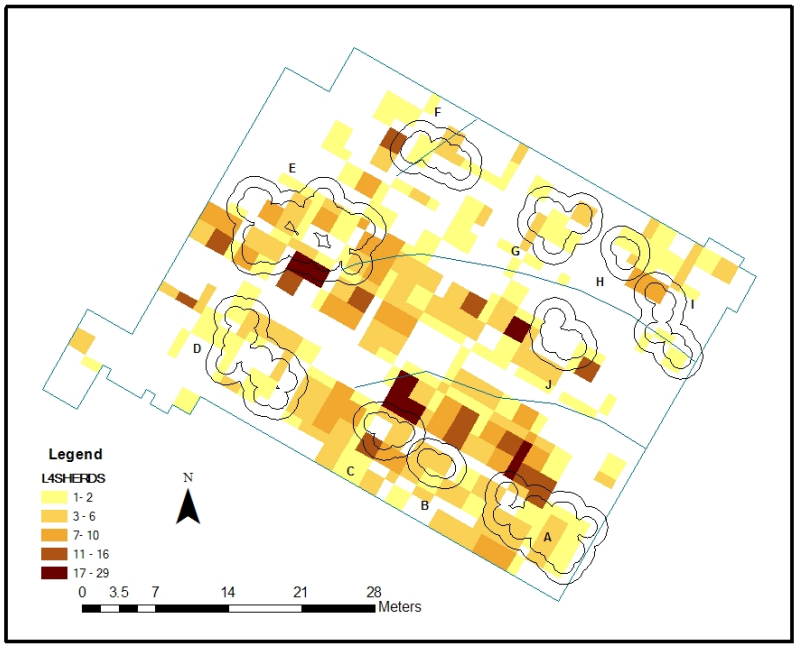

Figure 6.20. Distribution of shard in the Fourth Layer

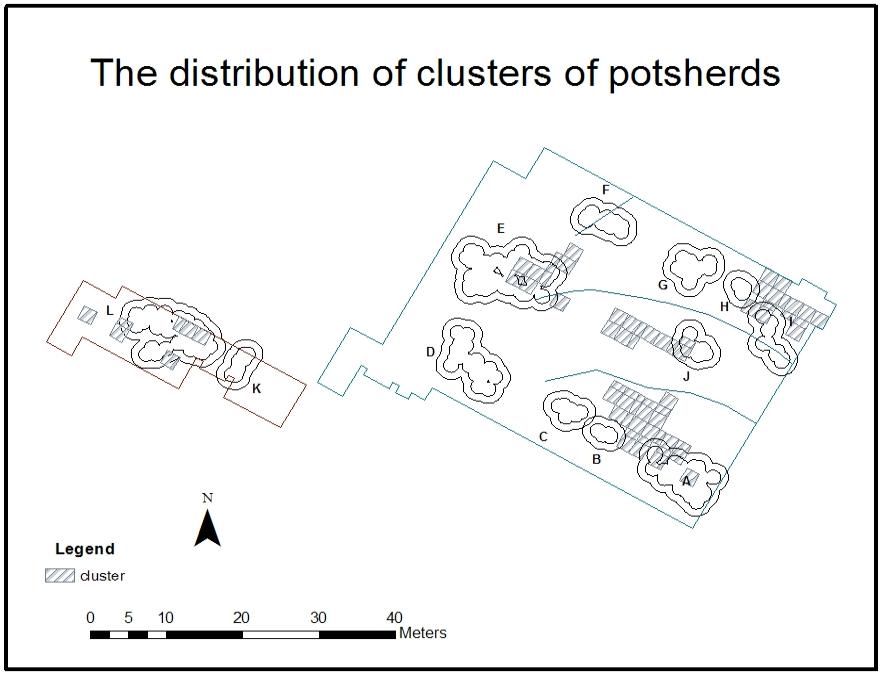

Figure 6.21. Distribution of pottery clusters in the Third Layer

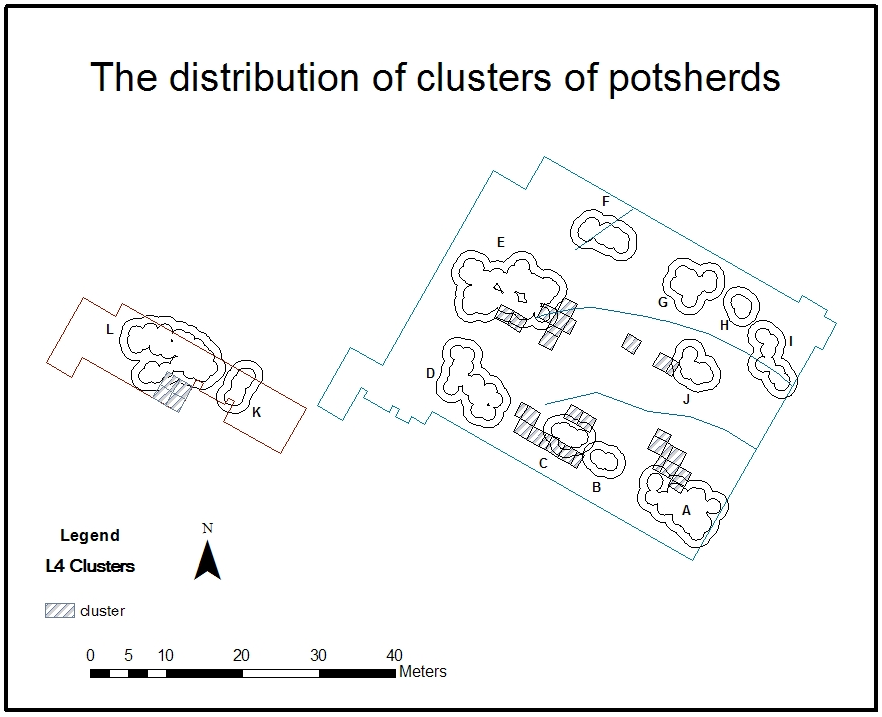

Figure 6.22. Distribution of pottery clusters in the Fourth Layer

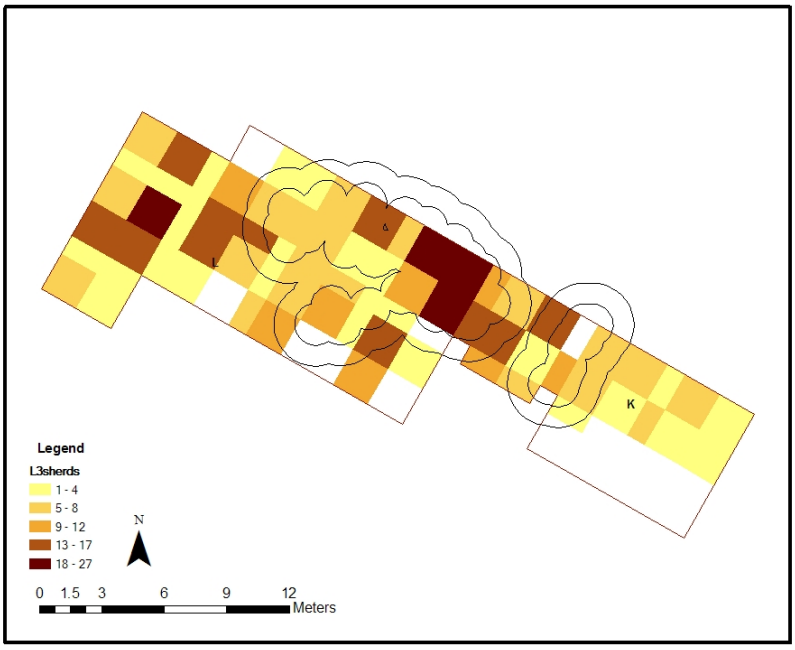

Figure 6.23. Distribution of pottery artifacts in the Third Layer

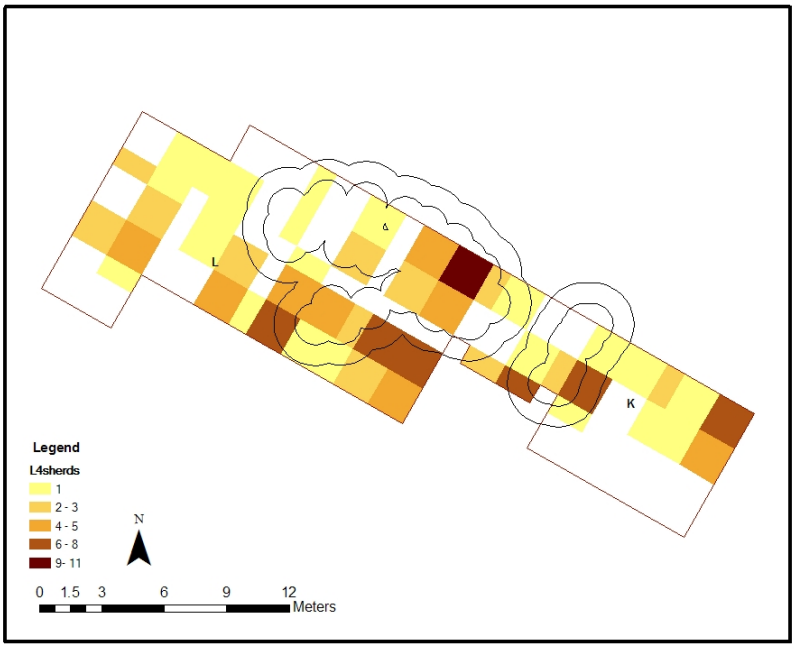

Figure 6.24. Distribution of pottery artifacts in the Fourth Layer

6.3.3 Discussion: the number of dwelling groups

As mentioned earlier, the goal of this section is to use the spatial distribution of artifacts to examine whether these dwellings form any groups. The distribution of artifacts shows a different pattern between the Third and Fourth Layers. Based on the existence of artifacts in the Fourth Layer, all twelve dwellings can be traced back to the early stage of the occupation. However, as shown in Figures 6.22, Dwellings F, G, H, I, and K do not have enough artifacts from the Fourth Layer to form any significant clusters. This might indicate that these dwellings were occupied later than the other dwellings or that the number of people inhabiting these dwellings was less than that of the other dwellings. Also, the distribution of artifact clusters illustrates that these dwellings do not form any groups. The artifact clusters are all associated with different dwellings. As a result, in this early period of occupation (around 3,500-3,300 BP.), each dwelling might have been an independent unit.

The distribution of artifacts from the Third Layer can also be observed in all the dwellings. Generally, the amount of pottery artifacts associated with each dwelling is large enough to form clusters adjacent to each dwelling, except for Dwellings C, D, G, and K. As mentioned before, the Third Layer of Dwelling D was removed by recent road construction; thus, the number of artifacts from this area is probably biased. However, the lack of significant clusters of artifacts at Dwellings C, G, and K is probably related to the formation of dwelling groups.

Based on the distribution of artifact clusters and features from the Third Layer and the proximity of dwellings (see Figure 6.15 and 6.21), Dwellings A, B, and C seem to form a group, while the Dwellings G, H, and I and Dwellings K and L might also form other groups. On the other hand, the close association between different dwellings in the Fourth Layer is less obvious than in the Third Layer.

6.4 The spatial association between the identified dwellings and ritual activities

One of the significant characteristics of the House Society is the ritual aspect of the House unit. Two types of archaeological evidence at the Wansan site can be used to argue for the practice of certain ritual activities. First, archaeological features, such as burials, left on the ground by prehistoric people after they performed certain ritual activities, have been found. Second is the presence of objects imbued with ritual significance or objects utilized during ritual ceremonies stored inside the dwellings or in specific locations.

At the Wansan site, the presence of burials serves as one line of evidence to argue for the practice of ritual activities in prehistoric Wansan society. The close association between the burials and the dwellings is identified in the second section of this chapter (see Figure 6.12). Each dwelling is surrounded by multiple burials, and these burials are most probably situated at the edge or just outside of the dwellings. Several grave goods were recovered inside the burials, and most of them are utilitarian artifacts, including both pottery and lithic artifacts. One specific type of jade object, the zoo-anthropomorphic object, is only found either inside or in close proximity to the burials. Its distribution and significance will be discussed in the next chapter.

Furthermore, a type of feature was identified as the remains of possible ritual activity. It is mostly in the form of arc-shaped concentrations of burned shale, slate, and sandstone chunks distributed inside the dwellings. Most notably, even though the stone tool workshop is one of the most common features at the Wansan site, the dwellings with the presence of possible ritual loci are not associated with any stone tool workshops. Two of the possible ritual loci are located inside Dwellings B and C, while the other is within Dwelling H. According to the artifact distribution, Dwellings A, B, and C probably form a dwelling group, and Dwellings G, H, and I probably form another group in the second phase of the settlement (the Third Layer). In addition, all of these possible ritual loci are located in the Third Layer. These details indicate that ritual is probably one of the factors related to the formation of different dwelling groups.

The presence of burials surrounding the dwellings and the possible ritual loci associated with the dwelling groups suggest that ritual performance is one of the common practices among the dwellings. Furthermore, as discussed in Chapters 2 and 3, the continuity of the Houses is often ensured through certain ritual performances to emphasize the close connection between House ancestors and the living members. It is evident from the distribution pattern of the stone coffins and urn burials that the members of each dwelling/dwelling group at the Wansan site perform certain rituals to place their deceased ancestors.

6.5 Discussion: the "continuity" of the Houses

As discussed in the beginning of this chapter, three archaeological implications are examined at the Wansan site. The first is the repetitive use of the same place for dwellings. The distribution of the dwellings and artifacts recovered from the Third and Fourth Layers indicates that each identified dwelling has been occupied repeatedly since the initial development of the Wansan settlement. The five radiocarbon dates from Dwelling A (see Chapter 4) suggests that this area probably had been occupied repeatedly from 3,500 to 2,900 years ago. The distribution of artifact clusters and features also confirms that several generations of the dwelling inhabitants carried on the knowledge of how the space should be organized. The practice of rebuilding a house at the same location testifies the close association between an individual household unit and specific locus in space. The continuity of utilizing the same place as house site relates to the maintenance of social memory and ancestral ties which suggests a unique history of this specific House (e.g. Grove and Gillespie 2002, Tringam 2000).

The second archaeological implication is the absence or presence of dwelling groups. Based on the distribution of postholes and features, at least twelve dwellings are identified. The distribution of artifacts and features indicates that each dwelling was an independent unit during the initial period of the occupation. Later (the Third Layer), it seems that several dwellings began to form groups since the artifact distribution indicates a shared pattern: more concentrated and larger artifact clusters. Thus, in the later phase of the settlement, the residents of adjacent dwellings probably form certain collaborative relationships through sharing certain features. At the same time, some dwellings continued to retain their independence. Furthermore, the artifact concentrations (both the lithic and pottery artifacts) seem to be located on the northern side of the dwelling groups, except for Dwelling Group VI. This implies that a shared idea of how to organize space had gradually been established during the second phase of the settlement.

Third, ritual activities should be found associated with these physical dwellings . Three possible ritual loci can be identified. The ritual loci recovered from Dwellings B, C, and H are part of the dwelling groups identified from the Third Layer. Also, these ritual activities all took place in the latter period of the occupation based on stratigraphy. Thus, these dwellings probably became the focus of certain ritual activities in the second phase (the Third Layer) of the settlement..

The associated distribution of burials and the dwellings also indicate the connection between ritual practices and the dwellings. Ethnographic evidence even suggests that members of the House usually bury their deceased members either under the house floor or adjacent to their houses to signify the continuous existence of the Houses (see the discussion in Chapter 2 and 3).

The lack of actual house structures impeded us from examining whether people practiced any intentional house modification or demolition at the Wansan site. Nevertheless, the spatial association of posthole clusters with other features and artifact clusters illustrate that prehistoric Wansan people not only utilized the same location for constructing the houses over hundred years, but also intentionally placed their deceased members in close proximity to their houses. In

other words, the house structures were not building structures which only provided sheltered area for the living. The houses were also a place for connecting the ancestors and the living members of the house. Furthermore, assembling slate coffins and making urns for the dead suggests a process of decision-making and negotiation between individuals and groups. For example, the materials to make coffin and urn were not locally available; thus, the descendents of the deceased had to travel to acquire it or exchange with other societies. The time and energy spent on the mortuary rituals signify the importance of the ancestral veneration in the society. Unlike houses built in perishable materials, these stones and urns were made from hard materials which last much longer than the houses. In prehistoric Wansan society, house was probably a prominent feature on landscape for the living like other Austronesian societies in Taiwan and Southeast Asia. However, it was probably the burials placed around these houses that ensured the longevity of the houses even after they were abandoned.

CHAPTER VII

SPATIAL ANALYSIS OF ARTIFACTS:

IDENTIFYING THE USE OF EACH HOUSE CLUSTER

The purpose of this chapter is to examine the difference among these identified dwellings in terms of activities practiced in the dwellings. In House society, each House functioned as a separate social and residential unit for carrying out of certain repetitive aspects of daily life. More importantly, added to the activities tied to economic production and social reproduction is an emphasis on repeated, shared ritual actions. Thus the shared participation in ritual reinforced the solidarity of House members. Objects related to ritual activities should be found in each House. Also, the buildings with a predominantly religious function limited to only some of the residential dwellings should also be found.

Ethnographic evidence from Taiwanese Aboriginal societies suggests that in addition to residential houses, houses were also constructed for special purposes, such as men's houses, meeting houses, and for granaries and livestock (Chijiiwa 1988). In Chapter 6, at least 12 dwellings were identified. Based on artifact concentration and spatial association, the 12 dwellings probably can form seven dwelling groups in the second phase of the settlement (the Third Layer) (Table 7.1). The size and the distribution of features within these dwelling groups might indicate certain variations exist among them. An analysis of the spatial distribution of each artifact associated with the dwelling is also made in an effort to determine whether special-purpose dwellings exist and whether variation in terms of activities performed in each dwelling can be inferred.

Dwelling Group	Dwellings
I	A, B, C
II	D
III	E
IV	F
V	G, H, I
VI	J
VII	K, L

Table 7. 1 Composition of the dwellings groups

As indicated in Chapter 6, the distribution of burials is closely associated with the dwellings. This suggests a certain repetitive ritual had been performed centered around the dwellings. Also the existence of possible ritual loci implies some dwellings probably can be associated with

specific ritual in addition to the mortuary rituals. Both lines of evidence testify that the physical dwelling is not only a place for the mundane living, but also a locus for ritual practices.

Also, one unique type of jade ornaments- the zoo-anthropomorphic jade ornaments- constitutes another line of evidence to argue for the strong ritual significance associated with burial and dwellings. It was always found within burial context in previous excavations at the Wansan site and in other contemporaneous archaeological sites (Huang 1986; Lien 2008; Liu 1999). A large amount of jade ornaments, such as earrings, bracelets, necklaces, etc, were uncovered from the Wansan site and other contemporary sites. However, only the zoo-anthropomorphic ornament always co-existed with burials and the number was low. Based on its unique form and archaeological context, this ornament can be viewed as a type of ritual object which is used to signify the association between the House and its founding ancestors (see Chapter 3).

Furthermore, the uncovered artifacts and features are evidence to argue for the kinds of activities carried out by prehistoric people. The distribution of features already indicates that some dwellings might be associated with specific activities, such as ritual and stone tool production. However, since these dwellings had been occupied for a long period of time, the function of each dwelling might also transform. The change of artifact inventories associated with each dwelling between the Third and Fourth Layers thus indicate the temporal variations.

The 1998 excavation unearthed abundant lithic and pottery artifacts, including storing, cooking, and serving vessels and a variety of weaving, hunting, fishing, farming, and tool production equipments. Although there are no clear features indicating the presence of pottery workshop at the site, the large amounts of pottery artifacts made from local clay suggest that most pottery artifacts were locally made. The concentration of artifacts implies that prehistoric Wansan people discarded their broken vessels and tools in certain areas outside of the dwellings. Even though these “dumping” areas are outside of the dwellings, they are in close proximity to dwellings or dwelling groups. The types of discarded artifacts associated with each dwelling/ dwelling groups reflect the inhabitants’ everyday practice. In a House Society, the sense of being a House member is by participating everyday practice with other House members.

Two types of artifacts were analyzed in this chapter: lithic and pottery artifacts. The analysis will start from the distribution of lithic artifacts followed by the distribution of pottery artifacts. The lithic tools can be categorized into various types based on the shape of the artifacts and observable use-wear. The shapes and use-wear of these tools can be linked to certain usages indicating the type of activities being practiced. A comparison of the distribution of these artifacts among dwellings/ dwelling groups is conducted.

Based on the shape of the pottery artifacts, they can be divided into vessels and non-vessels. Pottery vessels include jars, bowls, plates and vases which can be used as storing, cooking, and serving containers. Non-vessels are composed of figurines, bracelets, spindle whorls, and other broken objects whose complete form is uncertain. Except for the specific type of pottery urn used as burials, the rest of vessel are utilitarian artifacts and probably used for everyday life. The

presence of different vessel and non-vessel artifacts associated with each dwelling/ dwelling groups is also analyzed.

In the following analysis, dwellings identified from previous chapter are treated as one analysis unit. Even though most artifacts are accumulated within or around the edge of the dwellings, two artifact concentrations are clearly outside of the dwellings: one in proximity to the Dwellings A and B, and the other is close to the Dwelling J. In Chapter 6, these two areas were considered as part of Dwellings A and B and J. In order to further examine the two areas, they are analyzed as two separate units and named as Areas AB and J in this chapter (see Figure 7.1). If these two areas are part of the Dwellings, the artifact composition should exhibit similar pattern with the associated dwellings. On the other hand, if the artifact composition is different from the dwellings, it may signify the existence of special-purpose area.

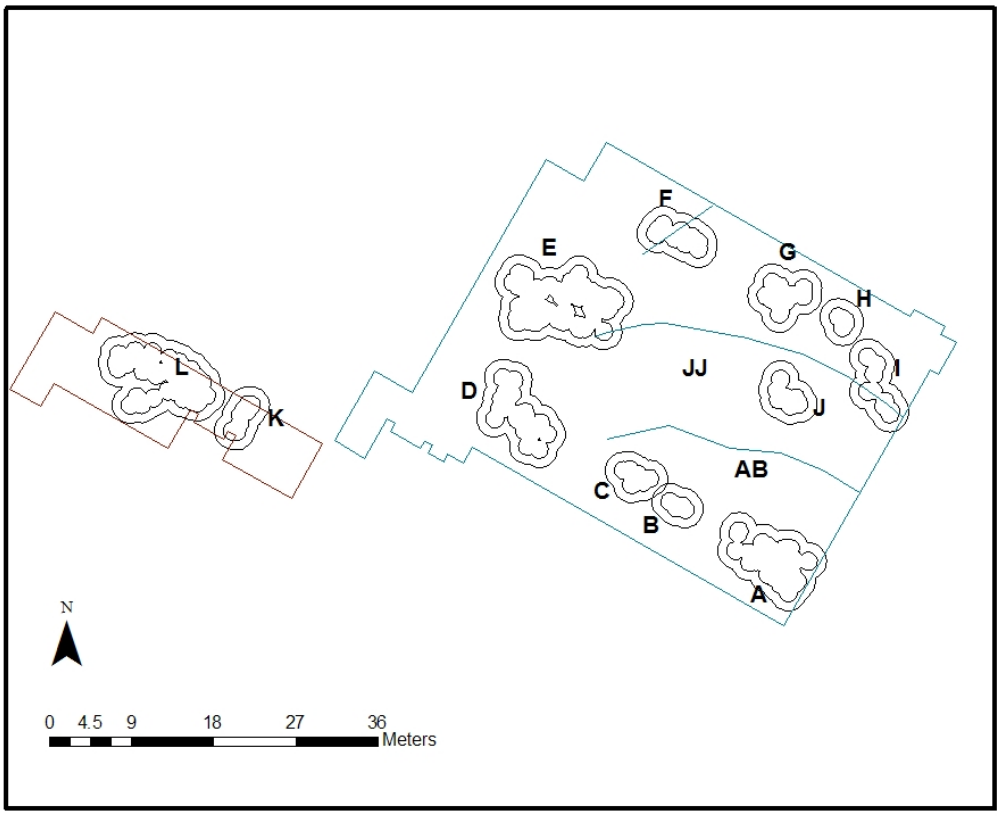

Figure 7. 1 Distribution of each analysis unit

7.1 The distribution of the zoo-anthropomorphic object

One specific object, the zoo-anthropomorphic object, is used to argue for the close connection between Houses and its ancestors and possible mechanism for social differentiation.

In the previous chapter I already illustrated the close association between the dwellings and burials. It indicates that the dwellings are also the place where mortuary ritual is performed. The participants can be the residents of the associated dwellings or other dwellings; however, the existence of the multiple burials around the dwelling demonstrates the dwelling is probably imbued with great ritual significance. Thus it probably constitutes as a type of "ritual attractor"(Fox 1993).

Furthermore, the presence of zoo-anthropomorphic object in some burials implies that certain social differentiation at the house level might have already appeared in prehistoric Wansan site. Based on ethnographic work conducted in Taiwan and Southeast Asian Austronesian societies (see Chapter 2 and 3), the anthropomorphic motif is often used to symbolize the connection between House members and the House founding ancestors. Particularly, this jade anthropomorphic object may also acts as an "inalienable object" and heirloom valuable owned by Houses in late Neolithic Taiwan (see Chapter 3). This object can be used to "establish hierarchy by validating or legitimizing identity and claims of individuals and groups who are unequal in terms of access to knowledge and resources" (Mills 2004: 240). The following analysis on the distribution of burials with this specific object thus provides a line of evidence to argue for the uneven social status among these possible Houses.

At the Wansan site, these dwellings not only are places where the living members of the dwellings, but also sites for deceased members to reside. A total of 69 burials, 14 in urns and 55 in stone boxes, were situated close to each defined dwelling. Not every burial has grave goods inside. The majority of grave goods are pottery vessels. However, due to the site formation process, the exact amount and form of the vessels cannot be determined. Other than the pottery vessels, pottery bracelet and spindle whorl also accompanied the burials.

In addition, lithic artifacts were used as grave goods. Ornament was the most common grave goods, and Dwelling E has the largest amount of ornaments. All of the grave goods have clear evidence of being used before entering the burial context. One of the most unique grave goods is the zoo-anthropomorphic ornament made from jade. Only eight of them were uncovered from the 1998 excavation. Five of them were clearly buried inside the stone coffins or urns. Even though the other three were recovered outside of the burials, they were in proximity to burials. Notably, this particular type of ornament can also be found in four other Neolithic sites in Taiwan which are also closely associated with burial context. In other words, this zoo-anthropomorphic ornament acted as unique ritual objects in mortuary rituals.

Significantly, these zoo-anthropomorphic ornaments are imported objects since jade is not locally available. It is suggested that the only jade quarry is situated in the southeastern part of Taiwan and all the jade artifacts in Taiwan are from the same area based on chemical analysis of these jade artifacts (Huang *et al* 2006; Lien 2003). Since the only jade source is not at the site and there is no evidence of producing these jade artifacts at the Wansan site, these artifacts are imported as complete products. Nevertheless, the Wansan site revealed the largest number of this zoo-anthropomorphic ornament in the Taiwan. In comparison, the Penan site, which uncovered more than a thousand and five hundred burials and more than 3,500 pieces of jade ornaments,

has only recovered three of this zoo-anthropomorphic ornament. There is evidence of jade production at the Penan site. However, at Wansan site, eight out of sixteen jade ornaments were zoo-anthropomorphic ornament. In other words, this object only had limited circulation in Taiwan during Neolithic times and the knowledge of its production was probably confined to specific individuals or groups resided outside of the Wansan site. Therefore, for the Wansan society, the ability to possess this object signified the special social network of this particular individuals and groups.

At the Wansan site, the burials with zoo-anthropomorphic ornament are located in the Area JJ, and AB, and Dwellings A, B, D, E, and F (Figure 7.2). Basically, every dwelling group has this particular object associated, except for the Dwelling Group V and VII. Especially in the Dwelling Group VI (the Dwelling J and the Area JJ), two zoo-anthropomorphic objects, one jade pendant and one broken jade object were all found inside one burial associated with this dwelling group.

Other jade ornaments that were used as grave goods are found in every dwelling, except for the dwellings in the Dwelling Group V, including Dwellings G, H, and I (Table 7.2). Also, even though there is no single zoo-anthropomorphic object found associated with the Dwelling Group VII, the presence of six jade earrings inside one burial also points out its difference among other dwelling groups.

Table 7.2 lists the number of different jade grave goods with associated dwellings. As indicated, there is no significant difference in terms of the quantity, except for the Dwelling L (Table 7.2). However, the types of jade artifacts among these dwellings show some variations. This suggests that every dwelling has the access to acquire the jade artifact for their deceased members; however, there are restrictions, in terms of which type of artifact these dwelling can acquire, especially of Dwelling L. Even though the Dwelling L has the largest number of earrings, it does not posses any single zoo-anthropomorphic objects. If these zoo-anthropomorphic objects signify the continuation with the ancestors, as observed in various ethnographic evidences, the Dwelling Group V and VII probably lack this symbol to claim their affiliation with ancestors.

Dwelling	Adze	Earring	Zoo-anthropomorphic	Pendant	Broken
A			1		
B	1		1		
C	1				
D			1		
E	1		1		1
F	2	1	1		
J			2	1	1
L		6			

Table 7. 1 Number of jade grave goods in the dwellings

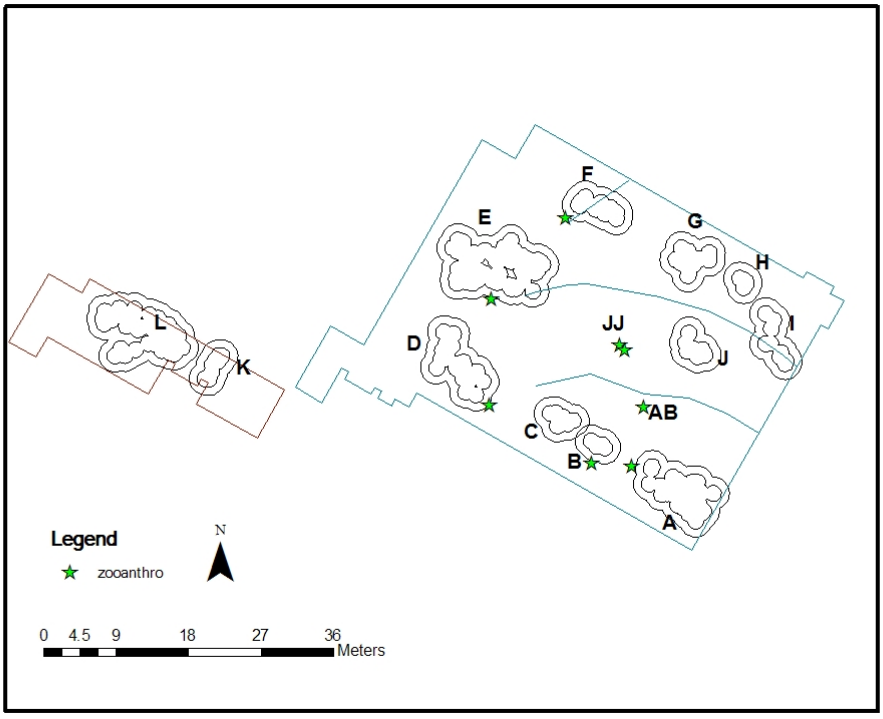

Figure 7. 2 Distribution of zoo-anthropomorphic object with associated dwelling

7.2 Lithic artifacts

In this section, lithic artifacts associated with various activities are examined to see if there is differential distribution among dwellings. In a House society, even though House members do not reside under the same roof, they may live close to each other. Therefore, similar artifact types should be found in each identified dwelling in the Fourth Layer or dwelling group in the Third Layer.

At the Wansan site, lithic artifacts can be divided into two categories: tools and non-utilitarian artifacts. The tools include arrowheads, net sinkers, axes, adzes, sickles, knives, choppers, and etc. Based on the form and use-wear of these lithic artifacts, the possible usage of these artifacts can be discerned. Particularly, most of the use-edge of lithic tools is polished, so the damage on the use-edge can be easily observed. The use-wear thus greatly assists identifying the possible usage of these tools. The various tools can be classified in to different categories based on their possible usage, such as fishing, hunting, harvesting, land clearing, woodworking and tool production. Some of the tools have clear use wear, however, due to the unique forms and without reference to any ethnographic examples; our understanding of the exact usage of these tools is limited.

Also, evidence of stone tool workshop can be found in the Dwellings A, E, F, G, I and J. Moreover, the large amount of raw materials, unfinished tools and debitage in dwellings other than these imply that stone tool production or maintenance might be an important part of people's everyday life at the Wansan site since the initial phase of the settlement.

As mentioned in the beginning of this chapter, if the Wansan society is a type of House Society, participating in different tasks together forms the sense of belonging to the same House. The distribution of features and artifacts at the Wansan site already imply these different dwelling groups might function as a House unit. Therefore, the following analysis is going to explore the distribution of these lithic artifacts and a similar spatial distribution pattern is expected to be found.

In addition, the temporal change of the dwellings is examined. Based on the stratigraphy, two cultural layers can be distinguished: the Fourth and Third Layers. The Fourth Layer indicates the initial stage of the settlement, while the Third Layer is the second phase of the settlement. In Chapter 6, the spatial distribution and quantity of the artifacts among the dwellings might imply the growth of the settlement. Also, the rise of larger House unit was proposed based on the change of artifact concentration between the Third and Fourth Layer. In the following analysis, the difference of artifact types between the two cultural layers is examined to confirm that temporal change in terms of the types of artifact being produced and utilized.

7.2.1 Temporal change

The types of lithic tool imply that the Wansan inhabitants' subsistence activities include fishing, hunting, and agriculture. Also, the presence of stone tool workshops and large amount of lithic raw materials and debitages show that tool production is one of the important activities being conducted at the site. Although these tool workshops were mainly discovered from the

Third Layer, the high density of whetstones, lithic raw materials, and debitage from the Fourth Layer suggests the importance of lithic tool production even in the initial phase of the settlement.

Overall, the total number of each artifact type increased dramatically from the Fourth to the Third Layer, but interestingly, the change of each type ratio indicates variations. For example, Table 7.3 shows the number of tool types in the Third and Fourth Layers. Figure 7.3 illustrates the relative frequencies of each artifact type in the Third and Fourth Layers. It demonstrates that ratio of ornament, scraper, net sinker, adze-axe and hoe-axe decrease in the Third Layer. The whetstone and artifacts related to tool production or maintenance keep similar ratio through time. On the other hand, the multi-perforated tool boosts in number dramatically from other artifacts.

The change of lithic inventories through time indicates that stone tool production and maintenance have been the most common activities among the dwellings. However, the rapid increase of multi-perforated tools and slight decline of other lithic tools might indicate that the importance of certain subsistence activities has been switched through time.

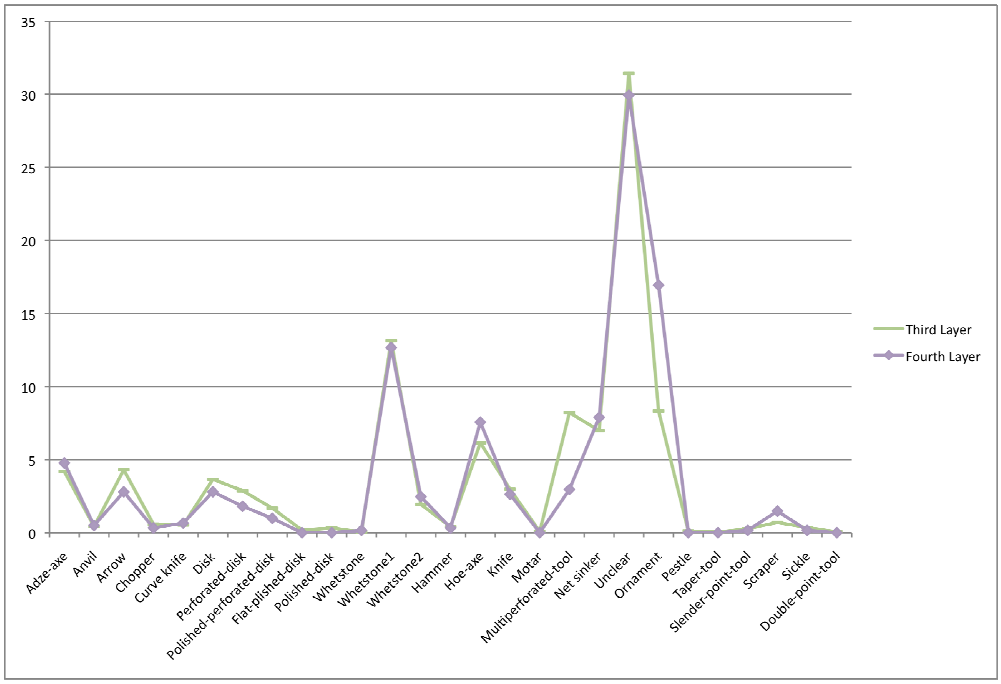

Figure 7.3 Change of lithic artifact types between the Third and the Fourth Layers

Possible function	Tool types	The Fourth Layer		The Third Layer III		Total
		Subtotal	% of Layer	Subtotal	% of Layer	
Fishing	Net sinker	**41**	**8.2**	**411**	**6.9**	**452**
Harvesting	Multiperforated tool	9	1.8	497	8.3	506
	Polished perforated disk	2	0.4	114	1.9	116
	Sickle	1	0.2	22	0.4	23
	Subtotal	**12**	**2.4**	**633**	**10.6**	**645**
Hunting	Arrowhead and spearhead	**15**	**3.0**	**262**	**4.4**	**277**
Tool production	Whetstone	83	16.6	916	15.3	999
	Unfinished artifacts, debitage, raw material	150	30	1,889	31.5	2039
	Subtotal	**233**	**46.6**	**2805**	**46.8%**	**3038**
Cutting	Knife	**15**	**3.0**	**209**	**3.5**	**224**
Land clearing	Hoe-axe	**39**	**7.8**	**368**	**6.1**	**407**
Processing	Anvil	2	0.4	26	0.4	28
	Mortar	0	0.0	5	0.1	5
	Pestle	0	0.0	9	0.6	9
	Hammer	2	0.4	21	0.4	23
	Subtotal	**4**	**0.8**	**61**	**1**	**65**
Woodworking	Adze-axe	**24**	**4.8**	**251**	**4.2**	**275**
Ornament	Earring/bracelet	**87**	**17.4**	**471**	**7.9**	**538**
Others	Chopper	2	0.4	38	0.6	40
	Disk	19	3.8	417	7.0	436
	Pointer	0	0.0	22	0.4	22
	Scraper	9	1.8	47	0.8	56
	Subtotal	**30**	**6.0**	**524**	**8.7**	**554**
Total	Grand Total	500	100.0	5995	100.0	5495

Table 7. 3 Number and relative frequencies of lithic artifact in the Third and Fourth Layers

7.2.2 Spatial variation

7.2.2.A The Initial Phase: the Fourth Layer

Table 7.4 shows the number of various types of lithic artifacts in different dwellings in the Fourth Layer. The ratio of each artifact type among each dwelling demonstrates variations (Figure 7.4). Dwellings A, D, and E have the most diverse artifact composition, and Dwelling H only has tool-production related artifacts present (Table 7.4). This variation suggests that different dwellings might have different emphasis in terms of their daily activities. However, this might also be result of small sample size.

Based on the types of lithic artifacts present in each dwelling, Dwellings A, B, D, and E have evidence indicate that the practice of fishing (net sinker), wood working (adze-axe), tool-production (whetstone, unclear), and harvesting (hoe-axe, multiperforated tools) can all be observed in these dwellings. Also, the number of artifacts in these dwellings demonstrates their possible larger population (Table 7.4).

Among these dwellings, Dwelling H has only four pieces of lithic artifacts. Since this is the initial phase of the settlement, some of the dwellings were probably not established yet. Therefore, the dwellings with small amount of lthic artifacts might indicate that these dwellings were occupied by few people or not even built yet. The analysis of pottery artifacts in the next section will be used to further examine this.

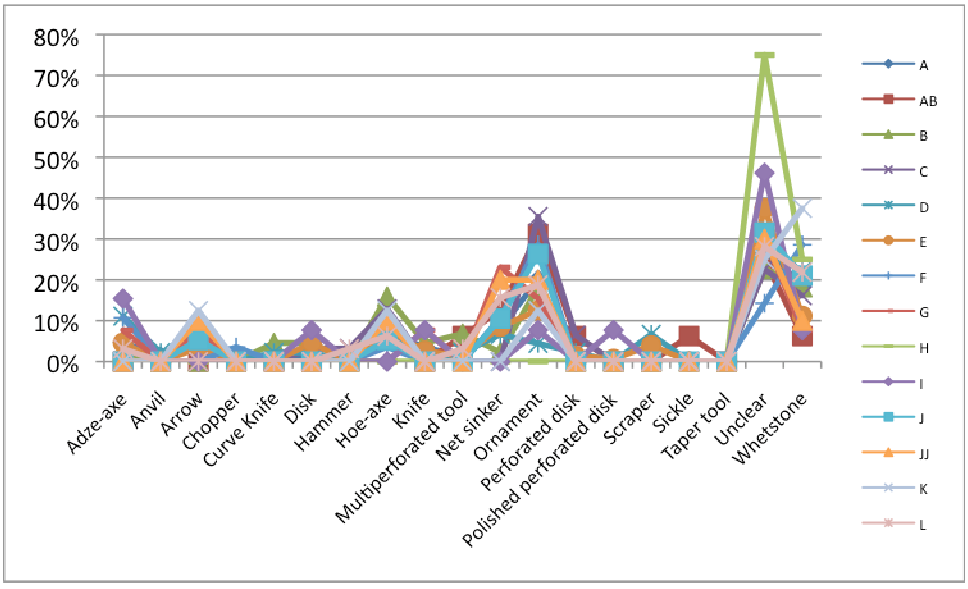

Figure 7. 4 Change of lithic artifacts among dwellings from the Fourth Layer

Dwelling	A	AB	B	C	D	E	F	G	H	I	J	JJ	K	L	Total
Adze-axe	4	0	1	0	5	7	3	1	0	2	0	0	0	1	29
	4.7%	0.0%	2.3%	0.0%	11.1%	4.6%	10.7%	7.7%	0.0%	15.4%	0.0%	0.0%	0.0%	3.1%	4.8%
Anvil	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3
	1.2%	0.0%	0.0%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
Arrow-Head	4	0	0	0	2	5	0	1	0	0	1	1	1	0	17
	4.7%	0.0%	0.0%	0.0%	4.4%	3.3%	0.0%	7.7%	0.0%	0.0%	5.3%	10.0%	12.5%	0.0%	2.8%
Chopper	1	0	0	0	0	0	1	0	0	0	0	0	0	0	2
	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	3.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
Curve Knife	1	0	2	0	1	0	0	0	0	0	0	0	0	0	4
	1.2%	0.0%	4.5%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
Disk	1	0	2	1	1	7	0	0	0	1	0	0	0	0	17
	1.2%	0.0%	4.5%	3.2%	2.2%	4.6%	0.0%	0.0%	0.0%	7.7%	0.0%	0.0%	0.0%	0.0%	2.8%
Hammer	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2
	0.0%	0.0%	0.0%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	0.3%
Hoe-axe	6	1	7	4	3	12	1	0	0	0	1	1	1	2	46
	7.1%	6.3%	15.9%	12.9%	6.7%	7.9%	3.6%	0.0%	0.0%	0.0%	5.3%	10.0%	12.5%	6.3%	7.6%
Knife	3	0	2	0	0	4	0	1	0	1	0	0	0	0	16
	3.5%	0.0%	4.5%	0.0%	0.0%	2.6%	0.0%	7.7%	0.0%	7.7%	0.0%	0.0%	0.0%	0.0%	2.6%
Multi-Perforat-ed tool	1	1	3	0	1	2	0	0	0	0	0	0	0	1	18
	1.2%	6.3%	6.8%	0.0%	2.2%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	3.0%
Net sinker	7	2	1	0	3	13	3	3	0	0	2	2	0	5	48
	8.2%	12.5%	2.3%	0.0%	6.7%	8.6%	10.7%	23.1%	0.0%	0.0%	10.5%	20.0%	0.0%	15.6%	7.9%
Ornament	17	5	8	11	2	19	8	2	0	1	5	2	1	6	103
	20.0%	31.3%	18.2%	35.5%	4.4%	12.5%	28.6%	15.4%	0.0%	7.7%	26.3%	20.0%	12.5%	18.8%	16.9%
Perforated disk	0	1	0	2	1	2	0	0	0	0	0	0	0	0	11
	0.0%	6.3%	0.0%	6.5%	2.2%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%
Polished Perforated disk	0	0	0	0	0	1	0	0	0	1	0	0	0	0	6
	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	7.7%	0.0%	0.0%	0.0%	0.0%	1.0%
Scraper	0	0	0	0	3	6	0	0	0	0	0	0	0	0	9
	0.0%	0.0%	0.0%	0.0%	6.7%	3.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%
Sickle	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Taper tool	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Unclear	23	4	10	7	12	57	4	4	3	6	6	3	2	9	182
	27.1%	25.0%	22.7%	22.6%	26.7%	37.5%	14.3%	30.8%	75.0%	46.2%	31.6%	30.0%	25.0%	28.1%	29.9%
Whet-Stone	16	1	8	5	10	17	8	1	1	1	4	1	3	7	93
	18.8%	6.3%	18.2%	16.1%	22.2%	11.2%	28.6%	7.7%	25.0%	7.7%	21.1%	10.0%	37.5%	21.9%	15.3%
Total	85	16	44	31	45	152	28	13	4	13	19	10	8	32	608
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 7. 4 Number of lithic artifact type in each dwelling from the Fourth Layer

7.2.2.B The Second Phase: the Third Layer

Figure 7. 5 illustrates the ratio of each type of lithic artifacts among dwellings in the Third Layer. Most of the dwellings exhibits similar artifact ratio, suggesting similar activities have been practiced among these dwellings. However, some variations can be recognized. Dwelling G demonstrates the most different pattern than other dwellings. It has the highest ratio of adze-axe, special-point tool and disks. However, it lacks arrowhead and hoe-axe which are the common tool types among other dwellings. Moreover, it has the lowest ratio of artifact related to tool production, such as raw materials, unfinished tools, broken tools and debitages. The inhabitants of dwelling G did not emphasize hunting and agricultural activities as other dwelling inhabitants. However, this is also possibly due to sample size issue.

Also, Dwellings G and K have the fewest types of lithic artifacts (Table 7.5). Unlike Dwelling G, the majority of artifact types in Dwelling K are related to tool-production, such as whetstone, possible raw materials, debitage, unfinished tool and broken tool. Even though there is no clear evidence of stone tool workshop in Dwelling K, the artifacts demonstrate that the Wansan people probably produced or processed lithic tools in this dwelling.

Among the 27 types of artifacts, artifacts related to tool-production and tool processing are the most common artifacts at the site. It indicates that this is probably the most important and usual practice for all the Wansan people. In addition, ornament, perforated-disk, net sinker, and adze-axe can be found in every dwelling. The presence of net sinker and adze-axe represent the practice of fishing and possible wood working activities. However, the perforated-disk is probably not a utilitarian tool. There is no clear use-edge or use-wear that can be observed on perforated-disk. The presence of ornament and perforated-disk thus provide another evidence to argue for the difference among dwellings.

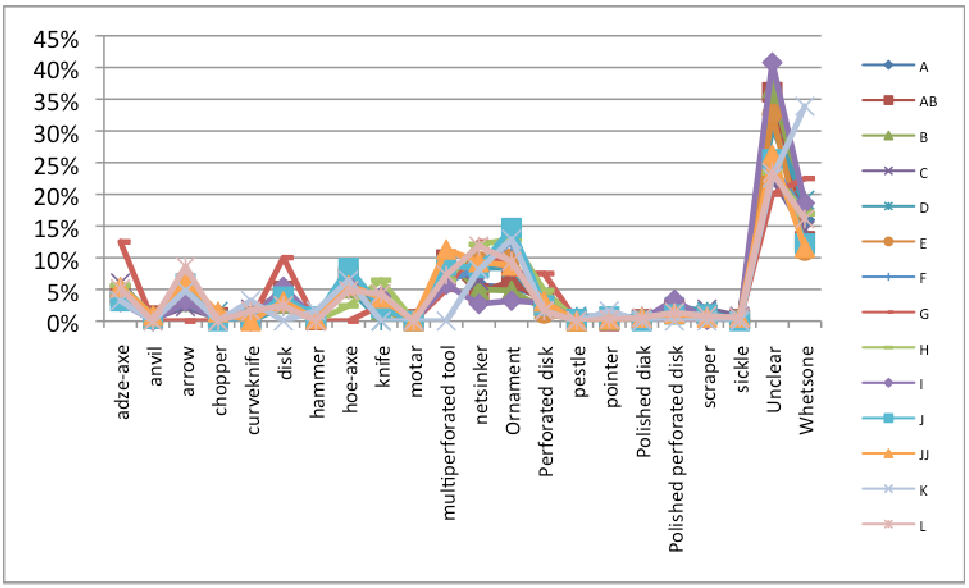

Figure 7.5 Change of lithic artifacts among dwellings from the Third Layer

Dwelling Group	I				II	III	IV
Dwelling	A	AB	B	C	D	E	F
Adze-axe	49	29	23	16	6	34	15
	3.8%	4.2%	4.0%	6.0%	4.6%	4.1%	3.8%
Anvil	3	6	5	1	1	4	1
	0.2%	0.9%	0.9%	0.4%	0.8%	0.5%	0.3%
Arrow	53	24	18	6	4	37	24
	4.2%	3.5%	3.1%	2.3%	3.1%	4.5%	6.1%
Chopper	13	4	5	1	2	6	1
	1.0%	0.6%	0.9%	0.4%	1.5%	0.7%	0.3%
Curve knife	5	3	1	5	0	6	2
	0.4%	0.4%	0.2%	1.9%	0.0%	0.7%	0.5%
Disk	41	33	16	11	3	40	12
	3.2%	4.8%	2.7%	4.1%	2.3%	4.8%	3.1%
Hammer	6	1	3	2	0	3	1
	0.5%	0.1%	0.5%	0.8%	0.0%	0.4%	0.3%
Hoe-axe	69	46	30	18	7	69	26
	5.4%	6.7%	5.2%	6.8%	5.3%	8.3%	6.6%
Knife	47	20	10	7	0	16	10
	3.7%	2.9%	1.7%	2.6%	0.0%	1.9%	2.6%
Mortar	1	2	0	0	0	1	1
	0.1%	0.3%	0.0%	0.0%	0.0%	0.1%	0.3%
Multiperforated tool	128	67	56	23	11	52	24
	10.1%	9.7%	9.6%	8.6%	8.4%	6.3%	6.1%
Net sinker	71	30	29	17	11	78	33
	5.6%	4.3%	5.0%	6.4%	8.4%	9.4%	8.4%
Ornament	68	44	28	35	11	82	49
	5.3%	6.4%	4.8%	13.2%	8.4%	9.9%	12.5%
Perforated disk	49	21	11	12	3	10	14
	3.8%	3.0%	1.9%	4.5%	2.3%	1.2%	3.6%
Pestle	2	0	0	1	1	2	0
	0.2%	0.0%	0.0%	0.4%	0.8%	0.2%	0.0%
Pointer	5	0	1	1	1	2	2
	0.4%	0.0%	0.2%	0.4%	0.8%	0.2%	0.5%
Polished disk	5	2	3	1	0	1	3
	0.4%	0.3%	0.5%	0.4%	0.0%	0.1%	0.8%
Polished perforated disk	28	13	12	4	3	13	7
	2.2%	1.9%	2.1%	1.5%	2.3%	1.6%	1.8%
Scraper	6	7	8	5	2	8	2
	0.5%	1.0%	1.4%	1.9%	1.5%	1.0%	0.5%
Sickle	6	2	2	2	0	2	2
	0.5%	0.3%	0.3%	0.8%	0.0%	0.2%	0.5%
Unclear	415	249	214	60	40	271	95
	32.6%	36.1%	36.8%	22.6%	30.5%	32.7%	24.3%

Table 7. 5 Number and relative frequencies of lithic artifact in the Third Layer (continue)

Whetstone	203	87	107	38	25	92	67
	15.9%	12.6%	18.4%	14.3%	19.1%	11.1%	17.1%
Total	1273	690	582	266	131	829	391
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 7. 5 Number and relative frequencies of lithic artifact in the Third Layer (continue)

Dwelling Group	V			VI		VII		Grand Total
Dwelling	G	H	I	J	JJ	K	L	
Adze-axe	5	7	18	9	19	2	19	251
	12.5%	5.6%	3.0%	3.1%	5.4%	3.2%	5.1%	4.2%
Anvil	0	1	0	1	3	0	0	26
	0.0%	0.8%	0.0%	0.3%	0.8%	0.0%	0.0%	0.4%
Arrow	0	4	18	17	22	3	32	262
	0.0%	3.2%	3.0%	5.9%	6.2%	4.8%	8.6%	4.4%
Chopper	0	0	1	0	5	0	0	38
	0.0%	0.0%	0.2%	0.0%	1.4%	0.0%	0.0%	0.6%
Curve knife	0	1	0	1	0	2	6	32
	0.0%	0.8%	0.0%	0.3%	0.0%	3.2%	1.6%	0.5%
Disk	4	3	32	11	11	0	9	226
	10.0%	2.4%	5.4%	3.8%	3.1%	0.0%	2.4%	3.8%
Hammer	0	0	1	2	1	1	0	21
	0.0%	0.0%	0.2%	0.7%	0.3%	1.6%	0.0%	0.4%
Hoe-axe	0	3	34	24	20	4	18	368
	0.0%	2.4%	5.8%	8.4%	5.6%	6.5%	4.8%	6.1%
Knife	1	8	23	6	13	0	16	177
	2.5%	6.5%	3.9%	2.1%	3.7%	0.0%	4.3%	3.0%
Mortar	0	0	0	0	0	0	0	5
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Multiperforated tool	2	8	34	25	40	0	27	497
	5.0%	6.5%	5.8%	8.7%	11.3%	0.0%	7.3%	8.3%
Net sinker	5	15	16	24	33	5	44	411
	12.5%	12.1%	2.7%	8.4%	9.3%	8.1%	11.8%	6.9%
Ornament	3	16	19	42	31	8	35	471
	7.5%	12.9%	3.2%	14.7%	8.8%	12.9%	9.4%	7.9%
Perforated disk	3	6	17	7	11	1	6	171
	7.5%	4.8%	2.9%	2.4%	3.1%	1.6%	1.6%	2.9%
Pestle	0	0	2	1	0	0	0	9
	0.0%	0.0%	0.3%	0.3%	0.0%	0.0%	0.0%	0.2%
Pointer	0	0	1	2	1	1	1	18
	0.0%	0.0%	0.2%	0.7%	0.3%	1.6%	0.3%	0.3%
Polished disk	0	0	1	0	2	0	2	20
	0.0%	0.0%	0.2%	0.0%	0.6%	0.0%	0.5%	0.3%

Table 7. 5 Number and relative frequencies of lithic artifact in the Third Layer (continue)

Dwelling Group	V			VI		VII		Total
Dwelling	G	H	I	J	JJ	K	L	
Polished perforated disk	0	2	20	3	4	0	5	114
	0.0%	1.6%	3.4%	1.0%	1.1%	0.0%	1.3%	1.9%
Scraper	0	0	1	3	2	0	3	47
	0.0%	0.0%	0.2%	1.0%	0.6%	0.0%	0.8%	0.8%
Sickle	0	0	2	0	2	0	2	22
	0.0%	0.0%	0.3%	0.0%	0.6%	0.0%	0.5%	0.4%
Unclear	8	29	241	73	93	14	87	1889
	20.0%	23.4%	40.8%	25.5%	26.3%	22.6%	23.4%	31.5%
Whetstone	9	21	110	35	41	21	60	916
	22.5%	16.9%	18.6%	12.2%	11.6%	33.9%	16.1%	15.3%
Total	40	124	591	286	354	62	372	5991
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 7. 5 Number and relative frequencies of lithic artifact in the Third Layer

The cluster of each artifact type is calculated using the Anselin Local Moran's *i* index in order to see if each artifact type forms any clusters. Table 7.6 summarizes the presence/absence of each artifact clusters associated with the dwellings. Some of the artifact classes have so small number of artifacts scattered on the site that they cannot form any statistically significant clusters. Therefore, only 18 types of artifacts form clusters. The distribution shows that no single artifact type forms any clusters in Dwellings D, G and K (Table 7.6). As discussed in the previous chapter, most of the Third Layer soil of the Dwelling D was removed because of recent road construction. Dwellings G and K not only have the fewest amount and variety of lithic artifacts accumulated, but also no single lithic artifact type forms any cluster at these two dwellings. Considering the sizes of these two dwellings are not the smallest at the site, the artifact distribution thus implies the activities being conducted at dwelling G and K are different from other dwellings.

It was assumed in previous chapter that some dwellings might form groups in the second phase. Figure 7.6 shows the relative frequencies of artifacts types in different dwelling groups. Comparing Figure 7.6 with Figure 7.5, the different ratio of each artifact type of every dwelling group is smaller than that of every dwelling. In other words, these dwelling groups must form a certain collaborative relationship for their everyday living. Some dwellings might build certain social relations with other dwellings. Consequently, they become more specialized in certain activities, while other dwellings in the same group emphasized others

Dwelling Group	I				II	III	IV	V			VI		VII	
Type\ Dwelling	A	AB	B	C	D	E	F	G	H	I	J	JJ	K	L
Arrow	☆	☆	☆			☆	☆			☆	☆	☆		☆
Net sinker	☆	☆	☆			☆	☆		☆		☆	☆		☆
Hoe-Axe	☆	☆	☆			☆				☆	☆	☆		☆
Adze-axe	☆	☆	☆	☆		☆				☆	☆	☆		☆
Multiperforated tool	☆	☆	☆	☆								☆		☆
Sickle	☆		☆	☆										
Knife	☆	☆	☆						☆	☆	☆	☆		☆
Curve knife	☆	☆		☆										☆
Chopper	☆		☆											
Scraper	☆	☆	☆	☆		☆	☆				☆	☆		☆
Perforated disk	☆	☆	☆	☆			☆			☆	☆	☆		☆
Hammers	☆					☆								
Whetstone	☆	☆	☆			☆	☆		☆	☆	☆	☆		☆
Anvil		☆	☆			☆						☆		
Disk	☆	☆	☆			☆	☆			☆		☆		☆
Ornament	☆	☆				☆	☆		☆	☆	☆	☆		☆
Unclear	☆	☆	☆			☆				☆		☆		☆
Number of clusters	16	14	14	6	0	11	7	0	4	9	9	13	0	13

Table 7. 6 Presence/ absence of lithic clusters among dwellings in the Third Layer (☆: presence of cluster)

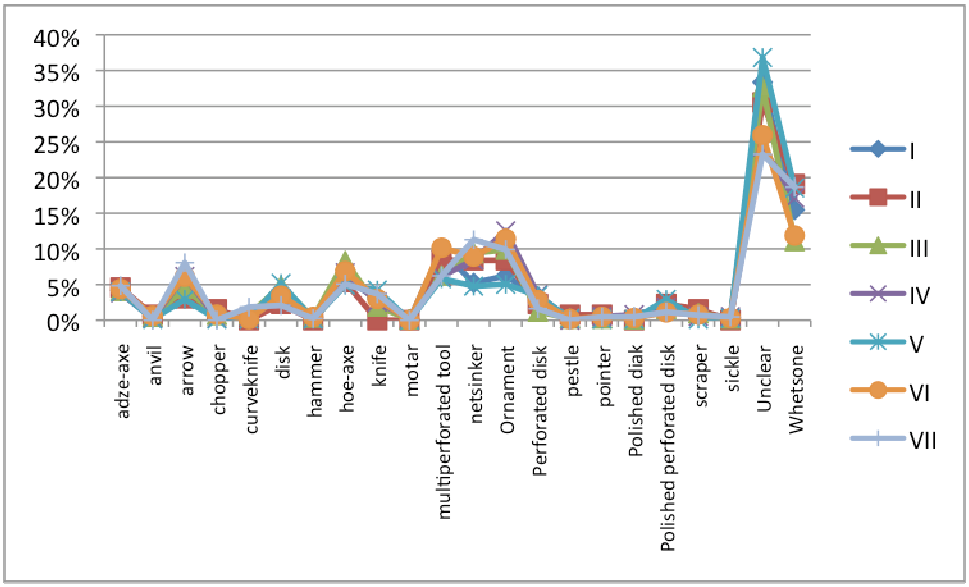

Figure 7.6 Change of lithic artifact among dwelling groups from the Third Layer

7.2.3 Summary of the distribution of lithic artifacts

There are 27 types of lithic artifacts and these artifacts can be further classified into different categories based on their possible usage. These categories include fishing tools, hunting tools, farming tools, tool processing tools, soft/hard material processing tools, ornaments and uncertain tools. These possible uses of tools and their association with dwellings thus indicate what kind of activities the inhabitants of each dwelling might conduct.

Based on the artifact clusters found in the Third Layer (see Table 7.6), most of the artifact clusters can be found within or in proximity to each dwelling of the Third Layer, except for the Dwelling G and K. Both of these dwellings do not have knife, sickle, scraper, pestle, hammers and different types of choppers. Sickles and knives are tools believed to be closely associated with the agricultural activities. Scrapers and choppers are tools without polished use-edge and comparatively rare in quantity at the site. The irregular shape and unpolished use-edge of these scrapers and choppers can be the result of more expedient production and use. Furthermore, the lack of pestles, hammers, and anvils can also be seen in both dwellings. The usage of pestles, hammers, and anvils can be referred from the use-wear. Pestles and hammers are tools used to pound either organic or inorganic materials. However, the exact materials that these tools used to processed are not clear without further experimental archaeology. Therefore, the Dwellings G and K only show evidence of practicing specific subsistence activities, such as fishing, hunting, and agricultural activities.

The inhabitants of the other dwellings all conduct fishing, hunting, farming, tool producing and food processing. Based on the artifact clusters from the Third Layer, the dwellings can be divided into three groups according to the number of artifact clusters. The first one, which has the highest number of artifact clusters, are Dwellings A, B, E, I, L and Area AB and JJ. The second level is Dwellings C, F, H, and J, and the third one includes Dwellings D, G, and K. As discussed earlier, the dwellings groups should be treated as a unit in the second phase of the settlement. As a result, each dwelling group consists of dwellings from the three levels (Table 7.7). Judging from the quantities and types of the artifacts associated with each dwelling group (Table 7.5 and 7.6), the difference and similarity among dwelling groups can be distinguished.

First, most of the dwellings practiced similar subsistence activities, although some dwellings might exhibit evidence of more emphasis on specific activities. Second, Dwelling Group I probably had the largest population or had been occupied for longer period of time than other dwelling groups since it had the largest number and most diversified artifacts. Third, even though Dwelling Group IV has fewer numbers of artifacts than other dwelling groups, the variety of the artifacts is no less than others. In other words, this dwelling group was still an independent unit despite it might be smaller in size. Finally, Dwelling Group VII had the fewest variety of artifacts than other dwelling groups. For example, it lacks processing tools, such as pestle, anvil, and mortar. Thus, Dwelling Group VII probably has to depend on other dwelling groups to accomplish certain work.

On the other hand, in the initial stage of the settlement (the Fourth Layer), only whetstones, lithic raw material, debitage, unfinished tools can be found within every dwelling. These artifact types indicate tool production is one of the common activities in the initial phase of the

settlement. However, the activities each dwelling inhabitants perform is limited. Based on clusters distribution (Table 7.8), Dwelling E has the most artifact clusters present, and Dwellings G, H, I and K have no cluster existed at all. Furthermore, the distribution of these clusters is more concentrated in the south part of the Dwelling E.

Dwelling Group	First level	Second level	Third level
I	A, AB, B	C	
II			D
III	E		
IV		F	
V	I	H	G
VI	JJ	J	
VII	L		K

Table 7. 7 Composition of dwellings in each dwelling group

Dwelling	A	AB	B	C	D	E	F	G	H	I	J	JJ	K	L
Arrow	☆					☆								☆
Net sinker	☆	☆				☆	☆	☆				☆		
Hoe-axe	☆	☆	☆	☆	☆	☆						☆		☆
Adze-axe	☆	☆			☆	☆		☆						
Multiperforated tool		☆	☆	☆	☆									☆
Sickle														
Knife	☆		☆		☆	☆								
Curve knife														
Chopper														
Scraper					☆	☆								
Perforated disk		☆		☆	☆	☆								
Hammer														
Whetstone	☆	☆	☆		☆	☆	☆				☆			☆
Anvil														
Disk						☆								
Ornament	☆	☆	☆	☆		☆	☆				☆			
Unclear	☆			☆	☆	☆								☆
Number of clusters	8	7	5	5	8	11	3	2	0	0	2	2	0	5

Table 7. 8 Presence/ absence of lithic clusters among dwellings in the Fourth Layer (☆: presence of cluster)

7.3 Pottery artifacts

As mentioned in the previous chapter, a total of 35,202 pieces potsherds, weighting 453 kilograms, were uncovered from the Third and Fourth Layers. These pottery artifacts can be grouped into vessel and non-vessel types. Vessels include jars, bowls, plates and vases and non-vessels consist of spindle whorls, figurines, bracelets and object whose complete form is uncertain. Except for jar, bowl, plate, and vase, the presence of foot-rim, shoulder, handle, base and knob also indicates the diversity of vessel forms. The various vessel forms thus might imply different usages. The majority of the pottery artifacts uncovered from the site are potsherds which are the result of broken vessels. Table 7.9 is the list of the number of identifiable vessels and non-vessels recovered from the Third and Fourth Layers.

There are four types of non-vessel pottery artifacts: spindle whorl, bracelet, figurine, and knife. The number of earthen figurines and knives are rare, especially the knives. The figurines are shaped similar to animals, such as birds, goats, and dogs and the shapes of the knives are similar to lithic knives. Obviously, the use of earthen knife is not the same as the lithic knife. It probably did not have utilitarian functions.

7.3.1 Temporal change

As shown in Table 7., the amount of the vessels increased from the Fourth to the Third Layers. While four vases were recovered from the Third Layer, both the Third and Fourth Layers have one plate each. Jars are the most common vessel form at the site. Also, the presence of miscellaneous vessel accessories, such as foot-rim, handles, and knobs, indicate various vessel forms which can argue for the diverse usages.

The increase of these non-vessel artifacts can also be observed (Table 7.9). Not only the number of artifacts rose, but also the variety of artifact types. Vase and clay knife was absent during the initial stage of the settlement in the Fourth Layer.

	Type	The Third Layer (% of Layer)	The Fourth Layer (% of Layer)
Vessel	Jar-rim	7921 (25.2)	1192 (31.1)
	Shoulder	333 (1.1)	13 (0.3)
	Foot-rim	774 (2.5)	120 (3.1)
	Handle	1113 (3.5)	97 (2.5)
	Knob	11 (0.0)	1 (0.0)
	Bowl	53 (0.2)	5 (0.1)
	Plate	0 (0.0)	1 (0.0)
	Vase	4 (0.0)	0 (0.0)
Non Vessel	Bracelet	74 (0.2)	7 (0.1)
	Figurine	7 (0.0)	2 (0.0)
	Knife	2 (0.0)	0 (0.0)
	Spindle whorl	223 (0.7)	48 (1.3)
	Unclear	342 (1.1)	63 (1.6)
Grand Total	Total	31,365 (100.0)	3,838 (100.0)

Table 7. 9 Number of pottery artifacts in the Third and Fourth Layers

7.3.2 Spatial variation

7.3.2.A The Initial Stage: The Fourth Layer

Table 7.10 indicates that the main pottery artifact associated with the identified dwellings is pottery vessel. Non-vessel only constitutes a very small ratio in each dwelling. Especially in Dwelling H, only vessels could be found. Figure 7.7 and 7.8 are relative frequencies of different types of vessel part and non-vessel each dwelling is associated with. The charts show that the most abundant vessel parts, the body and jar-rim, can be found within each dwelling or adjacent areas. Most of the dwellings have similar ratio of vessel types which imply the inhabitants of these dwellings utilize similar vessel forms for their everyday life. However, few dwellings display some variations.

In Table 7.11, the ratio of different vessel parts within each dwelling is listed. The Dwelling K has the highest ratio of jar rim and lowest ratio of body parts among the dwellings. This suggests that the vessels in Dwelling K are probably smaller vessels. On the contrary, Dwelling I has the highest ratio of body parts and lowest ratio of rim parts. Thus the vessels in this dwelling probably are larger vessels. Both of the dwellings have very high ratio of shoulder part which further indicates that the vessels in these two dwellings are different others. However, this could also be the effect of the small sample size of the Dwellings K and I.

Dwelling/ Area	Vessel	Non-vessel	Unclear	Grand Total
A	530	2	11	543
	97.6%	0.4%	2.0%	100.0%
AB	216	2	5	223
	96.9%	0.9%	2.2%	100.0%
B	184	4	1	189
	97.4%	2.1%	0.5%	100.0%
C	875	10	25	910
	96.2%	1.1%	2.7%	100.0%
D	190	5	5	200
	95.0%	2.5%	2.5%	100.0%
E	763	11	8	782
	97.6%	1.4%	1.0%	100.0%
F	105	6	1	112
	93.8%	5.4%	0.9%	100.0%
G	26	2	0	28
	92.9%	7.1%	0.0%	100.0%
H	21	0	0	21
	100.0%	0.0%	0.0%	100.0%
I	66	1	2	69
	95.7%	1.4%	2.9%	100.0%
J	389	3	2	394
	98.7%	0.8%	0.5%	100.0%
JJ	183	7	1	191
	95.8%	3.7%	0.5%	100.0%
K	26	1	1	28
	92.9%	3.6%	3.6%	100.0%
L	144	3	1	148
	97.3%	2.0%	0.7%	100.0%
Total	4497	65	71	4633
	97.1%	1.4%	1.5%	100.0%

Table 7. 10 Relative frequencies of pottery artifacts associated with each dwelling in the Fourth Layer

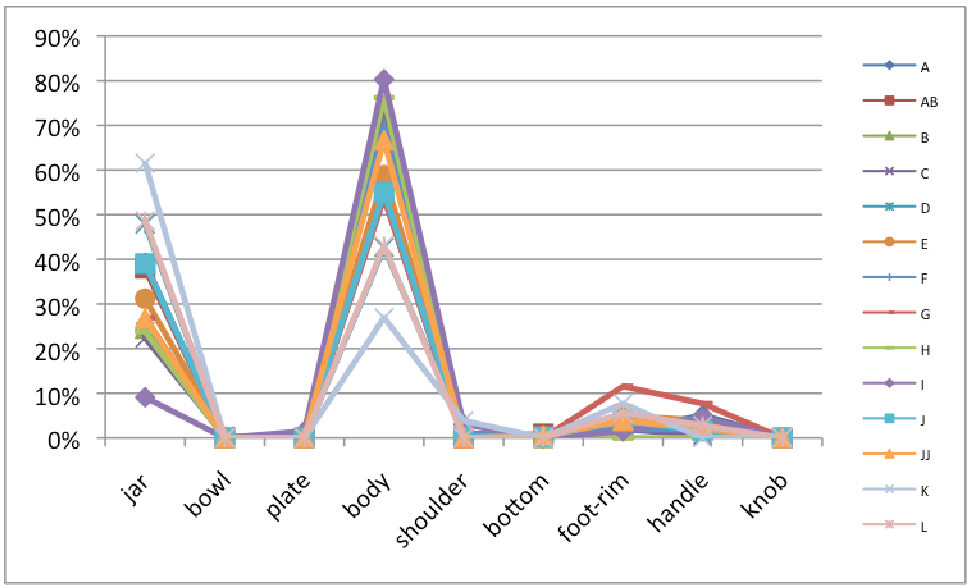

Figure 7. 7 Change of relative frequencies of pottery vessels among dwellings in the Fourth Layer

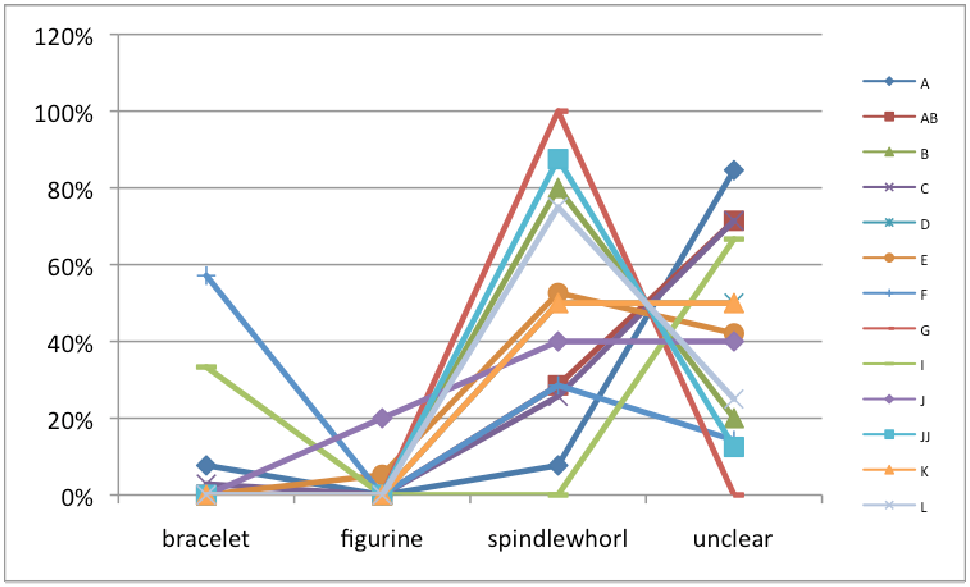

Figure 7. 8 Change of relative frequencies of non-vessels from dwellings in the Fourth Layer

Dwelling	Jar-rim	Bowl	Plate	Body	Shoulder	Bottom	Foot-rim	Handle	Knob	Grand Total
A	208	0	0	286	0	1	8	27	0	530
	39.2%	0.0%	0.0%	54.0%	0.0%	0.2%	1.5%	5.1%	0.0%	100.0%
AB	82	0	0	124	0	2	4	4	0	216
	38.0%	0.0%	0.0%	57.4%	0.0%	0.9%	1.9%	1.9%	0.0%	100.0%
B	45	0	0	127	2	0	5	5	0	184
	24.5%	0.0%	0.0%	69.0%	1.1%	0.0%	2.7%	2.7%	0.0%	100.0%
C	196	3	0	652	2	0	17	5	0	875
	22.4%	0.3%	0.0%	74.5%	0.2%	0.0%	1.9%	0.6%	0.0%	100.0%
D	91	0	0	81	2	1	10	5	0	190
	47.9%	0.0%	0.0%	42.6%	1.1%	0.5%	5.3%	2.6%	0.0%	100.0%
E	238	2	0	449	2	3	38	30	1	763
	31.2%	0.3%	0.0%	58.8%	0.3%	0.4%	5.0%	3.9%	0.1%	100.0%
F	27	0	0	73	1	0	2	2	0	105
	25.7%	0.0%	0.0%	69.5%	1.0%	0.0%	1.9%	1.9%	0.0%	100.0%
G	7	0	0	14	0	0	3	2	0	26
	26.9%	0.0%	0.0%	53.8%	0.0%	0.0%	11.5%	7.7%	0.0%	100.0%
H	5	0	0	16	0	0	0	0	0	21
	23.8%	0.0%	0.0%	76.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
I	6	0	1	53	2	0	1	3	0	66
	9.1%	0.0%	1.5%	80.3%	3.0%	0.0%	1.5%	4.5%	0.0%	100.0%
J	152	0	0	214	1	1	15	6	0	389
	39.1%	0.0%	0.0%	55.0%	0.3%	0.3%	3.9%	1.5%	0.0%	100.0%
JJ	49	0	0	122	0	1	7	4	0	183
	26.8%	0.0%	0.0%	66.7%	0.0%	0.5%	3.8%	2.2%	0.0%	100.0%
K	16	0	0	7	1	0	2	0	0	26
	61.5%	0.0%	0.0%	26.9%	3.8%	0.0%	7.7%	0.0%	0.0%	100.0%
L	70	0	0	62	0	0	8	4	0	144
	48.6%	0.0%	0.0%	43.1%	0.0%	0.0%	5.6%	2.8%	0.0%	100.0%

Table 7. 11 Relative frequencies of vessel parts from dwellings in the Fourth Layer

Even though most dwellings show similar patterns in terms of vessels, the existence of non-vessel artifacts in different dwellings display clear difference among these dwellings. Table 7.12 shows the number and relative frequencies of the non-vessel artifacts in different dwellings. Spindle whorls are the most common non-vessel artifact among the dwellings, however, Dwelling I does not have any spindle whorl present. On the other hand, Dwelling G has no other non-vessel artifact present but spindle whorls. The distribution of these non-vessel artifacts clearly demonstrates the difference among these dwellings.

Dwelling	Spindle whorl	Figurine	Bracelet	Grand Total
A	1	0	1	2
	50.0%	0.0%	50.0%	100.0%
AB	2	0	0	2
	100.0%	0.0%	0.0%	100.0%
B	4	0	0	4
	100.0%	0.0%	0.0%	100.0%
C	9	0	1	10
	90.0%	0.0%	10.0%	100.0%
D	5	0	0	5
	100.0%	0.0%	0.0%	100.0%
E	10	1	0	11
	90.9%	9.1%	0.0%	100.0%
F	2	0	4	6
	33.3%	0.0%	66.7%	100.0%
G	2	0	0	2
	100.0%	0.0%	0.0%	100.0%
I	0	0	1	1
	0.0%	0.0%	100.0%	100.0%
J	2	1	0	3
	66.7%	33.3%	0.0%	100.0%
JJ	7	0	0	7
	100.0%	0.0%	0.0%	100.0%
K	1	0	0	1
	100.0%	0.0%	0.0%	100.0%
L	3	0	0	3
	100.0%	0.0%	0.0%	100.0%

Table 7. 12 Number and relative frequencies of non-vessel artifacts in each dwelling

The spatial distribution of vessels recovered from the Fourth Layer tends to scatter outside of each dwelling (Figure 7.9 and 7.10), and the clusters of vessels and non-vessels overlap in most areas (Figure 7.11 and 7.12). This connotes that during the initial phase of the settlement, the Wansan people mostly threw out their pottery waste in certain areas outside of the dwellings.

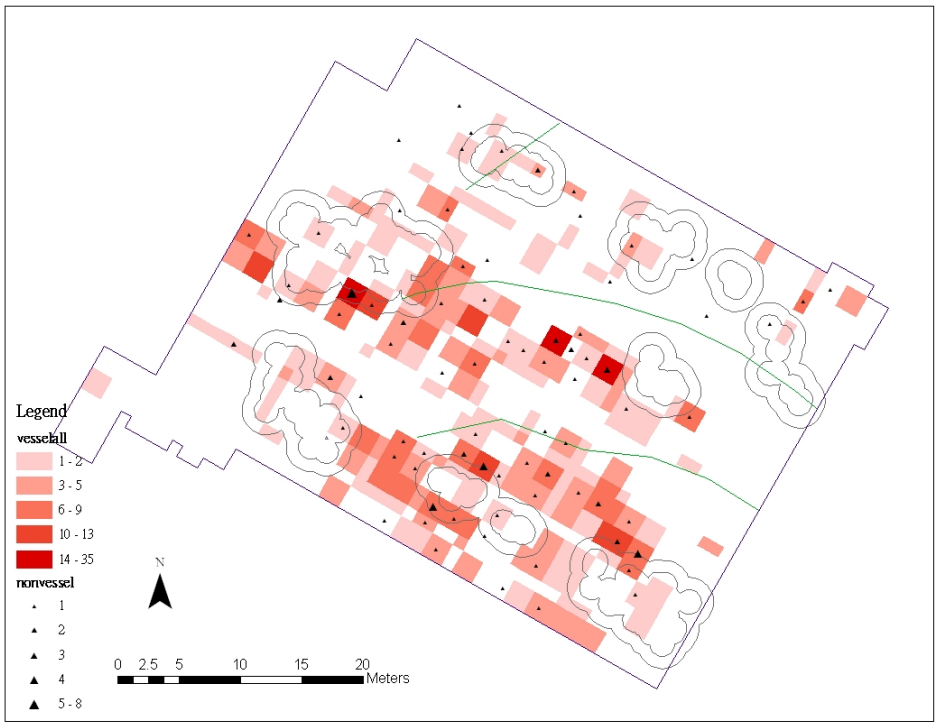

Figure 7. 9 Distribution of pottery of the Northern Excavation Area

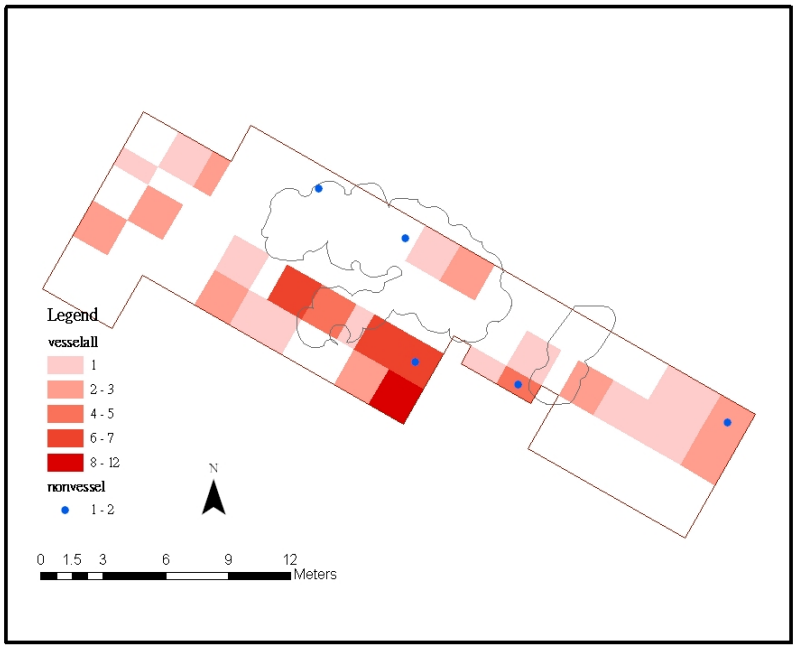

Figure 7. 20 Distribution of pottery from the Southern Excavation Area

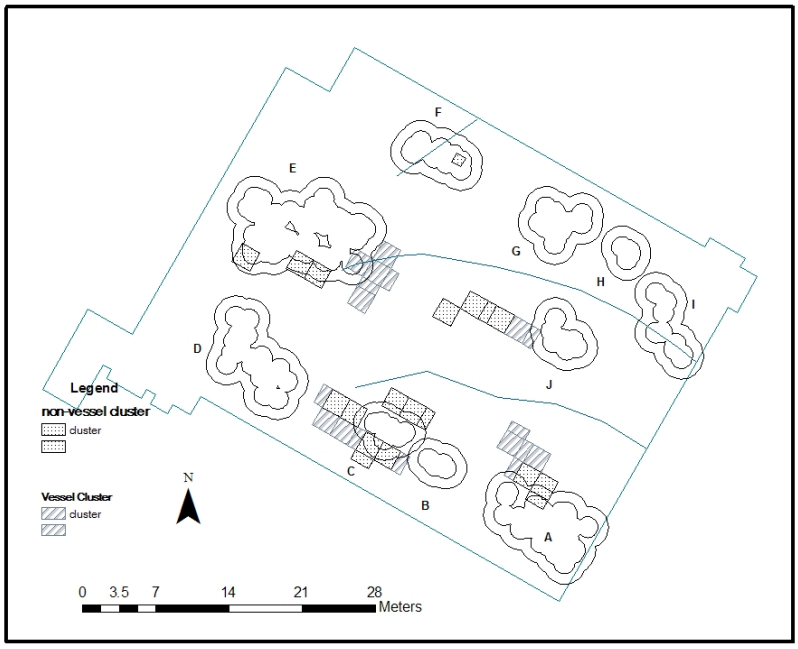

Figure 7. 11 Distribution of vessel and non-vessel clusters from the Northern Excavation Area

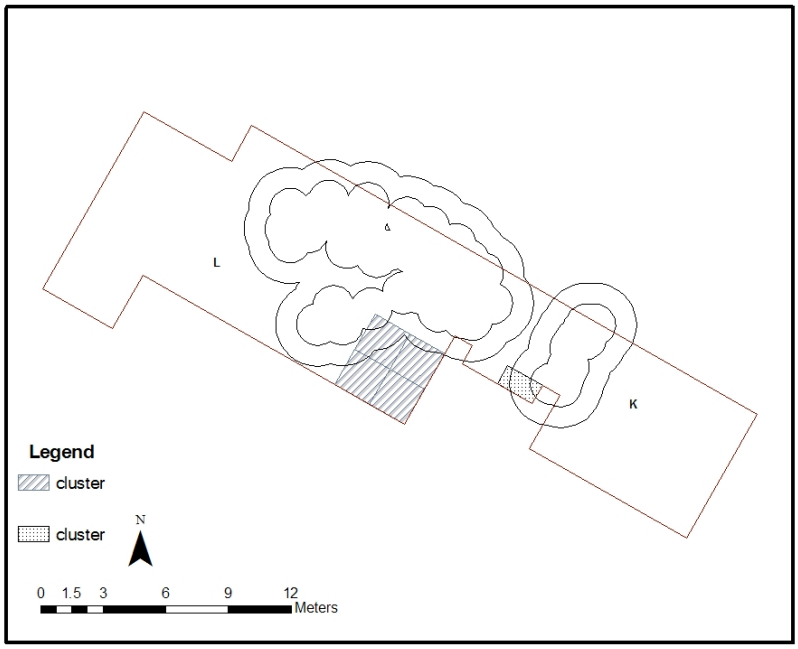

Figure 7. 12 Distribution of vessel and non-vessel clusters from the Southern Excavation Area

The amount of the non-vessel artifacts in this layer is also much less than the Third Layer. Three clusters of spindle whorls were identified, and two of them are associated with dwelling C (Figure 7.13). One is at the south of Dwelling C and the other is at the west of it. There are only six bracelets, and three of them are associated with Dwelling F.

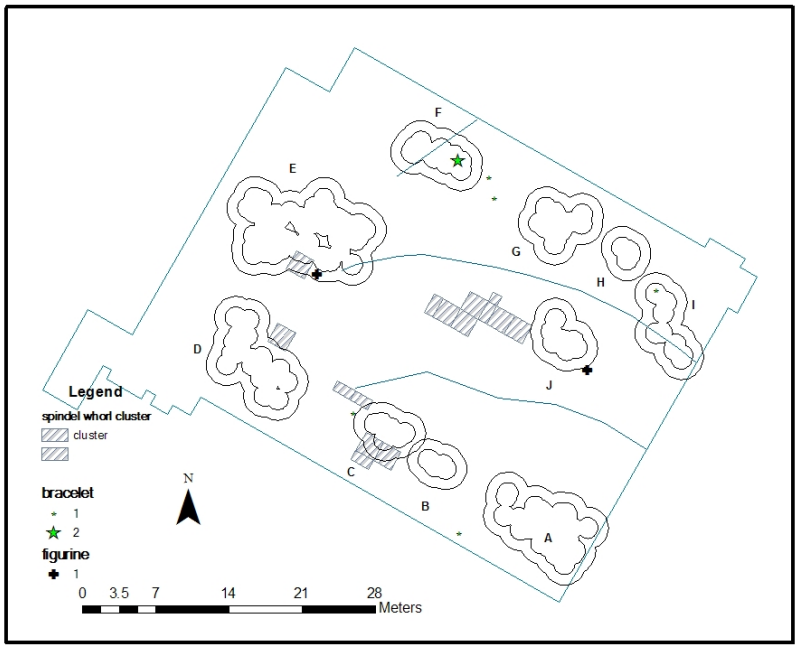

Figure 7. 13 Distribution of spindle whorl clusters and other non-vessels

7.3.2.B The second Phase: The Third Layer

In the previous chapter, the identified dwellings in the Third Layer can be arranged into seven groups based on the distribution of artifacts. If these groups of dwellings represent different House units, the artifacts among each dwelling group should show evidence of daily activities, indicating the presence of independent Houses.

Table 7.13 shows the number of vessels and non-vessels in each dwelling and dwelling group. Figure 7.14 illustrates the relative frequencies of vessels and non-vessel artifacts in each dwelling. The figure shows that the artifact diversity within each dwelling is similar. As discussed earlier, the small number of artifacts from Dwelling Group IV is the result of recent road construction. The construction work removed part of the Third Layer.

Dwelling Group	Dwelling	Vessel	Non-vessel	Unclear	Grand Total
I	A	3987	25	56	4068
		98.0%	0.6%	1.4%	100.0%
	AB	2864	12	55	2931
		97.7%	0.4%	1.9%	100.0%
	B	1831	8	27	1866
		98.1%	0.4%	1.4%	100.0%
	C	2051	16	27	2094
		97.9%	0.8%	1.3%	100.0%
II	D	493	9	1	503
		98.0%	1.8%	0.2%	100.0%
III	E	4890	65	52	5007
		97.7%	1.3%	1.0%	100.0%
IV	F	1595	46	23	1664
		95.9%	2.8%	1.4%	100.0%
V	G	289	1	2	292
		99.0%	0.3%	0.7%	100.0%
	H	804	6	9	819
		98.2%	0.7%	1.1%	100.0%
	I	2593	18	27	2638
		98.3%	0.7%	1.0%	100.0%
VI	J	2494	15	15	2524
		98.8%	0.6%	0.6%	100.0%
	JJ	2044	18	7	2069
		98.8%	0.9%	0.3%	100.0%
VII	K	110	3	1	114
		96.5%	2.6%	0.9%	100.0%
	L	1394	19	9	1422
		98.0%	1.3%	0.6%	100.0%

Table 7. 13 Number and relative frequencies of pottery artifacts in dwelling/dwelling groups of the Third Layer

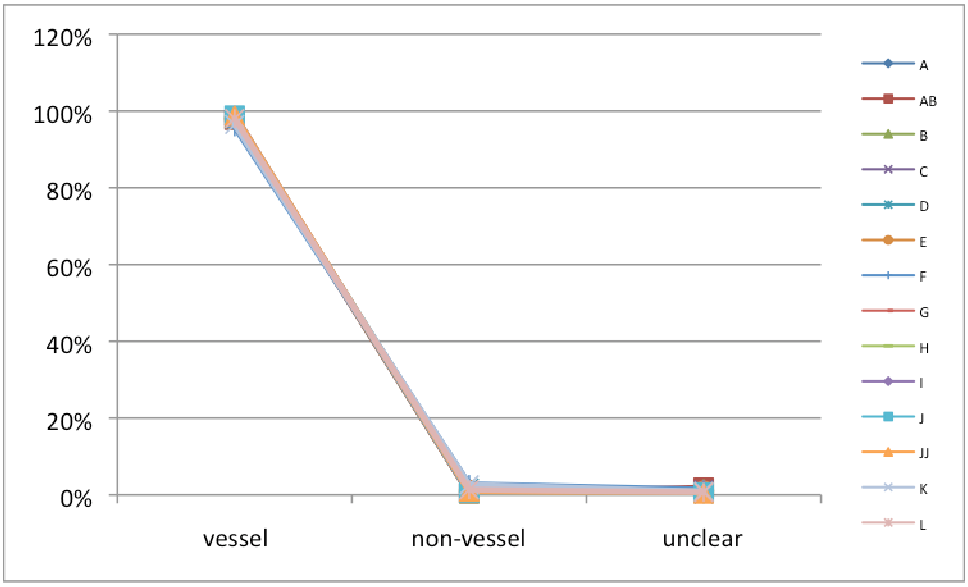

Figure 7. 14 Change of relative frequencies of pottery artifacts from dwelling groups in the Third Layer

Table 7.14 and 7.15 show the number of different vessel parts from each dwelling and dwelling group. Figure 7.15 and 7.16 demonstrate the relative frequencies of different vessel parts from each dwelling and dwelling group. As shown in Figure 7.16, Dwelling Group IV has slightly higher frequencies of handle and shoulder. This might indicate the vessel shapes in this dwelling group are probably different from other dwelling groups. This dwelling group has more jars attached with handles and shoulders.

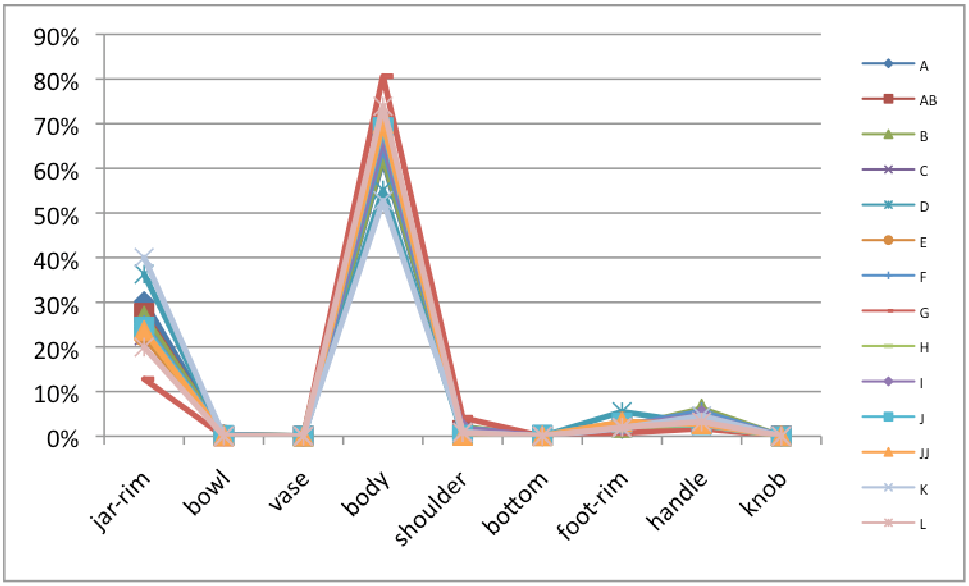

Figure 7. 15 Change of relative frequencies of vessel parts from the dwellings in the Third Layer

Dwelling	Jar-rim	Bowl	Vase	Body	Shoulder	Bottom	Foot-rim	Handle	Knob	Grand Total
A	1204	4	1	2464	61	4	68	181	0	3987
	30.2%	0.1%	0.0%	61.8%	1.5%	0.1%	1.7%	4.5%	0.0%	100.0%
AB	790	1	2	1876	38	4	64	87	2	2864
	27.6%	0.0%	0.1%	65.5%	1.3%	0.1%	2.2%	3.0%	0.1%	100.0%
B	493	5	0	1144	38	2	35	113	1	1831
	26.9%	0.3%	0.0%	62.5%	2.1%	0.1%	1.9%	6.2%	0.1%	100.0%
C	461	2	0	1465	21	5	46	51	0	2051
	22.5%	0.1%	0.0%	71.4%	1.0%	0.2%	2.2%	2.5%	0.0%	100.0%
D	179	0	0	272	1	0	27	14	0	493
	36.3%	0.0%	0.0%	55.2%	0.2%	0.0%	5.5%	2.8%	0.0%	100.0%
E	1093	14	0	3429	38	6	154	150	6	4890
	22.4%	0.3%	0.0%	70.1%	0.8%	0.1%	3.1%	3.1%	0.1%	100.0%
F	399	2	0	1038	29	2	37	88	0	1595
	25.0%	0.1%	0.0%	65.1%	1.8%	0.1%	2.3%	5.5%	0.0%	100.0%
G	37	0	0	233	12	0	2	5	0	289
	12.8%	0.0%	0.0%	80.6%	4.2%	0.0%	0.7%	1.7%	0.0%	100.0%
H	190	2	0	567	6	0	18	21	0	804
	23.6%	0.2%	0.0%	70.5%	0.7%	0.0%	2.2%	2.6%	0.0%	100.0%
I	630	7	0	1729	43	2	61	120	1	2593
	24.3%	0.3%	0.0%	66.7%	1.7%	0.1%	2.4%	4.6%	0.0%	100.0%
J	611	5	1	1725	6	7	74	65	0	2494
	24.5%	0.2%	0.0%	69.2%	0.2%	0.3%	3.0%	2.6%	0.0%	100.0%
JJ	484	1	0	1432	3	2	65	56	1	2044
	23.7%	0.0%	0.0%	70.1%	0.1%	0.1%	3.2%	2.7%	0.0%	100.0%
K	44	0	0	58	1	0	2	5	0	110
	40.0%	0.0%	0.0%	52.7%	0.9%	0.0%	1.8%	4.5%	0.0%	100.0%
L	278	1	0	1030	11	1	28	45	0	1394
	19.9%	0.1%	0.0%	73.9%	0.8%	0.1%	2.0%	3.2%	0.0%	100.0%

Table 7. 14 Number and relative frequencies of vessel parts from the dwellings in the Third Layer

Dwelling Group	Jar-rim	Bowl	Vase	Body	Shoulder	Bottom	Foot-rim	Handle	Knob	Grand Total
I	2948	12	3	6949	158	15	213	432	3	10733
	27.5%	0.1%	0.0%	64.7%	1.5%	0.1%	2.0%	4.0%	0.0%	100.0%
II	179	0	0	272	1	0	27	14	0	493
	36.3%	0.0%	0.0%	55.2%	0.2%	0.0%	5.5%	2.8%	0.0%	100.0%
III	1093	14	0	3429	38	6	154	150	6	4890
	22.4%	0.3%	0.0%	70.1%	0.8%	0.1%	3.1%	3.1%	0.1%	100.0%
IV	399	2	0	1038	29	2	37	88	0	1595
	25.0%	0.1%	0.0%	65.1%	1.8%	0.1%	2.3%	5.5%	0.0%	100.0%
V	857	9	0	2529	61	2	81	146	1	3686
	23.3%	0.2%	0.0%	68.6%	1.7%	0.1%	2.2%	4.0%	0.0%	100.0%
VI	1095	6	1	3157	9	9	139	121	1	4538
	24.1%	0.1%	0.0%	69.6%	0.2%	0.2%	3.1%	2.7%	0.0%	100.0%
VII	322	1	0	1088	12	1	30	50	0	1504
	21.4%	0.1%	0.0%	72.3%	0.8%	0.1%	2.0%	3.3%	0.0%	100.0%

Table 7. 15 Number and relative frequencies from dwelling groups in the Third Layer

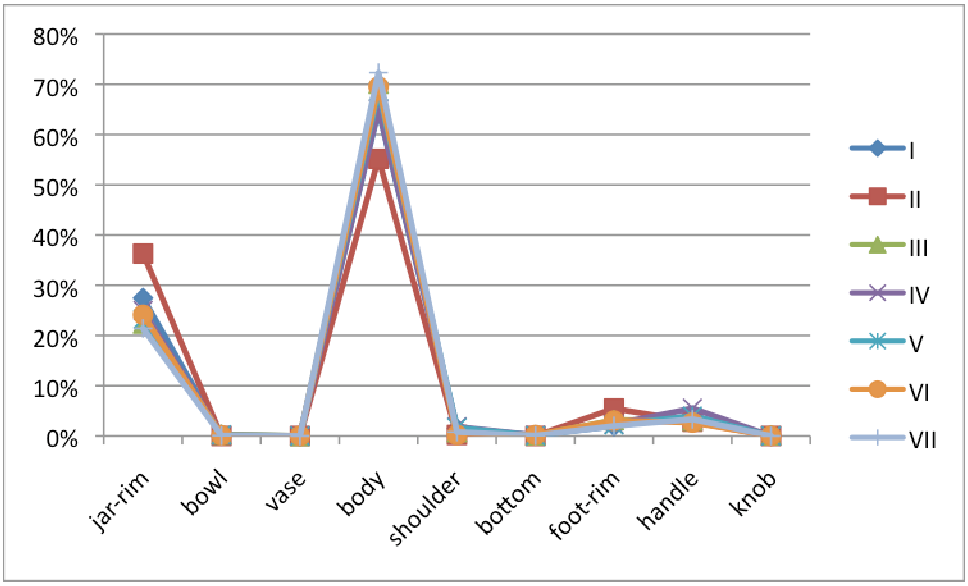

Figure 7. 16 Change of relative frequencies of vessel parts from dwelling groups in the Third Layer

Table 7.16 and Figure 7.17 show the numbers and relative frequencies of non-vessels from each dwelling groups. Even though most dwelling group show similar vessel forms, relative frequencies of non-vessel artifacts in different dwelling groups display some differences. Although spindle whorls are the most common non-vessel artifacts among the dwelling groups, Dwelling Group IV shows lower frequency of this type of artifact. At the same time, it has the highest number of bracelet of all the dwelling groups.

Dwelling Group	Bracelet	Figurine	Knife	Spindle whorl	Grand Total
I	7	1	1	52	61
	11.5%	1.6%	1.6%	85.2%	100.0%
II	1	0	0	8	9
	11.1%	0.0%	0.0%	88.9%	100.0%
III	21	3	1	40	65
	32.3%	4.6%	1.5%	61.5%	100.0%
IV	25	0	0	21	46
	54.3%	0.0%	0.0%	45.7%	100.0%
V	5	2	0	18	25
	20.0%	8.0%	0.0%	72.0%	100.0%
VI	6	0	0	27	33
	18.2%	0.0%	0.0%	81.8%	100.0%
VII	2	0	0	20	22
	9.1%	0.0%	0.0%	90.9%	100.0%

Table 7. 16 Number and relative frequencies of non-vessel artifacts from the dwelling groups in the Third Layer

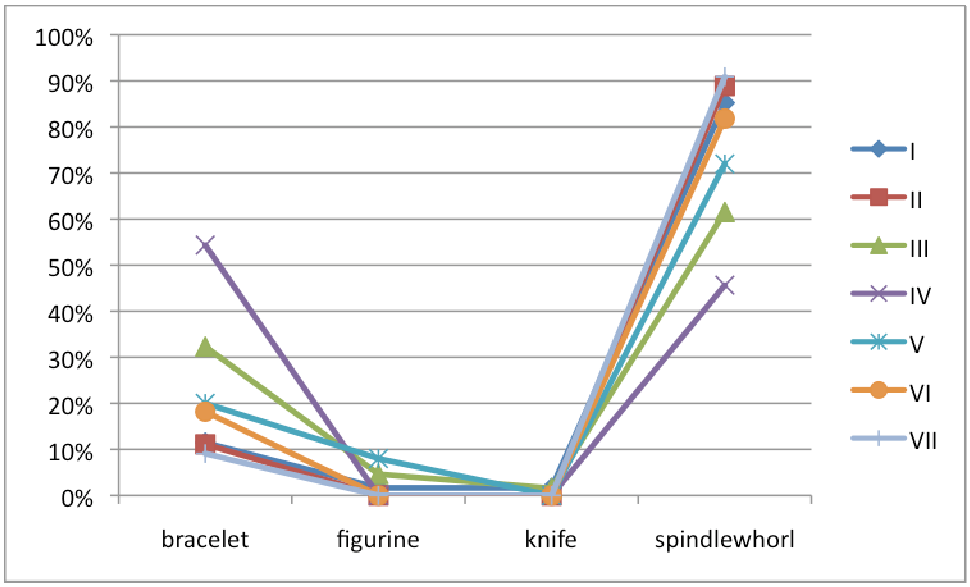

Figure 7. 17 Relative frequencies of non-vessel artifacts in dwelling groups of the Third Layer

Figure 7.18 shows the distribution of the vessel clusters and the dwellings excavated from the Third Layer. Basically, the jars can be found all over the area and can be put into four clusters, including the north of the Dwellings A,B and C, the center and north of the Dwelling E, the north of the Dwellings H and I and the west of the Dwelling J.

The figurines, bracelets and those uncertain objects are artifacts associated with specific usages. Thus the distribution of these artifacts with the dwellings implies whether a special-purpose dwelling existed at the site.

The distribution of spindle whorls, bracelet and figurine clusters show different patterns than the vessel distribution (Figure 7.19). The bracelets form clusters at Dwellings C,E, F, H and Area JJ. This is most notable at Dwelling F. Also the spindle whorl clusters distribute more widely. Different from other dwellings where clusters of artifacts often situate outside of the house, the clusters of spindle whorls and bracelets both located inside the Dwelling F. Even though the non-vessel artifacts are much less than the vessel, the distribution of the spindle whorl illustrates that the practice of weaving is a common activity among the dwelling inhabitants. However, the use of bracelet is more restricted to certain dwellings.

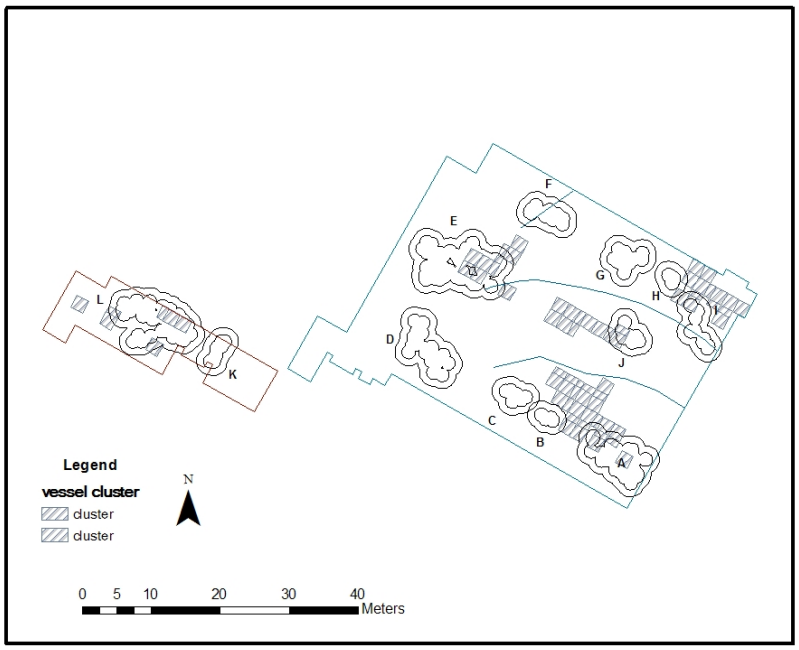

Figure 7. 18 Distribution of vessel clusters in the Third Layer

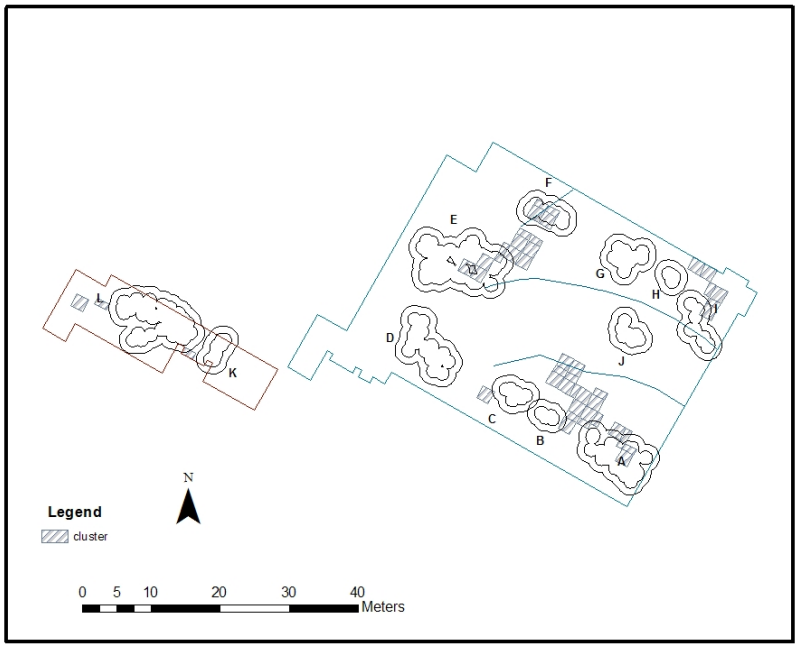

Figure 7. 19 Distribution of non-vessel clusters in the Third Layer

7.3.3 Summary of pottery artifacts

The pottery artifacts can be classified into two categories: vessels and non-vessels. Even though the exact vessel usage related with specific vessel forms needs further analysis, the various forms can be used to imply different usages. Since most of the utilitarian pottery artifacts are broken potsherds, vessel forms can only be identified from a few diagnostic pieces: rim, bottom, and foot-rim. The preliminary classification differentiates four broader vessel forms: jar, bowl, vase and plate. Jars and bowls are the most common vessel forms, and vases can only be found in the Third Layer. Handles attached to the vessels are also a common practice and are evidenced from the early phase of the occupation.

Other than vessels, Wansan people also used clay to make different goods, such as spindle whorls, bracelets, and figurines. Spindle whorl is the most common non-vessel artifact both in the Third and Fourth Layer. However, the distribution of the spindle whorl is more focused on the southern dwellings in the initial phase of the settlement. The distribution of bracelet demonstrates significant difference than other artifacts. The majority of the bracelet, whether in the Third or the Fourth Layer, is concentrated in Dwelling F.

The artifact types are basically the same from the Fourth to the Third Layer and the quantity of these artifacts increases from the Fourth to the Third Layer. Also, the ratio of vessel and non-vessel type of each dwelling and dwelling groups from the Third Layer does not show much variation. As a result, the dwellings do not form any dwelling groups based on the pottery

artifacts. The inhabitants of each dwelling probably utilize similar pottery artifacts on the daily basis.

In terms of spatial distribution, the artifact types are almost the same across these dwellings. Dwelling E has the most variety of pottery artifacts and the Dwelling G has the least from the Third Layer. In terms of clusters, most of artifact clusters are concentrated at the Dwelling A, B, E, F, H, I and J.

Also, during the second phase of the settlement (the Third Layer), Dwellings D and K have the largest ratio of rims and lowest ratio broken body parts. By implication this could mean that most of the vessels associated with these two dwellings are small vessels. On the other hand, Dwelling G has the largest ratio of broken body parts and lowest ratio of the rims, which is reflective of the presence of larger vessels. However, in the initial phase of the settlement, Dwelling I has the largest ratio of body part and Dwelling K has the largest ratio of rim. The data indicates that Dwelling K had always been a place where the inhabitants made use of smaller vessels since the initial phase of the settlement.

Significantly, the presence of foot-rims and handles indicate different vessel forms and can imply different usage. Therefore, the absence of handles in Dwellings H and K and foot-rim in Dwelling H imply that the usage of vessels in these two dwellings differs from other dwellings.

7.4 Discussion: daily life in the Houses

The artifact distributions within the dwellings indicate that similar activities occurred in the majority of dwellings. Most artifact types were present in every dwelling. Each dwelling had ground and chipped stone tools and pottery vessels and tools. These artifacts indicate that the daily activities prehistoric Wansan people conducted including hunting, fishing, land clearing, woodworking, tool production, harvesting, and weaving. Even though similar activities were practiced in the majority of dwellings, more emphasis on specific activities in particular dwellings can also be found since the early stage of the settlement. Lithic tool production and maintenance is the most general activity among the dwellings through time. Especially in the second phase of the settlement, clear evidence of lithic tool workshops was present in all of the dwelling groups.

Pottery vessel is also a common artifact existing in every dwelling. The form of vessel might show slight variation among the dwellings, but the difference is much smaller than the lithic artifacts. The majority of pottery artifacts are the jars. Unlike the lithic ornaments, most of the earthen bracelets are concentrated in one dwelling, Dwelling F, both in the initial and second phase of the settlement. The presence of foot-rim, shoulder, and handle illustrate the various vessel forms. The difference of vessel forms among dwellings from the initial phase is not obvious, however, the vessels from the second phase show higher ratio of foot-rim around the dwellings in the southwest corners. The distribution of these pottery artifacts indicates that the

inhabitants of each dwelling used similar set of pottery artifacts, including vessel, spindle whorl, and bracelet. Within these artifacts, only bracelet shows concentration in one dwelling.

Based on the distribution of both pottery and lithic artifacts, there is no obvious difference among the dwellings in the second phase of the settlement. In the initial phase of the settlement, members of each dwelling practiced a variety of activities and each dwelling has slightly different emphasis. However, there was no clear distinction among the dwellings. In the second phase of the settlement, the quantity and variety of the artifacts indicate that the population is probably growing. Each dwelling has similar artifact inventories and the ratio of each artifact is similar in each dwelling. Furthermore, members of neighboring dwelling probably form some kind of cooperation. Thus when the artifacts of neighboring dwellings are combined, the difference among them gets even smaller. It is possible that people in the same house group share these activities together.

It is suggested in the previous chapter that each dwelling might function as an independent unit in the initial phase of the settlement, and then neighboring dwellings began to form groups through time and form a larger social unit. The types of pottery and lithic artifacts associated with dwellings confirm that the cooperation between dwellings in the second phase grew stronger. Also, even though the tool production and maintenance had been an importance activity for the dwelling members, the emergence of formal stone tool workshop suggests that the inhabitants' attachment towards the place further enhanced. Additionally, the spatial distribution of the stone tool workshop, possible ritual locus and storage pit in the identified dwelling groups connotes the intense association between neighboring dwellings during the second phase. Each dwelling group forms an economically, socially and ritually independent unit.

In sum, the repeated occurrence of basic activities indicates that each dwelling and dwelling group functioned as a separate social and residential unit for carrying out of certain repetitive aspects of daily life. Crafting, such as weaving or ornament making, and the production of useful implements, such as lithic tools, occurs in every dwelling and dwelling group. Added to this mix of activities and interactions that are tied to economic production and social reproduction is an emphasis on repeated, shared mortuary rituals. Burials are found around all dwellings, and the shared participation in ritual reinforced the solidarity of dwelling residents.

More importantly, the presence of the ancestor-related object, the zoo-anthropomorphic object, within each dwelling/ dwelling group signifies the connection between the living members and dead ancestors. It also acted as an "inalienable object" related to the creation of social differentiation. The ownership of this object sets specific individuals and groups apart from others. The analysis of the grave goods at the Wansan site already illustrated the differential distribution among residential houses. Therefore, the analysis of different attributes of artifacts among these dwelling are examined in the next chapter.

CHAPTER VIII

SPATIAL ANALYSIS OF ARTIFACTS WITH DIFFERENT ATTRIBUTES

This chapter compares the distribution of artifacts with different attributes between dwellings/dwelling groups. It is anticipated that the artifact attributes will show differentiation between dwellings/dwelling groups. Two archaeological materials are analyzed: lithic and pottery artifacts. In House Societies, House members form a sense of identity through daily practices within the circumscribed physical boundaries. The emphasis on this dynamic process of forming a social group is based upon the fact that members of this social group inhabit and interact with other residents on a daily basis and identify themselves as belonging to same group through certain material mediums.

At the same time, a certain level of social differentiation always persists in a House society. This ranges from a more egalitarian, heterarchical organization to a highly hierarchical structure. The analysis of the artifacts in the previous chapter suggests that when people first established and lived in the house, there was no significant difference in terms of the amount of artifacts each house utilized. However, as dwellings developed, either as a result of a natural population increase or the incorporation of different individual dwellings, the size of the dwellings began to differentiate. As suggested in the previous chapter, three dwelling groups were formed in the second phase of the settlement.

In the previous chapter, the distribution of these artifacts was also examined and the results demonstrated that each dwelling/dwelling group was an independent unit economically. Based on the artifact distribution, each physical dwelling/dwelling group is a place where people live and interact with each other on a daily basis. The material in each dwelling indicates that the Wansan people's daily lives involved making different lithic tools, repairing the tools, hunting, fishing, wood chopping, land clearing, and harvesting. There is no significant difference between dwellings in terms of activities performed.

Therefore, two questions are examined in this chapter. The first thing to be considered is whether certain material objects associated with different dwellings/dwelling groups were used to express an uneven status. The examination of the distribution of jade artifacts among dwellings/dwelling groups is considered a method of analysis. Jade was used to produce both utilitarian tools and non-utilitarian goods at the Wansan site. Even though certain clay is also imported from outside, whether the pottery artifacts were imported as finished products or locally manufactured is hard to ascertain. On the contrary, the lack of objects associated with jade artifact production indicates that the recovered jade artifacts were imported as a complete product. Moreover, the limited number of jade artifacts and special jade artifacts, such as the zoo-anthropomorphic object, further suggest jade's special status in the Wansan society. Thus, to obtain the jade artifacts at the Wansan site required a special social network based on economic, social, ritual or political status.

Second, whether people in each dwelling employed certain utilitarian objects to differentiate their dwelling from others will be investigated. The spatial distribution of attributes of different artifacts among dwellings is compared. Both lithic and pottery artifacts are analyzed.

At the Wansan site, the analysis of the spatial distribution of features and artifacts shows that each dwelling was an independent unit in the initial phase of the settlement. As dwellings grew through time, dwellings in adjacent areas began to form a larger unit based on the concentration and distribution of artifacts. The presence of a lithic tool workshop associated with each house group in the Third Layer suggests house-based tool production. Since most of the stone tools were manufactured in different dwellings/dwelling groups, whether the craftsmen of these dwellings/dwelling groups imbued these tools with their identities is examined. The variation of tool forms among dwellings/dwelling groups is first explored. Second, the utilization of imported lithic artifacts is investigated. Other than jade, the Wansan people also utilized artifacts made from exotic materials. The differential capability to access foreign goods thus signifies that a certain level of social division resulted from different social status, wealth, age, gender, and so on.

In addition, while the location of the pottery workshop is not identified, the distribution of pottery artifacts implies a house-based consumption. Accordingly, the distribution of pottery artifacts with different attributes can serve as line of evidence to argue for the presence of social differentiation. Two aspects of pottery artifacts are examined. The first is the source of the clay, and the second is the shape of artifacts, either vessels or non-vessels.

8.1 The distribution of jade artifacts among dwellings

At the Wansan site, most lithic resources are available within a short distance and the evidence of lithic workshops and abundant debitage, raw material, and unfinished artifacts indicates that most of the lithic artifacts, except for the jade artifacts, were locally made. The Wansan people acquired these jade artifacts either directly from the Piling site or indirectly from other societies. The lack of tools and debitage associated with jade artifact production indicates that all of the jade artifacts at the Wansan site were imported as complete products from outside. Thus, the amount of jade artifacts each house obtained demonstrates its ability to acquire this imported object. Also, each jade artifact type, except for the adze-axe, exhibits diversity in terms of the forms at the Wansan site. Since all of these objects were imported from other societies as complete products, the amount and variety of these objects signifies the different social connections each house retained based on its social status, wealth, religious power, and so on.

8.1.1 The variations of artifact type among dwellings

The jade artifacts consist of adzes, arrowheads, and various ornaments, including bracelets, earrings, and pendants. As indicated in Chapter 7, these artifacts are categorized based on their shape and observable use-wear patterns. Furthermore, ethnographic analogy is also used to hypothesize possible usages of these artifacts. Nevertheless, some artifacts are too broken to be classified. Take lithic bracelets and earrings for example. The distinction between these two types of artifacts is whether it is a complete circle or not and its size. However, if the artifact is

too broken, it cannot be sure whether it is a bracelet or earring. Therefore, it is classified into bracelet/earring category.

The distribution of different artifacts associated with each dwelling from the Third and Fourth Layers is shown in Figures 8.1 and 8.2. These figures show that the adze-axe is the most common jade artifact throughout the whole time. Even though jade arrowheads, bracelets, earrings, and pendants were also present from the early stage of the settlement, their numbers are small and they are scattered among different dwellings (Table 8.1). During this time (the Fourth Layer), Dwellings G, H, I, J, K, and L had either small amounts of or even no jade artifacts.

Artifacts from the Third Layer show great increase in terms of variety and quantity (Table 8.1). If adjacent dwellings are grouped together, the number and variety of each artifact type is consistent throughout the dwelling groups, except for Dwelling Group I, which embraces a larger area and thus has more artifacts than others (Figure8.2). The fact that Dwelling D shows fewer artifacts is the result of recent road construction which removed most of the Third Layer.

Dwelling		Adze-axe	Arrowhead	Bracelet/earring	Pendant	Broken	Total
A	4^{th}	4	2	1	1	1	9
	3^{rd}	23	6	20	2	7	58
B	4^{th}	1	0	0	0	0	1
	3^{rd}	16	1	2	2	7	28
AB	4^{th}	0	0	0	0	0	0
	3^{rd}	18	5	8	1	0	32
C	4^{th}	0	0	0	0	1	1
	3^{rd}	10	2	1	0	1	14
D	4^{th}	3	0	0	0	0	3
	3^{rd}	2	0	0	1	1	4
E	4^{th}	3	0	3	0	1	7
	3^{rd}	15	2	11	3	2	33
F	4^{th}	3	0	1	0	0	4
	3^{rd}	11	1	8	3	6	29
G	4^{th}	1	0	0	0	0	1
	3^{rd}	4	0	0	0	0	4
H	4^{th}	0	0	0	0	0	0
	3^{rd}	2	1	1	0	2	6
I	4^{th}	1	0	0	0	0	1
	3^{rd}	8	2	9	0	2	21
J	4^{th}	0	0	0	0	0	0
	3^{rd}	5	1	0	0	2	8

Table 8.1. Distribution of jade artifacts among dwellings (continue)

Dwelling		Adze-axe	Arrowhead	Bracelet/earring	Pendant	Broken	Total
JJ	4th	0	0	0	0	1	1
	3rd	9	4	0	0	2	15
K	4th	0	1	0	1	0	2
	3rd	2	1	1	0	1	5
L	4th	1	0	0	0	0	1
	3rd	13	8	13	3	2	39

Table 8.1. Distribution of jade artifacts among dwellings

On the other hand, although the amount of jade artifacts in Dwelling Group VI is not much less than that of the other dwelling groups, the variety of artifact types is limited to tools, including adze-axes, arrowheads, and broken artifacts. There were no single jade ornaments found in Dwelling J in the Fourth Layer or in Dwelling Group VI in the Third Layer.

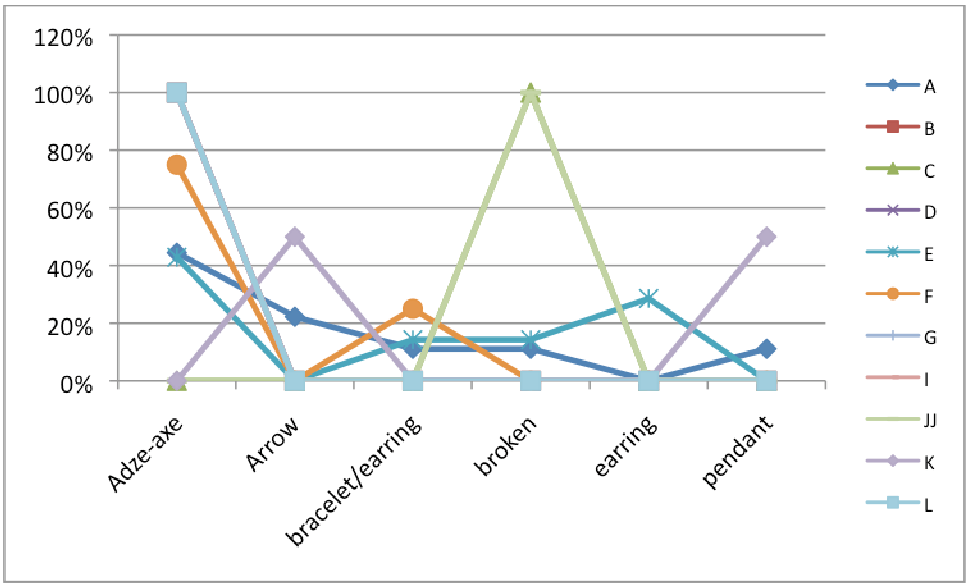

Figure 8.1. Change of relative frequencies of jade artifacts in the Fourth layer

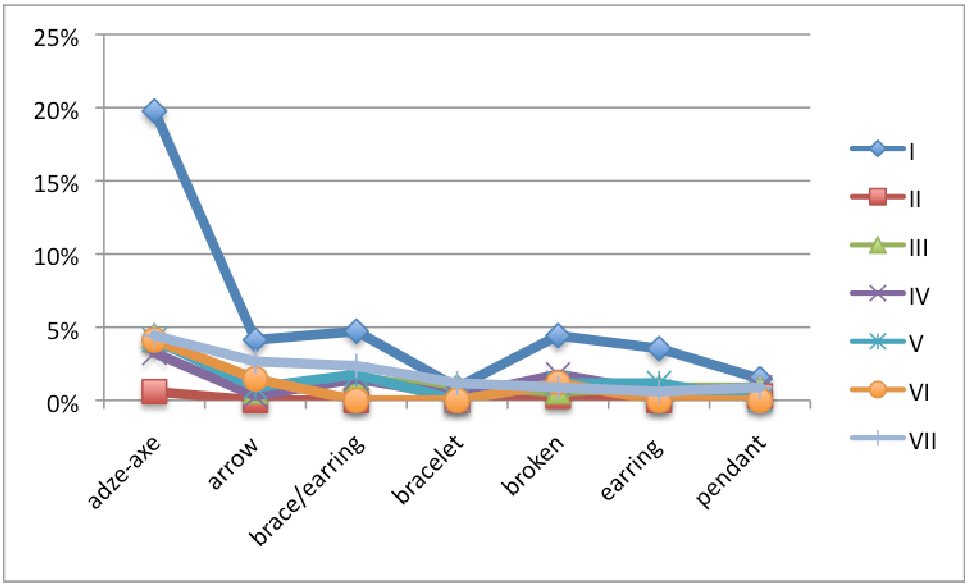

Figure 8.12. Change of relative frequencies of jade artifacts in the Third Layer

8.1.2 The variations of the artifact attributes

To further examine these jade artifacts, most of the artifact types, such as the arrowhead, earring, and pendant, include variations in terms of shape. Five forms of arrowheads are identified: flat bottom (A1); flat bottom with perforation (A2); concave bottom with perforation (A3); arrowhead with stem (A4); arrowhead with perforated stem (A5). The distribution of the jade arrowhead indicates that only Dwelling Groups I and VII have forms other than the A2 type (Figure 8.3). Also, the distribution of jade earrings indicates that Dwelling Group VII only has polygon-shaped earrings, even though the main earring type is the circular-shaped one (Table 8.2). The same pattern can again be observed on the distribution of the jade pendant. Five varieties of jade pendants were distinguished and Dwelling Group VII is the only dwelling group which does not possess the most common form of pendant: the round-shaped pendant (Table 8.3).

In sum, House Groups I and VII have the most diverse forms of arrowheads and earrings in the second phase of the settlement (the Third Layer). The rest of the dwelling groups have basically only one form of each artifact type.

Dwelling	Circular shape	Polygon shape
I	2	7
III	3	
IV	2	
V	3	1
VII		2

Table 8.2. Number of different forms of earrings among dwelling groups

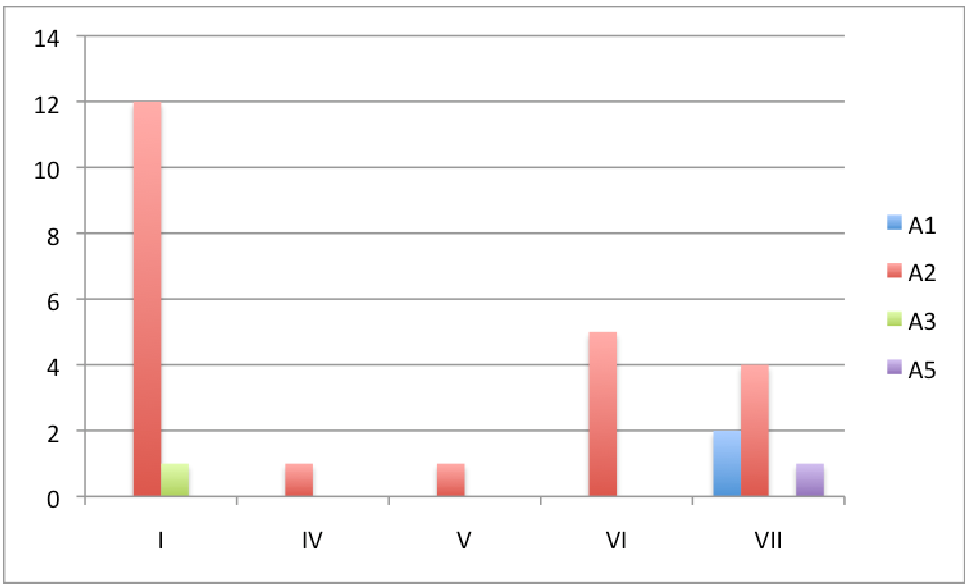

Figure 8.3. Number of different jade arrowheads among dwelling groups in the Third Layer

Dwelling	Half-circular shape	Polygon shape	Short-tube shape	Long-tube shape	Round shape
I	4	1			
II	1				
III	2		1		
IV	2				1
VII			2	1	

Table 8.3. Distribution of different forms of pendants among dwelling groups

In the Fourth Layer, Dwellings A, D, E, and F have a greater accumulation of jade artifacts (Table and Figure 8.1). In other words, in the early stage of the settlement, these dwellings, especially Dwelling A, had more access to acquiring greater numbers imported artifacts. In the later period (the Third Layer), these dwellings kept growing and the quantity and variety of artifacts also increased. This might indicate that there was an increase in the number of house members, house sizes, or house statuses, especially in Dwelling Group I.

Along with the distribution of the zoo-anthropomorphic object, an interesting pattern is revealed. As indicated in the map, the zoo-anthropomorphic object can be found in the burials associated with Dwelling Groups I, II, III, IV, and VI (see Chapter 7). Prehistoric Wansan people might have used this object to signify their connection with ancestors as inferred from ethnographic examples (see Chapter 2 and 3). The presence of more than one anthropomorphic object in Dwelling Group I probably indicates the possible combination of multiple dwellings. The presence of a thicker cultural layer and the larger amount and variety of artifacts of this house group also suggests their ability to attract more people. On the other hand, the absence of this zoo-anthropomorphic object in Dwelling Group V and VII could have been a result of their lack of connection with ancestors. Dwelling Group VII, in particular, does not have this

zoo-anthropomorphic jade object associated with any of the burials around it, and the form of every jade artifact related to this dwelling group differs from that of other dwelling groups.

8.1.3 Summary

The analysis of the jade artifact among dwellings/dwelling groups suggests that Dwelling Group I has the most diversified jade artifacts among the dwelling groups, and that every dwelling group shares similar stylistic artifacts, with the exception of Dwelling Group VII. Since the jade artifact is not locally produced, the presence of the similar artifacts among dwelling groups suggests that each house group had an equal ability to access these imported goods. The presence of the zoo-anthropomorphic object in burials further enhanced their shared connection with ancestral Dwellings. However, the lack of common style and zoo-anthropomorphic objects in Dwelling Group VII implies its different social status in the Wansan society. The material tradition that Dwelling Group VII inherited is clearly different from that of all other dwelling groups, and the absence of the zoo-anthropomorphic object implies its divergent House history.

8.2 The distribution of lithic artifacts with different attributes among dwellings

The distribution of lithic artifacts among dwellings/dwelling groups has been examined in Chapter 7. The distribution of these artifacts indicates that there is no clear difference among dwellings/dwelling groups in terms of the subsistence activities conducted. The large amount of the lithic debitage, production tools, raw materials, and the presence of a stone tool workshop in every house group illustrate that stone tool production was a household-based activity, especially during the second phase of the settlement. In this chapter, the attributes of these various tools will be examined for the purpose of further understanding the difference among dwellings/dwelling groups.

Two attributes of these tools will be examined: raw material and style. Thirteen kinds of lithic material were utilized at the Wansan site (Table 8.4). The majority of the lithic artifacts are made of slate and sandstone. Most of these lithic materials can be procured either in the Ilan Plain or in the neighboring mountain areas. Also, evidence of the existence of production and repaired tools indicates that most of the tools were fabricated, fixed, and reproduced at the site. In addition to jade, a very small amount of lithic material was imported from outside, including andesite, chert, greenstone, phyllite, crystal and schist.

Material	Raw number	Relative frequency
Andesite	1	0.01
Chert	8	0.11
Greenstone	39	0.54
Jade	365	5.02
Mudstone	58	0.8
Phyllite	1	0.01

Table 8.4. List and number of different lithic material (continue)

Material	Raw number	Relative frequency
Crystal	6	0.08
Quartzite	2	0.03
Sandstone	1197	16.44
Schist	6	0.08
Shale	483	6.64
Slate	5104	70.13
Other	7	0.1

Table 8.4. List and number of different lithic material

Due to the nature of lithic material, the form of lithic tools is constrained by the human physiological ability to utilize them. Nevertheless, people are still able to inscribe their creativity on the lithic tools. However, archaeologists cannot directly demonstrate whether the difference of these tools is due to physiological needs or is a reflection of people's creativity. Also, whether the creativity is a product of social interaction or the individual's aesthetic expression requires further consideration.

Our knowledge of the possible usage of the lithic tools from the Wansan site is largely derived from ethnographic examples. Within each tool category, a variety of tool shapes can be identified. Take the stone knife for example. Seven forms can be distinguished: the curved back, half-moon shape, rectangular shape, new moon shape, and unclear. The diversity of these forms might have come about for a variety of reasons. However, to confirm the usage of these tools requires further analysis, such as experimental archaeology, residue analysis, and so on.

Since this dissertation aims to understand the difference among dwellings/dwelling groups, the exact usage of these tools is not its focus. However, comparing the distribution of different stylistic attributes among dwellings/dwelling groups can offer a possible answer as to whether these "stylistic" attributes are the effects of physiological needs or expressions of individual identity.

8.2.1 Raw Material

Tables 8.5 and 8.6 show the number of different lithic raw materials from the Fourth and Third Layers. Figures 8.4 and 8.5 illustrate the relative frequencies of these raw materials from dwellings/ dwelling groups. In these figures, the data of Dwelling G, H, I and K from the Fourth Layer are removed due to small sample size. The tables and figures indicate that there is no clear difference between dwellings/ dwelling groups in both the Fourth and Third Layers.

As indicated in Figures 8.4 and 8.5, the variety of raw material being used increased in the second phase; however, the majority of lithic artifacts are made of slate in all dwellings throughout the whole time. With the exception of sandstone and shale, which can be procured at the Wansan hill or creeks around the hill, other types of lithic material had to be acquired through either travel to mountain areas or exchange efforts. The amount and presence of debitage of the slate indicate that the Wansan people probably traveled to the mountain areas to exploit

the resources and then brought the material back to proceed with further fabrication. On the other hand, the small quantity of some artifacts, such as andesite, phylite, chert, and schist, might suggest that artifacts made from these materials were imported as complete products.

Table 8.5 and 8.6 reveal that jade is the largest imported lithic artifact at the Wansan site, especially in the initial stage of the settlement. Other than jade, most of the dwellings have no imported lithic goods at this time. In the second phase, each dwelling group has a variety of imported artifacts, although the jade artifact still dominates. Dwelling Group I has the most abundant variety of lithic raw materials and Dwelling Group VI has the fewest types of lithic material.

Figures 8.6 and 8.7 show the relative frequencies of locally made lithic artifacts and imported lithic artifacts. It reveals that the ratio of imported artifacts among dwellings/ dwelling groups decreases from the Fourth to the Third Layer with exception of Dwelling Group VII (Dwelling K and L in Layer IV). Unlike other dwelling groups, the ratio of imported artifacts in Dwelling Group VII doubles from the Fourth to the Third Layer.

Dwellings	A	B	C	D	E	F	J	L	Total
Sandstone	17	9	8	12	30	8	5	12	107
	20.0%	15.0%	25.8%	26.7%	19.7%	28.6%	17.2%	37.5%	21.4%
Shale	7	9	1	6	8	2	4	2	40
	8.2%	15.0%	3.2%	13.3%	5.3%	7.1%	13.8%	6.3%	8.0%
Slate	50	36	21	21	105	14	19	16	309
	58.8%	60.0%	67.7%	46.7%	69.1%	50.0%	65.5%	50.0%	61.8%
Jade	9	1	1	3	7	4	1	1	31
	10.6%	1.7%	3.2%	6.7%	4.6%	14.3%	3.4%	3.1%	6.2%
Mudstone	1	1	0	1	2	0	0	0	5
	1.2%	1.7%	0.0%	2.2%	1.3%	0.0%	0.0%	0.0%	1.0%
Greenstone	1	4	0	2	0	0	0	0	7
	1.2%	6.7%	0.0%	4.4%	0.0%	0.0%	0.0%	0.0%	1.4%
Crystal	0	0	0	0	0	0	0	1	1
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	0.2%
Total	85	60	31	45	152	28	29	32	500
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Richness	**6**	**6**	**4**	**6**	**5**	**4**	**4**	**4**	

Table 8. 5 Numbers and relative frequencies of lithic material in the Fourth Layer

Dwelling group	I				III	IV
Dwelling	A	B	C	**Subtotal**	**E**	**F**
Sandstone	254	177	45	**476**	**136**	**59**
	16.4%	17.8%	16.9%	**16.9%**	**16.4%**	**15.1%**
Shale	83	67	10	**160**	**35**	**31**
	5.4%	6.7%	3.8%	**5.7%**	**4.2%**	**7.9%**
Quartzite	0	0	0	**0**	**0**	**0**
	0.0%	0.0%	0.0%	**0.0%**	**0.0%**	**0.0%**
Slate	1117	690	190	**1997**	**614**	**266**
	72.2%	69.2%	71.4%	**71.0%**	**74.1%**	**68.0%**
Jade	68	50	14	**132**	**33**	**29**
	4.4%	5.0%	5.3%	**4.7%**	**4.0%**	**7.4%**
Mudstone	19	4	1	**24**	**4**	**3**
	1.2%	0.4%	0.4%	**0.9%**	**0.5%**	**0.8%**
Greenstone	4	3	6	**13**	**4**	**2**
	0.3%	0.3%	2.3%	**0.5%**	**0.5%**	**0.5%**
Crystal	0	1	0	**1**	**0**	**0**
	0.0%	0.1%	0.0%	**0.0%**	**0.0%**	**0.0%**
Schist	1	2	0	**3**	**0**	**0**
	0.1%	0.2%	0.0%	**0.1%**	**0.0%**	**0.0%**
Andesite	0	1	0	**1**	**0**	**0**
	0.0%	0.1%	0.0%	**0.0%**	**0.0%**	**0.0%**
Phyllite	0	0	0	**0**	**1**	**0**
	0.0%	0.0%	0.0%	**0.0%**	**0.1%**	**0.0%**
Others	2	2	0	**4**	**2**	**1**
	0.1%	0.2%	0.0%	**0.1%**	**0.2%**	**0.3%**
Total	1548	997	266	**2811**	**829**	**391**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**
Richness	**8**	**10**	**6**	**10**	**8**	**7**

Table 8. 6 Numbers and relative frequencies of lithic material in the Third Layer (continue)

Dwelling group	V				VI	VII			Total
Dwelling	G	H	I	**Subtotal**	**J**	K	L	**Subtotal**	
Sandstone	8	17	93	**118**	**93**	20	59	**79**	**961**
	20.0%	13.7%	15.7%	**15.6%**	**14.5%**	32.3%	15.9%	**18.2%**	**16.5 %**
Shale	4	10	56	**70**	**42**	9	29	**38**	**376**
	10.0%	8.1%	9.5%	**9.3%**	**6.6%**	14.5%	7.8%	**8.8%**	**6.4%**
Quartzite	0	0	1	**1**	**0**	0	0	**0**	**1**
	0.0%	0.0%	0.2%	**0.1%**	**0.0%**	0.0%	0.0%	**0.0%**	**0.0%**
Slate	24	90	411	**525**	**477**	25	234	**259**	**4138**
	60.0%	72.6%	69.5%	**69.5%**	**74.5%**	40.3%	62.9%	**59.7%**	**70.5 %**
Jade	4	6	21	**31**	**23**	5	39	**44**	**292**
	10.0%	4.8%	3.6%	**4.1%**	**3.6%**	8.1%	10.5%	**10.1%**	**4.9%**
Mudstone	0	0	6	**6**	**2**	0	3	**3**	**42**
	0.0%	0.0%	1.0%	**0.8%**	**0.3%**	0.0%	0.8%	**0.7%**	**0.7%**
Greenstone	0	1	0	**1**	**1**	2	6	**8**	**29**
	0.0%	0.8%	0.0%	**0.1%**	**0.2%**	3.2%	1.6%	**1.8%**	**0.5%**
Crystal	0	0	0	**0**	**2**	1	1	**2**	**5**
	0.0%	0.0%	0.0%	**0.0%**	**0.3%**	1.6%	0.3%	**0.5%**	**0.1%**
Schist	0	0	3	**3**	**0**	0	0	**0**	**6**
	0.0%	0.0%	0.5%	**0.1%**	**0.0%**	0.0%	0.0%	**0.0%**	**0.1%**
Andesite	0	0	0	**0**	**0**	0	0	**0**	**1**
	0.0%	0.0%	0.0%	**0.0%**	**0.0%**	0.0%	0.0%	**0.0%**	**0.0%**
Phyllite	0	0	0	**0**	**0**	0	0	**0**	**1**
	0.0%	0.0%	0.0%	**0.0%**	**0.0%**	0.0%	0.0%	**0.0%**	**0.0%**
Others	0	0	0	**0**	**0**	0	1	**1**	**8**
	0.0%	0.0%	0.0%	**0.0%**	**0.0%**	0.0%	0.3%	**0.2%**	**0.1%**
Total	40	124	591	**755**	**640**	62	372	**434**	**5860**
	100.0%	100.0%	100.0%	**100.0**	**100.0%**	100.0%	100.0%	**100.0%**	**100.0 %**
Richness	**4**	**5**	**7**	**8**	**7**	**6**	**8**	**8**	

Table 8. 6 Numbers and relative frequencies of lithic material in the Third Layer

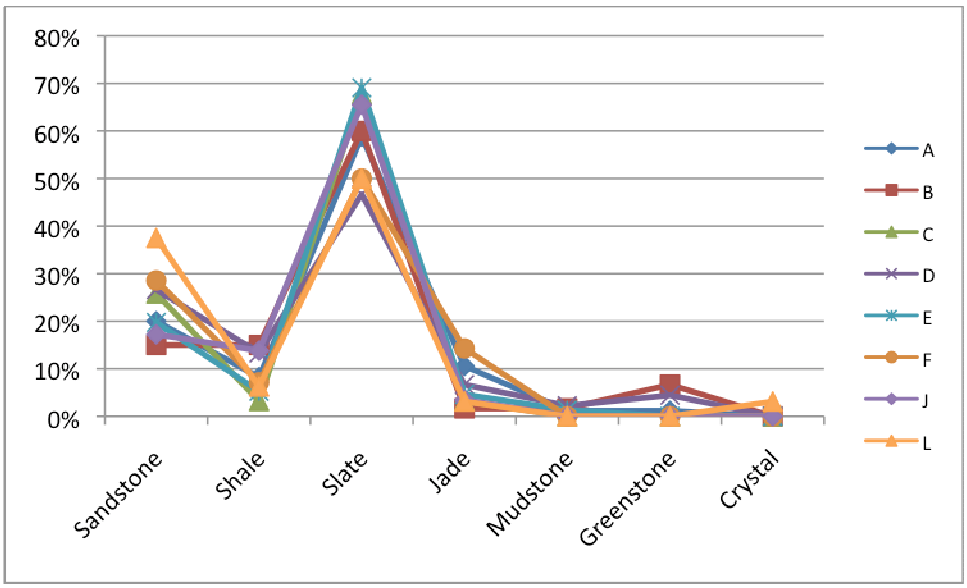

Figure 8.413. Change of relative frequencies of lithic material from dwellings in the Fourth Layer

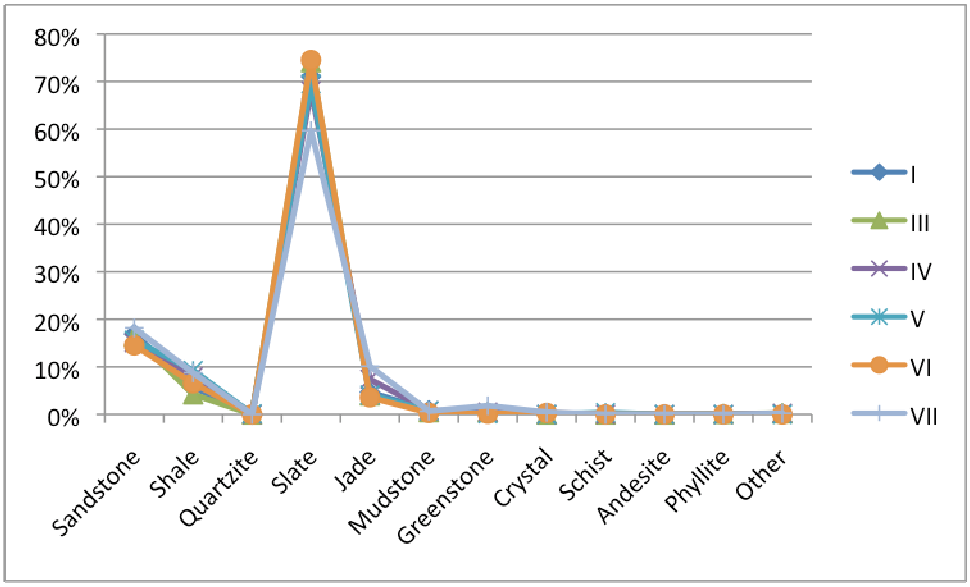

Figure 8.5. Change of relative frequencies of lithic material from dwellings in the Third Layer

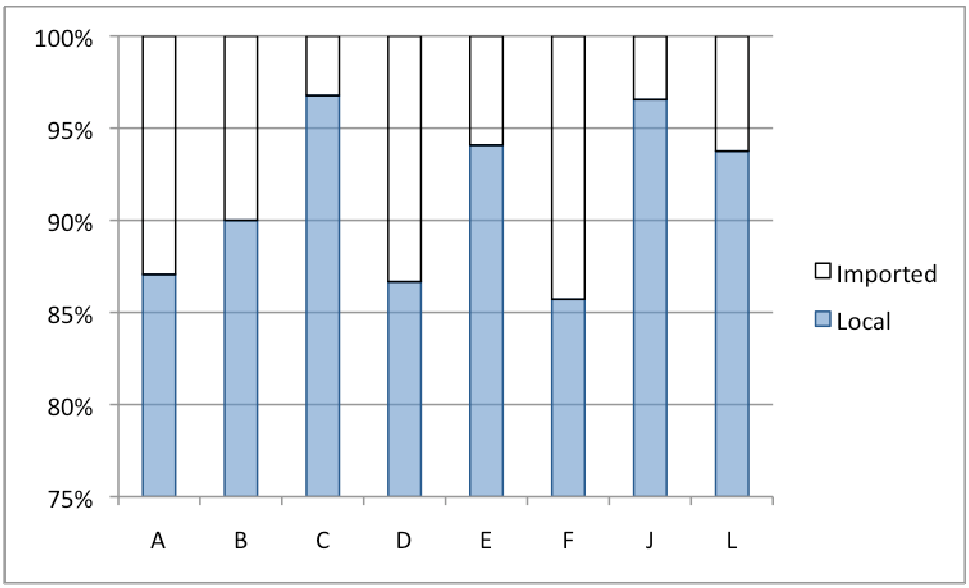

Figure 8.6. Relative frequencies of imported vs. local material from dwellings in Fourth Layer

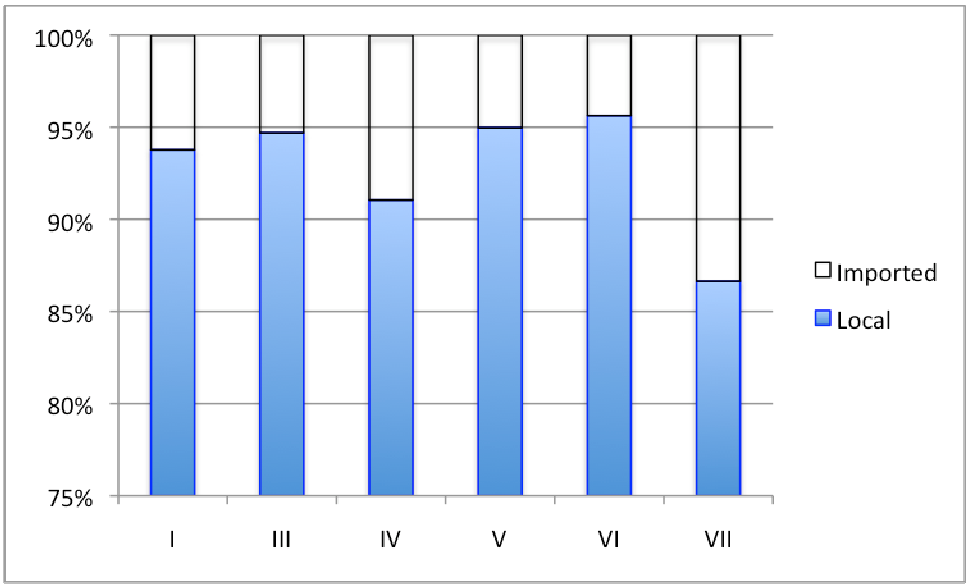

Figure 8.7. Relative frequencies of imported vs. local material from dwelling groups in Third Layer

8.2.2 Stylistic attributes

Four types of lithic tools and bracelets can be further divided based on their various forms. These tools include the lithic knife, adze-axe, arrowhead, spearhead, and net sinker. Each type of the tools shares similar shape and use-wear pattern which suggests possible usages of the tool. The following analysis examines the distribution of these stylistic attributes accordingly.

8.2.2.A Knife

Two types of lithic knives can be distinguished: the curved back (A) and the straight back (B). The preliminary observation of use-wear suggests two different types of breakages on these two tools caused by usage. This might imply different uses between the curved and straight back knife. Tables 8.7 and 8.8 show the number of each type of knives from dwelling/ dwelling group in Layer IV and III. Figures 8.8 and 8.9 demonstrate that the curved back knife had only been utilized in a few dwellings in the initial stage of the settlement, and then became a common tool among all dwelling groups later on.

Dwelling	A	B	E	D	G	I	Total
Curved back	1	2	1	0	0	0	4
Straight back	3	2	0	4	1	1	11
Total	4	4	1	4	1	1	15

Table 8. 7. Number of curved and straight back knives in the Fourth Layer

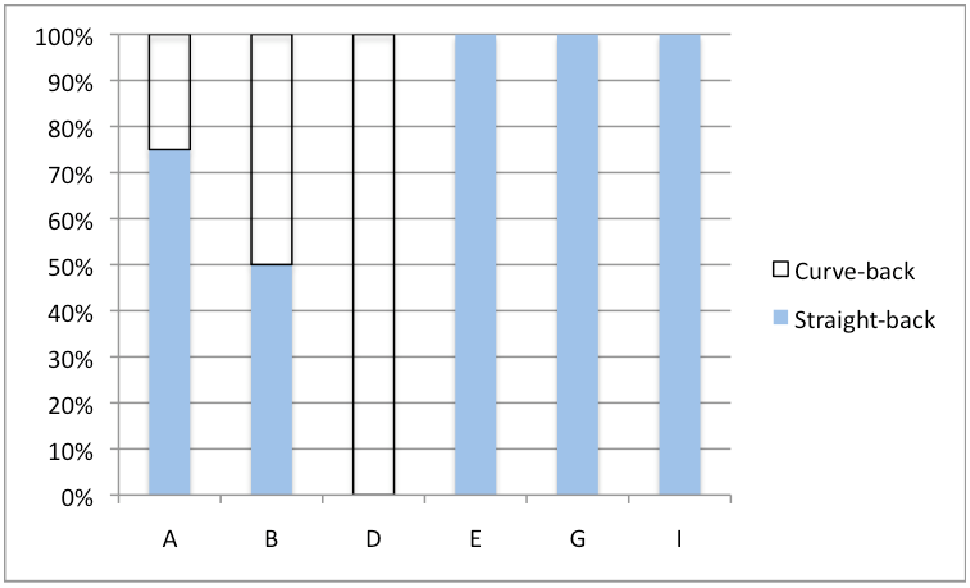

Figure 8.8. Change of relative frequencies of different knives from dwellings in the Fourth Layer

Dwelling group	I				III	IV			
Dwelling	A	B	C	**Subtotal**	**F**	G	H	I	**Subtotal**
Curved back	6	3	5	**14**	**2**	0	1	0	**1**
	12.8%	14.3%	50.0%	**17.9%**	**20.0%**	0.0%	12.5%	0.0%	**3.3%**
Straight back	41	18	5	**64**	**8**	1	7	21	**29**
	87.2%	85.7%	50.0%	**82.0%**	**80.0%**	100.0%	87.5%	100.0%	**96.7%**
Total	47	21	10	**78**	**10**	1	8	21	**30**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	100.0%	100.0%	100.0%	**100.0**

Dwelling group	V	VI			Total
Dwelling	J	K	L	**Subtotal**	
Curved back	1	2	6	**8**	**26**
	5.0%	100.0%	40.0%	**47.1%**	**18.3%**
Straight back	19	0	9	**9**	**129**
	95.0%	0.0%	60.0%	**52.9%**	**81.7%**
Total	20	2	15	**17**	**155**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**

Table 8. 8. Number of curved and straight back knives in the Third Layer

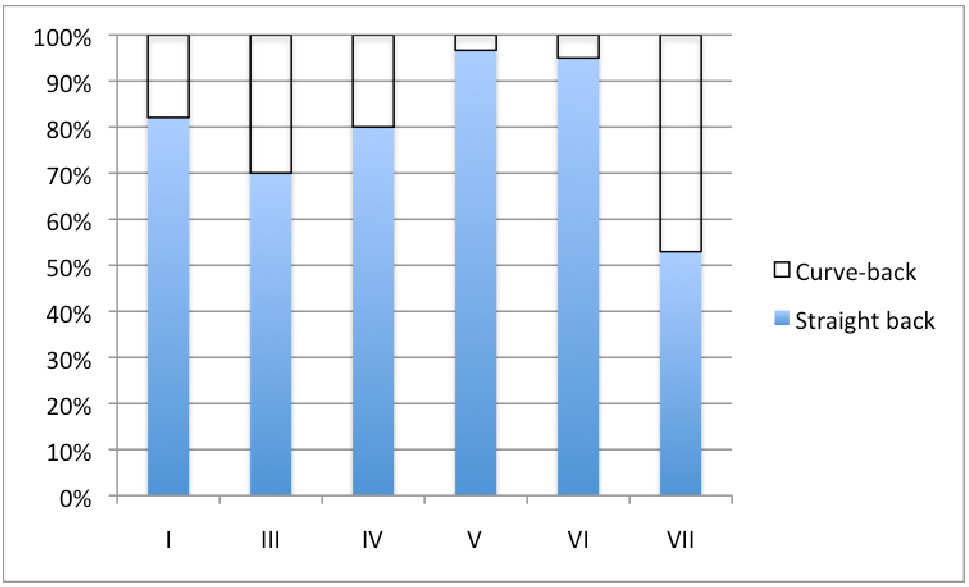

Figure 8.9. Change of relative frequencies of different knives from dwelling groups in the Third Layer

Regarding the straight back knife, it can be further divided into five categories according to the shape of the tool. They are half-moon shape, trapezoid shape, crescent shape, and rectangular shape. Tables 8.9 and 8.10 show the numbers of different shapes of knives from each dwelling/ dwelling group in the Fourth and Third Layers. The distribution of these shapes of knives among dwellings/dwelling groups shows that the trapezoid-shaped and the half-moon- shaped knives are the most common knife forms among dwellings throughout the whole settlement history (Figure 8.10 and Figure 8.11). However, in the initial stage of the settlement (the Fourth Layer), only one type of straight back knife is present in each dwelling. Nevertheless, both the half-moon-shaped and the Trapezoid-shaped knives are present in all dwelling groups in the later period (the Third Layer).

Dwelling	A	B	E	G	I	Total
Half-moon	2	0	4	0	0	6
Trapezoid	0	2	0	1	1	4
Unknown	1	0	0	0	0	1
Total	3	2	4	1	1	11

Table 8.9. Number of different forms of straight back knives

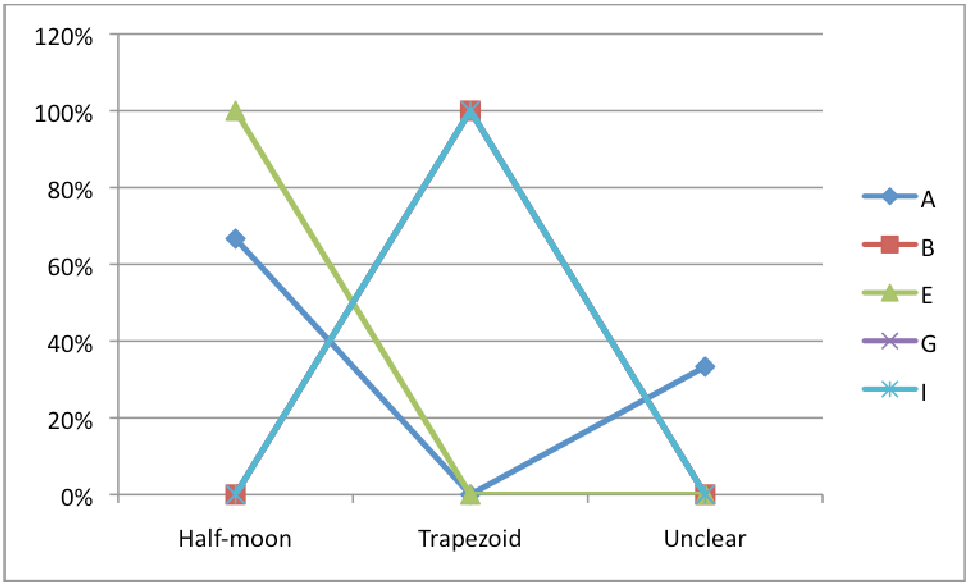

Figure 8.10. Change of relative frequencies of different straight back knives from dwellings in the Fourth Layer

Dwelling group	I				III	IV	V				VI	VII	Total
Dwelling	A	B	C	**Subtotal**	**E**	**F**	G	H	I	**Subtotal**	**J**	L	
Half-moon	26 (61.9)	12 (70.6)	4 (80.0)	**42 (65.6)**	**10 (71.4)**	**6 (75.0)**	0 (0.0)	3 (42.9)	10 (47.6)	**13 (44.8)**	**12 (63.2)**	6 (66.7)	**89 (62.2)**
Trapezoid	15 (35.7)	4 (23.5)	1 (20.0)	**20 (31.3)**	**4 (28.6)**	**2 (25.0)**	1 (100)	3 (42.9)	7 (33.3)	**11 (37.9)**	**6 (31.6)**	3 (33.3)	**46 (32.2)**
Crescent	1 (2.4)	1 (5.9)	0 (0.0)	**2 (3.1)**	**0 (0.0)**	**0 (0.0)**	0 (0.0)	0 (0.0)	3 (14.3)	**3 (10.3)**	**1 (5.3)**	0 (0.0)	**6 (4.2)**
Rectangular	0 (0.0)	0 (0.0)	0 (0.0)	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	0 (0.0)	0 (0.0)	1 (4.8)	**1 (3.5)**	**0 (0.0)**	0 (0.0)	**1 (0.7)**
Unknown	0 (0.0)	0 (0.0)	0 (0.0)	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	0 (0.0)	1 (14.3)	0 (0.0)	**1 (3.5)**	**0 (0.0)**	0 (0.0)	**1 (0.7)**
Total	42 (100)	17 (100)	5 (100)	**64 (100)**	**14 (100)**	**8 (100)**	1 (100)	7 (100)	21 (100)	**29 (100)**	**19 (100)**	9 (100)	**143 (100)**
Richness	**3**	**3**	**2**	**3**	**2**	**2**	**1**	**3**	**3**	**5**	**3**	**2**	**5**

Table 8. 10 Number of different straight back knife from Layer III

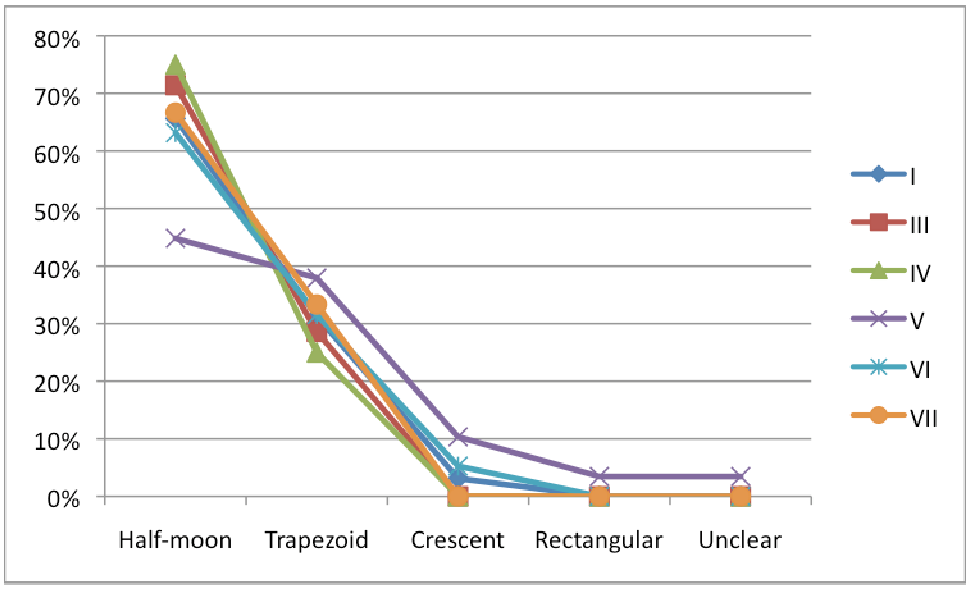

Figure 8.1114. Change of relative frequencies of different straight back knives from dwelling groups in the Third Layer

8.2.2.B Adze-axe

Four types of adze-axe are distinguished: the fully polished rectangular, long pebble, chipped rectangular, and chipped with a rough polished rectangular shape. Tables 8.10 and 8.11 show the numbers and relative frequencies of these different shapes of knives in the Fourth and Third Layers from each dwelling/ dwelling group. The fully polished rectangular-shaped adze-axe is most prevalent in number in both Fourth and Third Layers. The long pebble and chipped rectangular adze-axes are probably more expedient than the others in terms of the time involved in the production. Both of these tools are small in quantities. In terms of production, long pebble and chipped rectangular adze-axes are probably more expedient than others since the time involved with the processing, especially for the former, is shorter. Figures 8.12 and 8.13 show that the expedient long pebble adze-axe was only utilized in the later period. Most of the inhabitants employed only the fully polished rectangular adze-axe in the initial phase.

Dwelling	A	B	D	E	F	G	I	L	Total
Polished rectangular	4	1	3	3	3	1	1	1	17
	100.0%	100.0%	60.0%	42.9%	100.0%	100.0%	50.0%	100.0%	70.8%
Chipped rectangular	0	0	1	2	0	0	0	0	3
	0.0%	0.0%	20.0%	28.6%	0.0%	0.0%	0.0%	0.0%	12.5%
Rough polished	0	0	1	2	0	0	1	0	4
	0.0%	0.0%	20.0%	28.6%	0.0%	0.0%	50.0%	0.0%	16.7%
Total	4	1	5	7	3	1	2	1	24
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Richness	**1**	**1**	**3**	**3**	**1**	**1**	**2**	**1**	**3**

Table 8. 11Numbers and relative frequencies of different adze-axes among dwellings from the Fourth Layer

Dwelling group	**I**				**III**	**IV**
Dwelling	A	B	C	**Subtotal**	**E**	**F**
Polished rectangular	29	31	11	**71**	**15**	**11**
	54.7%	64.6%	68.8%	**60.7%**	**44.1%**	**73.3%**
Long pebble	0	1	0	**1**	**2**	**0**
	0.0%	2.1%	0.0%	**0.9%**	**5.9%**	**0.0%**
Chipped rectangular	4	2	0	**6**	**6**	**2**
	7.5%	4.2%	0.0%	**5.1%**	**17.6%**	**13.3%**
Rough polished	20	14	5	**39**	**11**	**2**
	37.7%	29.2%	31.3%	**33.3%**	**32.4%**	**13.3%**
Total	53	48	16	**117**	**34**	**15**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**
Richness	**3**	**4**	**2**	**4**	**4**	**3**

Table 8. 12 Number and relative frequencies of different adze-axes in the Third Layer (continue)

Dwelling group	V				VI	VII			Total
Dwelling	G	H	I	**Subtotal**	**J**	K	L	**Subtotal**	
Polished rectangular	4	4	10	**18**	**17**	2	13	**15**	**147**
	80.0%	57.1%	55.6%	**60.0%**	**60.7%**	100.0%	68.4%	**71.4%**	**59.4%**
Long pebble	0	0	0	**0**	**1**	0	2	**2**	**6**
	0.0%	0.0%	0.0%	**0.0%**	**3.6%**	0.0%	10.5%	**9.5%**	**3.2%**
Chipped rectangular	0	2	3	**5**	**3**	0	2	**2**	**24**
	0.0%	28.6%	16.7%	**16.7%**	**10.7%**	0.0%	10.5%	**9.5%**	**10.0%**
Rough polished	1	1	5	**7**	**7**	0	2	**2**	**68**
	20.0%	14.3%	27.8%	**23.3%**	**25.0%**	0.0%	10.5%	**9.5%**	**27.5%**
Total	5	7	18	**30**	**28**	2	19	**21**	**245**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	100.0%	100.0%	**100.0%**	**100.0 %**
Richness	**2**	**3**	**3**	**3**	**4**	**1**	**4**	**4**	

Table 8. 12 Number and relative frequencies of different adze-axes in the Third Layer

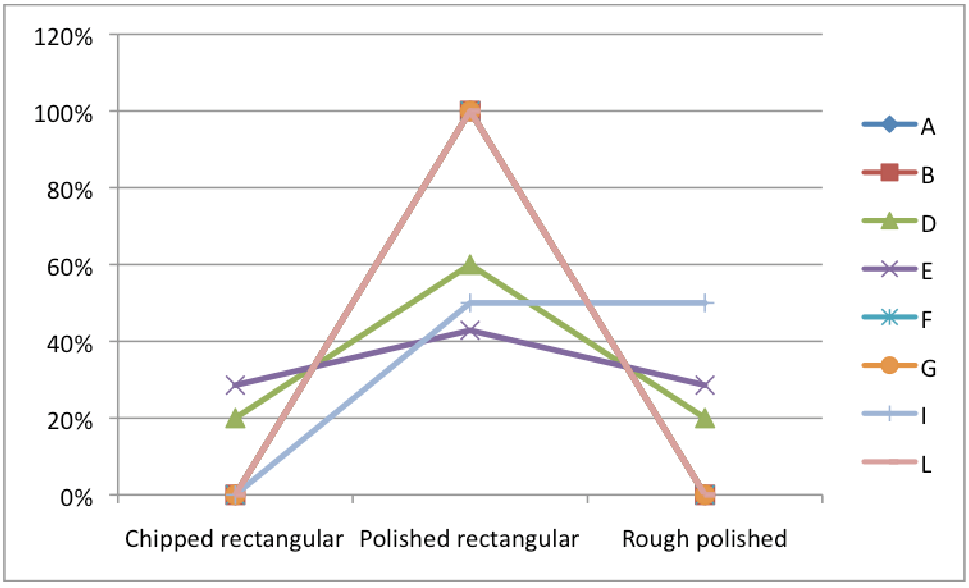

Figure 8.12. Change of relative frequency of different adze-axes from dwellings in the Fourth Layer

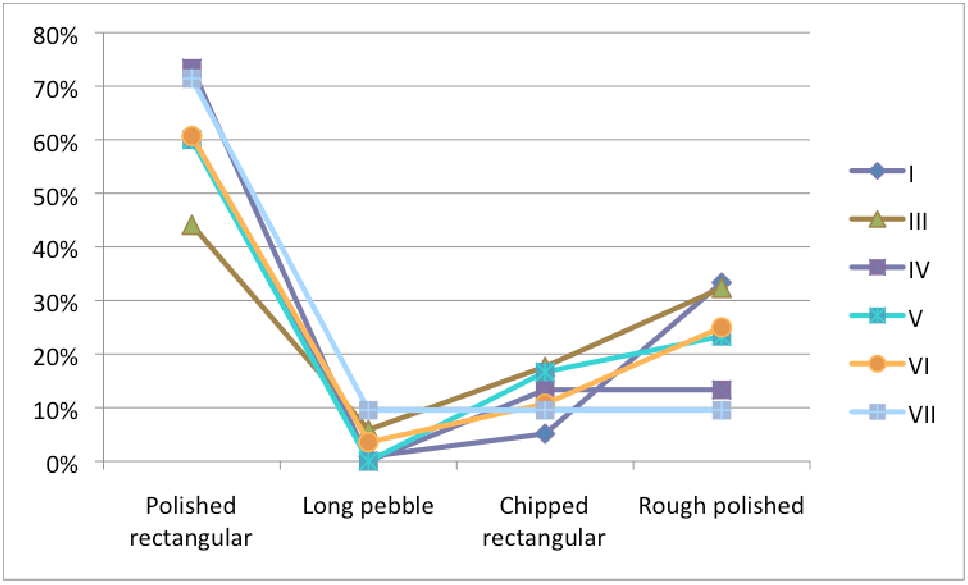

Figure 8.13. Change of relative frequency of different adze-axes from dwelling groups in the Third Layer

8.2.2.C Arrowhead

Five forms of arrowheads can be differentiated based on their shape of the tool and presence/absence of perforations on the tool. These forms include flat bottom (A1), flat bottom with perforation (A2), concave bottom with perforation (A3), stemmed arrowhead (A4), and perforated stem arrowhead (A5). Table 8.12 and 8.13 show the number of different forms of arrowheads from each dwelling/ dwelling group in the Fourth and Third Layers. The distribution of different forms of arrowheads indicates that the flat bottom arrowhead is the most common form in the two phases. Later on, two forms, the flat bottom and flat bottom with perforation types, became the most common arrowheads that coexisted in all dwelling groups (Figure 8.14 and 8.15).

Dwelling	A	D	E	G	Total
A1	0	1	2	1	4
A2	1	0	0	0	1
A3	1	0	0	0	1
Total	2	1	2	1	6

Table 8. 13 Number of different arrowheads among dwelling in the Fourth Layer

Dwelling group	I				III	IV	V	VI	VII			Total
Dwelling	A	B	C	**Subtotal**	**E**	**F**	**I**	**J**	K	L	**Subtotal**	
A1	9	1	1	**11**	**2**	**5**	**1**	**11**	1	4	**5**	**35**
	50.0 %	20.0%	33.3 %	**42.3%**	**33.3%**	**62.5%**	**16.7%**	**64.7%**	50.0%	40.0%	**41.7%**	**46.7%**
A2	7	3	2	**12**	**4**	**3**	**4**	**6**	0	5	**5**	**34**
	38.9 %	60.0%	66.7 %	**46.2%**	**66.7%**	**37.5%**	**66.7%**	**35.3%**	0.0%	50.0%	**41.7%**	**45.3%**
A3	2	0	0	**2**	**0**	**0**	**1**	**0**	1	0	**1**	**4**
	11.1 %	0.0%	0.0%	**7.7%**	**0.0%**	**0.0%**	**16.7%**	**0.0%**	50.0%	0.0%	**8.3%**	**5.3%**
A4	0	1	0	**1**	**0**	**0**	**0**	**0**	0	0	**0**	**1**
	0.0%	20.0%	0.0%	**3.8%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	0.0%	0.0%	**0.0%**	**1.3%**
A5	0	0	0	**0**	**0**	**0**	**0**	**0**	0	1	**1**	**1**
	0.0%	0.0%	0.0%	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	0.0%	10.0%	**8.3%**	**1.3%**
Total	18	5	3	**26**	**6**	**8**	**6**	**17**	2	10	**12**	**75**
	100. 0%	100.0 %	100.0 %	**100.0%**	**100.0 %**	**100.0 %**	**100.0 %**	**100.0 %**	100.0 %	100.0 %	**100.0%**	**100.0 %**
Richness	**3**	**3**	**2**	**4**	**2**	**2**	**4**	**2**	**2**	**3**	**4**	

Table 8. 14 Numbers and relative frequencies of different arrowheads in the Third Layer

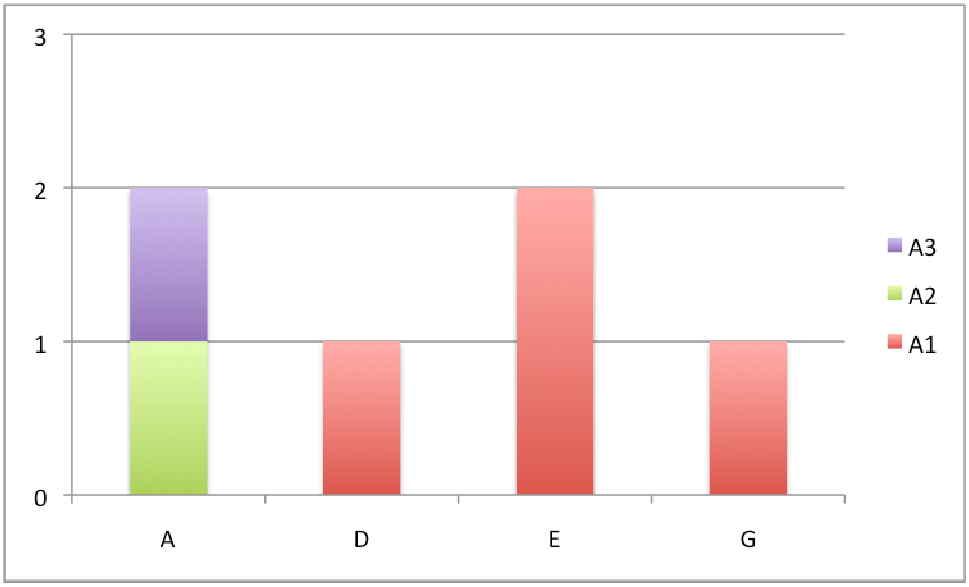

Figure 8.14. Change of number of different arrowhead from dwellings in the Fourth Layer

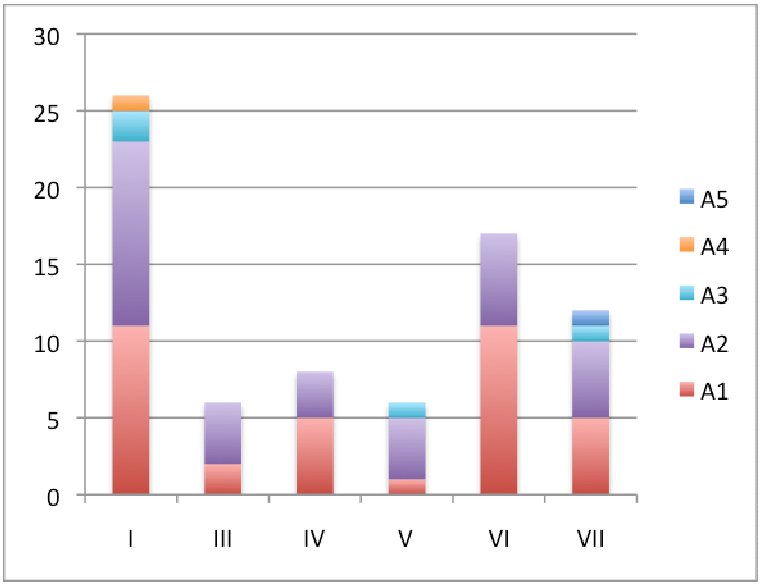

Figure 8.15. Change of number of different arrowheads from dwelling groups in the Third Layer

Slate is the main raw material used to make these arrowheads; however, jade is also used throughout the whole time. In the later period, a small amount of arrowheads were made with mudstone. Due to the brittle nature of slate, most of the slate arrowheads are too broken for their original shapes to be identified. In contrast, most of the jade arrowheads are better preserved. This is either because jade is more solid or because a certain level of repair work has been done on jade arrowhead. As demonstrated by Figures 8.14 and 8.15, the jade arrowhead can only be found in Dwellings A in the initial stage. However, it began getting discovered in every dwelling later on, even though the slate was still the favorite material for constructing arrowheads.

Comparing the forms versus the material of the arrowheads (Table 8.14), for the most part, jade was used to produce the A2 form of arrowhead. The distribution of the jade arrowhead indicates that only Dwelling Groups I and VII have forms other than the A2 type. On the contrary, even though the majority of slate was used to produce the A1 type arrowhead, slate was also used by each dwelling group to manufacture small quantities of other types of arrowheads (Figure 8.16).

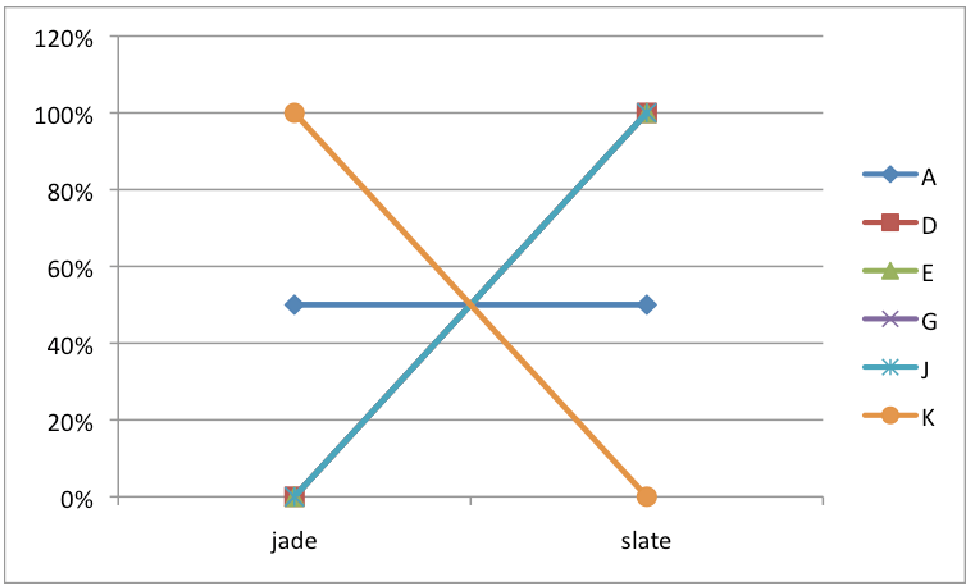

Figure 8.16. Change of relative frequencies of different material used to make arrowheads from dwellings in the Fourth Layer

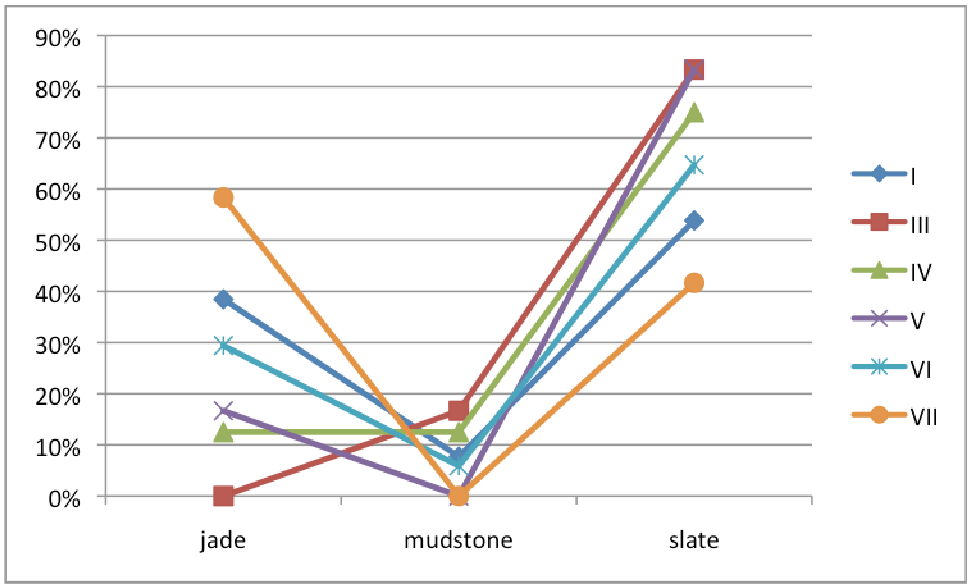

Figure 8.17. Change of relative frequencies of different material used to make arrowheads from dwelling groups in the Third Layer

Material	Jade	Mudstone	Slate
Broken	12	2	120
A1	2	2	42
A2	22	5	10
A3	2		3
A4			1
A5	1		
Total	36	9	164

Table 8.15. Number of materials and forms of arrowhead

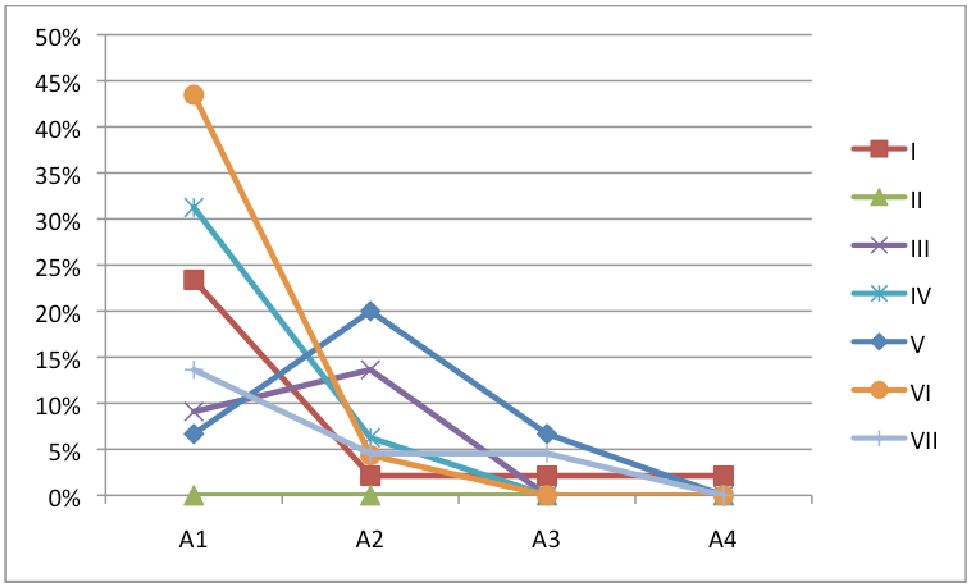

Figure 8.18. Change of relative frequencies of different slate arrowheads from dwelling groups in the Third Layer

8.2.2.D Spearhead

The fact that only two spearheads were found in the Fourth Layer indicates that significant use and production of the spearhead did not emerged until the second phase of the settlement. These spearheads can be classified into five types based on their shape at the end and the presence or absence of perforated holes. These types are triangle shape with stem (S1), triangle shape with side notch (S2), triangle shape with perforated stem (S3), triangle shape (S4), and slender shape (S5). Table 8.15 and Figure 8.17 show the number and relative frequencies of different spearheads from each dwelling group in the Third Layer. Almost half of them are too broken to have their original shape identified. The distribution of the identifiable spearheads among dwelling groups illustrates that, except for the Dwellings Group V and VII , most of dwelling groups have multiple forms of spearheads.

Dwelling group	I			III	IV	V	VI	VII	Total
Dwelling	A	B	**Subtotal**	E	F	I	J	L	
S1	4	2	**6**	1	2	0	1	0	**10**
	57.1%	50.0%	**54.4%**	16.7%	50.0%	0.0%	33.3%	0.0%	**40.7%**
S2	1	2	**3**	2	1	0	1	0	**7**
	14.3%	50.0%	**27.3%**	33.3%	25.0%	0.0%	33.3%	0.0%	**25.9%**
S3	0	0	**0**	1	1	0	1	1	**4**
	0.0%	0.0%	**0.0%**	16.7%	25.0%	0.0%	33.3%	100.0%	**14.8%**
S4	0	0	**0**	0	0	1	0	0	**1**
	0.0%	0.0%	**0.0%**	0.0%	0.0%	100.0%	0.0%	0.0%	**3.7%**
S5	2	0	**2**	2	0	0	0	0	**4**
	28.6%	0.0%	**18.2%**	33.3%	0.0%	0.0%	0.0%	0.0%	**14.8%**
Total	7	4	**11**	6	4	1	3	1	**26**
	100.0%	100.0%	**100.0%**	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**
Richness	**2**	**2**	**3**	**4**	**3**	**1**	**3**	**1**	**5**

Table 8. 16 Number of different spearheads in the Third Layer

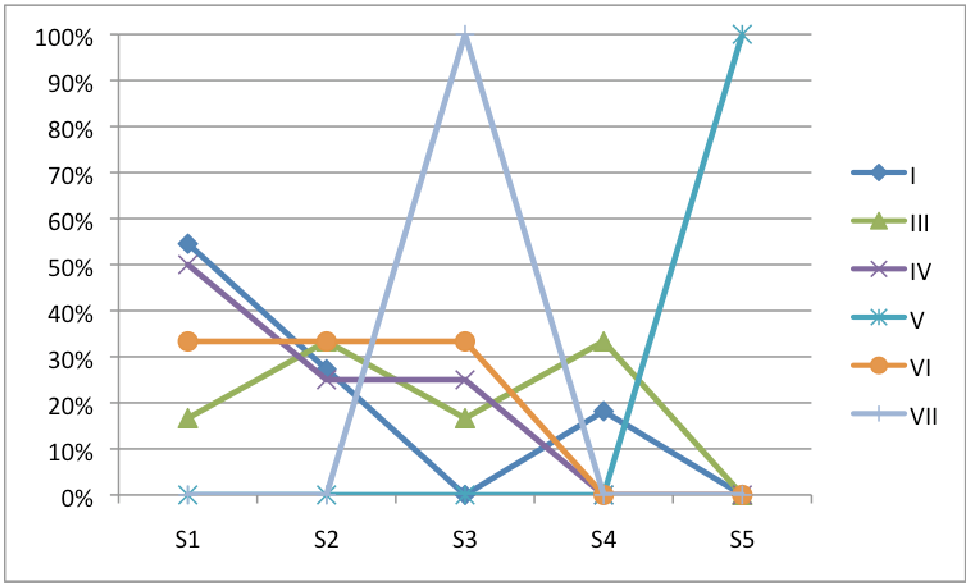

Figure 8.19. Change of relative frequencies of different spearheads from dwelling groups in the Third Layer

8.2.2E Net sinker

Four types of net sinkers are identified: long pebble with grooves on both ends (A), pebble with chips on both sides (B), rectangular shape with groove (C), and pebble with polished marks on both sides (D). Tables 8.16 and 8.17 show the number of each type of net sinkers from each dwelling/ dwelling group in the Fourth and Third Layers. In the Fourth Layer, Type A net sinkers are the most common type among all dwellings. Figure 8.18 and 8.19 show the relative frequencies of each type of net sinkers in dwelling groups from the Fourth and Third Layers. All

the dwelling groups have more than one type of net sinkers, with the exception of Dwelling Group VII. Thus, Dwelling Group VII shows clear distinction from the other dwelling groups.

Dwelling	A	B	D	E	F	G	J	L	Total
Type A	6	3	3	12	3	3	4	5	39
	85.7%	100.0%	100.0%	92.3%	100.0%	100.0%	100.0%	100.0%	95.1%
Type B	1	0	0	0	0	0	0	0	1
	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%
Type D	0	0	0	1	0	0	0	0	1
	0.0%	0.0%	0.0%	7.7%	0.0%	0.0%	0.0%	0.0%	2.4%
Total	7	3	3	13	3	3	4	5	41
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 8. 17 Numbers and relative frequencies of different net sinkers among dwellings from the Fourth Layer

Dwelling group	**I**				**III**	**IV**
Dwelling	A	B	C	**Subtotal**	**E**	**F**
Type A	75	39	16	**130**	**69**	**29**
	87.2%	88.6%	94.1%	**88.4%**	**88.5%**	**87.9%**
Type B	6	4	1	**11**	**5**	**2**
	7.0%	9.1%	5.9%	**7.5%**	**6.4%**	**6.1%**
Type C	3	1	0	**4**	**1**	**2**
	3.5%	2.3%	0.0%	**2.7%**	**1.3%**	**6.1%**
Type D	2	0	0	**2**	**3**	**0**
	2.3%	0.0%	0.0%	**1.4%**	**3.8%**	**0.0%**
Total	86	44	17	**147**	**78**	**33**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**
Richness	**4**	**3**	**2**	**4**	**4**	**3**

Table 8. 18 Numbers and relative frequencies of different net sinkers from the Third Layer (continue)

Dwelling group	**V**				**VI**	**VII**			**Total**
Dwelling	G	H	I	**Subtotal**	**J**	K	L	**Subtotal**	
Type A	4	14	11	**29**	**50**	5	44	**49**	**356**
	80.0%	93.3%	68.8%	**80.6%**	**87.7%**	100.0%	100.0%	**100.0%**	**88.8%**
Type B	0	1	4	**5**	**1**	0	0	**0**	**24**
	0.0%	6.7%	25.0%	**13.9%**	**1.8%**	0.0%	0.0%	**0.0%**	**6.1%**
Type C	1	0	1	**2**	**3**	0	0	**0**	**12**
	20.0%	0.0%	6.3%	**5.6%**	**5.3%**	0.0%	0.0%	**0.0%**	**2.9%**
Type D	0	0	0	**0**	**3**	0	0	**0**	**8**
	0.0%	0.0%	0.0%	**0.0%**	**5.3%**	0.0%	0.0%	**0.0%**	**2.2%**
Total	5	15	16	**36**	**57**	5	44	**49**	**400**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	100.0%	100.0%	**100.0%**	**100.0%**
Richness	**2**	**2**	**3**	**3**	**4**	**1**	**1**	**1**	

Table 8. 18 Numbers and relative frequencies of different net sinkers from the Third Layer

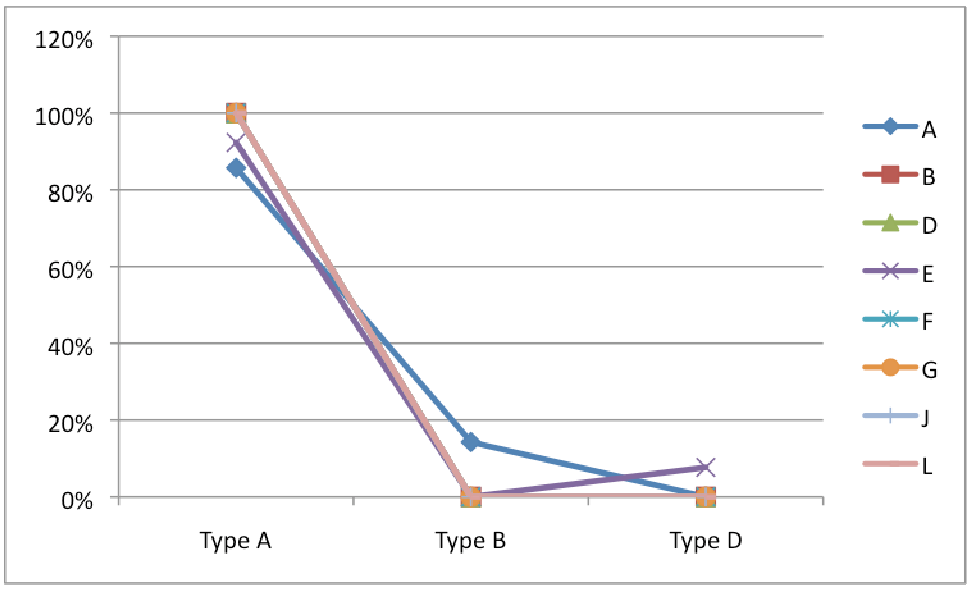

Figure 8.20. Change of relative frequencies of different net sinkers from dwellings in the Fourth Layer

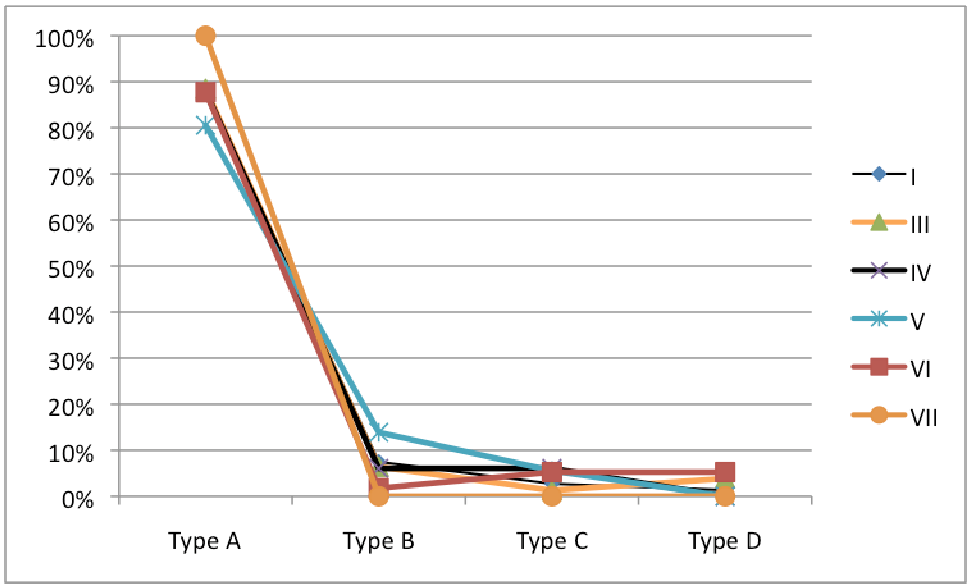

Figure 8.21. Change of relative frequencies of different net sinkers from dwelling groups in the Third Layer

8.2.2.F Bracelet/earring

Due to serious damage, with most of these ring-shaped artifacts, it is difficult to ascertain whether they are bracelets or earrings, especially the ones made from slate. Thus, most of the analysis treats these two forms as a single category. Based on ethnographic examples and archaeological contexts in other contemporaneous sites in Taiwan, these ring-shaped artifacts were probably some kinds of ornaments, such bracelets or earrings.

Two main lithic materials were used to make the bracelets/earrings: jade and slate. The distribution of these two materials used among dwellings indicates that slate was the most common material used for bracelet/earring production throughout the whole time (Figure 8.20 and Figure 8.21). In the later phase, a small number of other types of materials, such as mudstone, and a certain type of metamorphic stone, were also used. Even though the jade bracelet/earring can be found in almost all dwelling groups, there are no jade bracelets/earrings present in Dwelling Groups II and VI. However, as mentioned earlier, Dwelling Group II was removed due to road construction.

Six different forms of bracelets/earrings made from slate can be differentiated based on their profiles. These are rectangular shape (A1), oval shape (A2), flat shape (A3), raindrop-shape (A4), trapezoid shape (A5), and pentagon-shape (A6). Tables 8.17 and 8.18 show the number of different bracelets/earrings from each dwelling/ dwelling group in the Fourth and Third Layers. The oval-shaped is the dominant form of bracelet/earring in both Fourth and Third Layers, except for Dwelling Group VII. Figure 8.22 and 8.23 show the relative frequencies of different types of bracelets/ earrings from each dwelling group in the Fourth and Third Layers. All the dwelling groups have more than one type of bracelets/ earrings. In the initial stage (the Fourth Layer), the oval-shaped is the dominant form of bracelet/earring among dwellings even though diversity already existed in most of dwellings. However, this oval-shaped form is only dominant in two dwelling groups in the second phase, and it is even more diversified in each dwelling group than before.

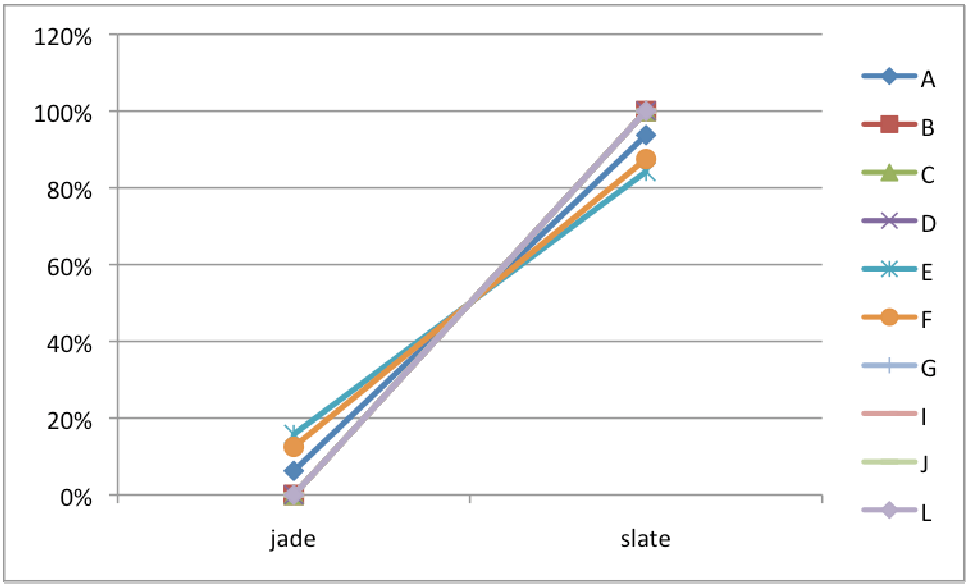

Figure 8.22. Change of relative frequencies of different material of the bracelet/earrings from dwellings in the Fourth Layer

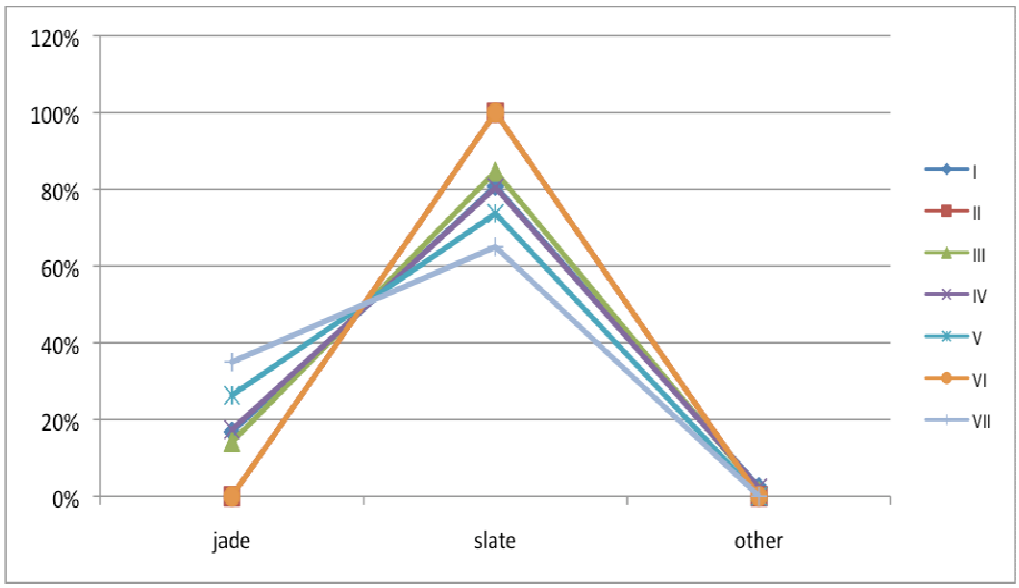

Figure 8.23. Change of relative frequencies of different materials of the bracelet/earrings from dwelling groups in the Third Layer

Dwelling	A	B	C	D	E	F	G	J	L	Total
Rectangular shape	0	0	2	0	3	0	0	0	0	5
	0.0%	0.0%	28.6%	0.0%	33.3%	0.0%	0.0%	0.0%	0.0%	11.9%
Oval-shape	3	6	3	0	3	2	0	2	0	19
	50.0%	66.7%	42.9%	0.0%	33.3%	40.0%	0.0%	100.0%	0.0%	45.2%
Flat	0	1	1	1	1	2	0	0	0	6
	0.0%	11.1%	14.3%	100.0%	11.1%	40.0%	0.0%	0.0%	0.0%	14.3%
Raindrop shape	0	0	1	0	2	0	1	0	1	5
	0.0%	0.0%	14.3%	0.0%	22.2%	0.0%	100.0%	0.0%	50.0%	11.9%
Trapezoid shape	3	1	0	0	0	1	0	0	1	6
	50.0%	11.1%	0.0%	0.0%	0.0%	20.0%	0.0%	0.0%	50.0%	14.3%
Pentagon shape	0	1	0	0	0	0	0	0	0	1
	0.0%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%
Total	6	9	7	1	9	5	1	2	2	42
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0 %
Richness	**2**	**4**	**4**	**1**	**4**	**3**	**1**	**1**	**2**	

Table 8. 19 Numbers and relative frequencies of different bracelets/earrings among dwellings in the Fourth Layer

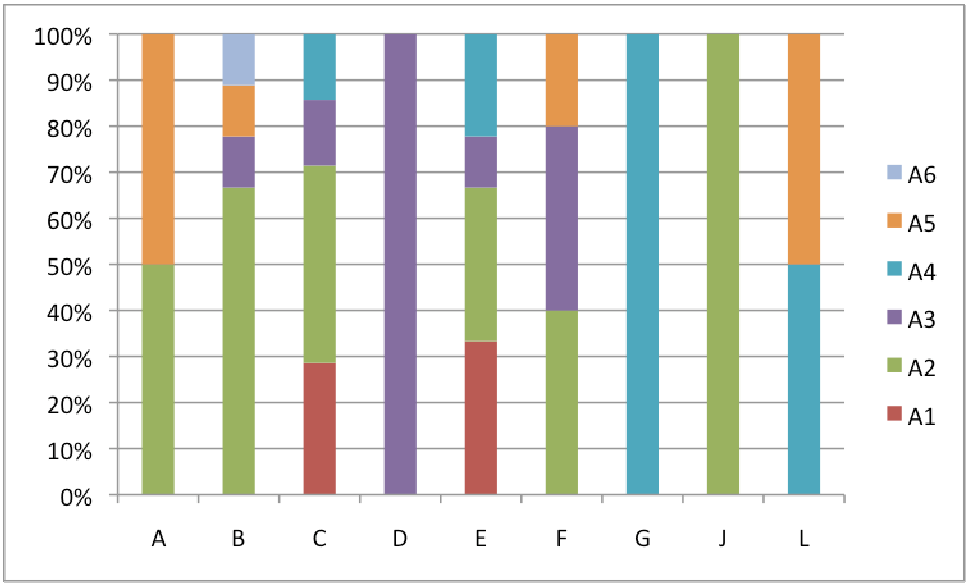

Figure 8.24. Change of relative frequencies of different slate bracelets/earrings from dwelling in the Fourth Layer

Dwelling group	I				II	III	IV
Dwelling	A	B	C	**Subtotal**	**D**	**E**	**F**
Rectangular shape	5	3	0	**8**	**2**	**19**	**3**
	15.6%	9.1%	0.0%	**13.4%**	**40.0%**	**43.2%**	**12.0%**
Oval shape	19	17	4	**40**	**1**	**18**	**7**
	59.4%	51.5%	33.3%	**51.9%**	**20.0%**	**40.9%**	**28.0%**
Flat	2	4	2	**6**	**0**	**3**	**5**
	6.3%	12.1%	16.7%	**7.8%**	**0.0%**	**6.8%**	**20.0%**
Raindrop shape	1	1	2	**4**	**1**	**2**	**1**
	3.1%	3.0%	16.7%	**5.2%**	**20.0%**	**4.5%**	**4.0%**
Trapezoid shape	5	8	4	**17**	**0**	**2**	**9**
	15.6%	24.2%	33.3%	**22.1%**	**0.0%**	**4.5%**	**36.0%**
Pentagon shape	0	0	0	**0**	**1**	**0**	**0**
	0.0%	0.0%	0.0%	**0.0%**	**20.0%**	**0.0%**	**0.0%**
Total	32	33	12	**77**	**5**	**44**	**25**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Richness	**5**	**5**	**4**	**5**	**4**	**5**	**5**

Table 8. 20 Number and relative frequencies of different bracelets/earrings in the Third Layer (continue)

Dwelling group	V				VI	VII			Total
Dwelling	G	H	I	**Subtotal**	J	K	L	**Subtotal**	
Rectangular shape	0	2	2	**4**	**8**	0	4	**4**	**46**
	0.0%	33.3%	0.0%	**33.3%**	**24.2%**	0.0%	50.0%	**40.0%**	**22.5%**
Oval shape	0	4	1	**5**	**14**	0	1	**1**	**86**
	0.0%	66.7%	33.3%	**41.7%**	**42.4%**	0.0%	12.5%	**10.0%**	**42.2%**
Flat	0	0	1	**1**	**3**	0	0	**0**	**20**
	0.0%	0.0%	33.3%	**8.3%**	**9.1%**	0.0%	0.0%	**0.0%**	**9.8%**
Raindrop shape	0	0	0	**0**	**2**	2	2	**4**	**14**
	0.0%	0.0%	0.0%	**0.0%**	**6.1%**	100.0%	25.0%	**40.0%**	**6.9%**
Trapezoid shape	1	0	1	**2**	**4**	0	1	**1**	**35**
	100.0%	0.0%	33.3%	**16.7%**	**12.1%**	0.0%	12.5%	**10.0%**	**17.2%**
Pentagon shape	0	0	0	**0**	**2**	0	0	**0**	**3**
	0.0%	0.0%	0.0%	**0.0%**	**6.1%**	0.0%	0.0%	**0.0%**	**1.5%**
Total	1	6	3	**12**	**33**	2	8	**10**	**204**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	100.0%	100.0%	**100.0%**	**100.0%**
Richness	**1**	**2**	**4**	**4**	**6**	**1**	**4**	**4**	

Table 8. 20 Number and relative frequencies of different bracelets/earrings in the Third Layer

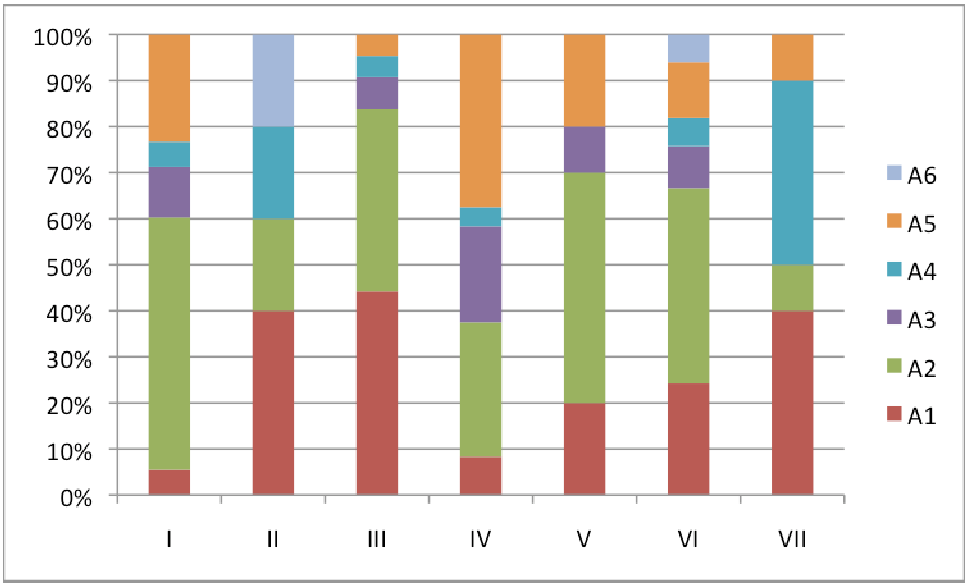

Figure 8.25. Change of relative frequencies of different slate bracelets/earrings from dwelling groups in the Third Layer

8.2.3 Summary of lithic artifacts

The distribution of lithic artifacts between the Third and Fourth Layers suggests that the variety of raw materials being used and the diversity of styles being created increased from the initial stage of the settlement until the end of the settlement history. In the early phase of the settlement, the material culture being produced and utilized among dwellings shows clear

distinctions. However, in the second phase of the settlement, an increase of diversification occurred in every dwelling group, either in terms of the raw material procured or the kind of stylistic creation employed. The only exception is Dwelling Group VII; it has a smaller diversity of forms than other dwelling groups, and some of the styles present can only be found in this dwelling group.

Slate is the most commonly used lithic material at the Wansan site, and it was used to manufacture all kinds of artifacts. Sandstone and shale are locally available. However, the utilization of these materials is less important than that of slate. The production of these lithic artifacts is dwelling-based (see Chapter7) and thus, the difference among dwellings/dwelling groups should be observed. However, the result of the analysis demonstrates that there is no clear distinction among dwelling groups, except for Dwelling Group VII. The spearheads and net sinkers in Dwelling Group VII show a different pattern from those of other dwelling groups, but the other artifacts are consistent with other dwelling groups.

8.3 The distribution of pottery artifacts with different attributes among dwellings

At the Wansan site, people employed local or imported clay resources to make vessel and non-vessel items, including jars, bowls, vases, plates, spindle whorls, bracelets, and figurines. The uneven ability of different dwellings/dwelling groups to acquire the imported clay source indicates a certain level of social distinction.

Moreover, due to poor preservation conditions, the exact shapes of the vessels are not clear. The presence of jar rims, shoulders, ring feet, and handles implies the variation of the vessel forms. Furthermore, the shapes of the spindle whorl, bracelet, and figurine are better preserved than those of the vessels. The distribution of these diverse forms of non-vessel artifacts can also be examined.

The following analysis divides pottery artifacts into two categories: vessel and non-vessel. The distribution pattern of the two categories is considered separately. The variations of vessel forms could be the result of the various functions the vessel served or stylistic distinctions. On the other hand, the diversity of non-vessel forms implies that prehistoric Wansan people produced or utilized various forms of bracelets, spindle whorls, and figurines. It is anticipated that the artifact attributes among dwellings/dwelling groups would show variations which can be used to characterize their boundaries and differentiation.

8.3.1 Vessels

As discussed in the previous chapter, four types of vessels can be identified: the jar, bowl, vase, and plate. However, due to poor preservation, the complete form of these vessels is not clear. Also, the amount of observable decoration on vessel surfaces is scarce. Although the shape and decoration cannot be ascertained due to poor preservation, the paste and color of the pottery vessels can be differentiated. Three main varieties can be distinguished: Yellowish Brown Sandy Ware, Brown Sandy Ware, and Light Red Sandy Ware. Based on petrographic studies on these potsherds, the source for the latter two should be from outside, either from northern Taiwan or

the Coastal Mountain Range (Lin 2002). Therefore, the distribution of these types of clay among dwellings illustrates whether these dwellings differed in their ability to acquire clay resources, which could imply the possibility of unequal power relations among these dwellings.

Moreover, despite the fact that only about 8% of the total jar rims are classifiable, the distribution of these rim forms can still help us ascertain whether different forms of jars among the dwellings exist.

8.3.1.A The distribution of Ware types among dwellings/dwelling groups

Three types of tempers were used to make pottery vessels at the Wansan site: Yellowish Brown Sandy Ware (YB), Brown Sandy Ware (BS), and Light Red Sandy Ware (LR). While the Yellowish Brown Sandy Ware is locally available, the latter two are imported based on the petrographic studies.

Table 8.19 and Figure 8.24 show the number and relative frequencies of pottery types from dwellings in the Fourth Layer. Although all the three pottery types can be found in each dwelling, the majority of pottery is Yellowish Brown Sandy Ware. As shown in Figure 8.25, there is no significant difference among dwellings.

Table 8.20 and Figure 8.25 show the number and relative frequency of pottery types among dwelling groups in the Third Layer. The Yellowish Brown Sandy Ware is still the dominant pottery type in all dwelling groups, except for Dwelling Group VII. Dwelling Group VII possessed more Brown Sandy Ware than other pottery types. In other words, it depends more heavily on outside sources.

Dwelling	A	B	C	D	E	F	G
YB	472	306	781	174	725	82	23
	75.5%	87.0%	86.0%	84.1%	89.6%	73.8%	81.5%
BS	49	75	81	7	28	20	3
	20.3%	10.6%	10.0%	10.1%	7.9%	21.4%	14.8%
LR	9	19	13	9	10	3	0
	4.2%	2.4%	3.9%	5.8%	2.5%	4.8%	3.7%
Total	530	400	875	190	763	105	26
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 8. 21 Number of the three pottery types among dwellings in the Fourth Layer (continue)

Dwelling	H	I	J	K	L	Total
YB	18	49	562	25	136	3353
	61.1%	72.3%	92.7%	91.4%	87.1%	84.9%
BS	2	16	9	1	8	299
	27.8%	23.4%	6.4%	8.6%	12.9%	12.1%
LR	1	1	1	0	0	66
	11.1%	4.3%	0.9%	0.0%	0.0%	3.0%
Total	21	66	572	26	144	3718
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 8. 21 Number of the three pottery types among dwellings in the Fourth Layer

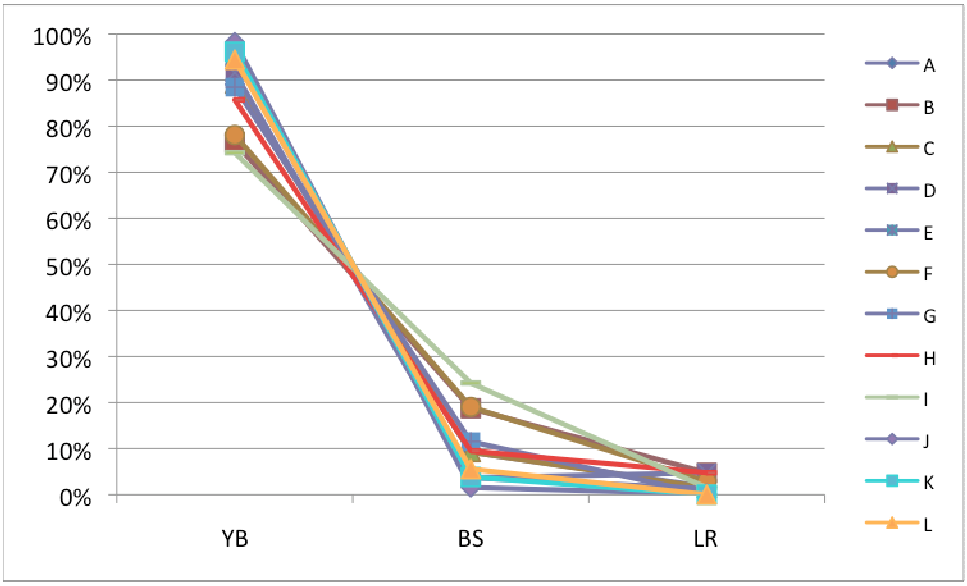

Figure 8.26. Change in relative frequency of the three pottery types from dwellings in the Fourth Layer

Dwelling group	I				III	IV	V			
Dwelling	A	B	C	**Subtotal**	**E**	**F**	G	H	I	**Subtotal**
YB	3210	2258	2180	**7648**	**4266**	**1306**	121	661	2313	**3095**
	66.9%	67.2%	84.6%	**71.3%**	**87.2%**	**81.9%**	41.9%	82.2%	89.2%	**84.0%**
BS	1191	835	340	**2366**	**489**	**243**	17	109	226	**352**
	24.8%	24.9%	13.2%	**22.0%**	**10.0%**	**15.2%**	5.9%	13.6%	8.7%	**9.5%**
YR	396	265	58	**719**	**135**	**46**	151	34	54	**239**
	8.3%	7.9%	2.3%	**6.7%**	**2.8%**	**2.9%**	52.3%	4.2%	2.1%	**6.4%**
Total	4797	3358	2578	**10733**	**4890**	**1595**	289	804	2593	**3686**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**	100.0%	100.0%	100.0%	**100.0%**

Table 8. 22 Numbers and relative frequencies of the three pottery types in the Third Layer (continue)

Dwelling group	VI	VII			Total
Dwelling	J	K	L	Subtotal	
YB	**3416**	61	550	**611**	**20342**
	75.3%	55.5%	39.5%	**40.6%**	**75.7%**
BS	**1019**	49	787	**836**	**5305**
	22.5%	44.6%	56.5%	**55.6%**	**19.4%**
YR	**103**	0	57	**57**	**1299**
	2.3%	0.0%	4.1%	**3.8%**	**4.9%**
Total	**4538**	110	1394	**1504**	**26946**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**

Table 8. 22 Numbers and relative frequencies of the three pottery types in the Third Layer

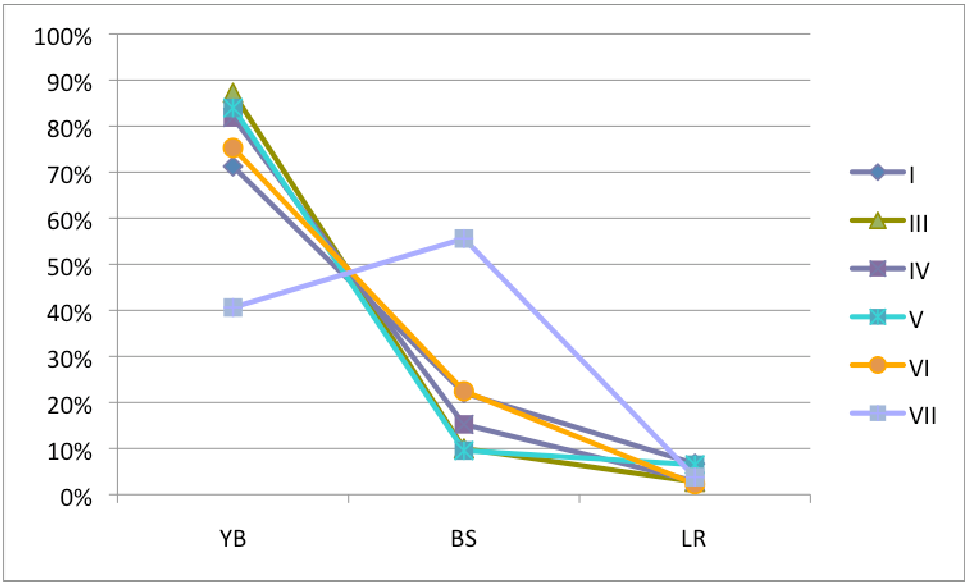

Figure 8.27. Change in relative frequency of the three pottery types from dwelling groups in the Third Layer

8.3.1.B The distribution of rim forms among dwellings/dwelling groups

Four main rim forms can be identified: the flared rim (A), straight rim with everted lip (B), flared rim with inward lip (C), and curved rim (D). Based on the lip shape, angle of the curve, and the length of the rim neck, these rim forms can be further classified into 28 types. The majority of the rims are the flared rims with an inward lip, and the number of the other rim forms only constitutes a small portion of the total rims in the second phase.

Although most of the pottery artifacts found at the Wansan site are broken potshards, the presence of different rim forms can be used to imply the presence of various jar shapes. Based on the previous chapter, each dwelling/dwelling group was an independent unit where people conducted their daily life. Therefore, it is anticipated that there is no obvious difference between

the dwellings/dwelling groups in terms of rim forms. On the other hand, the varieties within each rim form should show variations if the residents of the dwellings/dwelling groups used these attributes to differentiate themselves from each other.

For the purpose of understanding the difference among dwellings, the distribution of the four main rims forms among dwellings is examined first. Table 8.21 and Figure 8.26 show the numbers and relative frequencies of different types of jar rims from dwellings in the Fourth Layer. The data from Dwellings D, F, H and I are removed due to their small sample size. No single rim form is found dominant in any of these dwellings. As shown in Figure 8.26, there is no significant difference among dwellings in the Fourth Layer.

Table 8.22 and Figure 8.27 show the numbers and relative frequencies of the four types of rim forms among dwelling groups in the Third Layer. The type C (flared rim with inward lip) rim dominates most assemblages from those dwelling groups, except for Dwelling Group II and VI. The data from Dwelling Group II is not complete since most of the areas were removed by modern construction.

By comparing Figures 8.26 and 8.27, the percentage of the flared rim decreases while the flared rim with an inward lip increases. In the initial stage of the settlement (the Fourth Layer), the proportion of flared rims is equal to flared rims with an inward lip among some dwellings. The flared rim and the straight rim with everted lip are the dominant rim forms at this time. In the later phase (the Third Layer), the flared rim with inward lip jars became the primary jar form utilized among every dwelling/dwelling group. Also, the diversity of rim forms was enhanced among dwellings in the second stage of the settlement.

Even though Dwelling Group V has the third largest number of identifiable jar rims associated with it (only less than Groups I and III), it lacks one of the common rim forms: the curved rim. On the other hand, the flared rim cannot be found in association with Dwelling Group IV, while it can be found in other dwelling groups.

Dwelling	A	B	C	E	J	L	Total
Type A	3	3	3	6	4	2	23
	30.0%	37.5%	42.9%	33.3%	36.4%	40.0%	35.9%
Type B	4	2	3	6	3	2	23
	40.0%	25.0%	42.9%	33.3%	27.3%	40.0%	35.9%
Type C	3	1	0	6	4	1	15
	30.0%	12.5%	0.0%	33.3%	36.4%	20.0%	23.4%
Type D	0	2	1	0	0	0	3
	0.0%	25.0%	14.3%	0.0%	0.0%	0.0%	4.7%
Total	10	8	7	18	11	5	64
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Richness	**3**	**4**	**3**	**3**	**3**	**3**	

Table 8. 23 Number of different rim forms among dwellings in the Fourth Layer

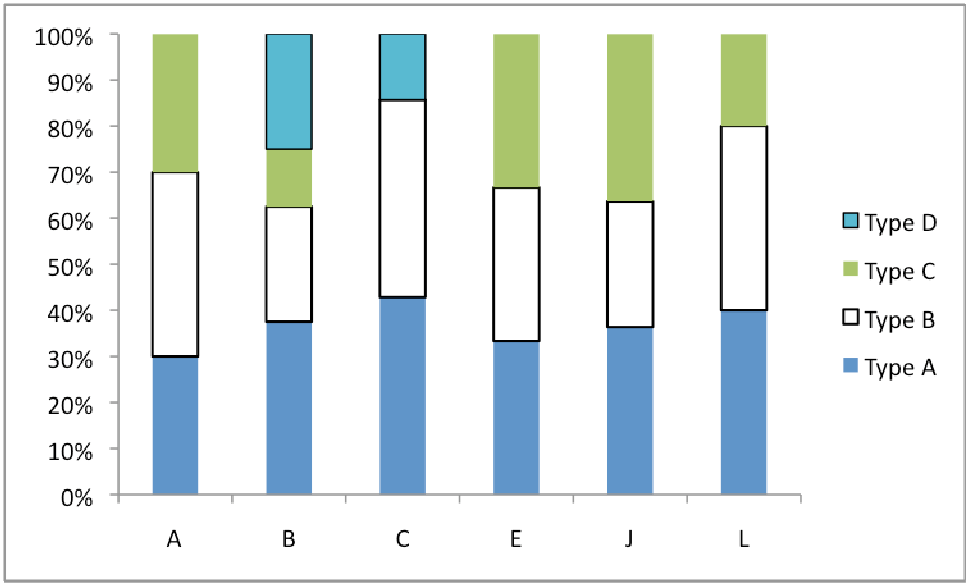

Figure 8.28. Change in relative frequency of different rim forms from dwellings in the Fourth Layer

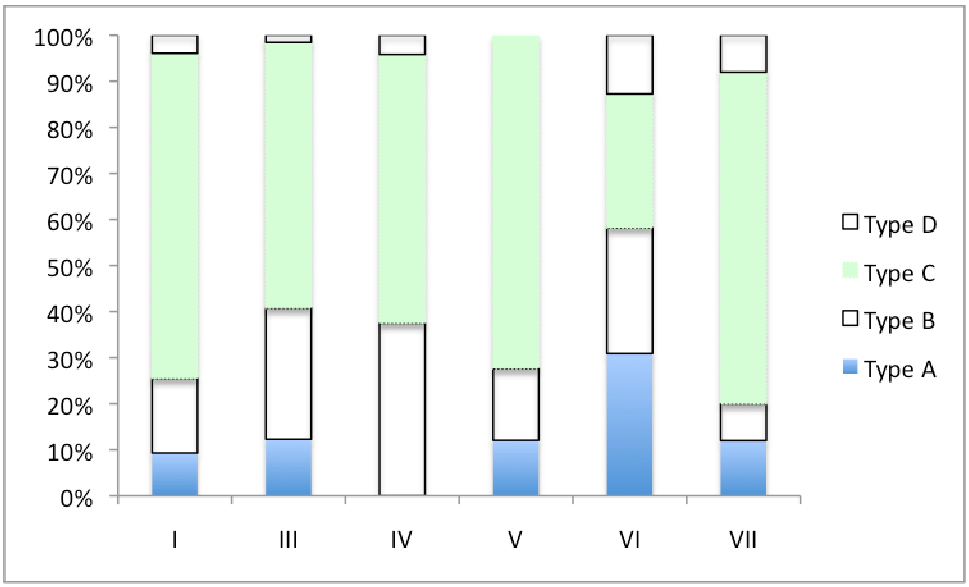

Figure 8.29. Change in relative frequency of different rim forms from dwelling groups in the Third Layer

Dwelling group	I				III	IV	V			
Dwelling	A	B	C	**Subtotal**	**E**	**F**	G	H	I	**Subtotal**
Type A	6	9	4	**19**	**16**	**0**	1	6	10	**17**
	6.8%	9.1%	23.5%	**9.3%**	**12.3%**	**0.0%**	100.0%	16.2%	9.7%	**12.1%**
Type B	16	14	3	**33**	**37**	**9**	0	9	13	**22**
	18.2%	14.1%	17.6%	**16.2%**	**28.5%**	**37.5%**	0.0%	24.3%	12.6%	**15.6%**
Type C	64	72	8	**144**	**75**	**14**	0	22	80	**102**
	72.7%	72.7%	47.1%	**70.6%**	**57.7%**	**58.3%**	0.0%	59.5%	77.7%	**72.3%**
Type D	2	4	2	**8**	**2**	**1**	0	0	0	**0**
	2.3%	4.0%	11.8%	**39.2%**	**1.5%**	**4.2%**	0.0%	0.0%	0.0%	**0.0%**
Total	88	99	17	**204**	**130**	**24**	1	37	103	**141**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**	100.0%	100.0%	100.0%	**100.0%**

Table 8. 24 Numbers and relative frequencies of different rim forms in the Third Layer (continue))

Dwelling group	VI	VII			Total
Dwelling	**J**	K	L	**Subtotal**	
Type A	**17**	0	3	**3**	**72**
	30.9%	0.0%	13.6%	**12%**	**13.2%**
Type B	**15**	0	2	**2**	**118**
	27.3%	0.0%	9.1%	**8%**	**20.0%**
Type C	**16**	3	15	**18**	**369**
	29.1%	100.0%	68.2%	**72%**	**63.3%**
Type D	**7**	0	2	**2**	**20**
	12.7%	0.0%	9.1%	**8%**	**3.4%**
Total	**55**	3	22	**25**	**579**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**

Table 8. 24 Numbers and relative frequencies of different rim forms in the Third Layer

8.3.1.C The distribution of other parts of jars among dwellings/dwelling groups

In addition to the rim, other parts of the jar, including the ring foot, shoulder, and handles, were also present. As with the rim form analysis, the forms of these vessel parts could demonstrate possible differences among dwellings.

Shoulders

Two shoulder forms can be differentiated: the round and angular shapes. Table 8.23 shows the number of different shoulders in the Fourth and Third Layers. Angular shoulders constitute more than 90% of the shoulders in both layers. Table 8.24 indicates that angular shape is the dominant type in all dwelling groups.

Layer\Shape	Round	Angular	Total
The Fourth Layer	4	11	15
The Third Layer	5	283	288

Table 8.25. Number of different shoulders

Dwelling group	I	III	IV	V	VI	VII	Total
Angular shape	156	38	28	60	8	12	302
Round shape	2	0	1	1	1	0	5
Total	158	38	29	61	9	12	307

Table 8.26 Number of different shoulders from dwelling groups in the Third Layer

Handle forms

Table 8.25 shows the number of different handle forms among dwellings in the Fourth Layer. Seven shapes of handles can be distinguished. The bridge-shape and lump-shape handles are the most common forms in the Fourth Layer. Table 8.26 and Figure 8.28 show the number and relative frequency of different handles among dwelling groups in the Third Layer. The bridge-shape handle is the dominant form among all dwelling groups. There is no difference among dwelling groups in terms of the presence of different handle forms.

Most of the bridge-shaped handles are made using the Brown Sandy ware which is imported from outside. Figures 8.29 and 8.30 demonstrate the distribution of this imported handle form among dwellings from the Third and Fourth Layers. This type of handle was not used in the area of Dwelling Groups VI and VII until the second phase of the settlement. In addition, Dwelling Group VII had the smallest variety of handles present.

Dwelling	A	B	C	D	E	I	J	**Total**
Bridge shape	9	4	0	0	6	3	0	**22**
	45.0%	57.1%	0.0%	0.0%	35.3%	100.0%	0.0%	**36.1%**
Column Shape	2	0	3	0	0	0	2	**7**
	10.0%	0.0%	75.0%	0.0%	0.0%	0.0%	33.3%	**11.5%**
Ear shape	0	2	0	0	1	0	1	**4**
	0.0%	28.6%	0.0%	0.0%	5.9%	0.0%	16.7%	**6.6%**
Lump shape	3	0	0	4	9	0	3	**19**
	15.0%	0.0%	0.0%	100.0%	52.9%	0.0%	50.0%	**31.1%**
Slender shape	6	1	1	0	1	0	0	**9**
	30.0%	14.3%	25.0%	0.0%	5.9%	0.0%	0.0%	**14.8%**
Total	20	7	4	4	17	3	6	**61**
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**
Richness	**4**	**3**	**2**	**1**	**4**	**1**	**3**	**5**

Table 8.27 Numbers and relative frequencies of five types of handle forms in the Fourth Layer

Dwelling group	**I**				**III**	**IV**	**V**			
Dwelling	A	B	C	**Subtotal**	**E**	**F**	G	H	I	**Subtotal**
Bridge shape	97	89	20	**206**	**42**	**33**	0	4	33	**37**
	75.2%	69.5%	57.1%	**70.5%**	**47.2%**	**71.7%**	0.0%	44.4%	62.3%	**57.8%**
Column shape	7	3	1	**11**	**6**	**2**	0	1	1	**2**
	5.4%	2.3%	2.9%	**3.8%**	**6.7%**	**4.3%**	0.0%	11.1%	1.9%	**3.1%**
Ear shape	5	6	1	**12**	**8**	**4**	1	2	9	**12**
	3.9%	4.7%	2.9%	**4.1%**	**9.0%**	**8.7%**	50.0%	22.2%	17.0%	**18.8**
Ear shape with perforation	6	3	0	**9**	**3**	**0**	0	1	4	**5**
	4.7%	2.3%	0.0%	**3.1%**	**3.4%**	**0.0%**	0.0%	11.1%	7.5%	**7.8%**
Flat shape	0	0	0	**0**	**0**	**0**	0	0	1	**1**
	0.0%	0.0%	0.0%	**0.0%**	**0.0%**	**0.0%**	0.0%	0.0%	1.9%	**1.6%**
Lump shape	9	17	11	**37**	**30**	**7**	1	1	4	**6**
	7.0%	13.3%	31.4%	**12.7%**	**33.7%**	**15.2%**	50.0%	11.1%	7.5%	**9.4%**
Slender shape	5	10	2	**17**	**0**	**0**	0	0	1	**1**
	3.9%	7.8%	5.7%	**5.8%**	**0.0%**	**0.0%**	0.0%	0.0%	1.9%	**1.6%**
Total	129	128	35	**292**	**89**	**46**	2	9	53	**64**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**	100.0%	100.0%	100.0%	**100.0%**
Richness	**6**	**6**	**5**	**6**	**5**	**4**	**2**	**5**	**7**	**7**

Table 8.28 Numbers and relative frequencies of seven types of handle forms in the Third Layer (continue)

Dwelling group	**VI**	**VII**			**Total**
Dwelling	**J**	K	L	**Subtotal**	
Bridge shape	**55**	2	19	**21**	**394**
	56.7%	100.0%	73.1%	**75%**	**64.1%**
Column shape	**4**	0	0	**0**	**25**
	4.1%	0.0%	0.0%	**0.0%**	**4.2%**
Ear shape	**8**	0	0	**0**	**44**
	8.2%	0.0%	0.0%	**0.0%**	**7.1%**
Ear shape with perforation	**1**	0	1	**1**	**19**
	1.0%	0.0%	3.8%	**3.6%**	**3.1%**
Flat shape	**0**	0	0	**0**	**1**
	0.0%	0.0%	0.0%	**0.0%**	**0.2%**
Lump shape	**17**	0	5	**5**	**102**
	17.5%	0.0%	19.2%	**17.9%**	**16.4%**
Slender shape	**12**	0	1	**1**	**31**
	12.4%	0.0%	3.8%	**3.6%**	**5.0%**
Total	**97**	2	26	**28**	**612**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**
Richness	**6**	**1**	**4**	**4**	**7**

Table 8.28 Numbers and relative frequencies of seven types of handle forms in the Third Layer

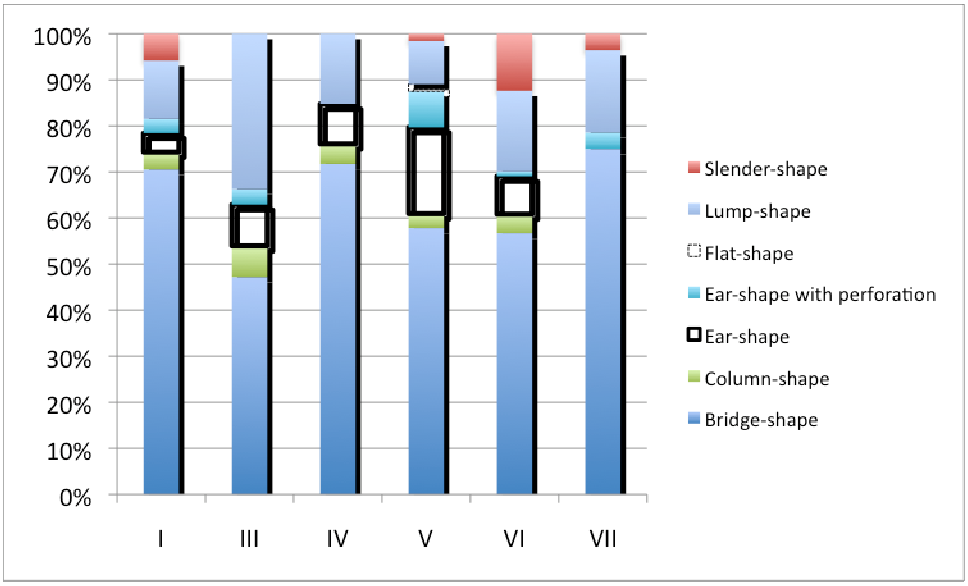

Figure 8.30. Change in relative frequencies of five types of handles form in the Third Layer

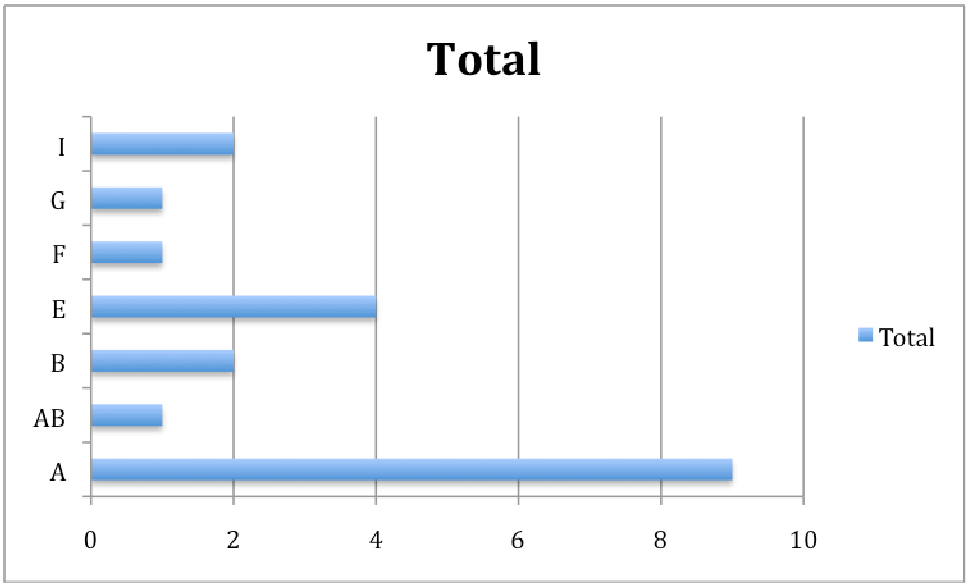

Figure 8.31. Distribution of bridge-shaped jar handles from the Fourth Layer

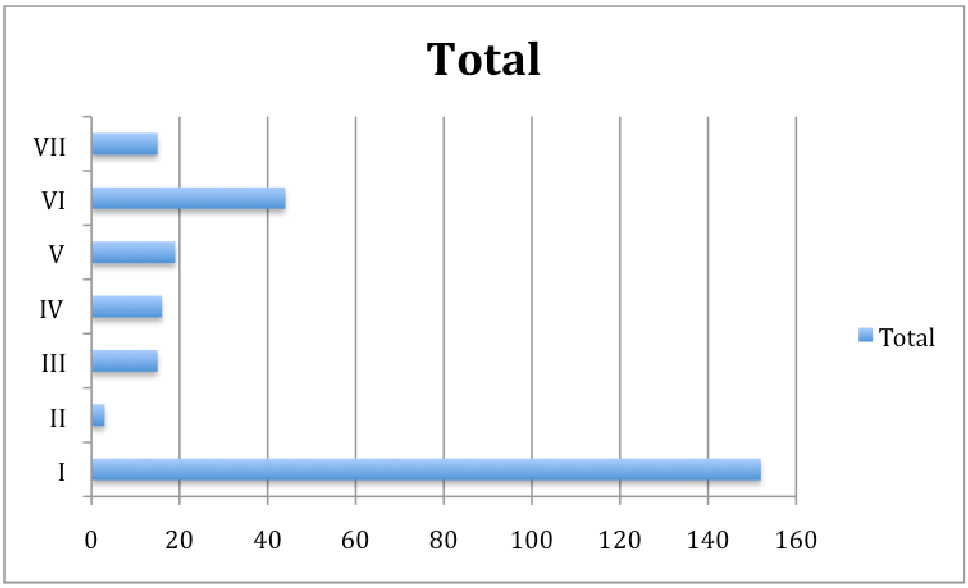

Figure 8.32. Distribution of bridge-shaped jar handles from the Third Layer

Ring-foot

The ring-foot is one of the common accessories that are attached to jars. The ring- foot can be classified into three forms: inverted, flared, and horn-shaped. Tables 8.27 and 8.28 show the number of different ring-foot forms among dwelling/ dwelling groups in the Fourth and Third Layers. As indicated in these tables, the flared ring-foot is the most common form from dwellings in both Layers.

Figure 8.31 shows relative frequencies of different ring-foot forms among dwelling groups in the Third Layer. Most of dwelling groups have more than one form present, except for Dwelling Groups II and VII. Both of the dwelling groups also have smaller number of sample size. However, most of the areas of Dwelling Group II were removed due to recent road construction.

Dwelling	A	B	C	E	J	L	Total
Flared	1	1	4	7	7	3	23
Horn shape	1	1	0	1	0	0	3
Inverted	0	0	1	0	0	0	1
Total	2	2	5	8	7	3	27

Table 8.29 Numbers of different types of ring-foot forms from dwellings in the Fourth Layer

Dwelling group	**I**				**III**	**IV**	**V**		
Dwelling	A	B	C	**Subtotal**	**E**	**F**	H	I	**Subtotal**
Flared	16	22	13	**51**	**26**	**4**	3	6	**9**
	76.19%	70.97%	81.25%	**75%**	**55.32%**	**66.67%**	75.00%	28.57%	**36%**
Horn shape	0	3	2	**5**	**6**	**0**	1	3	**4**
	0.00%	9.68%	12.50%	**7.4%**	**12.77%**	**0.00%**	25.00%	14.29%	**16%**
Inverted	5	6	1	**12**	**15**	**2**	0	12	**12**
	23.81%	19.35%	6.25%	**17.6%**	**31.91%**	**33.33%**	0.00%	57.14%	**48%**
Total	21	31	16	**68**	**47**	**6**	4	21	**25**
	100.00%	100.00%	100.00%	**100.0%**	**100.00%**	**100.00%**	100.00%	100.00%	**100.0%**
Richness	**2**	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**

Table 8.30 Numbers and relative frequencies of different types of ring-foot form in the Third Layer (continue)

Dwelling group	**VI**	**VII**	**Total**
Dwelling	**J**	L	
Flared	**29**	3	**122**
	82.86%	100.00%	**66.84%**
Horn shape	**4**	0	**19**
	11.43%	0.00%	**10.16%**
Inverted	**2**	0	**43**
	5.71%	0.00%	**22.99%**
Total	**35**	3	**184**
	100.00%	100.00%	**100.00%**
Richness	**3**	**1**	

Table 8.30. Numbers and relative frequencies of different types of ring-foot form in the Third Layer

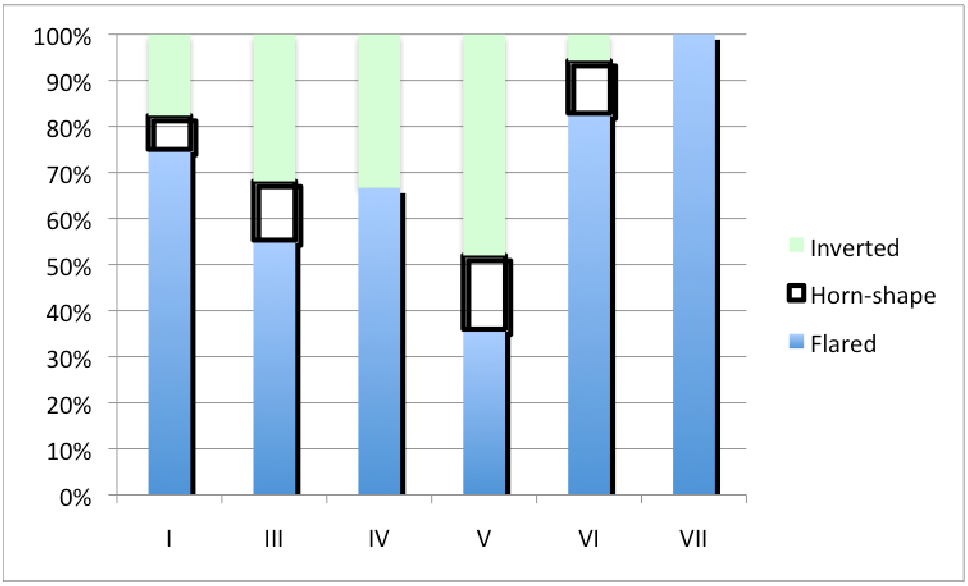

Figure 8.33. Change of relative frequencies of different types of ring-foot forms from dwelling groups in the Third Layer

Summary of vessels

Most dwelling groups have various shapes of rims present in the Third Layer. However, while most of dwelling groups show higher frequencies of flared rims with inward lip, Dwelling Group VI does not show reliance on any specific rim forms. In terms of different parts of vessels, residents of each dwelling group seemed to use various shapes of the vessels. Certain variations can be observed among dwelling groups, however, there is no absolute pattern is discerned.

8.3.2 Non-vessels

Three types of non-vessel pottery are analyzed: the spindle whorl, bracelet, and figurine. Based on the preliminary observation, each type of artifact is made using the same clay source. The spindle whorl was made mostly using the Yellowish Brown Sandy Ware, the bracelet using Grayish Black Fine Ware, and the figurine using Yellowish Brown Sandy Ware. As a result, the following analysis will focus on examining the stylistic difference among dwellings/dwelling groups.

8.3.2.A Spindle whorl

The cone-shaped artifacts are similar to ethnographic spindle whorl and could be found since the early Neolithic period. Thus it is assumed that these types of artifacts are probably also used as spindle whorl prehistorically. Based on the shape of the spindle whorl, three primary types can be identified: the single cone, double cone, and the cylinder. Table 8.29 and 8.30 show the number of different types of spindle whorls among dwellings/ dwelling groups from the Fourth and Third Layers. The single and double cone types appear throughout both layers, while the cylinder type only exists in the Third Layer.

Figure 8.32 shows relative frequencies of different types of spindle whorls from dwelling groups in the Third Layer. All the three types can be found in each dwelling group, although the cylinder type only constitutes a small portion in every dwelling group.

Table 8.32 shows number of decorated and non-decorated spindle whorls among dwelling groups in the Third Layer. Although the sample size of the decorated spindle whorl is small, the number still indicates that Dwelling Groups VI and VII are the only dwelling groups that do not have decorated spindle whorls.

Dwelling	A	B	C	D	E	F	G	J	K	L	Total
Double cone	1	3	5	4	1	0	2	6	1	1	24
	100.0 %	50.0%	71.4%	80.0%	12.5%	0.0%	100.0 %	66.7%	100.0 %	33.3%	54.5 %
Single cone	0	3	2	1	7	2	0	3	0	2	20
	0.0%	50.0%	28.6%	20.0%	87.5%	100.0 %	0.0%	33.3%	0.0%	66.7%	45.5 %
Total	1	6	7	5	8	2	2	9	1	3	44
	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

Table 8.31 Numbers and relative frequencies of different types of spindle whorls from dwellings in the Fourth Layer

Dwelling group	I				III	IV	V			
Dwelling	A	B	C	**Subtotal**	**E**	**F**	G	H	I	**Subtotal**
Single cone	5	11	5	**21**	**25**	**15**	0	2	2	**4**
	26.3%	68.8%	62.5%	**48.9%**	**69.4%**	**83.3%**	0.0%	50.0%	18.2%	**25%**
Double cone	13	4	2	**19**	**10**	**2**	1	2	6	**9**
	68.4%	25.0%	25.0%	**44.2%**	**27.8%**	**11.1%**	100.0%	50.0%	54.5%	**56.3%**
Cylinder	1	1	1	**3**	**1**	**1**	0	0	3	**3**
	5.3%	6.3%	12.5%	**7.0**	**2.8%**	**5.6%**	0.0%	0.0%	27.3%	**18.8%**
Total	19	16	8	**43**	**36**	**18**	1	4	11	**16**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**	100.0%	100.0%	100.0%	**100.0%**

Table 8.32 Numbers and relative frequencies of different types of spindle whorls in the Third Layer (continue)

Dwelling group	VI	VII			Total
Dwelling	**J**	K	L	**Subtotal**	
Single cone	**13**	1	6	**7**	**85**
	56.5%	50.0%	40.0%	**41.2%**	**55.3%**
Double cone	**8**	1	8	**9**	**57**
	34.8%	50.0%	53.3%	**52.9%**	**36.6%**
Cylinder	**2**	0	1	**1**	**11**
	8.7%	0.0%	6.7%	**5.9%**	**8.1%**
Total	**23**	2	15	**17**	**137**
	100.0%	100.0%	100.0%	**100.0%**	**100.0%**

Table 8.32 Numbers and relative frequencies of different types of spindle whorls in the Third Layer

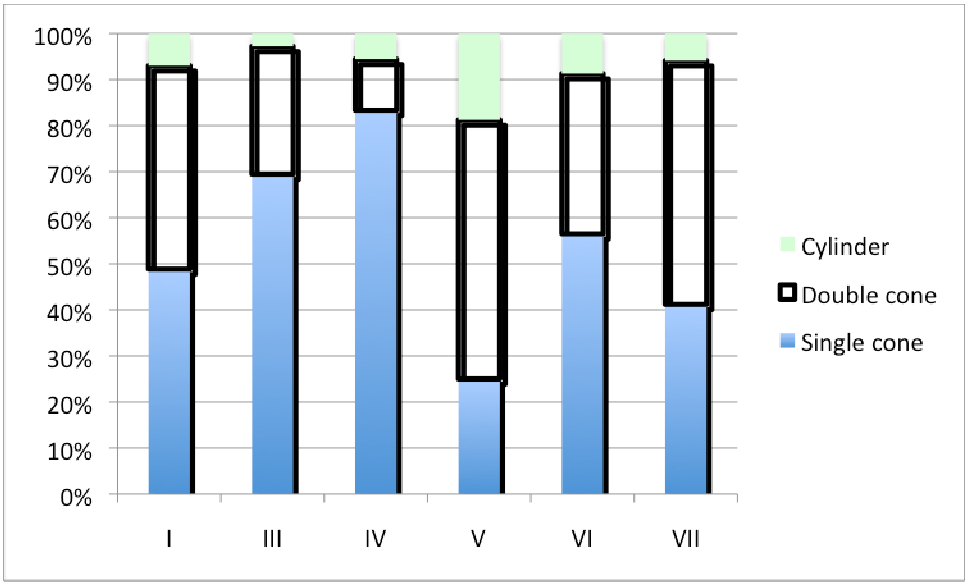

Figure 8.34. Relative frequency of different types of spindle whorls among dwelling groups in the Third Layer

Dwelling group	I	III	IV	V	VI	VII
Decorated	2	3	3	5	0	0
Non decorated	41	33	15	11	23	17

Table 8.33 Number of decorated and non decorated spindle whorls among dwelling groups in the Third Layer

8.3.2.B Bracelet

The ring-shaped artifacts made from ceramic can be used as bracelet based on other contemporaneous burials where these artifacts were placed as bracelets. Seven types of bracelets can be distinguished: layered-circular shape (type A), horn-shape (type B), triangular shape (type C), flake shape (type D), angular shape (type E), and thin-circular shape (type F). Tables 8.33 and 8.34 shows the numbers of different types of bracelets among dwellings/ dwelling groups in the Fourth and Third Layers. Although the sample size is small in the Fourth Layer, Dwelling F (Dwelling Group IV in Layer III) shows consistent high relative frequency of bracelets in both Layers. Moreover, Dwelling Groups III and IV have the largest numbers of bracelets among the seven dwelling groups. Figure 8.33 shows the change of relative frequencies of different bracelet in the Third Layer. It indicates that most of the dwelling groups have more than two types of bracelets, except for the Dwelling Group II and VII. The data from the Dwelling Group II should not be considered since it was removed due to road construction.

	A	C	F	I	Total
Type A	0	0	1	0	1
Type B	1	0	1	1	3
Type E	0	0	1	0	1
Type F	0	1	1	0	2
Grand Total	1	1	4	1	7

Table 8.34 Number of different types of bracelets among dwellings in the Fourth Layer

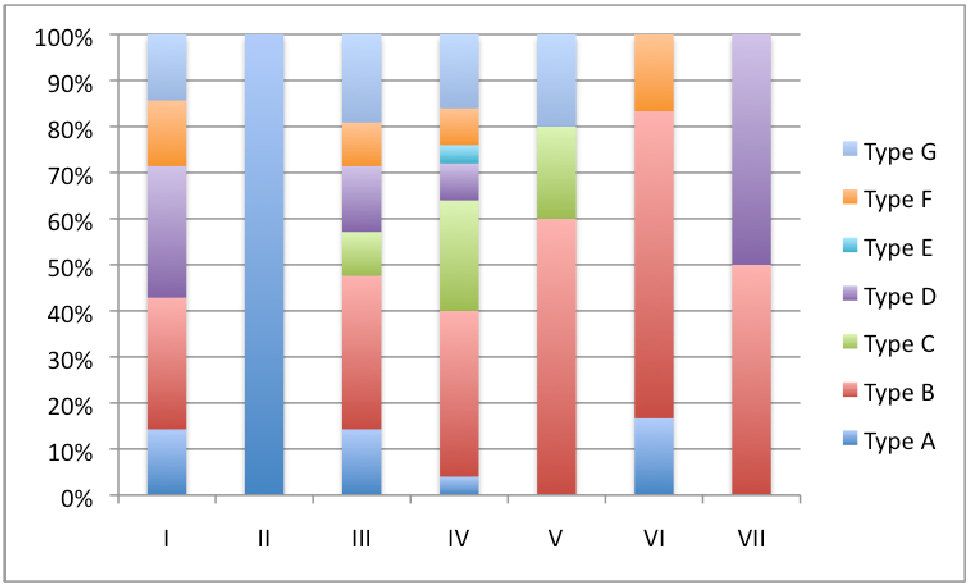

Figure 8.35. Change of relative frequencies of different bracelet in the Third Layer

Dwelling group	**I**			**III**	**IV**	**V**			**VI**
Dwelling	A	C	**Subtotal**	**E**	**F**	H	I	**Subtotal**	**J**
Type A	0	1	**1**	**3**	**1**	0	0	**0**	**1**
	0.0%	16.7%	**14.3%**	**14.3%**	**4.0%**	0.0%	0.0%	**0.0%**	**16.7%**
Type B	0	2	**2**	**7**	**9**	1	2	**3**	**4**
	0.0%	33.3%	**28.6%**	**33.3%**	**36.0%**	50.0%	66.7%	**60.0%**	**66.7%**
Type C	0	0	**0**	**2**	**6**	1	0	**1**	**0**
	0.0%	0.0%	**0.0%**	**9.5%**	**24.0%**	50.0%	0.0%	**20.0%**	**0.0%**
Type D	1	1	**2**	**3**	**2**	0	0	**0**	**0**
	100.0%	16.7%	**28.6%**	**14.3%**	**8.0%**	0.0%	0.0%	**0.0%**	**0.0%**
Type E	0	0	**0**	**0**	**1**	0	0	**0**	**0**
	0.0%	0.0%	**0.0%**	**0.0%**	**4.0%**	0.0%	0.0%	**0.0%**	**0.0%**
Type F	0	1	**1**	**2**	**2**	0	0	**0**	**1**
	0.0%	16.7%	**14.3%**	**9.5%**	**8.0%**	0.0%	0.0%	**0.0%**	**16.7%**
Type G	0	1	**1**	**4**	**4**	0	1	**1**	**0**
	0.0%	16.7%	**14.3%**	**19.0%**	**16.0%**	0.0%	33.3%	**20.0%**	**0.0%**
Total	1	6	**7**	**21**	**25**	2	3	**5**	**6**
	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**	100.0%	100.0%	**100.0%**	**100.0%**
Richness	**1**	**5**	**5**	**6**	**7**	**2**	**2**	**3**	**3**

Table 8.35 Number and relative frequencies of different types of bracelets in the Third Layer (continue)

Dwelling group	VII			Total
Dwelling	K	L	**Subtotal**	
Type A	0	0	**0**	**6**
	0.0%	0.0%	**0.0%**	**10.4%**
Type B	0	1	**1**	**26**
	0.0%	100.0%	**50.0%**	**38.8%**
Type C	0	0	**0**	**9**
	0.0%	0.0%	**0.0%**	**13.4%**
Type D	1	0	**1**	**8**
	100.0%	0.0%	**50.0%**	**11.9%**
Type E	0	0	**0**	**1**
	0.0%	0.0%	**0.0%**	**1.5%**
Type F	0	0	**0**	**6**
	0.0%	0.0%	**0.0%**	**9.0%**
Type G	0	0	**0**	**10**
	0.0%	0.0%	**0.0%**	**14.9%**
Total	1	1	**2**	**66**
	100.0%	100.0%	**100.0%**	**100.0%**
Richness	**1**	**1**	**2**	

Table 8.35 Number and relative frequencies of different types of bracelets in the Third Layer

8.3.2.C Figurine

While seventeen pottery figurines were uncovered from the 1998 excavation, only nine of them were recovered from the cultural layers. These figurines were mainly made using the Yellowish Brown Sandy ware and are in the form of animal shapes, possibly imitating the images of dogs and birds. Even though the appearance of the figurines began in the initial stage of the settlement, most of the figurines were produced in the later time period. The distribution of these figurines among dwelling groups shows that Dwelling Group III has the largest number of figurines (Figure 8.34).

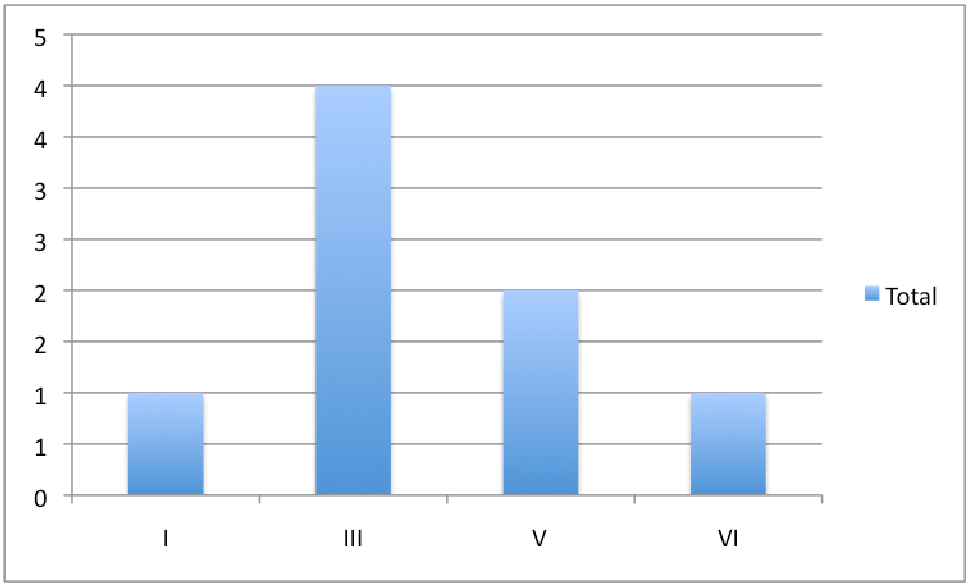

Figure 8.36. Number of figurines among dwelling groups in the Third Layer

8.3.3 Summary of pottery

Unlike lithic artifacts, the exact location of the pottery workshop was not identified at the Wansan site. However, the diverse forms of every kind of pottery artifact and their distribution indicate that it was possibly a dwelling-based consumption. Take the pottery jar for example. Four types of jar rims were distinguished based on the rim shape. These four types of rims can be found in almost every dwelling in the early phase of the settlement (the Fourth Layer) and then are distributed in all dwelling groups in the second phase (the Third Layer). The different rim shapes might imply both the different usages of these jars and the stylistic change of the jars. For example, the flared rim with inward lip (the C type) did not become the most popular rim form in the second phase (the Third Layer). In the initial phase, the importance of the flared rim and the straight rim with everted lip can be observed in every dwelling. However, the flared rim with inward lip became the dominant form in every dwelling group in the second phase. In other words, the increasing usage of the jars with a flared rim with an inward lip implies the change of preference of the Wansan people.

Additionally, the great variation that existed within each form of rim shape can also be observed. The distribution of these variations among dwelling groups might therefore imply that the production of the jars was not yet fully standardized. Most of the dwelling groups have diverse forms of rims present in the second phase of the settlement. However, Dwelling Groups II, IV, and VII show less diversity than other dwelling groups. The lack of diversity of Dwelling Group II might be related to the recent road construction which removed a large quantity of the Third Layer of this area. Furthermore, other parts of the vessels, including the handle and ring-foot, also show less variation in Dwelling Groups IV and VII. This evidence suggests that the utilization of the vessels in Dwellings Groups IV and VII was probably not as important as it was in other dwelling groups.

Furthermore, the lack of figurines, decorated spindle whorls, and the diversity of bracelets specify a unique pattern of Dwelling Group VII. In sum, the analysis of both pottery vessels and non-vessels all suggests that Dwelling Group VII is different from the other dwelling groups.

8.4 Summary: difference between the dwellings/dwelling groups

The analysis of lithic and pottery artifacts all indicates the unique distribution pattern of Dwelling Group VII in the Third Layer. Like other dwelling groups, the material objects within the Dwelling Group VII display certain variations. However, not only does Dwelling Group VII have the least variation among dwelling groups but it also possesses some variations that cannot be seen in other dwelling groups.

One of the examples is the distribution of jade artifacts. Dwelling Group VII possesses the second largest number of jade artifacts among all dwelling groups, and has a similar ratio of each artifact type. Tools are the most common jade artifacts in both the Third and Fourth Layers. However, unlike other dwelling groups, Dwelling Group VII does not share similar forms of certain artifact types, such as the earring and pendant. While most of the dwelling groups utilize the circular shape earrings and half-circular shape pendants, not a single one was found associated with Dwelling Group VII.

On the other hand, although the lithic and pottery artifacts from the Dwelling Group VII demonstrate less diversity than others, the quantity of the imported artifacts, both imported clays and lithic raw materials, is no less than in other dwelling groups. In other words, the proportion of imported goods in Dwelling Group VII is much higher than that of other dwelling groups. The differing ability to acquire foreign material, either in the form of finished products or raw material, indicates a certain differentiation between dwelling groups.

At the same time, Dwelling Group I exhibits the most abundant and diversified artifacts among dwelling groups. In addition, this dwelling group occupied the largest area and incorporated most of the features, such as burials, the stone tool workshop, and possible ritual loci. Judging from the quantity of the artifacts and the size of the dwelling group, Dwelling Group I is probably the largest social unit. Not only does it appear to have had the largest population, but it also probably had powerful social relations in order to have had access to such a large quantity of exotic goods. However, the differential ability to acquire foreign goods at the Wansan site does not simply imply an uneven economic status.

As illustrated from the example of Dwelling Group VII, the amount of artifacts this dwelling group utilized indicates that the size of the dwelling group is not as large as Dwelling Groups I, III, and V (Tables 8.35 and 8.36). However, the amount of imported artifacts in this dwelling group is no less than that of Dwelling Groups I, III, and V. If the ability to obtain foreign goods indicates economic fluency, Dwelling Group VII should have a similar amount of artifacts as the other dwelling groups. Accordingly, the differential ability to obtain exotic goods at the Wansan site suggests that the social network these dwelling groups established derived from the unequal social status of each dwelling group.

Dwelling Groups	% of total weight
I	42.17%
II	1.96%
III	12.43%
IV	5.86%
V	11.35%
VI	9.60%
VII	6.52%

Table 8.36 Relative frequencies of potshards among dwelling groups

Dwelling Groups	% of total number
I	36.96%
II	1.48%
III	17.42%
IV	4.88%
V	10.72%
VI	12.27%
VII	4.81%

Table 8.37 Relative frequencies of lithic artifacts among dwelling groups

The next chapter will address the issue of the social differentiation inspired from the concept of House society. The previous two chapters revealed the presence of different dwellings and the formation of dwelling groups through time. The analysis further demonstrated that residents in each dwelling/dwelling group basically conducted similar daily activities. However, the distinct distribution pattern of the attributes of artifacts suggests the presence of social differentiation at the dwelling/dwelling group level. The concept of the House society thus provides a model through which to further understand the social relations of the prehistoric Wansan society.

CHAPTER IX

DISCUSSION AND CONCLUSIONS

This dissertation utilized the House Society concept to examine how prehistoric Wansan people organized themselves and explore how and why there were differences among the houses. Various archaeological implications derived from the House society concept were proposed and examined using the archaeological material excavated from the Wansan site in northeastern Taiwan. The results of this analysis demonstrate that the residential houses in the Wansan society was not only a place where people resided and interacted with other members on a daily basis, but also where the lives of the living House members intertwined with the ancestors through situating of deceased members around the residential houses. Furthermore, the correlation between the presence of possible ancestor symbols and the variations of the artifacts among houses suggests that the social differentiation of the Wansan society was probably related to the people's ability to claim their association with the ancestors. The House, which could probably assure their connections with the ancestors, had better knowledge regarding how to manipulate local resources. At the same time, the House could construct a wider social network to share similar artifacts with other Houses in the society. On the contrary, Houses without the ancestral connections lacked the capability to fully explore local resources and were limited to certain options. Therefore, I proposed that the House's disparate technological tradition expressed in the artifacts resulted from social differentiation that emerged with differential ability to affirm connections with their ancestors.

9.1 The presence of Houses

This section thus integrates all the evidence that has been examined in Chapters 6, 7 and 8 to illustrate the presence and nature of these Houses at the Wansan site. Seven archaeological implications of using the House Society concept were proposed in Chapter 5 and examined through the spatial distribution of features and artifacts. These implications are: 1) the presence of houses or clusters of houses, 2) repetitive utilization of the houses, 3) ancestral ritual activities practiced in houses, 4) images or writings depicted in personal belongings or structures to transmit the House title or name, 5) movable and immovable material objects signifying the symbolic relevance of the House, 6) artifacts related to everyday life, and 7) the variability of the artifact in terms of quantity or quality among the House units. These archaeological implications thus constitute multiple lines of evidence to examine whether houses were the focus of social, economic, political and ritual practice in prehistoric Wansan society.

Each implication was analyzed individually through the distribution of features and artifacts excavated from the Wansan site. In Chapters 6, 7, and 8, I elaborated the details of the analytical procedures and the results. Combining the results of these different lines of evidence, it appears that these identified dwellings not only were where prehistoric Wansan people conducted their routine daily lives, but also places where the major mortuary rituals were conducted. The houses as conjunction of domestic and ritual places thus constituted the center of people's life. Furthermore, the House Society concept offers us a venue to explore how and why social

differentiation began in this small-scale Neolithic society. I argued that certain social house groups in the Wansan society had closer connection with the founding ancestors thus separate them from other Houses. The interment of the jade zoo-anthropomorphic objects in specific burials associated with certain houses provides material evidence to testify the prominent continuity of these Houses.

9.1.1. The presence of house structures or groups of house structures

In the first part of the analysis, the main effort was to identify house structures and activity areas through the distribution of features and artifacts. Although the presence of house structures at the Wansan site had been recognized during the excavation, the number and the relationships of these houses were not investigated until the actual spatial analysis had been conducted.

Based on the distribution of postholes and features, at least twelve houses can be identified. The distribution of these identified houses suggests that certain houses probably form corporate groups due to their proximity. Furthermore, the presence of hearths and storage pits implies certain shared activities among residents of these Houses. The association between the stone tool workshop, possible ritual loci, and the houses also indicates the close relationship between neighboring houses.

However, most of the construction of the features was probably initiated in the second phase of the settlement, based on the stratigraphy. Accordingly, the collaborative relationship between houses was likely to have been formed after the establishment of houses. Moreover, the distribution of the artifacts also demonstrates that the residents of neighboring houses probably arranged the location for daily refuse together.

Therefore, in this initial phase of the settlement, I have concluded that each house was established independently and of similar size at this time. In the second phase of the settlement, the size and degree of artifact concentration indicate that the population was probably growing. Furthermore, members of neighboring houses began to form several collaborative groups. The residents of each house group shared the use of the stone tool workshop, hearth, storage pit, and possibly participated in certain ritual activities together. They also discarded their debris in certain areas outside of the house structures. At the same time, they consistently placed their deceased members outside of their houses.

9.1.2 The repetitive utilization of the same spot for house constructions

The thick and uninterrupted stratigraphy suggested that most houses had been repeatedly occupied since the inception of the settlement. The radiocarbon dates from Dwelling A (see Chapter 4) also confirm the repetitive utilization of this place for about a thousand year. The construction of substantial subsurface features inside the structures, such as the stone tool workshop, demonstrates the persistent utilization of these house structures. Furthermore, the consistent spatial pattern of burials surrounding the houses demonstrates that the houses stood on

the landscape as permanent markers. Even though the houses might undergo abandonment, reconstruction, and renovation, the memory of the presence of these burials must constantly remind prehistoric Wansan people where the house structures were and should stand on the landscape.

9.1.3 The ancestral ritual associated with the Houses

The distribution of the houses and burials at the Wansan site testify to the close association between ancestral ritual and houses. Burials, whether in the form of slate coffins or pottery urns, were placed surrounding the houses. A great deal of ethnographic evidence suggests that the action of burying the deceased members under the house floor or adjacent to houses expresses the inhabitants' intention to connect with the ancestors (see discussion in Chapters 2 and 3). Inspired from rich ethnographic examples, I believe that the embedded jade zoo-anthropomorphic object inside the burials further suggests that the prehistoric Wansan people purposefully constructed strong connections with the ancestors through material objects related to ancestral representations.

9.1.4 The presence of images or writings to transmit House titles and names

There is no evidence of any writing systems having been developed in any Taiwanese indigenous societies until the 17th century. However, examples of images carved on wooden posts, bronze daggers, and attached or carved on pottery vessels can be found in several Iron Age sites and indigenous societies in Taiwan. Some of these objects were used as a medium to transmit House titles and names (see Chapter 3). The most prominent example is the image carved on the house post in Paiwan societies, where the usage of certain images was restricted only to specific noble Houses (Jen 1959).

Thus, I argued in Chapter 3 that the anthropomorphic design motive found in Taiwanese Neolithic sites might have acted as a source of "inalienable wealth" (Weiner 1985) that stayed in a certain House to guard and consolidate the House identity. The anthropomorphic image on a material object "acts as a vehicle for bringing past time into the present, so that the histories of ancestors, titles, or mythological events become an intimate part of a person's present identity" (Weiner 1985:210).

I thus proposed that, at the Wansan site, the zoo-anthropomorphic object acted as an "inalienable object". As such, it can be seen as "transcendent treasures, historical documents that authenticate and confirm for the living the legacies and powers associated with a group's or an individual's connections to ancestors and gods" (Weiner 1992:3). More importantly, the obvious importance of this object during mortuary rituals and the close association with domestic dwellings further connote that this object might be retained by House members as House heirlooms; physical evidence of the continuity of the Houses (Joyce 2000; McKinnon 2000).

9.1.5 The presence of symbolic objects or features signify the symbolic relevance of the House

The burials and the accompanied zoo-anthropomorphic object served as evidence to signify the House's symbolic prominence on the landscape. Firstly, the placement of burials around the houses implied the symbolic significance of the house structures. Furthermore, the stress on the connection with the ancestors and the importance of House continuity were articulated through these burials and zoo-anthropomorphic objects. The associated objects and the performance of the mortuary ritual thus affirm that the House probably also served as a "ritual attractor" in the Wansan society (Fox 1993; also see Chapter 2 and 3).

9.1.6 Houses as residences

The artifact distribution within the houses indicates that similar activities occurred in the majority of houses. Most artifact types were present in every house. Ground and chipped stones and pottery vessels as well as tools and ornaments are common artifacts found in most of the houses. These artifacts indicate that the daily activities of prehistoric Wansan people included hunting, fishing, land clearing, woodworking, tool production, harvesting, and weaving. Even though similar activities were practiced in the majority of houses, more emphasis on specific activities in particular houses can also be found throughout the whole history of the settlement. For example, the majority of clay bracelets were found associated with the houses in the northwest corner at the Wansan site. However, it did not suggest that the residents here only produced or made clay bracelets. The presence of other artifact types proves that the house residents practiced other activities shared by the residents of other dwellings.

In general, lithic tool production and maintenance is the activity most commonly conducted by house residents throughout the whole settlement history. Especially in the second phase of the settlement, clear evidence of lithic tool workshops was present in all of the house groups. If these house groups constituted several Houses, the production of lithic artifacts was probably a House-based activity. Each House possessed its own stone tool workshop to fabricate, renew, and maintain its lithic artifacts.

Clay vessel is also a common artifact existing in every house structure. The form of the vessel might show slight variation among the house structures, but the difference is much smaller than that of the lithic artifacts. The majority of pottery artifacts are jars. Unlike lithic bracelets most of the earthen bracelets are concentrated in one house structure. The presence of the foot-rim, shoulder, and handle illustrate the various vessel forms. The difference of vessel forms among houses from the initial phase is not obvious; however, the vessels from the second phase show a higher ratio of foot-rims around the houses in the southwest corners. The distribution of these pottery artifacts indicates that the inhabitants of each house used a similar set of pottery artifacts, including vessels, spindle whorls, and bracelets. Within these artifacts, only the bracelet shows concentration in one House, Dwelling Group V.

9.1.7 The variability of artifacts

The analysis of lithic and pottery artifacts indicates a unique distribution pattern of one specific House, Dwelling Group VII in the Third Layer. As suggested earlier, each dwelling/dwelling group was probably a House unit; this House clearly exhibits its unique artifact pattern. Although there are variations of artifact attributes in every House, the material objects associated with this specific House in the Southern Excavation Area display certain variations that differ from other Houses.

One example is the distribution of jade artifacts. House VII possesses the second largest number of jade artifacts among all dwelling groups, and has a similar ratio of each artifact type. However, unlike other Houses, House VII does not share similar forms of each artifact type, such as the earring and pendant. While most of the dwelling groups utilize the circular-shaped earring and half-circle shaped pendant, not a single one was found associated with House VII.

In terms of utilizing artifacts more locally produced, the residents of House VII did not have as many *choices* as other Houses. It was common for the Wansan residents to utilize more than one type of spearhead, net sinker, flared-rim vessel, and ring foot. However, the residents of the House VII were limited to using only one shape of these artifacts.

Even though the lithic and pottery artifacts from House VII demonstrate less diversity than others, the quantity of the imported artifacts, both imported clays and lithic raw materials, is no less than in other Houses. On the contrary, the proportion of the imported goods in House VII is much higher than in other Houses. The presence of foreign material, either in the form of finished product or raw material, indicates that House VII relied more on imported goods than the other Houses.

As illustrated from the example of House VII, the amount of artifacts this dwelling group utilized indicates that the size of the dwelling group is not as large as Houses I, III, and V (see Table 8.16 and 8.17). However, the amount of the imported artifacts in this House is no less than that of Houses I, III, and V. If the ability to obtain foreign goods indicates economic affluence, House VII should have fewer amounts of exotic artifacts than other Houses since the size and the amounts of artifact this House possessed was smaller. However, the amount of foreign goods that the House VII possessed is no less than other Houses. Therefore, the differential ability to obtain the exotic goods at the Wansan site suggests that the social network these houses established probably derived more from unequal social status than economic power.

9.1.8 The Houses at the Wansan site

The arrangement and substantial construction of the structures, the presence of artifact clusters and lithic tool workshops, the abundance and variety of artifacts, and the radiocarbon dates suggest long-term occupation at the Wansan site. Except for Dwelling Group V and including Dwellings G, H, and I, the radiocarbon dates indicate that the emergence of each dwelling group should take place around the same time, about 3,500 years ago. The distribution of artifact clusters from the Fourth Layer is consistent with the radiocarbon dates. The early

settlers came to Wansan and constructed their dwellings on the flat surface of this small, isolated Wansan hill. At first, the amount of people and dwellings they established was small. Although the remains left by the initial settlers are limited, the distribution of artifacts and posthole clusters suggests that each dwelling seemed to form an independent unit in terms of practicing their daily activities. Furthermore, most features did not begin to be assembled until the second phase which indicates that the early settlers were still in the process of familiarizing themselves with the area.

During the second phase of the settlement, features such as the stone tool workshop, hearths, stonewall, possible storage pits, and burials suggest that people began to build up a closer relationship with the landscape. The spatial layout of the clusters of postholes, burials, and features indicates that there seems to have been a deliberate emphasis on maintaining the positions of certain activities and those of individual buildings, from one generation to another. The burials were placed outside of the dwellings, while the stone tool workshops were located at the edge of the dwellings. Also, the collaboration between neighboring dwellings was stronger than in the previous stage. The distribution of artifact clusters, hearths, and storage pits suggests that several dwellings on the same platform seemed to form a corporative unit.

The artifact distributions around the dwellings indicate that similar activities occurred in the majority of dwellings. Most artifact classes were present in every dwelling. Each dwelling had ground and chipped stone tools and pottery, and all but one dwelling had jade ornaments.

The repeated occurrence of basic activities indicates that each dwelling and dwelling group functioned as a separate social and residential unit for the carrying out of certain repetitive aspects of daily life. Crafting, such as weaving or ornament making, and the production of useful implements, such as lithic tools, occurred in every dwelling and dwelling group.

The presence of the ancestor-related object, the zoo-anthropomorphic object, which each dwelling/dwelling group possessed, signifies the connection between the living members and the dead ancestors (see Chapters 3 and 7). The association of the burials and the zoo-anthropomorphic objects highlight the affiliation between the dead members and the history of the dwelling.

The variation in the presence and quality of jade objects among the buried members of the dwelling testifies to the enduring nature of differences in rank within the society (see Chapters 3 and 7). The people living in these dwellings, at any particular moment, were enmeshed in repeated acts of daily life, ritual, and cooperation that would have created a sense of common or shared identity.

The archaeological evidence of the prehistoric Wansan society summarized above suggests that these identified houses were not just mundane roofed shelters. Drawing inspiration from the abundant discussions of House Society, a picture of more dynamic interaction between these residential houses and the past social relations becomes clearer. The prehistoric Wansan inhabitants of each dwelling/dwelling group practiced their daily life centered on their dwellings. I have argued that these dwellings/dwelling groups were not just a basic economic unit of the

Wansan society, but were the center of their social and ritual life. Members of each dwelling/dwelling group identify themselves as belonging to the same group through participating in routine daily mundane activities. At the same time, the mortuary rituals habitually practiced around their physical houses enhanced their identity among the living members and, through their connection to the common ancestors, further strengthened this identity. As Hendon argued:

The Social house brings together descent and alliance, kinship and locality, to create flexible but enduring social group of variable size with a common investment in the house estate, an investment embodied in shared participation in ritual and day-to-day interactions…. Core aspects of a house are a commitment to continuity, its role in the passing on of valued property, and the use of the language of kinship for strategic ends. [2007: 293]

This echoes Taiwanese anthropologists' recent comments on studying Taiwanese indigenous societies. They argue that we should abandon the traditional lineage-centered approach to understand these indigenous populations. The house-centered approach actually helps us to better understand how the indigenous people organize themselves into a group and differentiate their group from other groups. My research of this prehistoric society thus follows this journey and allows the "house" to actually transmit a native perspective.

The rich ethnographic data in Taiwan already pointed out that the houses are not merely roofed area where living people have resided, but also acts as the center of peoples' economic, social, ritual and political life. The "physical houses" thus can be an entry point to assist Taiwanese archaeologists to investigate prehistoric social relations. Furthermore, the concept of House Society facilitate us to understand the process of how prehistoric Wansan people's identity was created, negotiated and consolidated through daily interaction in association with the houses. At the same time, the House Society concept offers a possible venue to interpret why and how social differentiation emerged (see Chapter 3).

9.2 The House differentiation

The multiple lines of evidence indicate that each identified dwelling might have functioned as an independent unit in the initial phase of the settlement, and then neighboring dwellings began to form groups through time and grew a larger House. The types of pottery and lithic artifacts associated with dwellings confirm that the cooperation between dwellings in the second phase grew stronger. Also, even though the tool production and maintenance had been an important activity for the House members, the emergence of the formal stone tool workshop suggests that the inhabitants' attachment to the place was further enhanced. Additionally, the spatial distribution of the stone tool workshop, possible ritual locus, and storage pit in the identified dwelling groups connotes the intense collaboration between neighboring dwellings during the second phase. Each dwelling group thus forms an economically, socially, and ritually independent House.

In Taiwan, archaeological research has always placed higher emphasis on burial data to examine the emergence of social differentiation. This project does not reject the idea that the burial can reflect past social relations. However, this dissertation tried to argue that the burial data alone could distort our understanding of prehistoric social organization. Specifically, at the Wansan site, there was no clear distinction of the grave goods between burials, except for the presence or absence of the zoo-anthropomorphic object. Nevertheless, the differentiation of artifact attributes can be observed on the House level. Moreover, previous studies of House Societies have already demonstrated that grave goods alone cannot tell the complete story. Instead, combining the data from both the residential and burial context can offer multiple lines of evidence to examine social differentiation.

Based on ethnographic studies conducted in House societies, one of the most significant characteristics is the emphasis on the connection between ancestors and the Houses (Bloch 1995; Fox 1993; McKinnon 1991; Waterson 1990; also see Chapters 2 and 3). Specifically, the privilege to claim the close association with the ancestors often distinguishes one House from the other. Furthermore, a certain material object related to the ancestors can become an "inalienable possession." The possession can affirm rank, authority, power, and even divine rule because it can represents a group's historical or mythical origins (Weiner 1992:51). Unlike other material objects which can be circulated in the society or between societies, the "inalienable possession" should be kept in the original group and cannot be exchanged.

Therefore, I argue that at the Wansan site, the possession of the zoo-anthropomorphic object separates certain Houses from others (see Chapter 7). This object is the evidence of a House's status since it proclaims the House's connection with the ancestor; the ability to own the past. Ethnographic, archaeological, and linguistic studies on Austronesian societies also illustrate the common stress on the "origin" or the "founder ideology" (Bellwood 2006; Fox 1995, 2006; Gustafsson 1992; Kahn 2007; Reuter 2002). The close connection with the ancestor and the knowledge of its history thus constitute the base of social differentiation in the Austronesian House Societies. As in the Tanimbar society, the difference between the named and unnamed Houses is that the named House is a group which has an enduring relation with the founding ancestors. This relation is a sign of the House's permanence, its weight, and its value (Mckinnon 1991:98).

I argue (see Chapters 3 and 7) that the zoo-anthropomorphic object thus acts as a material medium which signifies the close relation with the ancestors in the prehistoric Wansan society. The Houses that own the objects are the Houses which can declare their association with the ancestors. Therefore, they have the privilege to possess this ancestral-related object to use during mortuary rituals. Furthermore, the variations of artifacts at the Wansan site also demonstrate that there is indeed a difference between the Houses with the object and the Houses without the object.

At the Wansan site, two types of Houses can be distinguished based on the presence or absence of the zoo-anthropomorphic object. Most Houses possessed a zoo-anthropomorphic object in one of the burials, except for Houses V and VII. The analysis of artifact attributes also

confirms that the artifact variations of House VII, located in the Southern Excavation Area, show discrete patterns. First, it did not exploit local resources as much as other Houses. On the contrary, it depended more heavily on exotic goods, both lithic and pottery artifacts. Second, in terms of the jade object, the earrings and pendants that House VII utilized were different from those of the other Houses. Lastly, the diversity of artifact styles is quite limited in House VII. Not only did it rely heavily on imported goods, but it also had less control over utilizing specific styles of locally available objects.

The other House that no zoo-anthropomorphic object was found is House V situated at the northeastern corner of the Northern Excavation Area. The artifact variations of House V are similar to its neighboring Houses. Based on the changes of the artifact quantity stratigraphically, it is likely that House V was not fully developed until the later stage of the settlement (see Chapter 6).Therefore, two possible interpretation can be made. First, the House V was probably a more recently established House. Due to its short history, it did not own the right to claim a close association with the ancestors. Secondly, the House V was probably the result of the expansion of other neighboring Houses. Therefore, it cannot claim direct connection with their ancestors.

9.3 Conclusion

The distribution of features and artifacts affirms that the houses at the Wansan site are centers of people's economic, social, and ritual lives. At the same time, inspired by the ethnogrpahic studies conducted on House Societies, the mechanism of the social differentiation of the Wansan society probably derived from the House's ability to display its close association between the Houses and their ancestors.

Although the differential capacity to claim the connection with the ancestors demarcated the Houses' boundaries, it did not necessarily indicate an absoluate hierarchical relationship between Houses. House VII in the Southern Excavation Area at the Wansan site, for example, did not own the ancestral-related object. Nevertheless, the House retained its broad social network to obtain foreign goods, especially jade artifacts. The difference between this House and the other Houses was the differential ability to explore local resurces.

The distribution of hearths and storage pits in the Houses with the ancestral-related object indicates that the residents of these Houses probably participated in certain activities together. The shared artifact attributes of these Houses revealed that various artifacts made with local material were circulated among these Houses through marriage or exchange activities. Furthermore, the possession of the zoo-anthropmorphic object of these Houses probably differentiates these Houses from others.

9.4 Suggestions for future research

The examination of artifact distribution from the Wansan site suggests several lines of inquiry that deserve further investigation. These can be formulated as a series of research

subjects that need to be examined for understanding not only the nature of the Wansan society, but also other prehistoric societies in the Austronesian world.

First, this study proves that the house-based approach is useful in considering Taiwanese Neolithic social organization. Recent development of rescue archaeology in Taiwan provides rich spatial information from Neolithic sites. These sites consist of numerous artifacts as well as a variety of features closely associated with different types of house structures. This dissertation project demonstrates that the house-based approach does illustrate the possible presence of House society in Neolithic Taiwan. Therefore, this house-based analysis can be used both in an examination of whether the House society also existed in other Neolithic sites and as a productive approach to considering the relationships between prehistoric social relations and house structures.

Second, since the meaning and role that the zoo-anthropomorphic object played in Neolithic Taiwan was hypothesized and examined in this project, whether this object acts the same way can also be investigated in other Neolithic societies. The discovery of the zoo-anthropomorphic object in Taiwan is not as common as that of other jade objects and the analysis of this object is limited. However, the significance of this object in Neolithic societies is evident from this project. Previous studies on this object only focused on two aspects. One emphasis is on the morphology of these objects found in Taiwan (Sung and Lien 1984). The other is on how the presence of these objects can inform us about the prehistoric exchange activity in Taiwan (Liu 1995). Therefore, future research focused on this zoo-anthropomorphic object should consider and compare the context of the zoo-anthropomorphic object. Its discovery context and its association with other features and objects at the site should be examined. Second, a broad comparison of this object from different sites should be conducted.

Furthermore, although this specific jade zoo-anthropomorphic object was only discovered in Taiwan, a similar anthropomorphic design motif on lithic material was also found from sites belonging to the Dong Son Culture (BC. 1000-AD. 100) in southern Vietnam (Ha Van Tan and Trinh Du'o'ong 1977, cited from Sung and Lien 1984). The vast distribution of this motif was viewed as a stylistic trend which resulted from cultural diffusion (Loofs-Wissowa 1980-1, cited from Sung and Lien 1984). However, this project has already demonstrated that the anthropomorphic motif acted as a medium to connect Houses with their ancestors and the possession of this object was probably closely associated with certain social differentiation. In Oceanic archaeology, the emphasis on anthropomorphic motif was used to argue for the presence of House society and further explained the mechanism of the Austronesian expansion into Polynesia (Chiu 2003, 2005; Kirch 1997). Therefore, examining the distribution and the archaeological context of this motif in early societies in Southeast Asia can probably further link this early Austronesian expansion with that of the Oceania.

Third, in terms of the research of Wansan society itself, this project would be benefited more if finer grain analysis on the artifacts themselves could be conducted. The lithic tools, for example, show great diversity in terms of morphological variations. In this project, the exact usage of these tools was not further examined. Accordingly, whether the morphological variation

of the same tool type is the result of different usages was uncertain without proper experimental archaeology and residue analysis on the tool itself. The same analysis can be applied to the pottery vessels as well. Thus, more artifact analysis will assist us to better investigate the prehistoric Wansan peoples' daily life.

These proposed future research projects could be pursued using a theoretical framework similar to the one outlined in this dissertation. Archaeological research in the Oceanic has already utilized the concept of House society to consider prehistoric social organization and has greatly enriched our understanding of these early Austronesian societies (Chiu 2003, 2005; Kahn 2005, 2007; Kirch 2000, Kirch and Green 2001). Moreover, through systematic application of the house-based approach to these prehistoric Austronesian societies, archaeologists have added the temporal dimensions to the House society model. However, the archaeological application of the House society model is still lacking in the Southeast Asian countries where the earliest Austronesian societies were located. This is not to say that the prehistoric Austronesian societies were all House societies; however, this house-based approach can offer archaeologists in this area a better angle through which to investigate prehistoric societies. The rich ethnographic and linguistic studies in this area already suggest the utility of this house-based approach. The archaeological research can thus add temporal attributes to the study of House society.

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APPENDIX A

This appendix lists the Anelin Local Moran's I value and z score of the lithic artifacts in the Fourth Layer. The values are calculated by the spatial analysis function in ArcGIS 9.1.

Dwelling	Unit number	I value	Z score
A	T5P15	20.79	6.94
A	T5P15	21.66	7.17
A	T5P15	18.44	12.67
A	T5P15	24.94	12.06
A	T5P15	23.02	9.60
A	T6P15	29.16	5.34
A	T6P15	29.17	5.34
A	T5P15	-45.72	-11.84
A	T5P15	25.51	6.62
A	T5P15	31.43	8.83
A	T5P15	34.30	9.26
A	T5P15	36.26	9.35
A	T5P15	39.58	10.70
A	T5P15	43.59	11.36
A	T5P15	41.42	11.60
A	T5P16	34.88	12.39
A	T5P16	37.45	12.03
A	T5P16	47.71	7.81
A	T5P16	46.98	7.61
A	T5P16	54.24	7.99
A	T5P16	58.08	7.78
A	T5P16	53.05	9.30
A	T4P16	34.16	9.96
A	T4P16	30.72	9.23
A	T4P16	42.13	10.65
A	T5P16	52.84	8.67
A	T5P16	57.34	8.51
A	T5P16	55.84	9.30
A	T5P16	53.67	9.68
A	T5P16	51.61	9.66
A	T5P16	51.16	9.54
A	T5P16	45.73	9.50
A	T5P16	38.95	10.33
A	T5P16	31.04	8.25

Dwelling	Unit number	I value	Z score
A	T5P16	36.29	10.52
A	T5P16	44.30	10.48
A	T4P16	12.32	7.14
A	T5P16	30.24	8.06
A	T5P16	40.00	9.30
A	T5P16	45.47	8.83
A	T5P16	46.72	8.42
A	T5P16	47.01	7.98
A	T5P16	35.76	10.08
A	T5P16	24.21	11.58
B	T5P13	16.73	7.23
B	T5P13	17.40	6.40
B	T5P13	16.08	6.42
B	T5P13	24.58	3.97
B	T5P13	25.37	4.07
C	T5P12	9.19	5.00
C	T5P12	10.91	5.09
C	T5P12	13.29	5.57
C	T5P12	14.06	5.49
C	T5P12	12.10	6.64
C	T5P12	11.76	6.02
C	T5P12	9.83	5.77
D	T5P7	1.28	2.37
D	T4P8	2.14	1.02
D	T4P8	2.66	1.06
D	T4P8	2.14	1.15
D	T4P8	6.31	2.04
D	T4P8	5.38	1.96
D	T4P8	5.77	1.98
D	T5P8	5.75	2.01
D	T5P8	8.01	1.78
D	T5P8	7.85	1.81
D	T5P8	7.20	2.13
D	T5P8	6.25	2.15
D	T5P8	4.20	2.69
D	T5P9	6.28	2.65
D	T5P9	7.35	2.91
D	T5P9	7.81	1.69

Dwelling	Unit number	I value	Z score
D	T5P9	8.36	1.80
D	T5P9	7.24	3.60
D	T5P9	7.25	3.42
D	T5P9	9.89	4.65
D	T5P9	8.23	4.69
D	T5P9	5.08	3.47
D	T4P9	3.52	0.93
D	T4P9	3.37	0.89
D	T4P9	0.60	0.76
D	T5P10	5.14	3.72
D	T5P10	4.93	3.91
E	T4P8	0.07	0.10
E	T3P8	-0.03	0.03
E	T3P8	-0.17	-0.04
E	T2P7	2.00	1.04
E	T2P7	1.67	0.84
E	T2P7	2.08	1.04
E	T2P7	1.54	0.62
E	T2P7	2.30	0.92
E	T2P8	2.77	1.08
E	T2P8	2.97	1.11
E	T2P8	2.22	0.84
E	T2P8	2.44	0.70
E	T2P8	1.78	0.52
E	T3P8	1.10	0.53
E	T3P8	1.17	0.39
E	T3P8	1.09	0.29
E	T3P8	1.01	0.29
E	T3P8	0.45	0.18
E	T3P8	0.11	0.05
E	T3P8	0.11	0.05
E	T3P8	0.11	0.08
E	T3P8	1.28	0.36
E	T3P8	1.49	0.34
E	T3P8	1.62	0.34
E	T3P8	1.71	0.28
E	T3P8	1.61	0.27
E	T3P8	1.94	0.53

Dwelling	Unit number	I value	Z score
E	T3P8	2.18	0.39
E	T3P8	2.24	0.38
E	T3P8	2.19	0.38
E	T2P8	2.01	0.42
E	T2P8	3.43	1.53
E	T2P8	4.47	1.38
E	T2P8	5.29	0.92
E	T2P8	5.25	0.85
E	T2P8	5.10	0.94
E	T2P9	1.38	0.40
E	T2P9	1.59	0.40
E	T2P9	1.59	0.38
E	T2P9	1.19	0.37
E	T2P9	2.00	0.37
E	T2P9	2.73	0.51
E	T2P9	2.73	0.45
E	T2P9	0.38	0.13
E	T2P9	0.41	0.16
E	T2P9	0.36	0.12
E	T2P9	0.49	0.21
E	T2P10	0.76	0.63
E	T2P10	1.16	1.16
E	T2P9	4.25	1.27
E	T2P9	4.57	1.26
E	T2P9	5.23	1.45
E	T1P9	6.60	1.98
E	T1P9	6.31	1.53
E	T1P9	6.09	1.59
E	T2P9	0.98	0.53
E	T2P9	4.36	1.71
E	T2P9	7.39	1.33
E	T2P9	8.23	1.27
E	T2P9	7.24	1.30
E	T2P9	7.63	1.27
E	T2P9	7.63	1.38
E	T2P9	8.16	1.34
E	T2P9	7.86	1.35
E	T2P9	6.96	1.67

Dwelling	Unit number	I value	Z score
E	T2P9	7.18	1.52
E	T2P9	7.45	1.49
E	T2P9	6.13	1.58
E	T2P9	7.31	1.56
E	T2P9	7.60	1.52
E	T2P9	7.87	1.52
E	T2P9	8.57	1.75
E	T2P9	8.14	1.78
E	T2P9	7.20	1.43
E	T2P9	6.60	1.23
E	T2P9	6.57	1.24
E	T2P8	5.91	1.33
E	T2P8	6.53	1.08
E	T2P8	6.22	1.07
E	T2P8	6.18	1.10
E	T2P8	4.84	1.62
E	T1P8	5.92	2.69
F	T01P9	12.54	5.11
F	T01P9	12.83	5.22
F	T0P10	8.07	10.21
F	T0P9	32.79	7.15
F	T0P9	32.99	7.25
F	T0P9	26.89	9.75
F	T01P9	22.21	11.33
F	T01P10	26.60	10.82
F	T01P10	27.93	10.44
F	T01P10	14.86	6.92
F	T01P10	28.70	9.89
F	T01P10	26.52	9.28
F	T01P10	16.60	5.06
F	T01P10	14.77	5.11
F	T01P10	11.19	5.25
F	T01P10	10.87	6.01
F	T01P11	7.96	9.29
F	T01P11	9.44	12.09
G	T0P13	9.23	7.96
G	T01P12	16.18	7.97
G	T01P12	18.60	7.50

Dwelling	Unit number	I value	Z score
G	T01P12	20.06	7.41
G	T0P12	16.41	5.86
G	T0P12	20.57	4.76
G	T0P13	20.26	4.94
G	T0P13	17.99	6.63
G	T0P13	17.57	5.57
G	T0P13	15.17	5.36
G	T0P13	19.79	8.06
G	T01P13	19.99	8.30
G	T01P13	18.01	8.27
G	T01P13	14.82	8.92
G	T01P13	15.59	8.46
G	T0P13	11.96	9.57
H	T01P14	14.91	5.09
H	T01P14	17.75	4.69
H	T01P14	20.07	4.29
H	T01P14	19.71	4.34
H	T01P14	14.09	5.45
I	T0P15	5.80	4.40
I	T0P15	5.65	5.22
I	T0P15	5.77	4.36
I	T0P16	5.35	2.68
I	T0P16	5.02	2.62
I	T0P16	11.35	1.74
I	T0P16	12.10	1.77
I	T0P16	7.13	2.00
I	T0P16	5.72	1.68
I	T0P16	4.76	1.43
J	T1P14	1.87	1.66
J	T1P14	1.66	1.13
J	T1P14	1.42	0.89
J	T1P14	1.45	0.78
J	T1P14	1.64	0.88
J	T1P14	1.46	0.84
J	T1P14	1.36	0.80
K	T8P3AE	1.20	0.48
K	T8P3AE	3.55	0.97
K	T8P3AE	3.35	0.88

Dwelling	Unit number	I value	Z score
K	T8P3AE	2.21	0.72
K	T8P3AE	0.18	0.14
K	T8P3AE	0.30	0.21
K	T8P3BE	0.09	0.15
K	T8P3BE	1.95	0.71
K	T8P3BE	2.40	0.83
L	T8P01B	0.39	0.37
L	T8P01B	0.42	0.33
L	T8P01BE	0.40	0.34
L	T8P01BE	0.62	0.40
L	T8P01BE	0.71	0.37
L	T8P01BE	0.73	0.37
L	T8P1D	0.72	0.28
L	T8P1D	0.80	0.29
L	T9P1A	6.54	5.33
L	T9P1A	6.97	5.62
L	T9P1A	5.94	5.68
L	T8P1C	0.51	0.45
L	T8P1C	0.60	0.44
L	T8P1B	0.54	0.39
L	T8P1D	0.21	0.28
L	T8P1A	0.29	0.31
L	T8P1B	0.26	0.30
L	T8P1B	0.08	0.20
L	T8P1B	-0.31	0.01
L	T8P1A	-0.75	-0.36
L	T8P2D	6.19	3.08
L	T8P2D	7.34	3.38
L	T8P2D	3.93	2.18
L	T8P2D	0.57	0.47
L	T8P2D	-0.98	-0.23
L	T8P2D	6.44	2.51
L	T8P2D	4.16	1.63
L	T8P2D	-0.19	0.08
L	T8P2A	-0.37	0.00
L	T8P2A	-1.62	-0.49
L	T8P2A	-0.25	0.03
L	T8P2A	-0.05	0.11

Dwelling	Unit number	I value	Z score
L	T8P2A	-0.08	0.09
L	T8P2A	-0.10	0.08
L	T8P2AE	0.31	0.40
L	T8P2B	0.70	0.40
L	T8P2C	-1.57	-0.39
L	T8P2C	0.62	0.39
L	T8P2C	0.39	0.44
L	T8P2B	0.61	0.43
L	T8P2B	-3.52	-0.94
L	T8P2B	-1.84	-0.42
L	T8P2B	-1.34	-0.33
L	T8P2BE	0.54	0.33
L	T8P1SE	-0.37	-0.13
L	T8P1SE	0.00	0.00

APPENDIX B

This appendix lists the Anelin Local Moran's I value and z score of the lithic artifacts in the Fourth Layer. The values are calculated by the spatial analysis function in ArcGIS 9.1.

Unit Number	I value	Z score	Unit number	I value	Z score
T01P10A	0.19	0.22	T01P14BS	0.26	0.21
T01P10AE	0.21	0.23	T01P14C	0.11	0.11
T01P10B	-0.24	-0.22	T01P14CS	-0.27	-0.21
T01P10BE	0.32	0.28	T01P14D	0.19	0.22
T01P10BS	-1.05	-0.84	T01P14SE	0.42	0.32
T01P10C	0.11	0.11	T01P15A	-0.17	-0.20
T01P10CS	0.01	0.01	T01P15AE	-0.50	-0.53
T01P10D	0.19	0.22	T01P15B	-0.25	-0.23
T01P10SE	-0.12	-0.08	T01P15BE	-1.28	-1.11
T01P11A	-0.17	-0.20	T01P15BS	0.22	0.18
T01P11AE	-0.50	-0.53	T01P15C	0.29	0.27
T01P11B	0.29	0.27	T01P15CS	0.39	0.32
T01P11BE	0.14	0.12	T01P15D	0.19	0.22
T01P11BS	0.21	0.17	T01P15SE	-0.28	-0.21
T01P11C	0.29	0.27	T01P16A	0.13	0.14
T01P11CS	0.39	0.32	T01P16AE	-0.05	-0.11
T01P11D	0.19	0.22	T01P16AN	0.05	0.06
T01P11SE	-0.29	-0.21	T01P16B	0.26	0.27
T01P12A	0.19	0.22	T01P16BE	0.18	0.22
T01P12AE	0.21	0.23	T01P16BS	0.39	0.32
T01P12B	0.11	0.11	T01P16C	-0.25	-0.23
T01P12BE	0.32	0.28	T01P16CS	0.39	0.32
T01P12BS	-0.27	-0.21	T01P16D	-0.24	-0.23
T01P12C	0.29	0.27	T01P16DN	-0.13	-0.15
T01P12CS	0.08	0.07	T01P16SE	0.31	0.28
T01P12D	-0.17	-0.20	T01P8A	0.19	0.22
T01P12SE	-0.64	-0.48	T01P8AE	0.21	0.23
T01P13A	0.19	0.22	T01P8B	0.11	0.11
T01P13AE	0.21	0.23	T01P8BE	-0.22	-0.19
T01P13B	0.29	0.27	T01P8BS	0.39	0.32
T01P13BE	0.32	0.28	T01P8C	0.18	0.22
T01P13BS	0.04	0.04	T01P8CS	0.29	0.27
T01P13C	0.29	0.27	T01P8D	0.08	0.16
T01P13CS	0.39	0.32	T01P8SE	0.24	0.19

Unit Number	I value	Z score	Unit number	I value	Z score
T01P13D	0.19	0.22	T01P9A	0.19	0.22
T01P13SE	0.24	0.18	T01P9AE	0.21	0.23
T01P14A	0.19	0.22	T01P9B	0.29	0.27
T01P14AE	0.21	0.23	T01P9BE	0.32	0.28
T01P14B	0.29	0.27	T01P9BS	0.39	0.32
T01P14BE	0.32	0.28	T01P9C	0.11	0.11
T01P9CS	0.39	0.32	T0P14AE	0.32	0.28
T01P9D	0.19	0.22	T0P14B	0.29	0.27
T01P9SE	0.24	0.18	T0P14BE	0.11	0.16
T0P10A	-0.24	-0.22	T0P14BS	0.29	0.27
T0P10AE	0.32	0.28	T0P14C	0.29	0.27
T0P10B	-0.41	-0.38	T0P14CS	0.39	0.32
T0P10BE	0.14	0.12	T0P14D	0.11	0.11
T0P10BS	-1.23	-0.98	T0P15A	-0.08	-0.07
T0P10C	0.29	0.27	T0P15AE	-0.09	-0.08
T0P10CS	-0.14	-0.11	T0P15BE	0.11	0.16
T0P10D	0.11	0.11	T0P15D	0.16	0.15
T0P10SE	0.20	0.16	T0P16A	0.29	0.27
T0P11A	0.29	0.27	T0P16AE	0.21	0.23
T0P11AE	0.14	0.12	T0P16B	0.29	0.27
T0P11B	-0.25	-0.23	T0P16BE	0.21	0.23
T0P11BE	0.14	0.13	T0P16BS	0.39	0.32
T0P11BS	0.04	0.03	T0P16C	0.29	0.27
T0P11C	0.29	0.27	T0P16CS	0.29	0.27
T0P11CS	0.21	0.17	T0P16D	0.11	0.11
T0P11D	0.29	0.27	T0P16SE	0.31	0.28
T0P11SE	0.25	0.19	T0P7A	0.19	0.22
T0P12A	-0.78	-0.73	T0P7AE	0.21	0.23
T0P12AE	-2.35	-2.03	T0P7B	0.29	0.27
T0P12B	0.29	0.27	T0P7BE	0.32	0.28
T0P12BE	0.14	0.12	T0P7BS	0.39	0.32
T0P12BS	0.21	0.17	T0P7C	0.18	0.22
T0P12C	-0.25	-0.23	T0P7CS	0.29	0.27
T0P12CS	0.04	0.03	T0P7D	0.08	0.16
T0P12D	0.29	0.27	T0P7SE	0.42	0.32
T0P12SE	-0.29	-0.21	T0P8A	0.29	0.27
T0P13A	-0.69	-0.64	T0P8AE	0.32	0.28
T0P13AE	-0.04	-0.03	T0P8B	0.29	0.27
T0P13B	0.29	0.27	T0P8BE	0.32	0.28
T0P13BE	0.32	0.28	T0P8BS	0.39	0.32
T0P13BS	0.39	0.32	T0P8C	0.29	0.27

Unit Number	I value	Z score	Unit number	I value	Z score
T0P13C	0.29	0.27	T0P8CS	0.39	0.32
T0P13CS	0.21	0.17	T0P8D	0.29	0.27
T0P13D	-0.87	-0.82	T0P8SE	0.42	0.32
T0P13SE	0.42	0.32	T0P9A	0.29	0.27
T0P14A	0.29	0.27	T0P9AE	0.32	0.28
T0P9B	2.37	2.22	T1P13C	0.29	0.27
T0P9BE	-0.40	-0.34	T1P13CS	0.08	0.07
T0P9BS	2.78	2.22	T1P13D	0.29	0.27
T0P9C	-0.25	-0.23	T1P13SE	-0.98	-0.73
T0P9CS	-0.14	-0.11	T1P14A	0.29	0.27
T0P9D	0.29	0.27	T1P14AE	0.11	0.16
T0P9SE	-0.47	-0.35	T1P14B	0.29	0.27
T1P10A	-0.41	-0.38	T1P14BE	0.32	0.28
T1P10AE	0.14	0.12	T1P14BS	0.39	0.32
T1P10B	-0.06	-0.05	T1P14C	0.29	0.27
T1P10BE	0.32	0.28	T1P14CS	-0.14	-0.11
T1P10BS	-0.10	-0.08	T1P14D	0.29	0.27
T1P10C	0.29	0.27	T1P14SE	0.42	0.32
T1P10CS	-0.41	-0.32	T1P15AE	0.11	0.16
T1P10D	0.11	0.11	T1P15B	0.29	0.27
T1P10SE	-0.12	-0.08	T1P15BE	0.32	0.28
T1P11A	0.29	0.27	T1P15BS	0.39	0.32
T1P11AE	-0.03	-0.03	T1P15C	0.29	0.27
T1P11B	0.29	0.27	T1P15CS	0.39	0.32
T1P11BE	0.32	0.28	T1P15SE	0.42	0.32
T1P11BS	0.08	0.07	T1P16A	0.29	0.27
T1P11C	0.11	0.11	T1P16AE	0.21	0.23
T1P11CS	-0.27	-0.21	T1P16B	-0.20	-0.18
T1P11D	0.29	0.27	T1P16BE	0.03	0.04
T1P11SE	0.24	0.19	T1P16BS	0.22	0.18
T1P12A	0.29	0.27	T1P16C	0.16	0.15
T1P12AE	0.14	0.12	T1P16CS	0.39	0.32
T1P12B	0.29	0.27	T1P16D	0.29	0.27
T1P12BE	0.14	0.12	T1P16SE	0.31	0.28
T1P12BS	-0.66	-0.53	T1P7A	0.29	0.27
T1P12C	0.29	0.27	T1P7AE	0.32	0.28
T1P12CS	0.22	0.18	T1P7B	0.29	0.27
T1P12D	0.29	0.27	T1P7BE	0.32	0.28
T1P12SE	-0.29	-0.21	T1P7BS	0.39	0.32
T1P13A	0.29	0.27	T1P7C	0.18	0.22

Unit Number	I value	Z score	Unit number	I value	Z score
T1P13AE	0.32	0.28	T1P7CS	0.29	0.27
T1P13B	0.11	0.11	T1P7D	0.18	0.22
T1P13BE	-0.21	-0.18	T1P7SE	0.42	0.32
T1P13BS	0.94	0.76	T1P8A	0.29	0.27
T1P8AE	0.32	0.28	T2P12BS	0.22	0.18
T1P8B	0.29	0.27	T2P12C	0.02	0.02
T1P8BE	0.32	0.28	T2P12CS	0.04	0.03
T1P8BS	0.39	0.32	T2P12D	0.39	0.36
T1P8C	0.29	0.27	T2P12SE	0.42	0.32
T1P8CS	0.39	0.32	T2P13A	-1.23	-1.15
T1P8D	0.29	0.27	T2P13AE	-1.46	-1.26
T1P8SE	0.24	0.19	T2P13B	-0.20	-0.18
T1P9A	0.41	0.38	T2P13BE	0.14	0.12
T1P9AE	-0.09	-0.08	T2P13BS	0.22	0.18
T1P9B	0.29	0.27	T2P13C	0.16	0.15
T1P9BE	-0.03	-0.03	T2P13CS	0.39	0.32
T1P9BS	-0.14	-0.11	T2P13D	-0.65	-0.61
T1P9C	0.29	0.27	T2P13SE	0.42	0.32
T1P9CS	0.04	0.04	T2P14A	0.29	0.27
T1P9D	0.16	0.15	T2P14AE	0.32	0.28
T1P9SE	-1.00	-0.75	T2P14B	-0.20	-0.18
T2P10A	0.46	0.44	T2P14BE	0.14	0.12
T2P10AE	-0.04	-0.03	T2P14BS	0.22	0.18
T2P10B	1.41	1.32	T2P14C	0.16	0.15
T2P10BE	-1.65	-1.43	T2P14CS	0.39	0.32
T2P10BS	0.91	0.73	T2P14D	0.29	0.27
T2P10C	1.64	1.54	T2P14SE	0.42	0.32
T2P10CS	0.55	0.44	T2P15A	0.29	0.27
T2P10D	-0.01	-0.01	T2P15AE	0.32	0.28
T2P10SE	0.24	0.18	T2P15B	0.29	0.27
T2P11A	-0.08	-0.07	T2P15BE	0.32	0.28
T2P11AE	0.03	0.03	T2P15BS	0.39	0.32
T2P11B	0.39	0.36	T2P15C	0.29	0.27
T2P11BE	0.15	0.13	T2P15CS	0.39	0.32
T2P11BS	-0.14	-0.11	T2P15D	0.29	0.27
T2P11C	-1.16	-1.08	T2P15SE	0.42	0.32
T2P11CS	-0.48	-0.38	T2P16A	0.29	0.27
T2P11D	-0.02	-0.02	T2P16AE	0.21	0.23
T2P11SE	-0.17	-0.12	T2P16B	0.29	0.27
T2P12A	-1.16	-1.08	T2P16BE	0.21	0.23

Unit Number	I value	Z score	Unit number	I value	Z score
T2P12AE	-0.75	-0.65	T2P16BS	0.39	0.32
T2P12B	-0.11	-0.10	T2P16C	0.29	0.27
T2P12BE	0.14	0.12	T2P16CS	0.39	0.32
T2P16D	0.29	0.27	T3P11AE	-0.04	-0.03
T2P16SE	0.31	0.28	T3P11B	0.50	0.47
T2P7A	0.29	0.27	T3P11BE	0.14	0.12
T2P7AE	0.32	0.28	T3P11BS	-0.10	-0.08
T2P7B	0.16	0.15	T3P11C	-1.16	-1.08
T2P7BE	0.14	0.12	T3P11CS	-0.93	-0.74
T2P7BS	0.04	0.04	T3P11D	0.16	0.15
T2P7C	-0.13	-0.15	T3P11SE	-0.48	-0.35
T2P7CS	-0.41	-0.39	T3P12A	0.29	0.27
T2P7D	0.18	0.22	T3P12AE	0.32	0.28
T2P7SE	0.42	0.32	T3P12B	-0.06	-0.06
T2P8A	0.11	0.11	T3P12BE	-0.10	-0.08
T2P8AE	0.03	0.03	T3P12BS	0.13	0.11
T2P8B	0.02	0.02	T3P12C	-0.24	-0.22
T2P8BE	-0.09	-0.08	T3P12CS	1.09	0.87
T2P8BS	0.22	0.18	T3P12D	0.29	0.27
T2P8C	-0.11	-0.10	T3P12SE	0.08	0.06
T2P8CS	0.04	0.04	T3P13A	0.29	0.27
T2P8D	0.29	0.27	T3P13AE	0.32	0.28
T2P8SE	-0.11	-0.08	T3P13B	0.11	0.11
T2P9A	-0.01	-0.01	T3P13BE	0.32	0.28
T2P9AE	-0.39	-0.34	T3P13BS	-0.03	-0.02
T2P9B	0.11	0.11	T3P13C	0.11	0.11
T2P9BE	-0.22	-0.19	T3P13CS	-0.10	-0.07
T2P9BS	0.70	0.56	T3P13D	0.29	0.27
T2P9C	0.11	0.11	T3P13SE	-0.11	-0.08
T2P9CS	-2.72	-2.17	T3P14A	0.29	0.27
T2P9D	0.06	0.06	T3P14AE	0.32	0.28
T2P9SE	-0.04	-0.03	T3P14B	-0.06	-0.05
T3P10A	1.17	1.10	T3P14BE	-0.04	-0.03
T3P10AE	-0.22	-0.19	T3P14BS	1.48	1.18
T3P10B	1.55	1.45	T3P14C	0.11	0.11
T3P10BE	-1.29	-1.11	T3P14CS	-0.09	-0.07
T3P10BS	-0.31	-0.25	T3P14D	0.29	0.27
T3P10C	0.84	0.79	T3P14SE	0.56	0.42
T3P10CS	-0.48	-0.38	T3P15A	0.29	0.27
T3P10D	1.17	1.10	T3P15AE	0.32	0.28

Unit Number	I value	Z score	Unit number	I value	Z score
T3P10SE	-0.29	-0.21	T3P15B	0.16	0.15
T3P11A	-0.20	-0.18	T3P15BE	0.32	0.28
T3P15BS	0.39	0.32	T3P9D	27.92	26.14
T3P15C	-0.20	-0.18	T3P9SE	0.42	0.32
T3P15CS	-0.84	-0.67	T4P10A	0.29	0.27
T3P15D	0.29	0.27	T4P10AE	0.14	0.12
T3P15SE	0.42	0.32	T4P10B	0.29	0.27
T3P16A	0.29	0.27	T4P10BE	0.32	0.28
T3P16AE	0.21	0.23	T4P10BS	0.04	0.04
T3P16B	0.29	0.27	T4P10C	-0.43	-0.40
T3P16BE	0.21	0.23	T4P10CS	-0.14	-0.11
T3P16BS	0.39	0.32	T4P10D	0.29	0.27
T3P16C	0.29	0.27	T4P10SE	-0.82	-0.61
T3P16CS	0.39	0.32	T4P11A	0.04	0.04
T3P16D	0.29	0.27	T4P11AE	-0.40	-0.34
T3P16SE	0.31	0.28	T4P11B	0.29	0.27
T3P7A	0.27	0.25	T4P11BE	-0.21	-0.18
T3P7AE	-0.22	-0.19	T4P11BS	-0.59	-0.47
T3P7B	18.82	17.62	T4P11C	-0.06	-0.05
T3P7BE	-2.91	-2.51	T4P11CS	0.32	0.25
T3P7BS	9.10	7.25	T4P11D	0.16	0.15
T3P7C	10.53	12.68	T4P11SE	-1.71	-1.28
T3P7CS	-0.82	-0.77	T4P12A	-0.47	-0.44
T3P7D	0.35	0.42	T4P12AE	0.03	0.03
T3P7SE	-0.48	-0.35	T4P12B	1.38	1.30
T3P8A	-0.20	-0.19	T4P12BE	0.64	0.56
T3P8AE	6.48	5.60	T4P12BS	0.73	0.59
T3P8B	-0.11	-0.10	T4P12C	-0.25	-0.23
T3P8BE	-0.22	-0.19	T4P12CS	-0.59	-0.47
T3P8BS	-0.05	-0.04	T4P12D	0.96	0.90
T3P8C	0.25	0.24	T4P12SE	-0.47	-0.35
T3P8CS	0.32	0.25	T4P13A	0.47	0.45
T3P8D	-0.20	-0.18	T4P13AE	0.03	0.03
T3P8SE	-0.29	-0.21	T4P13B	0.57	0.54
T3P9A	23.45	21.96	T4P13BE	5.37	4.64
T3P9AE	-1.65	-1.42	T4P13BS	-0.27	-0.21
T3P9B	0.02	0.02	T4P13C	0.81	0.76
T3P9BE	-0.58	-0.50	T4P13CS	0.33	0.27
T3P9BS	0.39	0.32	T4P13D	0.11	0.10
T3P9C	-0.69	-0.64	T4P13SE	0.80	0.60
T3P9CS	-0.14	-0.11	T4P14A	5.50	5.15

Unit Number	I value	Z score	Unit number	I value	Z score
T4P14AE	10.94	9.46	T4P8BS	-0.14	-0.11
T4P14B	8.39	7.85	T4P8C	0.29	0.27
T4P14BE	9.63	8.32	T4P8CS	0.21	0.17
T4P14BS	-0.66	-0.52	T4P8D	-0.06	-0.05
T4P14C	9.16	8.58	T4P8SE	0.45	0.34
T4P14CS	-1.01	-0.81	T4P9A	0.29	0.27
T4P14D	-0.60	-0.56	T4P9AE	0.32	0.28
T4P14SE	-0.29	-0.21	T4P9B	4.08	3.82
T4P15A	-0.38	-0.35	T4P9BE	4.30	3.72
T4P15AE	0.32	0.28	T4P9BS	0.55	0.44
T4P15B	25.12	23.52	T4P9C	2.63	2.46
T4P15BE	-1.82	-1.57	T4P9CS	0.55	0.44
T4P15BS	21.07	16.80	T4P9D	0.29	0.27
T4P15C	19.34	18.11	T4P9SE	1.87	1.41
T4P15CS	1.67	1.34	T5P10A	1.44	1.35
T4P15D	4.50	4.22	T5P10AE	4.31	3.73
T4P15SE	7.84	5.89	T5P10B	0.29	0.27
T4P16A	0.29	0.27	T5P10BE	-0.04	-0.03
T4P16AE	0.21	0.23	T5P10BS	0.39	0.32
T4P16B	0.16	0.15	T5P10C	0.29	0.27
T4P16BE	0.21	0.23	T5P10CS	0.39	0.32
T4P16BS	0.39	0.32	T5P10D	0.02	0.02
T4P16C	-0.20	-0.18	T5P10SE	0.24	0.18
T4P16CS	-0.67	-0.53	T5P11A	0.08	0.08
T4P16D	0.29	0.27	T5P11AE	-0.57	-0.49
T4P16SE	0.31	0.28	T5P11B	-0.33	-0.31
T4P7A	-0.24	-0.22	T5P11BE	-0.22	-0.19
T4P7AE	0.32	0.28	T5P11BS	0.30	0.25
T4P7B	-0.76	-0.71	T5P11C	-0.27	-0.25
T4P7BE	0.14	0.12	T5P11CS	0.06	0.05
T4P7BS	4.17	3.33	T5P11D	4.43	4.15
T4P7C	-0.69	-0.83	T5P11SE	-0.29	-0.22
T4P7CS	3.85	3.64	T5P12A	-0.37	-0.35
T4P7D	0.18	0.22	T5P12AE	0.03	0.03
T4P7SE	0.45	0.34	T5P12B	0.28	0.26
T4P8A	0.29	0.27	T5P12BE	0.52	0.46
T4P8AE	0.14	0.12	T5P12BS	-0.40	-0.32
T4P8B	-0.07	-0.06	T5P12C	-0.64	-0.60
T4P8BE	1.78	1.54	T5P12CS	-0.93	-0.74

Unit Number	I value	Z score	Unit number	I value	Z score
T5P12D	-0.20	-0.18	T5P7AE	0.14	0.12
T5P12SE	-0.11	-0.08	T5P7B	0.29	0.27
T5P13A	0.60	0.57	T5P7BE	-0.21	-0.18
T5P13AE	2.95	2.55	T5P7BS	-0.14	-0.11
T5P13B	0.11	0.11	T5P7C	0.18	0.22
T5P13BE	0.39	0.34	T5P7CS	0.29	0.27
T5P13BS	-0.28	-0.22	T5P7D	-0.69	-0.83
T5P13C	-0.24	-0.23	T5P7SE	-1.71	-1.28
T5P13CS	-0.27	-0.21	T5P8A	0.29	0.27
T5P13D	0.47	0.45	T5P8AE	-0.21	-0.18
T5P13SE	-0.27	-0.20	T5P8B	0.29	0.27
T5P14A	0.02	0.02	T5P8BE	0.32	0.28
T5P14AE	0.14	0.12	T5P8BS	0.39	0.32
T5P14B	-0.01	-0.01	T5P8C	0.29	0.27
T5P14BE	-0.04	-0.03	T5P8CS	-0.14	-0.11
T5P14BS	-0.10	-0.07	T5P8D	0.29	0.27
T5P14C	0.47	0.45	T5P8SE	0.24	0.18
T5P14CS	0.34	0.27	T5P9A	0.11	0.11
T5P14D	1.44	1.35	T5P9AE	-0.21	-0.18
T5P14SE	-0.17	-0.12	T5P9B	0.29	0.27
T5P15A	-1.61	-1.50	T5P9BE	0.32	0.28
T5P15AE	1.34	1.16	T5P9BS	0.26	0.21
T5P15B	0.29	0.27	T5P9C	0.11	0.11
T5P15BE	0.14	0.12	T5P9CS	-0.27	-0.21
T5P15BS	0.22	0.18	T5P9D	0.11	0.11
T5P15C	0.29	0.27	T5P9SE	0.42	0.32
T5P15CS	0.04	0.03	T6P10A	0.29	0.27
T5P15D	-0.08	-0.07	T6P10AE	0.32	0.28
T5P15SE	-0.12	-0.08	T6P10D	0.29	0.27
T5P16A	0.16	0.15	T6P11A	-0.66	-0.61
T5P16AE	0.21	0.23	T6P11AE	-0.40	-0.34
T5P16B	-0.11	-0.10	T6P11D	-0.42	-0.39
T5P16BE	0.03	0.04	T6P12A	0.29	0.27
T5P16BS	-0.18	-0.14	T6P12AE	0.32	0.28
T5P16C	0.26	0.24	T6P12D	-0.06	-0.05
T5P16CS	-0.89	-0.70	T6P13A	0.29	0.27
T5P16D	0.05	0.05	T6P13AE	-0.21	-0.18
T5P16SE	0.31	0.28	T6P13D	0.11	0.11
T5P7A	-0.76	-0.71	T6P14A	0.11	0.11

Unit Number	I value	Z score	Unit number	I value	Z score
T6P14AE	0.03	0.03	T8P01B	-0.75	-0.70
T6P14D	0.11	0.11	T8P01BE	-3.03	-2.68
T6P15A	-0.11	-0.10	T8P01BS	0.35	0.31
T6P15AE	0.14	0.12	T8P01C	-0.02	-0.01
T6P15D	0.02	0.02	T8P01CS	-0.38	-0.35
T6P16A	0.29	0.27	T8P01SE	-0.54	-0.40
T6P16AE	0.21	0.23	T8P0A	-0.61	-0.73
T6P16D	-0.24	-0.22	T8P0AE	-1.45	-1.54
T6P6A	0.19	0.22	T8P0B	-1.04	-0.99
T6P6AE	0.21	0.23	T8P0BE	-3.90	-3.45
T6P6B	0.16	0.15	T8P0BS	0.28	0.26
T6P6BE	0.21	0.23	T8P0C	-0.75	-0.70
T6P6BS	0.15	0.15	T8P0CS	-0.01	0.02
T6P6C	-0.01	0.00	T8P0D	0.11	0.24
T6P6CS	-0.08	-0.07	T8P0SE	-0.83	-0.62
T6P6D	0.08	0.16	T8P1A	-0.90	-1.08
T6P7A	0.29	0.27	T8P1AE	-2.03	-2.18
T6P7AE	-0.21	-0.18	T8P1B	0.42	0.42
T6P7B	0.29	0.27	T8P1BE	0.46	0.43
T6P7BE	0.21	0.23	T8P1BS	0.28	0.26
T6P7BS	0.18	0.22	T8P1C	-1.04	-0.99
T6P7C	0.29	0.27	T8P1CS	0.57	0.49
T6P7CS	0.18	0.22	T8P1D	-0.61	-0.73
T6P7D	0.29	0.27	T8P1SE	0.61	0.50
T6P8A	0.29	0.27	T8P2A	0.07	0.10
T6P8AE	0.32	0.28	T8P2AE	0.52	0.58
T6P8B	0.08	0.16	T8P2B	0.42	0.42
T6P8C	0.29	0.27	T8P2BE	0.31	0.35
T6P8CS	0.10	0.16	T8P2BS	0.13	0.15
T6P8D	0.29	0.27	T8P2C	0.42	0.42
T6P9A	0.29	0.27	T8P2CS	-0.87	-0.69
T6P9AE	0.32	0.28	T8P2D	-1.34	-1.62
T6P9D	0.11	0.11	T8P3A	-0.24	-0.28
T7P6A	0.18	0.22	T8P3AE	0.52	0.58
T7P6B	0.08	0.16	T8P3B	0.42	0.42
T7P6C	0.08	0.16	T8P3BE	-0.28	-0.28
T7P6D	0.01	0.01	T8P3BS	0.26	0.34
T10P01A	0.26	0.34	T8P3C	0.42	0.42
T10P01D	0.26	0.34	T8P3CS	0.26	0.34

Unit Number	I value	Z score	Unit number	I value	Z score
T8P3D	0.02	0.04	T9P4A	0.42	0.42
T8P4A	-0.98	-1.17	T9P4AE	0.46	0.43
T8P4AE	-0.86	-0.91	T9P4D	-0.02	-0.01
T8P4B	-0.02	0.00	T9P5A	0.26	0.34
T8P4BE	0.46	0.43	T9P5D	0.42	0.42
T8P4BS	0.35	0.31			
T8P4C	-0.37	-0.34			
T8P4CS	0.14	0.16			
T8P4D	0.12	0.16			
T8P4SE	0.61	0.50			
T8P5A	-0.10	-0.20			
T8P5B	0.26	0.34			
T8P5BS	0.41	0.42			
T8P5C	0.42	0.42			
T8P5CS	0.57	0.49			
T8P5D	-0.54	-0.64			
T9P01A	0.42	0.42			
T9P01AE	-0.13	-0.09			
T9P01B	-0.38	-0.35			
T9P01BE	0.01	0.03			
T9P01BS	0.13	0.15			
T9P01C	0.05	0.07			
T9P01CS	0.41	0.42			
T9P01D	-0.02	-0.01			
T9P0A	0.02	0.04			
T9P0AE	0.16	0.17			
T9P0B	-0.24	-0.28			
T9P0BE	0.01	0.03			
T9P0C	0.05	0.08			
T9P0D	-0.56	-0.52			
T9P1A	-0.38	-0.35			
T9P1AE	-1.30	-1.14			
T9P1B	-0.24	-0.28			
T9P1BE	-0.28	-0.28			
T9P1C	0.05	0.08			
T9P1D	0.20	0.21			
T9P2A	0.76	0.95			
T9P2B	-0.10	-0.20			
T9P2C	-0.24	-0.28			
T9P2D	-1.70	-1.62			

APPENDIX C

This appendix lists the Anelin Local Moran's I value and z score of the lithic artifacts in the Third Layer. The values are calculated by the spatial analysis function in ArcGIS 9.1.

Unit number	I value	Z score	Unit number	I value	Z score
T01P10A	0.27	0.31	T01P14BS	0.13	0.10
T01P10AE	0.36	0.37	T01P14C	0.09	0.08
T01P10B	0.03	0.03	T01P14CS	0.35	0.28
T01P10BE	-0.09	-0.07	T01P14D	0.20	0.24
T01P10BS	0.69	0.55	T01P14SE	-0.01	0.00
T01P10C	-0.22	-0.20	T01P15A	0.23	0.27
T01P10CS	0.49	0.39	T01P15AE	-0.01	-0.01
T01P10D	0.27	0.31	T01P15B	3.00	2.77
T01P10SE	-0.37	-0.27	T01P15BE	4.18	3.56
T01P11A	0.34	0.40	T01P15BS	-0.80	-0.63
T01P11AE	0.39	0.41	T01P15C	1.58	1.46
T01P11B	0.38	0.35	T01P15CS	0.44	0.35
T01P11BE	0.52	0.44	T01P15D	0.19	0.22
T01P11BS	0.04	0.04	T01P15SE	0.79	0.59
T01P11C	0.10	0.09	T01P16A	-0.03	-0.03
T01P11CS	-0.18	-0.14	T01P16AE	-0.02	-0.03
T01P11D	0.34	0.40	T01P16AN	0.10	0.12
T01P11SE	0.20	0.15	T01P16B	6.29	6.39
T01P12A	0.34	0.40	T01P16BE	0.43	0.52
T01P12AE	0.39	0.41	T01P16BS	6.52	5.13
T01P12B	0.38	0.35	T01P16C	7.27	6.71
T01P12BE	0.55	0.47	T01P16CS	7.58	5.96
T01P12BS	0.11	0.09	T01P16D	-0.08	-0.07
T01P12C	0.38	0.35	T01P16DN	0.04	0.04
T01P12CS	0.10	0.08	T01P16SE	-0.70	-0.61
T01P12D	0.34	0.40	T01P8A	0.34	0.40
T01P12SE	0.33	0.25	T01P8AE	0.39	0.41
T01P13A	0.25	0.29	T01P8B	0.53	0.49
T01P13AE	0.20	0.21	T01P8BE	0.58	0.50
T01P13B	0.16	0.15	T01P8BS	0.66	0.52
T01P13BE	0.27	0.23	T01P8C	0.34	0.40
T01P13BS	-0.29	-0.22	T01P8CS	0.53	0.49
T01P13C	0.41	0.38	T01P8D	0.15	0.29
T01P13CS	0.17	0.14	T01P8SE	0.65	0.48
T01P13D	0.34	0.40	T01P9A	0.29	0.34

Unit number	I value	Z score	Unit number	I value	Z score
T01P13SE	0.30	0.23	T01P9AE	0.33	0.34
T01P14A	0.12	0.15	T01P9B	0.53	0.49
T01P14AE	-0.02	-0.02	T01P9BE	0.42	0.36
T01P14B	0.08	0.08	T01P9BS	0.36	0.29
T01P14BE	-0.13	-0.11	T01P9C	0.47	0.44
T01P9CS	0.49	0.39	T0P14AE	-0.02	-0.01
T01P9D	0.32	0.37	T0P14B	0.24	0.23
T01P9SE	0.20	0.15	T0P14BE	0.10	0.15
T0P10A	0.99	0.91	T0P14BS	0.29	0.28
T0P10AE	0.16	0.14	T0P14C	0.46	0.43
T0P10B	2.09	1.93	T0P14CS	0.67	0.53
T0P10BE	0.19	0.16	T0P14D	0.25	0.23
T0P10BS	-0.03	-0.02	T0P15A	1.90	1.75
T0P10C	1.06	0.98	T0P15AE	2.17	1.85
T0P10CS	-1.09	-0.86	T0P15BE	-0.15	-0.21
T0P10D	0.56	0.52	T0P15D	1.60	1.48
T0P10SE	0.08	0.07	T0P16A	3.77	3.48
T0P11A	0.00	0.00	T0P16AE	-0.46	-0.48
T0P11AE	0.06	0.06	T0P16B	0.00	0.00
T0P11B	0.01	0.01	T0P16BE	0.20	0.21
T0P11BE	0.13	0.11	T0P16BS	0.01	0.01
T0P11BS	-0.11	-0.08	T0P16C	-0.16	-0.14
T0P11C	-0.01	-0.01	T0P16CS	0.00	0.00
T0P11CS	0.01	0.01	T0P16D	5.89	5.44
T0P11D	0.26	0.24	T0P16SE	0.39	0.33
T0P11SE	0.40	0.30	T0P7A	0.31	0.36
T0P12A	0.28	0.26	T0P7AE	0.33	0.34
T0P12AE	0.28	0.24	T0P7B	0.53	0.49
T0P12B	0.22	0.20	T0P7BE	0.58	0.50
T0P12BE	0.49	0.42	T0P7BS	0.72	0.57
T0P12BS	0.43	0.34	T0P7C	0.34	0.40
T0P12C	0.23	0.21	T0P7CS	0.53	0.49
T0P12CS	0.61	0.48	T0P7D	0.15	0.29
T0P12D	0.22	0.21	T0P7SE	0.71	0.53
T0P12SE	0.71	0.53	T0P8A	0.32	0.29
T0P13A	0.16	0.15	T0P8AE	0.35	0.30
T0P13AE	0.30	0.26	T0P8B	0.10	0.09
T0P13B	0.53	0.49	T0P8BE	-0.02	-0.02
T0P13BE	0.58	0.50	T0P8BS	0.44	0.35
T0P13BS	0.72	0.57	T0P8C	0.37	0.35
T0P13C	0.53	0.49	T0P8CS	0.45	0.36

Unit number	I value	Z score	Unit number	I value	Z score
T0P13CS	0.66	0.52	T0P8D	0.45	0.42
T0P13D	0.31	0.29	T0P8SE	0.40	0.30
T0P13SE	0.77	0.57	T0P9A	-0.06	-0.05
T0P14A	0.02	0.02	T0P9AE	-0.54	-0.46
T0P9B	0.04	0.04	T1P13CS	-0.63	-0.49
T0P9BE	-0.27	-0.22	T1P13D	0.36	0.33
T0P9BS	0.00	0.01	T1P13SE	0.12	0.09
T0P9C	-0.10	-0.09	T1P14A	0.47	0.44
T0P9CS	0.12	0.10	T1P14AE	0.19	0.29
T0P9D	0.24	0.23	T1P14B	0.06	0.05
T0P9SE	0.07	0.05	T1P14BE	0.49	0.42
T1P10A	1.03	0.95	T1P14BS	0.24	0.19
T1P10AE	-0.05	-0.04	T1P14C	-0.19	-0.17
T1P10B	0.17	0.16	T1P14CS	0.08	0.06
T1P10BE	-0.05	-0.04	T1P14D	0.53	0.49
T1P10BS	-0.03	-0.02	T1P14SE	0.61	0.46
T1P10C	0.64	0.59	T1P15AE	0.13	0.19
T1P10CS	-0.58	-0.46	T1P15B	0.36	0.33
T1P10D	0.32	0.30	T1P15BE	0.52	0.44
T1P10SE	0.55	0.41	T1P15BS	0.66	0.52
T1P11A	0.16	0.15	T1P15C	0.48	0.45
T1P11AE	0.52	0.44	T1P15CS	0.57	0.45
T1P11B	0.43	0.40	T1P15SE	0.77	0.57
T1P11BE	0.55	0.47	T1P16A	0.12	0.12
T1P11BS	0.17	0.13	T1P16AE	0.26	0.27
T1P11C	0.43	0.40	T1P16B	0.19	0.18
T1P11CS	0.54	0.42	T1P16BE	0.26	0.27
T1P11D	0.16	0.15	T1P16BS	0.47	0.38
T1P11SE	0.46	0.35	T1P16C	0.44	0.41
T1P12A	0.47	0.44	T1P16CS	0.72	0.57
T1P12AE	0.52	0.44	T1P16D	0.19	0.18
T1P12B	0.45	0.41	T1P16SE	0.58	0.50
T1P12BE	0.33	0.29	T1P7A	0.53	0.49
T1P12BS	-1.10	-0.86	T1P7AE	0.55	0.47
T1P12C	0.51	0.47	T1P7B	0.53	0.49
T1P12CS	0.32	0.26	T1P7BE	0.58	0.50
T1P12D	0.53	0.49	T1P7BS	0.63	0.50
T1P12SE	0.00	0.00	T1P7C	0.34	0.40
T1P13A	0.48	0.45	T1P7CS	0.50	0.46
T1P13AE	0.58	0.50	T1P7D	0.34	0.40
T1P13B	-0.16	-0.15	T1P7SE	0.52	0.39

Unit number	I value	Z score	Unit number	I value	Z score
T1P13BE	-0.12	-0.10	T1P8A	0.32	0.30
T1P13BS	-0.80	-0.62	T1P8AE	0.20	0.17
T1P13C	0.22	0.20	T1P8B	0.21	0.20
T1P8BE	0.02	0.02	T2P12D	1.11	1.03
T1P8BS	0.12	0.10	T2P12SE	0.03	0.02
T1P8C	0.45	0.42	T2P13A	5.07	4.69
T1P8CS	0.51	0.41	T2P13AE	-0.33	-0.28
T1P8D	0.37	0.35	T2P13B	4.02	3.71
T1P8SE	0.18	0.13	T2P13BE	-0.32	-0.27
T1P9A	-0.08	-0.07	T2P13BS	-0.42	-0.33
T1P9AE	-0.34	-0.29	T2P13C	7.10	6.56
T1P9B	0.14	0.13	T2P13CS	-0.76	-0.59
T1P9BE	0.16	0.14	T2P13D	8.31	7.68
T1P9BS	-0.37	-0.29	T2P13SE	0.35	0.26
T1P9C	0.10	0.09	T2P14A	-0.17	-0.15
T1P9CS	-0.27	-0.21	T2P14AE	0.29	0.25
T1P9D	0.03	0.03	T2P14B	-0.07	-0.06
T1P9SE	0.01	0.01	T2P14BE	0.25	0.21
T2P10A	0.04	0.04	T2P14BS	0.25	0.20
T2P10AE	-0.04	-0.03	T2P14C	-0.04	-0.03
T2P10B	0.19	0.18	T2P14CS	0.16	0.13
T2P10BE	0.11	0.10	T2P14D	-0.43	-0.39
T2P10BS	-0.06	-0.04	T2P14SE	0.68	0.50
T2P10C	-0.01	0.00	T2P15A	0.41	0.38
T2P10CS	-0.02	-0.01	T2P15AE	0.58	0.50
T2P10D	0.00	0.00	T2P15B	0.51	0.47
T2P10SE	0.12	0.09	T2P15BE	0.58	0.50
T2P11A	-0.17	-0.16	T2P15BS	0.72	0.57
T2P11AE	0.22	0.19	T2P15C	0.42	0.39
T2P11B	-0.02	-0.02	T2P15CS	0.69	0.55
T2P11BE	-0.01	-0.01	T2P15D	0.09	0.09
T2P11BS	0.01	0.01	T2P15SE	0.77	0.57
T2P11C	-0.03	-0.03	T2P16A	0.19	0.18
T2P11CS	0.13	0.10	T2P16AE	0.26	0.27
T2P11D	-0.02	-0.01	T2P16B	0.45	0.41
T2P11SE	0.28	0.21	T2P16BE	0.35	0.37
T2P12A	3.23	2.99	T2P16BS	0.69	0.55
T2P12AE	6.37	5.43	T2P16C	0.51	0.47
T2P12B	2.98	2.75	T2P16CS	0.72	0.57
T2P12BE	4.68	3.99	T2P16D	0.44	0.41
T2P12BS	-0.21	-0.16	T2P16SE	0.58	0.50

Unit number	I value	Z score	Unit number	I value	Z score
T2P12C	1.13	1.05	T2P7A	0.15	0.14
T2P12CS	0.02	0.02	T2P7AE	-0.06	-0.04
T2P7B	1.19	1.11	T3P11CS	0.60	0.47
T2P7BE	1.67	1.42	T3P11D	0.32	0.30
T2P7BS	-0.30	-0.23	T3P11SE	0.14	0.10
T2P7C	0.24	0.29	T3P12A	0.44	0.41
T2P7CS	0.04	0.04	T3P12AE	0.52	0.44
T2P7D	0.22	0.27	T3P12B	0.50	0.46
T2P7SE	0.13	0.10	T3P12BE	0.04	0.04
T2P8A	-0.26	-0.23	T3P12BS	-0.05	-0.04
T2P8AE	0.12	0.10	T3P12C	0.53	0.49
T2P8B	-0.04	-0.04	T3P12CS	0.53	0.42
T2P8BE	0.14	0.12	T3P12D	0.47	0.44
T2P8BS	0.54	0.42	T3P12SE	0.21	0.16
T2P8C	0.18	0.17	T3P13A	0.45	0.42
T2P8CS	0.29	0.23	T3P13AE	0.45	0.39
T2P8D	-0.03	-0.03	T3P13B	0.22	0.21
T2P8SE	0.13	0.10	T3P13BE	-0.62	-0.52
T2P9A	1.85	1.72	T3P13BS	0.70	0.55
T2P9AE	0.84	0.72	T3P13C	-0.04	-0.03
T2P9B	0.46	0.43	T3P13CS	-0.62	-0.48
T2P9BE	0.13	0.12	T3P13D	0.34	0.31
T2P9BS	-0.32	-0.25	T3P13SE	4.17	3.10
T2P9C	1.13	1.04	T3P14A	0.35	0.33
T2P9CS	0.00	0.01	T3P14AE	0.55	0.47
T2P9D	1.39	1.28	T3P14B	4.25	3.93
T2P9SE	0.10	0.07	T3P14BE	-0.84	-0.71
T3P10A	-0.11	-0.10	T3P14BS	9.82	7.72
T3P10AE	0.14	0.12	T3P14C	3.57	3.30
T3P10B	0.16	0.15	T3P14CS	20.36	16.01
T3P10BE	0.30	0.26	T3P14D	0.28	0.26
T3P10BS	0.47	0.37	T3P14SE	-0.22	-0.16
T3P10C	0.27	0.26	T3P15A	0.53	0.49
T3P10CS	0.63	0.50	T3P15AE	0.58	0.50
T3P10D	0.00	0.00	T3P15B	0.42	0.39
T3P10SE	0.35	0.26	T3P15BE	0.43	0.37
T3P11A	0.27	0.25	T3P15BS	0.23	0.18
T3P11AE	0.52	0.44	T3P15C	0.27	0.26
T3P11B	0.53	0.49	T3P15CS	-0.34	-0.27
T3P11BE	0.43	0.37	T3P15D	0.53	0.49
T3P11BS	0.50	0.40	T3P15SE	0.54	0.40
T3P11C	0.50	0.46	T3P16A	0.53	0.49

Unit number	I value	Z score	Unit number	I value	Z score
T3P16AE	0.39	0.41	T4P10C	0.51	0.47
T3P16B	0.51	0.47	T4P10CS	0.72	0.57
T3P16BE	0.39	0.41	T4P10D	0.51	0.47
T3P16BS	0.66	0.52	T4P10SE	0.59	0.44
T3P16C	0.42	0.39	T4P11A	0.30	0.28
T3P16CS	0.63	0.50	T4P11AE	0.22	0.19
T3P16D	0.53	0.49	T4P11B	-0.28	-0.25
T3P16SE	0.58	0.50	T4P11BE	-0.19	-0.16
T3P7A	0.50	0.46	T4P11BS	-0.01	0.00
T3P7AE	0.55	0.47	T4P11C	0.20	0.19
T3P7B	0.41	0.38	T4P11CS	0.39	0.31
T3P7BE	0.49	0.42	T4P11D	0.35	0.33
T3P7BS	0.72	0.57	T4P11SE	-0.01	0.00
T3P7C	0.12	0.14	T4P12A	-0.65	-0.60
T3P7CS	0.40	0.38	T4P12AE	0.42	0.36
T3P7D	0.18	0.22	T4P12B	0.82	0.76
T3P7SE	0.71	0.53	T4P12BE	-0.04	-0.03
T3P8A	0.37	0.34	T4P12BS	-0.30	-0.23
T3P8AE	0.27	0.23	T4P12C	1.13	1.04
T3P8B	0.45	0.41	T4P12CS	0.08	0.07
T3P8BE	0.42	0.36	T4P12D	-0.04	-0.04
T3P8BS	0.69	0.55	T4P12SE	-0.07	-0.05
T3P8C	0.48	0.44	T4P13A	10.87	10.04
T3P8CS	0.72	0.57	T4P13AE	11.62	9.91
T3P8D	0.51	0.47	T4P13B	5.34	4.93
T3P8SE	0.77	0.57	T4P13BE	9.91	8.45
T3P9A	0.27	0.26	T4P13BS	-0.52	-0.40
T3P9AE	0.02	0.02	T4P13C	2.27	2.10
T3P9B	0.41	0.38	T4P13CS	-0.02	-0.01
T3P9BE	0.41	0.35	T4P13D	6.27	5.79
T3P9BS	0.69	0.55	T4P13SE	0.15	0.12
T3P9C	0.19	0.18	T4P14A	30.79	28.43
T3P9CS	0.60	0.47	T4P14AE	2.42	2.06
T3P9D	0.20	0.19	T4P14B	40.97	37.83
T3P9SE	0.62	0.46	T4P14BE	4.24	3.62
T4P10A	0.39	0.36	T4P14BS	19.34	15.21
T4P10AE	0.29	0.25	T4P14C	37.56	34.68
T4P10B	0.45	0.41	T4P14CS	8.49	6.68
T4P10BE	0.52	0.44	T4P14D	44.18	40.79
T4P10BS	0.63	0.50	T4P14SE	3.35	2.48

Unit number	I value	Z score	Unit number	I value	Z score
T4P15A	0.37	0.34	T4P9BS	0.67	0.53
T4P15AE	0.09	0.08	T4P9C	0.41	0.38
T4P15B	9.06	8.37	T4P9CS	0.47	0.37
T4P15BE	2.23	1.90	T4P9D	0.53	0.49
T4P15BS	11.49	9.04	T4P9SE	0.77	0.57
T4P15C	7.95	7.34	T5P10A	0.39	0.36
T4P15CS	8.32	6.54	T5P10AE	0.24	0.21
T4P15D	0.75	0.69	T5P10B	-0.10	-0.09
T4P15SE	3.57	2.65	T5P10BE	0.06	0.05
T4P16A	0.34	0.32	T5P10BS	0.13	0.11
T4P16AE	0.32	0.34	T5P10C	0.15	0.14
T4P16B	0.29	0.27	T5P10CS	0.63	0.50
T4P16BE	0.04	0.04	T5P10D	0.51	0.47
T4P16BS	-0.06	-0.04	T5P10SE	-0.14	-0.10
T4P16C	1.29	1.19	T5P11A	0.02	0.02
T4P16CS	-0.07	-0.05	T5P11AE	0.04	0.04
T4P16D	0.35	0.33	T5P11B	0.01	0.01
T4P16SE	0.35	0.30	T5P11BE	0.03	0.03
T4P7A	0.50	0.46	T5P11BS	0.00	0.00
T4P7AE	0.49	0.42	T5P11C	-0.01	0.00
T4P7B	0.53	0.49	T5P11CS	-0.22	-0.17
T4P7BE	0.33	0.29	T5P11D	0.04	0.04
T4P7BS	0.53	0.42	T5P11SE	0.04	0.03
T4P7C	0.34	0.40	T5P12A	0.06	0.06
T4P7CS	0.06	0.06	T5P12AE	0.22	0.19
T4P7D	0.34	0.40	T5P12B	0.03	0.03
T4P7SE	0.02	0.02	T5P12BE	0.03	0.03
T4P8A	0.53	0.49	T5P12BS	0.35	0.28
T4P8AE	0.58	0.50	T5P12C	-0.08	-0.07
T4P8B	0.00	0.00	T5P12CS	0.17	0.14
T4P8BE	0.24	0.21	T5P12D	0.02	0.02
T4P8BS	-0.59	-0.46	T5P12SE	0.41	0.31
T4P8C	0.12	0.11	T5P13A	0.57	0.53
T4P8CS	-0.01	0.00	T5P13AE	1.23	1.05
T4P8D	0.50	0.46	T5P13B	-0.06	-0.05
T4P8SE	0.09	0.07	T5P13BE	0.97	0.83
T4P9A	0.53	0.49	T5P13BS	0.09	0.07
T4P9AE	0.55	0.47	T5P13C	-0.15	-0.14
T4P9B	0.53	0.49	T5P13CS	0.04	0.03
T4P9BE	0.58	0.50	T5P13D	0.62	0.57

Unit number	I value	Z score	Unit number	I value	Z score
T5P13SE	-0.01	-0.01	T5P8BE	0.58	0.50
T5P14A	17.05	15.74	T5P8BS	0.72	0.57
T5P14AE	10.68	9.11	T5P8C	0.53	0.49
T5P14B	0.59	0.55	T5P8CS	0.66	0.52
T5P14BE	-0.08	-0.07	T5P8D	0.32	0.29
T5P14BS	-0.01	-0.01	T5P8SE	0.77	0.57
T5P14C	3.07	2.84	T5P9A	0.53	0.49
T5P14CS	1.36	1.07	T5P9AE	0.58	0.50
T5P14D	8.41	7.77	T5P9B	0.50	0.46
T5P14SE	0.18	0.13	T5P9BE	0.41	0.35
T5P15A	7.86	7.26	T5P9BS	0.72	0.57
T5P15AE	7.01	5.98	T5P9C	0.53	0.49
T5P15B	-0.02	-0.01	T5P9CS	0.72	0.57
T5P15BE	-0.12	-0.10	T5P9D	0.47	0.44
T5P15BS	0.47	0.38	T5P9SE	0.71	0.53
T5P15C	-0.15	-0.13	T6P10A	0.31	0.29
T5P15CS	0.38	0.30	T6P10AE	-0.03	-0.02
T5P15D	7.53	6.96	T6P10D	0.48	0.44
T5P15SE	0.25	0.19	T6P11A	0.02	0.02
T5P16A	1.13	1.04	T6P11AE	0.09	0.08
T5P16AE	-0.21	-0.22	T6P11D	-0.14	-0.12
T5P16B	1.92	1.78	T6P12A	0.47	0.44
T5P16BE	-0.68	-0.71	T6P12AE	0.45	0.39
T5P16BS	-0.14	-0.10	T6P12D	0.41	0.38
T5P16C	3.24	3.00	T6P13A	0.16	0.15
T5P16CS	0.24	0.19	T6P13AE	0.05	0.05
T5P16D	4.87	4.50	T6P13D	0.16	0.15
T5P16SE	0.32	0.28	T6P14A	0.03	0.03
T5P7A	0.18	0.17	T6P14AE	-0.08	-0.06
T5P7AE	0.39	0.34	T6P14D	0.04	0.04
T5P7B	0.51	0.47	T6P15A	0.53	0.49
T5P7BE	0.52	0.44	T6P15AE	0.55	0.47
T5P7BS	0.66	0.52	T6P15D	0.28	0.26
T5P7C	0.28	0.34	T6P16A	0.32	0.29
T5P7CS	0.47	0.44	T6P16AE	0.32	0.34
T5P7D	-0.48	-0.57	T6P16D	0.20	0.19
T5P7SE	0.52	0.39	T6P6A	0.34	0.40
T5P8A	0.01	0.01	T6P6AE	0.36	0.37
T5P8AE	0.55	0.47	T6P6B	0.45	0.42
T5P8B	0.53	0.49	T6P6BE	0.33	0.34

Unit number	I value	Z score	Unit number	I value	Z score
T6P6BS	0.42	0.39	T8P0CS	2.09	1.78
T6P6C	0.23	0.27	T8P0D	0.24	0.50
T6P6CS	0.44	0.41	T8P0SE	1.24	1.01
T6P6D	0.15	0.29	T8P1A	1.33	1.67
T6P7A	0.51	0.47	T8P1AE	3.59	3.97
T6P7AE	0.52	0.44	T8P1B	-0.50	-0.46
T6P7B	-0.38	-0.35	T8P1BE	-0.10	-0.07
T6P7BE	0.04	0.05	T8P1BS	-0.04	-0.01
T6P7BS	0.00	0.00	T8P1C	1.11	1.12
T6P7C	0.18	0.17	T8P1CS	0.88	0.76
T6P7CS	0.27	0.33	T8P1D	0.57	0.72
T6P7D	0.45	0.41	T8P1SE	-0.02	0.01
T6P8A	0.53	0.49	T8P2A	1.09	1.37
T6P8AE	0.58	0.50	T8P2AE	-0.49	-0.53
T6P8B	0.15	0.29	T8P2B	0.20	0.22
T6P8C	0.53	0.49	T8P2BE	0.84	0.94
T6P8CS	0.19	0.29	T8P2BS	-0.15	-0.13
T6P8D	0.53	0.49	T8P2C	0.48	0.49
T6P9A	0.50	0.46	T8P2CS	-0.46	-0.36
T6P9AE	0.49	0.42	T8P2D	4.28	5.33
T6P9D	0.53	0.49	T8P3A	-0.21	-0.24
T7P6A	0.26	0.31	T8P3AE	-0.24	-0.25
T7P6B	0.15	0.29	T8P3B	-0.24	-0.21
T7P6C	0.15	0.29	T8P3BE	-0.02	-0.01
T7P6D	0.31	0.37	T8P3BS	0.03	0.06
T10P01A	0.49	0.63	T8P3C	0.63	0.64
T10P01D	0.37	0.49	T8P3CS	0.29	0.38
T8P01B	0.42	0.43	T8P3D	-0.01	0.01
T8P01BE	0.27	0.27	T8P4A	-0.01	0.00
T8P01BS	-1.48	-1.21	T8P4AE	-0.06	-0.04
T8P01C	0.56	0.72	T8P4B	0.15	0.17
T8P01CS	0.84	0.85	T8P4BE	0.52	0.49
T8P01SE	-0.18	-0.12	T8P4BS	0.81	0.71
T8P0A	0.19	0.26	T8P4C	-0.07	-0.04
T8P0AE	0.05	0.07	T8P4CS	0.19	0.21
T8P0B	-0.04	-0.01	T8P4D	0.01	0.03
T8P0BE	1.40	1.29	T8P4SE	1.47	1.19
T8P0BS	1.92	1.64	T8P5A	0.16	0.34
T8P0C	-0.40	-0.37	T8P5B	0.75	0.96

Unit number	I value	Z score
T8P5BS	1.26	1.27
T8P5C	0.87	0.88
T8P5CS	1.65	1.41
T8P5D	0.12	0.16
T9P01A	-5.18	-5.07
T9P01AE	-1.88	-1.69
T9P01B	0.26	0.28
T9P01BE	0.37	0.43
T9P01BS	0.61	0.63
T9P01C	0.18	0.24
T9P01CS	0.53	0.54
T9P01D	-1.30	-1.62
T9P0A	-0.04	-0.01
T9P0AE	-0.09	-0.06
T9P0B	0.68	0.86
T9P0BE	0.46	0.53
T9P0C	0.55	0.71
T9P0D	1.36	1.36
T9P1A	-0.03	0.00
T9P1AE	-1.18	-1.05
T9P1B	0.53	0.68
T9P1BE	0.55	0.62
T9P1C	0.14	0.19
T9P1D	0.17	0.19
T9P2A	-0.02	0.00
T9P2B	0.07	0.15
T9P2C	0.15	0.21
T9P2D	-1.89	-1.83
T9P4A	1.12	1.12
T9P4AE	1.38	1.28
T9P4D	0.51	0.66
T9P5A	0.80	1.03
T9P5D	1.27	1.27

APPENDIX D

This appendix lists the Anelin Local Moran's I value and z score of the clay artifacts in the Fourth Layer. The values are calculated by the spatial analysis function in ArcGIS 9.1.

Unit number	I value	Z score	Unit number	I value	Z score
T01P10A	0.18	0.22	T01P14BE	0.30	0.27
T01P10AE	0.20	0.22	T01P14BS	0.38	0.31
T01P10B	0.18	0.17	T01P14C	0.28	0.27
T01P10BE	0.01	0.01	T01P14CS	0.38	0.31
T01P10BS	0.00	0.00	T01P14D	0.18	0.22
T01P10C	0.08	0.08	T01P14SE	0.40	0.31
T01P10CS	0.00	0.00	T01P15A	-0.02	-0.02
T01P10D	0.18	0.22	T01P15AE	-0.19	-0.21
T01P10SE	-0.58	-0.44	T01P15B	-0.32	-0.30
T01P11A	0.18	0.22	T01P15BE	-1.47	-1.29
T01P11AE	0.20	0.22	T01P15BS	0.38	0.31
T01P11B	-0.11	-0.10	T01P15C	0.28	0.27
T01P11BE	0.30	0.27	T01P15CS	0.38	0.31
T01P11BS	-1.10	-0.88	T01P15D	-0.12	-0.14
T01P11C	0.28	0.27	T01P15SE	-0.28	-0.21
T01P11CS	-0.22	-0.17	T01P16A	-0.49	-0.51
T01P11D	0.18	0.22	T01P16AE	-0.15	-0.29
T01P11SE	0.00	0.01	T01P16AN	-0.12	-0.14
T01P12A	0.18	0.22	T01P16B	0.25	0.27
T01P12AE	0.20	0.22	T01P16BE	0.17	0.22
T01P12B	-0.26	-0.25	T01P16BS	0.38	0.31
T01P12BE	0.10	0.09	T01P16C	-0.32	-0.30
T01P12BS	0.18	0.15	T01P16CS	0.38	0.31
T01P12C	0.13	0.12	T01P16D	-0.14	-0.14
T01P12CS	0.38	0.31	T01P16DN	0.18	0.22
T01P12D	0.18	0.22	T01P16SE	0.29	0.27
T01P12SE	0.01	0.01	T01P8A	0.18	0.22
T01P13A	0.18	0.22	T01P8AE	0.20	0.22
T01P13AE	0.20	0.22	T01P8B	0.28	0.27
T01P13B	0.28	0.27	T01P8BE	0.30	0.27
T01P13BE	0.30	0.27	T01P8BS	0.38	0.31
T01P13BS	0.38	0.31	T01P8C	0.18	0.22
T01P13C	0.28	0.27	T01P8CS	0.27	0.27
T01P13CS	0.28	0.23	T01P8D	0.08	0.15
T01P13D	0.18	0.22	T01P8SE	0.40	0.31
T01P13SE	0.40	0.31	T01P9A	0.18	0.22

Unit number	I value	Z score	Unit number	I value	Z score
T01P14A	-0.12	-0.14	T01P9AE	0.20	0.22
T01P14AE	-0.39	-0.42	T01P9B	0.18	0.17
T01P14B	0.28	0.27	T01P9BE	0.01	0.01
T01P9BS	0.18	0.15	T0P13D	0.00	0.00
T01P9C	0.28	0.27	T0P13SE	0.40	0.31
T01P9CS	0.38	0.31	T0P14A	0.28	0.27
T01P9D	0.18	0.22	T0P14AE	0.30	0.27
T01P9SE	0.20	0.16	T0P14B	0.28	0.27
T0P10A	0.03	0.03	T0P14BE	0.10	0.15
T0P10AE	0.01	0.01	T0P14BS	0.27	0.27
T0P10B	0.08	0.08	T0P14C	0.28	0.27
T0P10BE	0.20	0.18	T0P14CS	0.38	0.31
T0P10BS	-0.19	-0.15	T0P14D	0.28	0.27
T0P10C	0.18	0.17	T0P15A	0.18	0.17
T0P10CS	0.00	0.01	T0P15AE	0.01	0.01
T0P10D	-0.17	-0.16	T0P15BE	0.10	0.15
T0P10SE	0.00	0.01	T0P15D	0.28	0.27
T0P11A	-0.11	-0.10	T0P16A	0.28	0.27
T0P11AE	0.30	0.27	T0P16AE	0.20	0.22
T0P11B	0.08	0.08	T0P16B	0.28	0.27
T0P11BE	0.01	0.01	T0P16BE	0.20	0.22
T0P11BS	0.01	0.01	T0P16BS	0.38	0.31
T0P11C	0.28	0.27	T0P16C	0.28	0.27
T0P11CS	0.20	0.17	T0P16CS	0.27	0.27
T0P11D	0.28	0.27	T0P16D	0.18	0.17
T0P11SE	0.20	0.16	T0P16SE	0.30	0.27
T0P12A	-0.12	-0.11	T0P7A	0.18	0.22
T0P12AE	-0.59	-0.52	T0P7AE	0.20	0.22
T0P12B	0.08	0.08	T0P7B	0.28	0.27
T0P12BE	0.01	0.01	T0P7BE	0.30	0.27
T0P12BS	0.01	0.01	T0P7BS	0.38	0.31
T0P12C	0.18	0.17	T0P7C	0.18	0.22
T0P12CS	0.30	0.25	T0P7CS	0.27	0.27
T0P12D	0.28	0.27	T0P7D	0.08	0.15
T0P12SE	0.20	0.16	T0P7SE	0.40	0.31
T0P13A	0.20	0.19	T0P8A	0.28	0.27
T0P13AE	0.30	0.27	T0P8AE	0.30	0.27
T0P13B	0.28	0.27	T0P8B	0.28	0.27
T0P13BE	0.30	0.27	T0P8BE	0.30	0.27
T0P13BS	0.38	0.31	T0P8BS	0.38	0.31
T0P13C	0.18	0.17	T0P8C	0.28	0.27

Unit number	I value	Z score	Unit number	I value	Z score
T0P13CS	0.38	0.31	T0P8CS	0.38	0.31
T0P8D	0.28	0.27	T1P13AE	0.30	0.27
T0P8SE	0.30	0.23	T1P13B	0.18	0.17
T0P9A	-0.26	-0.25	T1P13BE	0.20	0.18
T0P9AE	-0.09	-0.08	T1P13BS	-0.07	-0.06
T0P9B	0.28	0.27	T1P13C	-0.21	-0.20
T0P9BE	0.20	0.18	T1P13CS	0.36	0.30
T0P9BS	-0.09	-0.07	T1P13D	0.28	0.27
T0P9C	0.18	0.17	T1P13SE	0.00	0.00
T0P9CS	0.01	0.01	T1P14A	0.28	0.27
T0P9D	0.13	0.12	T1P14AE	0.10	0.15
T0P9SE	-0.01	-0.01	T1P14B	0.28	0.27
T1P10A	0.08	0.08	T1P14BE	0.30	0.27
T1P10AE	0.20	0.18	T1P14BS	0.38	0.31
T1P10B	-0.67	-0.64	T1P14C	0.28	0.27
T1P10BE	0.30	0.27	T1P14CS	0.28	0.23
T1P10BS	0.86	0.70	T1P14D	0.28	0.27
T1P10C	0.01	0.01	T1P14SE	0.30	0.24
T1P10CS	-1.07	-0.87	T1P15AE	0.10	0.15
T1P10D	-0.71	-0.68	T1P15B	0.28	0.27
T1P10SE	-0.59	-0.45	T1P15BE	0.30	0.27
T1P11A	0.00	0.01	T1P15BS	0.38	0.31
T1P11AE	0.20	0.18	T1P15C	0.28	0.27
T1P11B	0.28	0.27	T1P15CS	-0.21	-0.16
T1P11BE	0.30	0.27	T1P15SE	0.40	0.31
T1P11BS	0.08	0.07	T1P16A	0.28	0.27
T1P11C	0.28	0.27	T1P16AE	0.20	0.22
T1P11CS	0.18	0.15	T1P16B	0.28	0.27
T1P11D	0.20	0.19	T1P16BE	0.20	0.22
T1P11SE	0.40	0.31	T1P16BS	0.38	0.31
T1P12A	0.18	0.17	T1P16C	0.28	0.27
T1P12AE	0.30	0.27	T1P16CS	0.38	0.31
T1P12B	0.28	0.27	T1P16D	0.28	0.27
T1P12BE	0.01	0.01	T1P16SE	0.30	0.27
T1P12BS	-2.25	-1.82	T1P7A	0.28	0.27
T1P12C	0.28	0.27	T1P7AE	0.30	0.27
T1P12CS	0.38	0.31	T1P7B	0.28	0.27
T1P12D	0.28	0.27	T1P7BE	0.30	0.27
T1P12SE	0.18	0.14	T1P7BS	0.38	0.31
T1P13A	0.28	0.27	T1P7C	0.18	0.22
T1P7CS	0.27	0.27	T2P12A	-6.22	-5.91

Unit number	I value	Z score	Unit number	I value	Z score
T1P7D	0.18	0.22	T2P12AE	-2.47	-2.17
T1P7SE	0.30	0.23	T2P12B	0.78	0.74
T1P8A	0.28	0.27	T2P12BE	0.18	0.16
T1P8AE	0.30	0.27	T2P12BS	0.00	0.00
T1P8B	-0.11	-0.11	T2P12C	0.30	0.29
T1P8BE	0.00	0.00	T2P12CS	0.00	0.00
T1P8BS	-0.20	-0.16	T2P12D	-1.51	-1.43
T1P8C	0.18	0.17	T2P12SE	0.01	0.01
T1P8CS	0.00	0.01	T2P13A	9.71	9.24
T1P8D	0.28	0.27	T2P13AE	9.53	8.37
T1P8SE	0.18	0.14	T2P13B	0.00	0.00
T1P9A	1.19	1.14	T2P13BE	-0.01	0.00
T1P9AE	0.73	0.64	T2P13BS	0.28	0.23
T1P9B	0.18	0.17	T2P13C	-0.10	-0.09
T1P9BE	0.11	0.10	T2P13CS	0.38	0.31
T1P9BS	0.00	0.01	T2P13D	-0.06	-0.05
T1P9C	-0.02	-0.01	T2P13SE	0.01	0.01
T1P9CS	-0.01	0.00	T2P14A	0.18	0.17
T1P9D	-0.04	-0.04	T2P14AE	-0.01	0.00
T1P9SE	0.01	0.01	T2P14B	0.00	0.00
T2P10A	4.46	4.24	T2P14BE	0.20	0.18
T2P10AE	-0.01	0.00	T2P14BS	0.00	0.01
T2P10B	4.10	3.90	T2P14C	0.18	0.18
T2P10BE	4.03	3.54	T2P14CS	0.00	0.00
T2P10BS	4.05	3.29	T2P14D	-0.12	-0.11
T2P10C	2.38	2.27	T2P14SE	0.30	0.23
T2P10CS	0.83	0.68	T2P15A	-0.17	-0.16
T2P10D	0.47	0.45	T2P15AE	0.30	0.27
T2P10SE	0.46	0.36	T2P15B	0.18	0.17
T2P11A	-0.25	-0.23	T2P15BE	0.30	0.27
T2P11AE	0.00	0.01	T2P15BS	0.01	0.01
T2P11B	-0.76	-0.72	T2P15C	0.28	0.27
T2P11BE	0.18	0.16	T2P15CS	0.30	0.25
T2P11BS	-0.01	-0.01	T2P15D	-0.86	-0.82
T2P11C	1.06	1.01	T2P15SE	0.30	0.23
T2P11CS	-1.35	-1.09	T2P16A	0.28	0.27
T2P11D	0.04	0.04	T2P16AE	0.20	0.22
T2P11SE	-0.02	-0.01	T2P16B	0.28	0.27
T2P16BE	0.20	0.22	T3P10CS	-0.11	-0.09
T2P16BS	0.38	0.31	T3P10D	0.71	0.67
T2P16C	0.28	0.27	T3P10SE	0.30	0.23

Unit number	I value	Z score	Unit number	I value	Z score
T2P16CS	0.38	0.31	T3P11A	1.32	1.26
T2P16D	0.28	0.27	T3P11AE	-0.78	-0.68
T2P16SE	0.30	0.27	T3P11B	-0.34	-0.32
T2P7A	0.28	0.27	T3P11BE	0.00	0.00
T2P7AE	0.30	0.27	T3P11BS	0.01	0.01
T2P7B	0.28	0.27	T3P11C	-0.04	-0.04
T2P7BE	0.10	0.09	T3P11CS	0.01	0.01
T2P7BS	0.08	0.07	T3P11D	1.24	1.18
T2P7C	0.18	0.22	T3P11SE	0.11	0.09
T2P7CS	-0.31	-0.29	T3P12A	0.18	0.17
T2P7D	0.18	0.22	T3P12AE	0.30	0.27
T2P7SE	0.40	0.31	T3P12B	0.08	0.08
T2P8A	-0.02	-0.01	T3P12BE	0.00	0.00
T2P8AE	0.01	0.01	T3P12BS	0.00	0.00
T2P8B	0.03	0.03	T3P12C	0.08	0.08
T2P8BE	0.00	0.01	T3P12CS	0.00	0.00
T2P8BS	0.08	0.07	T3P12D	0.18	0.17
T2P8C	-0.26	-0.25	T3P12SE	-0.40	-0.30
T2P8CS	0.18	0.15	T3P13A	0.28	0.27
T2P8D	0.18	0.17	T3P13AE	0.30	0.27
T2P8SE	0.01	0.01	T3P13B	0.23	0.22
T2P9A	0.10	0.10	T3P13BE	0.09	0.08
T2P9AE	-0.39	-0.34	T3P13BS	0.57	0.47
T2P9B	-0.02	-0.02	T3P13C	-0.05	-0.04
T2P9BE	0.28	0.25	T3P13CS	-0.36	-0.29
T2P9BS	-0.01	-0.01	T3P13D	0.28	0.27
T2P9C	0.18	0.17	T3P13SE	-0.01	0.00
T2P9CS	-2.13	-1.72	T3P14A	0.18	0.17
T2P9D	0.00	0.00	T3P14AE	0.30	0.27
T2P9SE	-0.09	-0.07	T3P14B	1.46	1.39
T3P10A	2.11	2.01	T3P14BE	-0.29	-0.25
T3P10AE	-0.98	-0.86	T3P14BS	7.78	6.30
T3P10B	0.02	0.02	T3P14C	-0.41	-0.39
T3P10BE	0.10	0.09	T3P14CS	0.68	0.55
T3P10BS	0.18	0.15	T3P14D	0.18	0.17
T3P10C	-0.37	-0.35	T3P14SE	1.21	0.93
T3P15A	0.18	0.17	T3P9BE	-0.19	-0.17
T3P15AE	0.30	0.27	T3P9BS	0.28	0.23
T3P15B	0.28	0.27	T3P9C	-1.35	-1.28
T3P15BE	0.30	0.27	T3P9CS	-0.21	-0.16
T3P15BS	0.28	0.23	T3P9D	10.51	10.01

Unit number	I value	Z score	Unit number	I value	Z score
T3P15C	0.28	0.27	T3P9SE	0.01	0.01
T3P15CS	-0.31	-0.25	T4P10A	0.28	0.27
T3P15D	0.28	0.27	T4P10AE	0.30	0.27
T3P15SE	0.40	0.31	T4P10B	0.28	0.27
T3P16A	0.28	0.27	T4P10BE	0.30	0.27
T3P16AE	0.20	0.22	T4P10BS	-0.30	-0.24
T3P16B	-0.21	-0.20	T4P10C	0.18	0.17
T3P16BE	0.20	0.22	T4P10CS	0.08	0.07
T3P16BS	-1.46	-1.18	T4P10D	0.28	0.27
T3P16C	0.28	0.27	T4P10SE	-0.68	-0.52
T3P16CS	0.00	0.01	T4P11A	0.18	0.17
T3P16D	0.28	0.27	T4P11AE	0.00	0.00
T3P16SE	-0.20	-0.17	T4P11B	0.18	0.17
T3P7A	0.33	0.32	T4P11BE	-0.68	-0.60
T3P7AE	0.00	0.01	T4P11BS	-0.02	-0.01
T3P7B	-0.52	-0.49	T4P11C	-0.40	-0.38
T3P7BE	-0.99	-0.86	T4P11CS	1.65	1.34
T3P7BS	-0.79	-0.64	T4P11D	0.18	0.17
T3P7C	1.25	1.53	T4P11SE	-0.39	-0.30
T3P7CS	-0.02	-0.01	T4P12A	0.03	0.03
T3P7D	0.23	0.29	T4P12AE	-0.29	-0.25
T3P7SE	0.01	0.01	T4P12B	5.78	5.50
T3P8A	-0.26	-0.25	T4P12BE	-0.03	-0.02
T3P8AE	-2.37	-2.08	T4P12BS	1.02	0.83
T3P8B	-0.79	-0.75	T4P12C	4.18	3.98
T3P8BE	-0.79	-0.69	T4P12CS	-0.02	-0.01
T3P8BS	-0.11	-0.09	T4P12D	-0.08	-0.07
T3P8C	0.00	0.00	T4P12SE	0.11	0.08
T3P8CS	0.18	0.15	T4P13A	1.17	1.12
T3P8D	0.13	0.12	T4P13AE	-0.02	-0.01
T3P8SE	0.40	0.31	T4P13B	0.57	0.54
T3P9A	14.12	13.43	T4P13BE	-0.01	0.00
T3P9AE	-0.99	-0.86	T4P13BS	-0.01	-0.01
T3P9B	-0.17	-0.16	T4P13C	0.47	0.45
T4P13CS	-0.30	-0.24	T4P8A	0.28	0.27
T4P13D	0.33	0.32	T4P8AE	0.30	0.27
T4P13SE	0.30	0.24	T4P8B	0.08	0.08
T4P14A	11.56	11.00	T4P8BE	0.27	0.24
T4P14AE	9.23	8.11	T4P8BS	-0.10	-0.07
T4P14B	0.99	0.95	T4P8C	0.18	0.17
T4P14BE	11.59	10.18	T4P8CS	0.00	0.01

Unit number	I value	Z score	Unit number	I value	Z score
T4P14BS	0.08	0.07	T4P8D	0.28	0.27
T4P14C	-0.06	-0.05	T4P8SE	0.26	0.20
T4P14CS	-0.30	-0.24	T4P9A	0.28	0.27
T4P14D	1.79	1.70	T4P9AE	0.20	0.18
T4P14SE	-0.96	-0.73	T4P9B	-0.08	-0.08
T4P15A	0.00	0.00	T4P9BE	-0.01	0.00
T4P15AE	0.20	0.18	T4P9BS	-0.36	-0.29
T4P15B	9.37	8.91	T4P9C	0.40	0.38
T4P15BE	-0.49	-0.43	T4P9CS	0.21	0.17
T4P15BS	3.22	2.61	T4P9D	0.28	0.27
T4P15C	18.81	17.90	T4P9SE	-0.29	-0.22
T4P15CS	1.35	1.10	T5P10A	1.14	1.09
T4P15D	2.69	2.56	T5P10AE	2.88	2.53
T4P15SE	-0.49	-0.37	T5P10B	-0.52	-0.49
T4P16A	-0.21	-0.20	T5P10BE	-0.02	-0.02
T4P16AE	0.20	0.22	T5P10BS	-0.40	-0.32
T4P16B	0.28	0.27	T5P10C	-0.02	-0.02
T4P16BE	0.20	0.22	T5P10CS	0.38	0.31
T4P16BS	0.30	0.25	T5P10D	-0.01	0.00
T4P16C	0.18	0.17	T5P10SE	0.00	0.00
T4P16CS	0.01	0.01	T5P11A	1.04	0.99
T4P16D	0.28	0.27	T5P11AE	-0.49	-0.42
T4P16SE	0.30	0.27	T5P11B	4.87	4.64
T4P7A	0.28	0.27	T5P11BE	2.49	2.19
T4P7AE	0.20	0.18	T5P11BS	-0.01	-0.01
T4P7B	0.08	0.08	T5P11C	4.18	3.98
T4P7BE	0.11	0.10	T5P11CS	0.55	0.45
T4P7BS	-0.03	-0.02	T5P11D	5.72	5.44
T4P7C	-0.02	-0.02	T5P11SE	-0.38	-0.29
T4P7CS	-0.12	-0.11	T5P12A	-0.08	-0.07
T4P7D	0.18	0.22	T5P12AE	-0.09	-0.08
T4P7SE	-0.10	-0.07	T5P12B	4.45	4.24
T5P12BE	3.33	2.92	T5P16CS	0.28	0.23
T5P12BS	-1.22	-0.98	T5P16D	0.00	0.00
T5P12C	5.19	4.94	T5P16SE	0.30	0.27
T5P12CS	0.97	0.79	T5P7A	0.08	0.08
T5P12D	0.03	0.03	T5P7AE	0.11	0.10
T5P12SE	0.53	0.41	T5P7B	0.28	0.27
T5P13A	0.13	0.12	T5P7BE	0.30	0.27
T5P13AE	-0.09	-0.08	T5P7BS	0.38	0.31
T5P13B	-0.02	-0.02	T5P7C	0.18	0.22

Unit number	I value	Z score	Unit number	I value	Z score
T5P13BE	0.18	0.16	T5P7CS	0.27	0.27
T5P13BS	0.38	0.31	T5P7D	-0.02	-0.02
T5P13C	-0.32	-0.30	T5P7SE	0.40	0.31
T5P13CS	-0.31	-0.25	T5P8A	0.18	0.17
T5P13D	-0.26	-0.25	T5P8AE	0.00	0.00
T5P13SE	0.11	0.09	T5P8B	0.18	0.17
T5P14A	0.00	0.00	T5P8BE	0.01	0.01
T5P14AE	0.00	0.01	T5P8BS	0.38	0.31
T5P14B	0.12	0.11	T5P8C	0.28	0.27
T5P14BE	0.00	0.00	T5P8CS	0.38	0.31
T5P14BS	-0.31	-0.25	T5P8D	0.18	0.17
T5P14C	0.50	0.47	T5P8SE	0.20	0.16
T5P14CS	-0.11	-0.09	T5P9A	0.28	0.27
T5P14D	-0.59	-0.56	T5P9AE	0.01	0.01
T5P14SE	0.00	0.00	T5P9B	0.28	0.27
T5P15A	-0.50	-0.48	T5P9BE	0.30	0.27
T5P15AE	0.00	0.01	T5P9BS	0.30	0.25
T5P15B	0.28	0.27	T5P9C	0.08	0.08
T5P15BE	0.20	0.18	T5P9CS	0.01	0.01
T5P15BS	-0.18	-0.15	T5P9D	-0.02	-0.01
T5P15C	0.08	0.08	T5P9SE	0.40	0.31
T5P15CS	0.00	0.00	T6P10A	-0.54	-0.51
T5P15D	-0.02	-0.01	T6P10AE	-0.09	-0.08
T5P15SE	0.40	0.31	T6P10D	0.05	0.05
T5P16A	0.20	0.19	T6P11A	0.08	0.08
T5P16AE	0.20	0.22	T6P11AE	0.00	0.01
T5P16B	0.20	0.19	T6P11D	0.08	0.08
T5P16BE	0.20	0.22	T6P12A	-0.59	-0.56
T5P16BS	0.38	0.31	T6P12AE	-0.78	-0.68
T5P16C	0.01	0.01	T6P12D	-0.01	-0.01
T6P13A	0.05	0.05	T7P6C	0.08	0.15
T6P13AE	0.20	0.18	T7P6D	0.18	0.22
T6P13D	-0.54	-0.51	T10P01A	0.26	0.35
T6P14A	0.28	0.27	T10P01D	0.26	0.35
T6P14AE	1.14	1.00	T8P01B	-0.01	0.01
T6P14D	0.00	0.00	T8P01BE	-0.35	-0.30
T6P15A	0.08	0.08	T8P01BS	-0.07	-0.03
T6P15AE	-0.19	-0.17	T8P01C	-0.03	-0.03
T6P15D	1.43	1.36	T8P01CS	-0.05	-0.03
T6P16A	0.28	0.27	T8P01SE	0.26	0.24
T6P16AE	0.20	0.22	T8P0A	0.26	0.35

Unit number	I value	Z score	Unit number	I value	Z score
T6P16D	0.28	0.27	T8P0AE	0.30	0.36
T6P6A	0.18	0.22	T8P0B	0.41	0.43
T6P6AE	0.20	0.22	T8P0BE	0.44	0.44
T6P6B	0.20	0.19	T8P0BS	0.39	0.36
T6P6BE	0.20	0.22	T8P0C	0.07	0.09
T6P6BS	0.27	0.27	T8P0CS	0.55	0.51
T6P6C	0.00	0.01	T8P0D	0.11	0.25
T6P6CS	0.18	0.17	T8P0SE	0.59	0.51
T6P6D	0.08	0.15	T8P1A	0.26	0.35
T6P7A	0.28	0.27	T8P1AE	0.13	0.17
T6P7AE	0.30	0.27	T8P1B	0.41	0.43
T6P7B	0.28	0.27	T8P1BE	0.44	0.44
T6P7BE	0.20	0.22	T8P1BS	-0.11	-0.07
T6P7BS	0.18	0.22	T8P1C	0.41	0.43
T6P7C	0.28	0.27	T8P1CS	-0.44	-0.35
T6P7CS	0.18	0.22	T8P1D	0.26	0.35
T6P7D	0.28	0.27	T8P1SE	0.43	0.37
T6P8A	0.28	0.27	T8P2A	-0.17	-0.20
T6P8AE	0.30	0.27	T8P2AE	-0.04	-0.03
T6P8B	0.08	0.15	T8P2B	0.41	0.43
T6P8C	0.28	0.27	T8P2BE	0.30	0.36
T6P8CS	0.10	0.15	T8P2BS	-0.59	-0.58
T6P8D	0.28	0.27	T8P2C	0.41	0.43
T6P9A	0.28	0.27	T8P2CS	-0.60	-0.50
T6P9AE	0.30	0.27	T8P2D	0.00	0.02
T6P9D	0.18	0.17	T8P3A	0.26	0.35
T7P6A	0.18	0.22	T8P3AE	0.30	0.36
T7P6B	0.08	0.15	T8P3B	0.06	0.08
T8P3BE	-0.38	-0.41	T8P3BS	0.16	0.22
T8P3C	0.12	0.14	T9P1D	0.57	0.60
T8P3CS	0.05	0.08	T9P2A	3.63	4.74
T8P3D	0.26	0.35	T9P2B	3.37	7.18
T8P4A	0.09	0.14	T9P2C	3.01	3.88
T8P4AE	-0.02	0.00	T9P2D	3.61	3.67
T8P4B	0.02	0.04	T9P4A	0.41	0.43
T8P4BE	-0.01	0.01	T9P4AE	0.44	0.44
T8P4BS	0.39	0.36	T9P4D	0.26	0.35
T8P4C	-0.67	-0.66	T9P5A	0.26	0.35
T8P4CS	-0.09	-0.07	T9P5D	0.41	0.43
T8P4D	0.26	0.35			
T8P4SE	0.43	0.37			

Unit number	I value	Z score			
T8P5A	0.02	0.05			
T8P5B	-0.17	-0.20			
T8P5BS	0.07	0.10			
T8P5C	0.00	0.02			
T8P5CS	0.39	0.36			
T8P5D	0.02	0.05			
T9P01A	-0.51	-0.50			
T9P01AE	0.11	0.12			
T9P01B	0.03	0.05			
T9P01BE	0.30	0.36			
T9P01BS	0.40	0.44			
T9P01C	-0.62	-0.78			
T9P01CS	-0.09	-0.07			
T9P01D	-0.16	-0.19			
T9P0A	-0.05	-0.03			
T9P0AE	-0.74	-0.67			
T9P0B	-0.22	-0.26			
T9P0BE	0.05	0.07			
T9P0C	-0.12	-0.13			
T9P0D	0.28	0.31			
T9P1A	1.84	1.88			
T9P1AE	0.19	0.20			
T9P1B	0.13	0.19			
T9P1BE	-0.21	-0.22			
T9P1C	-0.01	0.00			

APPENDIX E

This appendix lists the Anelin Local Moran's I value and z score of the clay artifacts in the Third Layer. The values are calculated by the spatial analysis function in ArcGIS 9.1.

Unit number	I value	Z score	Unit number	I value	Z score
T01P10A	0.14	0.17	T01P14BS	0.02	0.02
T01P10AE	0.41	0.42	T01P14C	0.16	0.15
T01P10B	-0.55	-0.50	T01P14CS	0.44	0.35
T01P10BE	-0.49	-0.41	T01P14D	0.19	0.22
T01P10BS	1.34	1.05	T01P14SE	-0.75	-0.55
T01P10C	-0.54	-0.49	T01P15A	3.54	4.13
T01P10CS	0.27	0.21	T01P15AE	-0.74	-0.76
T01P10D	-0.12	-0.14	T01P15B	10.10	9.27
T01P10SE	-0.20	-0.14	T01P15BE	13.37	11.32
T01P11A	0.38	0.45	T01P15BS	2.63	2.05
T01P11AE	0.44	0.46	T01P15C	1.75	1.61
T01P11B	0.31	0.28	T01P15CS	-0.07	-0.05
T01P11BE	0.48	0.41	T01P15D	4.25	4.95
T01P11BS	-0.02	-0.01	T01P15SE	0.38	0.28
T01P11C	-0.04	-0.03	T01P16A	0.03	0.03
T01P11CS	0.01	0.01	T01P16AE	-0.10	-0.19
T01P11D	0.38	0.45	T01P16AN	0.04	0.04
T01P11SE	0.16	0.12	T01P16B	23.87	24.08
T01P12A	0.38	0.45	T01P16BE	3.53	4.30
T01P12AE	0.44	0.46	T01P16BS	11.05	8.64
T01P12B	-0.19	-0.17	T01P16C	20.70	18.99
T01P12BE	0.36	0.31	T01P16CS	5.33	4.16
T01P12BS	0.40	0.32	T01P16D	-0.57	-0.52
T01P12C	0.29	0.27	T01P16DN	-0.40	-0.47
T01P12CS	0.39	0.31	T01P16SE	-1.47	-1.27
T01P12D	0.38	0.45	T01P8A	0.38	0.45
T01P12SE	0.84	0.62	T01P8AE	0.44	0.46
T01P13A	0.38	0.45	T01P8B	0.60	0.55
T01P13AE	0.44	0.46	T01P8BE	0.66	0.56
T01P13B	0.29	0.27	T01P8BS	0.76	0.60
T01P13BE	0.51	0.43	T01P8C	0.38	0.45
T01P13BS	0.34	0.27	T01P8CS	0.60	0.55
T01P13C	0.53	0.49	T01P8D	0.16	0.32
T01P13CS	0.73	0.57	T01P8SE	0.84	0.62
T01P13D	0.38	0.45	T01P9A	0.33	0.39

Unit number	I value	Z score	Unit value	I value	Z score
T01P13SE	0.52	0.39	T01P9AE	0.12	0.12
T01P14A	-0.02	-0.03	T01P9B	0.60	0.55
T01P14AE	0.24	0.25	T01P9BE	0.60	0.51
T01P14B	-0.03	-0.03	T01P9BS	0.65	0.51
T01P14BE	0.15	0.13	T01P9C	0.57	0.53
T01P9CS	0.71	0.56	T0P14B	0.25	0.24
T01P9D	0.36	0.42	T0P14BE	0.03	0.04
T01P9SE	0.25	0.19	T0P14BS	0.51	0.47
T0P10A	1.83	1.69	T0P14C	0.53	0.49
T0P10AE	0.53	0.45	T0P14CS	0.82	0.64
T0P10B	1.24	1.14	T0P14D	0.37	0.34
T0P10BE	0.33	0.28	T0P15A	3.42	3.14
T0P10BS	0.09	0.07	T0P15AE	1.88	1.60
T0P10C	0.76	0.70	T0P15BE	-0.10	-0.14
T0P10CS	0.64	0.50	T0P15D	4.58	4.20
T0P10D	1.09	1.00	T0P16A	2.04	1.87
T0P10SE	0.09	0.07	T0P16AE	-0.18	-0.19
T0P11A	0.04	0.04	T0P16B	-0.19	-0.17
T0P11AE	0.04	0.04	T0P16BE	0.02	0.03
T0P11B	0.07	0.06	T0P16BS	-0.03	-0.02
T0P11BE	0.03	0.02	T0P16C	0.03	0.03
T0P11BS	0.35	0.27	T0P16CS	-0.05	-0.05
T0P11C	-0.02	-0.02	T0P16D	1.96	1.80
T0P11CS	0.17	0.14	T0P16SE	0.53	0.46
T0P11D	0.85	0.78	T0P7A	0.38	0.45
T0P11SE	0.43	0.32	T0P7AE	0.44	0.46
T0P12A	0.57	0.53	T0P7B	0.58	0.53
T0P12AE	0.66	0.56	T0P7BE	0.63	0.53
T0P12B	-0.04	-0.03	T0P7BS	0.82	0.64
T0P12BE	0.42	0.36	T0P7C	0.33	0.39
T0P12BS	0.59	0.46	T0P7CS	0.57	0.53
T0P12C	0.10	0.10	T0P7D	0.16	0.32
T0P12CS	0.64	0.50	T0P7SE	0.78	0.58
T0P12D	0.43	0.39	T0P8A	0.44	0.41
T0P12SE	0.87	0.64	T0P8AE	0.60	0.51
T0P13A	0.31	0.29	T0P8B	0.10	0.10
T0P13AE	0.13	0.11	T0P8BE	0.34	0.29
T0P13B	0.60	0.55	T0P8BS	0.54	0.42
T0P13BE	0.66	0.56	T0P8C	0.38	0.35
T0P13BS	0.82	0.64	T0P8CS	0.66	0.52
T0P13C	0.60	0.55	T0P8D	0.56	0.51

Unit number	I value	Z score	Unit number	I value	Z score
T0P13CS	0.82	0.64	T0P8SE	0.78	0.58
T0P13D	0.60	0.55	T0P9A	0.31	0.28
T0P13SE	0.87	0.64	T0P9AE	-0.12	-0.10
T0P14A	-0.63	-0.57	T0P9B	-0.46	-0.42
T0P14AE	1.48	1.25	T0P9BE	-0.26	-0.22
T0P9BS	-0.03	-0.02	T1P14A	0.60	0.55
T0P9C	0.09	0.08	T1P14AE	0.22	0.32
T0P9CS	0.53	0.42	T1P14B	0.02	0.02
T0P9D	0.51	0.47	T1P14BE	0.60	0.51
T0P9SE	0.07	0.06	T1P14BS	-0.08	-0.06
T1P10A	2.06	1.89	T1P14C	0.26	0.24
T1P10AE	-0.23	-0.19	T1P14CS	2.82	2.21
T1P10B	1.77	1.62	T1P14D	0.60	0.55
T1P10BE	0.14	0.13	T1P14SE	0.38	0.28
T1P10BS	-0.86	-0.67	T1P15AE	0.22	0.32
T1P10C	5.32	4.88	T1P15B	0.60	0.55
T1P10CS	1.31	1.03	T1P15BE	0.66	0.56
T1P10D	2.97	2.73	T1P15BS	0.82	0.64
T1P10SE	0.38	0.28	T1P15C	0.60	0.55
T1P11A	0.31	0.29	T1P15CS	0.12	0.10
T1P11AE	0.57	0.48	T1P15SE	0.87	0.64
T1P11B	0.42	0.39	T1P16A	-0.10	-0.09
T1P11BE	0.60	0.51	T1P16AE	0.17	0.18
T1P11BS	0.41	0.33	T1P16B	0.60	0.55
T1P11C	0.23	0.21	T1P16BE	0.44	0.46
T1P11CS	0.47	0.37	T1P16BS	0.82	0.64
T1P11D	0.02	0.02	T1P16C	0.60	0.55
T1P11SE	0.61	0.45	T1P16CS	0.82	0.64
T1P12A	0.60	0.55	T1P16D	0.11	0.11
T1P12AE	0.66	0.56	T1P16SE	0.65	0.56
T1P12B	0.51	0.47	T1P7A	0.54	0.50
T1P12BE	0.57	0.48	T1P7AE	0.48	0.41
T1P12BS	-0.34	-0.26	T1P7B	0.54	0.50
T1P12C	0.60	0.55	T1P7BE	0.48	0.41
T1P12CS	-0.60	-0.47	T1P7BS	0.67	0.53
T1P12D	0.60	0.55	T1P7C	0.38	0.45
T1P12SE	-0.17	-0.12	T1P7CS	0.57	0.53
T1P13A	0.60	0.55	T1P7D	0.38	0.45
T1P13AE	0.66	0.56	T1P7SE	0.50	0.37
T1P13B	0.00	0.00	T1P8A	0.57	0.53
T1P13BE	0.02	0.02	T1P8AE	0.63	0.53

Unit number	I value	Z score	Unit number	I value	Z score
T1P13BS	1.13	0.88	T1P8B	-0.01	-0.01
T1P13C	-0.15	-0.14	T1P8BE	-0.03	-0.02
T1P13CS	1.24	0.97	T1P8BS	-0.35	-0.27
T1P13D	0.60	0.55	T1P8C	0.54	0.50
T1P13SE	0.05	0.04	T1P8CS	0.52	0.41
T1P8D	0.51	0.47	T2P13BE	0.22	0.19
T1P8SE	-0.02	-0.01	T2P13BS	0.28	0.22
T1P9A	-0.11	-0.10	T2P13C	1.05	0.97
T1P9AE	0.06	0.05	T2P13CS	-0.04	-0.03
T1P9B	2.35	2.16	T2P13D	9.75	8.95
T1P9BE	4.99	4.23	T2P13SE	0.32	0.24
T1P9BS	0.51	0.40	T2P14A	-0.80	-0.73
T1P9C	0.41	0.38	T2P14AE	-0.02	-0.01
T1P9CS	-0.74	-0.57	T2P14B	0.33	0.31
T1P9D	0.29	0.26	T2P14BE	-0.17	-0.14
T1P9SE	4.31	3.18	T2P14BS	-0.09	-0.07
T2P10A	-0.06	-0.05	T2P14C	0.78	0.71
T2P10AE	0.00	0.00	T2P14CS	0.05	0.04
T2P10B	4.55	4.18	T2P14D	2.30	2.12
T2P10BE	0.89	0.76	T2P14SE	0.34	0.26
T2P10BS	2.17	1.70	T2P15A	0.09	0.09
T2P10C	1.27	1.17	T2P15AE	0.66	0.56
T2P10CS	-0.37	-0.28	T2P15B	0.31	0.29
T2P10D	0.52	0.48	T2P15BE	0.63	0.53
T2P10SE	-0.43	-0.31	T2P15BS	0.63	0.50
T2P11A	-0.06	-0.05	T2P15C	-0.29	-0.27
T2P11AE	0.22	0.19	T2P15CS	0.03	0.03
T2P11B	0.02	0.02	T2P15D	-0.94	-0.86
T2P11BE	0.34	0.29	T2P15SE	0.75	0.56
T2P11BS	0.28	0.22	T2P16A	0.60	0.55
T2P11C	0.02	0.02	T2P16AE	0.44	0.46
T2P11CS	0.22	0.18	T2P16B	0.60	0.55
T2P11D	-0.06	-0.05	T2P16BE	0.44	0.46
T2P11SE	0.09	0.07	T2P16BS	0.82	0.64
T2P12A	5.40	4.96	T2P16C	0.60	0.55
T2P12AE	3.12	2.64	T2P16CS	0.79	0.62
T2P12B	3.57	3.28	T2P16D	0.60	0.55
T2P12BE	2.41	2.04	T2P16SE	0.65	0.56
T2P12BS	-0.03	-0.02	T2P7A	0.08	0.08
T2P12C	2.71	2.49	T2P7AE	-0.22	-0.19
T2P12CS	0.11	0.09	T2P7B	-0.06	-0.06

Unit number	I value	Z score	Unit number	I value	Z score
T2P12D	3.57	3.28	T2P7BE	0.19	0.16
T2P12SE	0.00	0.00	T2P7BS	0.03	0.03
T2P13A	8.45	7.76	T2P7C	-0.01	-0.01
T2P13AE	1.91	1.62	T2P7CS	0.21	0.20
T2P13B	0.25	0.24	T2P7D	0.23	0.28
T2P7SE	0.64	0.47	T3P12BS	0.18	0.14
T2P8A	0.01	0.01	T3P12C	0.58	0.53
T2P8AE	-0.06	-0.05	T3P12CS	0.73	0.57
T2P8B	0.22	0.21	T3P12D	0.34	0.32
T2P8BE	-0.16	-0.13	T3P12SE	-0.17	-0.12
T2P8BS	0.73	0.57	T3P13A	0.60	0.55
T2P8C	0.17	0.16	T3P13AE	0.66	0.56
T2P8CS	0.67	0.53	T3P13B	2.18	2.00
T2P8D	0.14	0.14	T3P13BE	-0.25	-0.21
T2P8SE	0.23	0.17	T3P13BS	7.06	5.52
T2P9A	15.30	14.04	T3P13C	1.73	1.59
T2P9AE	11.88	10.06	T3P13CS	5.46	4.26
T2P9B	3.69	3.39	T3P13D	0.54	0.50
T2P9BE	1.12	0.95	T3P13SE	8.53	6.29
T2P9BS	-0.07	-0.06	T3P14A	0.28	0.26
T2P9C	3.32	3.05	T3P14AE	0.66	0.56
T2P9CS	0.26	0.21	T3P14B	4.16	3.82
T2P9D	5.33	4.89	T3P14BE	-0.83	-0.70
T2P9SE	0.02	0.02	T3P14BS	15.51	12.12
T3P10A	0.43	0.39	T3P14C	-0.46	-0.42
T3P10AE	0.18	0.15	T3P14CS	24.53	19.17
T3P10B	0.08	0.08	T3P14D	0.34	0.32
T3P10BE	0.29	0.25	T3P14SE	-0.54	-0.39
T3P10BS	0.59	0.46	T3P15A	0.60	0.55
T3P10C	0.16	0.15	T3P15AE	0.63	0.53
T3P10CS	0.35	0.28	T3P15B	0.60	0.55
T3P10D	-0.17	-0.16	T3P15BE	0.66	0.56
T3P10SE	0.78	0.58	T3P15BS	0.46	0.36
T3P11A	0.27	0.25	T3P15C	0.51	0.47
T3P11AE	0.39	0.34	T3P15CS	-0.06	-0.04
T3P11B	0.60	0.55	T3P15D	0.40	0.37
T3P11BE	0.66	0.56	T3P15SE	0.76	0.56
T3P11BS	0.67	0.53	T3P16A	0.60	0.55
T3P11C	0.51	0.47	T3P16AE	0.44	0.46
T3P11CS	0.59	0.46	T3P16B	0.60	0.55
T3P11D	0.34	0.31	T3P16BE	0.44	0.46

Unit number	I value	Z score	Unit number	I value	Z score
T3P11SE	0.87	0.64	T3P16BS	0.82	0.64
T3P12A	0.40	0.37	T3P16C	0.60	0.55
T3P12AE	0.45	0.39	T3P16CS	0.82	0.64
T3P12B	0.52	0.48	T3P16D	0.60	0.55
T3P12BE	-0.11	-0.09	T3P16SE	0.65	0.56
T3P7A	0.40	0.37	T4P11C	-0.08	-0.07
T3P7AE	0.66	0.56	T4P11CS	0.00	0.00
T3P7B	0.57	0.53	T4P11D	-0.03	-0.03
T3P7BE	0.52	0.44	T4P11SE	0.01	0.01
T3P7BS	0.76	0.59	T4P12A	-0.31	-0.28
T3P7C	0.38	0.45	T4P12AE	0.40	0.34
T3P7CS	0.60	0.55	T4P12B	0.12	0.11
T3P7D	0.38	0.45	T4P12BE	0.09	0.08
T3P7SE	0.62	0.46	T4P12BS	-0.05	-0.04
T3P8A	0.54	0.50	T4P12C	-0.13	-0.12
T3P8AE	0.48	0.41	T4P12CS	-0.17	-0.13
T3P8B	0.60	0.55	T4P12D	0.14	0.13
T3P8BE	0.60	0.51	T4P12SE	0.05	0.04
T3P8BS	0.82	0.64	T4P13A	11.69	10.73
T3P8C	0.57	0.53	T4P13AE	18.45	15.62
T3P8CS	0.76	0.59	T4P13B	2.06	1.89
T3P8D	0.60	0.55	T4P13BE	3.96	3.35
T3P8SE	0.87	0.64	T4P13BS	0.52	0.41
T3P9A	0.23	0.21	T4P13C	0.60	0.55
T3P9AE	-0.08	-0.07	T4P13CS	-0.31	-0.24
T3P9B	0.56	0.51	T4P13D	7.71	7.07
T3P9BE	0.45	0.38	T4P13SE	-0.39	-0.28
T3P9BS	0.76	0.59	T4P14A	21.49	19.71
T3P9C	0.44	0.41	T4P14AE	1.48	1.26
T3P9CS	0.76	0.60	T4P14B	36.69	33.66
T3P9D	0.04	0.04	T4P14BE	11.16	9.46
T3P9SE	0.64	0.47	T4P14BS	12.92	10.10
T4P10A	0.29	0.27	T4P14C	25.44	23.34
T4P10AE	0.36	0.31	T4P14CS	5.42	4.23
T4P10B	0.44	0.41	T4P14D	41.01	37.62
T4P10BE	0.48	0.41	T4P14SE	0.52	0.39
T4P10BS	0.64	0.50	T4P15A	0.07	0.07
T4P10C	0.56	0.51	T4P15AE	0.15	0.13
T4P10CS	0.64	0.51	T4P15B	2.38	2.19
T4P10D	-0.11	-0.10	T4P15BE	0.65	0.55
T4P10SE	0.37	0.27	T4P15BS	2.71	2.12

Unit number	I value	Z score	Unit number	I value	Z score
T4P11A	0.14	0.13	T4P15C	5.62	5.16
T4P11AE	0.42	0.36	T4P15CS	4.94	3.86
T4P11B	-0.80	-0.73	T4P15D	0.23	0.22
T4P11BE	-0.87	-0.73	T4P15SE	1.12	0.83
T4P11BS	0.62	0.49	T4P16A	0.60	0.55
T4P16AE	0.44	0.46	T5P10CS	0.57	0.45
T4P16B	0.36	0.33	T5P10D	0.12	0.11
T4P16BE	0.41	0.42	T5P10SE	-0.08	-0.06
T4P16BS	-0.17	-0.13	T5P11A	0.62	0.57
T4P16C	-0.08	-0.07	T5P11AE	-0.15	-0.13
T4P16CS	2.02	1.58	T5P11B	2.19	2.01
T4P16D	0.48	0.45	T5P11BE	1.07	0.91
T4P16SE	0.59	0.51	T5P11BS	-0.32	-0.25
T4P7A	0.60	0.55	T5P11C	1.15	1.06
T4P7AE	0.60	0.51	T5P11CS	-0.72	-0.56
T4P7B	0.60	0.55	T5P11D	0.06	0.06
T4P7BE	0.28	0.24	T5P11SE	0.02	0.02
T4P7BS	0.55	0.43	T5P12A	0.19	0.18
T4P7C	0.38	0.45	T5P12AE	0.11	0.09
T4P7CS	0.05	0.05	T5P12B	-0.02	-0.02
T4P7D	0.38	0.45	T5P12BE	0.16	0.14
T4P7SE	-0.15	-0.10	T5P12BS	0.50	0.40
T4P8A	0.60	0.55	T5P12C	0.01	0.01
T4P8AE	0.66	0.56	T5P12CS	0.43	0.34
T4P8B	0.01	0.01	T5P12D	0.02	0.02
T4P8BE	0.29	0.25	T5P12SE	0.40	0.30
T4P8BS	-0.46	-0.36	T5P13A	0.32	0.29
T4P8C	0.17	0.16	T5P13AE	0.67	0.57
T4P8CS	0.04	0.04	T5P13B	-0.11	-0.10
T4P8D	0.60	0.55	T5P13BE	0.48	0.41
T4P8SE	0.25	0.19	T5P13BS	0.12	0.10
T4P9A	0.60	0.55	T5P13C	0.22	0.21
T4P9AE	0.33	0.29	T5P13CS	0.22	0.18
T4P9B	0.52	0.48	T5P13D	0.06	0.06
T4P9BE	0.63	0.53	T5P13SE	0.04	0.03
T4P9BS	0.71	0.56	T5P14A	4.95	4.54
T4P9C	0.46	0.43	T5P14AE	1.75	1.49
T4P9CS	0.63	0.50	T5P14B	0.31	0.29
T4P9D	0.60	0.55	T5P14BE	-0.03	-0.02
T4P9SE	0.87	0.64	T5P14BS	0.00	0.00
T5P10A	0.38	0.35	T5P14C	0.89	0.82

Unit number	I value	Z score	Unit number	I value	Z score
T5P10AE	0.06	0.05	T5P14CS	-0.19	-0.15
T5P10B	0.02	0.03	T5P14D	3.16	2.90
T5P10BE	0.25	0.22	T5P14SE	0.26	0.19
T5P10BS	0.20	0.16	T5P15A	1.42	1.30
T5P10C	0.26	0.24	T5P15AE	0.13	0.11
T5P15B	-0.02	-0.02	T5P9D	0.46	0.42
T5P15BE	-0.09	-0.07	T5P9SE	0.84	0.62
T5P15BS	0.56	0.44	T6P10A	0.28	0.26
T5P15C	-0.25	-0.23	T6P10AE	0.01	0.01
T5P15CS	0.27	0.21	T6P10D	0.57	0.53
T5P15D	3.19	2.93	T6P11A	0.00	0.01
T5P15SE	0.49	0.36	T6P11AE	0.06	0.05
T5P16A	0.97	0.89	T6P11D	-0.19	-0.17
T5P16AE	-0.18	-0.19	T6P12A	0.51	0.47
T5P16B	0.10	0.09	T6P12AE	0.36	0.31
T5P16BE	-0.26	-0.27	T6P12D	0.40	0.37
T5P16BS	-0.02	-0.01	T6P13A	-0.08	-0.07
T5P16C	0.55	0.50	T6P13AE	-0.01	0.00
T5P16CS	-0.02	-0.01	T6P13D	0.17	0.16
T5P16D	3.57	3.28	T6P14A	-0.01	-0.01
T5P16SE	0.45	0.38	T6P14AE	0.17	0.15
T5P7A	0.18	0.17	T6P14D	0.02	0.02
T5P7AE	0.40	0.34	T6P15A	0.60	0.55
T5P7B	0.60	0.55	T6P15AE	0.66	0.56
T5P7BE	0.66	0.56	T6P15D	0.48	0.45
T5P7BS	0.82	0.64	T6P16A	0.43	0.39
T5P7C	0.38	0.45	T6P16AE	0.44	0.46
T5P7CS	0.60	0.55	T6P16D	0.34	0.32
T5P7D	-0.59	-0.69	T6P6A	0.38	0.45
T5P7SE	0.87	0.64	T6P6AE	0.44	0.46
T5P8A	0.20	0.18	T6P6B	0.60	0.55
T5P8AE	0.57	0.48	T6P6BE	0.44	0.46
T5P8B	0.60	0.55	T6P6BS	0.60	0.55
T5P8BE	0.66	0.56	T6P6C	0.38	0.45
T5P8BS	0.82	0.64	T6P6CS	0.60	0.55
T5P8C	0.60	0.55	T6P6D	0.16	0.32
T5P8CS	0.82	0.64	T6P7A	0.60	0.55
T5P8D	0.46	0.42	T6P7AE	0.66	0.56
T5P8SE	0.87	0.64	T6P7B	0.52	0.48
T5P9A	0.42	0.39	T6P7BE	0.41	0.42
T5P9AE	0.42	0.36	T6P7BS	0.35	0.42

Unit number	I value	Z score	Unit number	I value	Z score
T5P9B	0.60	0.55	T6P7C	0.58	0.53
T5P9BE	0.57	0.48	T6P7CS	0.38	0.45
T5P9BS	0.82	0.64	T6P7D	0.60	0.55
T5P9C	0.60	0.55	T6P8A	0.60	0.55
T5P9CS	0.82	0.64	T6P8AE	0.66	0.56
T6P8B	0.16	0.32	T8P2BS	-0.08	-0.05
T6P8C	0.60	0.55	T8P2C	0.04	0.07
T6P8CS	0.22	0.32	T8P2CS	-0.77	-0.62
T6P8D	0.60	0.55	T8P2D	4.67	5.79
T6P9A	0.60	0.55	T8P3A	-0.01	0.01
T6P9AE	0.66	0.56	T8P3AE	0.32	0.37
T6P9D	0.60	0.55	T8P3B	-0.08	-0.06
T7P6A	0.38	0.45	T8P3BE	-0.04	-0.02
T7P6B	0.14	0.28	T8P3BS	-0.01	0.00
T7P6C	0.14	0.28	T8P3C	0.00	0.02
T7P6D	0.38	0.45	T8P3CS	0.05	0.08
T10P01A	0.07	0.10	T8P3D	0.24	0.32
T10P01D	-0.23	-0.28	T8P4A	0.14	0.19
T8P01B	-1.16	-1.11	T8P4AE	0.05	0.07
T8P01BE	-0.80	-0.70	T8P4B	0.78	0.79
T8P01BS	-1.61	-1.32	T8P4BE	0.68	0.63
T8P01C	-0.16	-0.18	T8P4BS	1.64	1.40
T8P01CS	0.22	0.24	T8P4C	0.10	0.12
T8P01SE	-0.04	-0.01	T8P4CS	0.43	0.45
T8P0A	0.34	0.44	T8P4D	0.41	0.53
T8P0AE	0.16	0.19	T8P4SE	1.70	1.37
T8P0B	0.79	0.79	T8P5A	0.00	0.02
T8P0BE	0.09	0.10	T8P5B	0.39	0.51
T8P0BS	2.47	2.09	T8P5BS	1.08	1.09
T8P0C	0.19	0.21	T8P5C	0.88	0.89
T8P0CS	2.67	2.26	T8P5CS	1.84	1.57
T8P0D	0.27	0.57	T8P5D	-0.04	-0.03
T8P0SE	-0.08	-0.04	T9P01A	-4.35	-4.23
T8P1A	0.07	0.11	T9P01AE	-4.30	-3.86
T8P1AE	1.99	2.19	T9P01B	0.24	0.25
T8P1B	-0.35	-0.32	T9P01BE	0.43	0.49
T8P1BE	-0.14	-0.11	T9P01BS	0.51	0.53
T8P1BS	-0.05	-0.01	T9P01C	-0.23	-0.28
T8P1C	-0.70	-0.66	T9P01CS	-0.09	-0.07
T8P1CS	-0.88	-0.71	T9P01D	0.18	0.25
T8P1D	-0.04	-0.03	T9P0A	2.71	2.68

Unit number	I value	Z score	Unit number	I value	Z score
T8P1SE	0.56	0.47	T9P0AE	0.11	0.13
T8P2A	3.34	4.14	T9P0B	0.63	0.80
T8P2AE	0.65	0.73	T9P0BE	0.53	0.59
T8P2B	-0.37	-0.34	T9P0C	0.54	0.68
T8P2BE	-0.12	-0.11	T9P0D	1.90	1.88
T9P1A	-0.01	0.01			
T9P1AE	-1.21	-1.07			
T9P1B	0.31	0.39			
T9P1BE	-0.22	-0.22			
T9P1C	0.24	0.32			
T9P1D	-0.09	-0.07			
T9P2A	-0.11	-0.12			
T9P2B	-0.34	-0.67			
T9P2C	-0.78	-0.95			
T9P2D	-2.66	-2.58			
T9P4A	1.36	1.35			
T9P4AE	1.48	1.36			
T9P4D	0.60	0.76			
T9P5A	0.86	1.09			
T9P5D	1.36	1.35			