INVESTIGATING CRAFT SPECIALIZATION DURING THE LONGSHAN PERIOD OF CHINA

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I will never forget the first time I saw some of the famous thin-walled, black polished pottery from the Longshan Period (ca. 2600–1900 B.C.) in Shandong province of northern China. The time was 1987. I was exhausted from weeks of traveling alone, by bicycle and on unbelievably crowded trains and buses, to study pottery vessels from the Longshan Period. I had only seen this pottery in photographs, and I was spellbound as I gazed at the incredible eggshell-thin vessels on display. The elegant, tall-stemmed cups had walls that were literally as thin as eggshells, approximately one millimeter in thickness. These vessels represent the climax of ceramic technology in ancient China and, as far as I am aware, no prehistoric vessels of this kind have been found in any other area of the world (Figure 1). I stayed transfixed in front of those museum display cases, lost in thought, as families with small children moved past me.

What were these tall stemmed cups used for? Surely they were too fragile to be used for daily eating and drinking. Besides, most of these vessels were found in burials, so they probably were used in rituals. Judging by the relatively large quantities of goods in burials, probably only the wealthy and powerful people had the privilege of using the cups. How I wished I could jump in a time machine and observe people from the Longshan Period using these cups at funeral ceremonies. Who were the potters who made the eggshell-thin vessels? As many archaeologists have suggested, they must have been craft specialists, since clearly they had unusual skills. What kind of craft specialization existed? My mind drifted off, imagining potters in workshops carefully thinning vessel walls by scraping, as an overseer inspected their work.

Then I remembered the less elaborate vessels from Longshan sites in the Huang or Yellow River valley that I had examined in museums and storerooms at archaeological work stations (see Figure 2 for the location of this area). There is great variety in the shapes of vessels that people must have used on a daily basis for food preparation, cooking, storage, and serving. (See Figure 3 for a pitcher that may have been placed over a fire and used to prepare soups or heat liquids.) More questions arose. What kind of organization of labor existed for the production of these vessels? Was it different for the eggshell pottery? Did most communities have a few craft specialists who made vessels for every family? Was there more than one kind of craft specialization during the Longshan Period? Were there important changes in the way pottery vessels were made and used during this period?

Archaeologists in several areas of the world have suggested
that change in craft specialization played a role in the development of complex societies. Since that initial trip to study pottery collections, I have continued to investigate craft specialization during the late prehistoric Longshan Period. After discussing some of the approaches archaeologists in China have used for
investigating the Longshan Period, I will describe my own attempts to investigate change in craft specialization.

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**Research in China**

**On the Longshan Period**

The Longshan Period is extremely important in Chinese archaeology because it provides information on the precursors of civilization in China. For over fifty years, archaeologists have excavated late prehistoric and early historic sites in the Huang River valley in order to learn how early Chinese civilization developed. One significant characteristic of archaeology in China is that practitioners regard the field as part of history. Archaeologists work to
trace the history of their long, continuous civilization, one with which they feel a direct and personal connection. In contrast, most archaeologists in North America regard archaeology as a subfield of anthropology. Most archaeologists working in North America are not Native Americans and have no ancestral ties to the prehistoric cultures they study. These American archaeologists seek to identify similarities and differences among prehistoric cultures in various areas, rather than to trace the origins of their own culture.

In China, one priority in archaeological research is to trace the origins of key features of early Chinese civilization. These fea-
tures include large settlements with surrounding walls of rammed earth, bronze metallurgy, writing, and clear social differentiation represented in mortuary ritual. These features characterize the earliest undisputed dynasty in China, the Shang (ca. 1700–1100 B.C.) as well as the Western Zhou (ca. 1100 B.C.–770 B.C.), which followed the Shang Dynasty. A dynasty is a succession of kings from the same line of descent. Archaeologists also use the terms Shang and Zhou to refer to time periods.

Legends and written records suggest that an even earlier dynasty, the Xia, existed in the Huang River valley sometime before ca. 1700 B.C. Therefore, another priority in research is identifying archaeological remains from the Xia Dynasty. Archaeologists have faced difficulties in this task, however, because no writing from the period has been found. Most archaeologists think that remains of what is called the Erlitou Culture in central and western Henan as well as southwestern Shanxi province, represent the Xia, judging from expected location, dating, and the degree of social complexity represented by the remains. However, there is great debate over which specific periods of Erlitou Culture remains belong to the Xia Dynasty.

An important goal in archaeological research is to identify the sequence of cultures over time in each major area along the Huang River valley, especially to identify the sequence of cultures that led to the development of each early dynasty. Archaeologists identify different types, or leixing, of Longshan Culture in different areas, such as western Henan and eastern Shandong provinces, on the basis of variation in pottery styles and other factors. Archaeologists believe that remains from Longshan Period sites in western Henan and southern Shanxi provinces belong to one type of Longshan Culture and represent the predecessors of people who lived during the Xia Dynasty. Similarly, remains from northern Henan and southern Hebei provinces are ancestral to the Shang Dynasty. Another important goal of research on the Longshan Period is to document the first appearance of bronze metallurgy, walled towns, and other key characteristics of early Chinese civilization.

There are many debates about the Longshan Period. A central debate concerns the level of social complexity represented by the large, walled sites such as Wangchenggang in western Henan province. Some archaeologists believe that this site actually represents the earliest remains of the Xia Dynasty rather than a pre-state society. Some researchers even argue that the Longshan
Period as a whole represents the first development of states, urbanization, and civilization in China. It is likely that complex societies developed in a parallel fashion in more than one region of the Huang River valley, not just western Henan. Sites with surrounding walls, traces of metallurgy, and rich burials that appear to symbolize social stratification have been found from Shanxi province in the west to Shandong province in the east. In addition, recent discoveries in other areas of China are forcing archaeologists to evaluate their views about where civilization first evolved. Archaeologists have discovered late prehistoric sites with remains indicating cultural complexity in other areas—most notably, the lower and middle Yangzi River valley (see Figure 2). This area has large sites with surrounding earthen walls and extremely rich burials. For example, burials from the Liangzhu Culture (ca. 3300–2200 B.C.) are known for their large quantities of elaborate jade objects. These sites challenge the long established notion that the Huang River valley is the single center for the origins of Chinese civilization. Complex societies developed in more than one area, and probably several were contemporary with one another. One should consider that each area contributed to the development of Chinese civilization.

Some current research in China is also devoted to determining the processes by which civilization evolved. Archaeologists in China, as in other countries, have investigated topics such as warfare, the rise of urbanization, and social stratification as indicated by burials.

One of my goals has been to tell English-speaking archaeologists about the exciting research being done on the Longshan Period, because it is difficult for foreigners to get access to archaeological reports published in Chinese. I have also offered my own interpretations about the processes by which complex societies developed in China. Trained in North American anthropological archaeology, I have approached the development of civilization in China partially from a comparative perspective. I have sought to understand whether processes of change were similar to or different from those in other areas of the world where early complex societies emerged.

The concept of chiefdom is useful for describing general characteristics of Longshan sociopolitical organization. The Longshan Period appears to have features similar to pre-state societies known as chiefdoms in other areas of the world. These features include regional settlement hierarchies (interrelated
groups of settlements with political centers that may have had important economic or religious functions, and smaller settlements such as villages, social stratification as indicated by differences in burials and houses, craft specialization (such as pottery vessels and jade items), and competition between elites to increase their political power. I have examined these features in an effort to examine how and why cultural change occurred during the Longshan Period. Researchers have particularly remarked that the elaborate pottery vessels from the Longshan Period indicate the existence of craft specialization. I have investigated the relationship between change in craft specialization and the development of complex societies.

**CURRENT MODELS OF CRAFT SPECIALIZATION**

Many archaeologists assume that the organization of labor to produce craft goods changes as social and political systems become more complex. For example, they expect change from part-time to full-time craft specialization as chiefdoms evolve into states. Also, researchers expect that societies with social ranking such as chiefdoms would have two different kinds of craft goods, utilitarian and prestige goods. The former represent goods used on a daily basis and those that are accessible to all households. Prestige goods are those made from costly, rare, or difficult to obtain materials and often represent considerable labor input. Only households with sufficient resources would have the means to acquire these objects. To ensure a steady supply of these luxury goods, high status households might support the craftspeople who made them (providing materials, food, etc.). Archaeologists call this kind of sponsored production “attached specialization.” Elites could set up workshops for craftspeople in the vicinity of their residences in order to oversee production more effectively. In contrast, archaeologists call production of utilitarian items by specialists free of elite control “independent specialization.”

There has been much debate about how craft specialization changes as complex societies develop. Were there more significant changes in attached specialization or in independent specialization? Some archaeologists argue that more changes occurred in
attached specialization. As elites competed with others to increase their wealth and political power, they sought to acquire greater quantities and varieties of prestige goods. Thus, elites attempted to increase their control of production, distribution, and use of these goods. Other archaeologists argue that there were also important changes in independent specialization, such as making greater quantities of goods more efficiently and exchanging them over longer distances. These changes integrated communities over greater distances and were accompanied by greater occupational specialization in general.¹⁸

Archaeologists who work in different areas of the world have developed criteria to identify organization of pottery production at sites. Researchers use information on traditional pottery production obtained from ethnography, ethnohistory, and archaeology to describe the variation in organization of labor that could have existed in prehistory. Archaeologists have also collected their own information on traditional pottery production. These studies are called “ethnoarchaeological,” because archaeologists study the material culture of contemporary peoples in order to improve methods for interpreting remains on ancient sites.¹⁹

Some archaeologists have described the different kinds of organization of labor to produce pottery as “modes of production.” By this they mean models or descriptions of the organization of labor, including information about craftspeople and where they work.²⁰ Who were these craftspeople—what was their sex, age, and kin group? Did they work in their own houses or in workshops? What kinds of techniques did they use—hand building techniques, wheels, or molds? What was the division of labor to make vessels? Archaeologists have identified several modes of production, from simple to complex, and most of these involve specialization.

Two of these modes are useful as starting points for investigating the organization of labor to make pottery vessels during the Longshan Period. One is called “household industry” and refers to specialization on a relatively small scale. A few households in a village specialize in pottery production and exchange their vessels for goods from other households. “Individual workshop industry” may have existed during the Longshan Period, too. This term refers to specialized production in spaces exclusively for pottery and involves production of greater quantities of vessels as well as exchange of vessels over longer distances.²¹

In order to identify organization of ceramic production in prehistory, archaeologists have relied upon two criteria. One is
the degree of standardization of vessels. For example, archaeologists expect pots in a system of individual workshop industry to exhibit a greater degree of standardization than those produced in a system of household industry. There should be a relatively small number of producers within a given area, and each one should strive to make vessels efficiently. Researchers assess degree of vessel standardization by measuring the major dimensions of pots, such as height and maximum diameter. It is also worthwhile to assess the variety of decorative techniques and the like used to make individual shapes of vessels.\textsuperscript{22} The second kind of evidence archaeologists use to assess organization of pottery production is remains of production areas in sites. Some scholars believe that it should be possible to recognize individual workshop industry by the presence of a small quantity of structures exclusively devoted to pottery production. Similarly, more production areas in or near residences should indicate household industry.\textsuperscript{23}

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**STUDYING POTTERY FROM THE LONGSHAN PERIOD**

When I initially chose to work on craft specialization, I considered the materials realistically available for study in China and designed methods of data collection that involved examination of excavated vessels described in published reports. Pottery vessels constitute the most abundant category of remains from late Neolithic sites, and they are well described in archaeological reports. Also, I had good reason to expect that I would be allowed to examine many vessels in museum displays and in storage areas.

When I went to China to do my initial research, I planned to investigate the organization of pottery production during the Longshan Period by assessing degree of vessel standardization, varieties of vessels, and direct evidence for production at sites, such as tools and kilns. My first step was to choose sites with clear dating of periods and published reports with detailed descriptions of pottery. During my six-month stay in China in 1987, I learned about the Longshan Period from archaeologists at Beijing University and also visited several museums and archaeological research stations in Henan and Shandong provinces where
vessels from my sites of interest were stored. I examined as many as possible from each site.

Sometimes finding and examining particular pottery collections was difficult. After a long, crowded train trip I might find that a particular town did not have the vessels in question after all. I learned to accept the fact that occasionally I would make a fool of myself as I became more acquainted with each area. One day my hosts thoughtfully took me to visit the location of an archaeological site. I stood in front of the stone marker to get a closer look at the Chinese characters, noticing that my hosts kept their distance. I soon realized that I was sinking up to my knees in a pile of compost, containing night soil, for the fields. My hosts kindly kept from laughing too hard as they led me to a local family’s water pump to wash off.

Being able to see particular vessels mentioned in site reports helped me understand the kinds of information these reports provide. I examined primarily whole, reconstructed vessels from Longshan sites. In China, one of the main purposes of describing pottery vessels is for identifying different time periods and tracing the historical development of a culture. Archaeologists reconstruct as many vessels from sites as possible in order to obtain information for establishing a relative chronology based on morphological and stylistic features. Therefore, these kinds of data are emphasized in Neolithic site reports. Some of the information I needed for my study could only be obtained by my own observations. When my hosts gave me permission, I measured as many vessels of each different shape as possible to assess degree of standardization. I brought the necessary equipment with me. I also recorded diversity of shape classes and decorative techniques per period at these sites.

As is often the case, doing fieldwork causes one to learn unexpected things. I saw a greater variety of utilitarian and possible prestige vessels from Longshan sites than I had anticipated. For example, there were several kinds of thin-walled vessels in addition to the famous eggshell vessels. When I returned to North America to analyze my data, I realized that I should think in broader terms about the ways in which pottery production and use can change as change in sociopolitical organization occurs. Focusing exclusively on change in mode of production is too limiting. The development of complex societies can be accompanied by more than one kind of ceramic change, involving utilitarian or prestige vessels. Important changes in ceramics may not be
accompanied by a change in organization of labor. For instance, new shapes of pottery vessels can emerge to accommodate new cooking techniques or new foods in the diet.\textsuperscript{24}

I formulated a more comprehensive model outlining the kinds of ceramic changes that can occur in a context of increasing cultural complexity. The model allows for consideration of more than one kind of possible prestige vessel during the Longshan Period. I saw several varieties of labor intensive vessels (thin-walled, highly polished, elaborately shaped, and very large vessels) in Henan and Shandong provinces. Archaeological reports indicate that these vessels were made in other areas along the Huang River valley, too. The very large vessels were a complete surprise. I researched the use of large containers for feasting by elites in traditional societies (ethnographic and archaeological) as one means to display status. I also examined cross-cultural data on conspicuous consumption with containers. In addition, I looked at data on the use of bronze and pottery vessels by elites during the Shang Dynasty in China. Then I incorporated these uses of containers in my model, outlining different possible trajectories of ceramic change during the Longshan Period. Finally, I considered the processes that could result in similarities in labor intensive techniques in different areas, such as exchange of vessels between elites and emulation (deliberate copying of techniques used in neighboring regions).\textsuperscript{25}

I concluded that attached specialists made labor intensive vessels for high status people in several areas throughout the Longshan Period. Some techniques, such as making thin-walled vessels, were probably copied in neighboring regions as elites sought to outdo others in displays of status. Although I do not have data on large quantities of labor intensive vessels, I do not think there is any evidence that these vessels became more standardized in shape or decoration over time. Thus, I do not see any evidence for a change in mode of production for prestige vessels, such as a change from household industry to individual workshop industry. I think that elites tried to make greater varieties of prestige vessels over time, but that this kind of change was not accompanied by a change in mode of production.

Most of the vessels that I was permitted to measure in China were probably utilitarian vessels, such as jars and small bowls. I do not see any evidence for increase over time in degree of dimensional standardization for these vessels, either. The limited data on decorative varieties per shape class do not indicate
increasing standardization in production. I infer that there was no change in organization of production for utilitarian vessels either. Thus, contrary to expectations for areas in which complex societies developed, I do not see any evidence for change in organization of pottery production. Since there are many varieties of vessels on sites, and excavators have not discovered any large workshops for pottery production, I suggest that many communities during the Longshan Period had potters, and that household industry (independent specialization) characterized most areas rather than individual workshop industry. Prestige vessels probably were made under a system of small-scale attached specialization (household industry near elite residences). I conclude that, in China, significant change in the organization of pottery production did not occur until after states were well established.

My study was the first systematic investigation of specialization of pottery production during the Chinese Neolithic Period. My results should be regarded as hypotheses rather than firm conclusions, since the samples of vessels available for study were small. I hope to test these hypotheses in future work by obtaining a larger sample of vessels and by examining other kinds of evidence. More information on the contexts in which labor intensive vessels occur at sites must be obtained in order to strengthen the hypothesis that they were used by elites. In addition, more direct evidence for pottery production at sites is needed, such as tools, spatial areas for shaping pots, and kilns. Also, it is necessary to compare these kinds of remains at sites within a given settlement hierarchy. At least some large, walled sites should yield evidence for attached specialization of labor intensive vessels. Many smaller sites where ordinary people lived should yield evidence for small scale specialization of production of utilitarian vessels. Whether or not people agree with my conclusions, I hope that I demonstrated the value of using the approach that I did. I also concluded during the course of my study that I could more effectively assess organization of ceramic production in the future by collecting my own ethnoarchaeological data in China.

Ceramic Ethnoarchaeological Research

Archaeological studies have been hampered by the limited methods available for investigating the organization of ceramic production. More ethnoarchaeological studies are needed to test the
validity of criteria such as degree of vessel standardization.\textsuperscript{26} It is not clear, for example, what the difference in degree of standardization of vessels should be for household industry versus individual workshop industry. When I began to plan my own ethnoarchaeological study, I wondered if there were other material indicators of variation in organization of ceramic production that had not been considered by scholars. After much inquiry, I learned that there were several areas in China with potters using traditional techniques, especially in the western provinces. Traditional pottery production is declining at a rapid rate throughout the world as economic change occurs, and it is imperative not to lose this opportunity to conduct ethnoarchaeological studies.\textsuperscript{27}

I worked to find areas in China where pottery is produced with traditional techniques and where vessels are used on a regular basis by local people. I also looked for areas with an organization of production equivalent to household industry, since this was likely an important kind of organization of labor during the Longshan Period. Of course, I also needed to find local researchers who would permit my study and were willing to assist me. I learned that many potters using traditional techniques are located in areas occupied by minority ethnic groups in western provinces. Chinese researchers have done important studies in some areas for over thirty years, but their main goal has been to document the history of a particular technological tradition, rather than organization of production.\textsuperscript{28}

In 1992, I had the opportunity to conduct a pilot study in two very different areas—Xinjiang province in northwest China and Guizhou province in the southwest (see Figure 2). The purpose was to visit a number of communities where pottery production takes place, to begin to collect data, and to determine which communities were more feasible for an in-depth project.

Xinjiang is an arid province with mountains and deserts interspersed with small farming villages. Uighur (Uygur) potters, Muslims who speak a Turkic language, make large water jars and flower pots by using earthen molds. There are several large dome-shaped mounds of packed earth in the courtyards of potting families. Potters spread clay on top of these molds to form the two halves of each vessel. In Guizhou province, potters from the Buyi ethnic group as well as Han (the majority ethnic group in China) potters live in small villages surrounded by terraced rice fields and lush, green mountains. They make a variety of ves-
sels, such as large storage jars and the small containers used to serve popular condiments of hot chili peppers that are eaten with every meal. (I was gradually able to increase my intake!) Potters in Guizhou use kick (fast) wheels of wood or dried clay to make the majority of vessels and, in some communities, wooden hand wheels to make small bowls.

In each area, the majority of potters are male, but they rely on the help of family members in more than one step of production. Thus, I think it is appropriate to describe this kind of system as family specialization. It is not surprising to find potters in these provinces also using some techniques that were developed after the late Neolithic Period, such as adding glaze to vessels. Pottery production has been an important activity in China since the Neolithic Period, and it would be difficult to find a community using purely Neolithic techniques. I do not claim that these communities directly represent pottery production as it was during the Longshan Period, but it is likely that they do represent a partially analogous situation.

I decided to continue my research in Guizhou province because there are more potting communities in which a greater variety of vessels are made. Also, the people speak Mandarin Chinese, the language I had been studying (although the dialect is very different from that of other areas such as Beijing). In Xinjiang I could not talk with potters directly, since I had not studied Uygur. I relied on the assistance of a skilled interpreter who translated from Uygur to Chinese, and vice versa. Another important factor in my decision was that potters in Guizhou use the fast wheel to make most vessels, a major technique used during the Longshan Period. I continued my study in Guizhou during the summers of 1993 and 1994, comparing specialization of pottery production in two different communities. The village I studied in 1994 is “closed” to foreigners, but thanks to the local Public Security Bureau I obtained permission to work there. I am now in the process of completing my analyses. At this point I can outline the methods I used during those three years as well as my preliminary results.29

One of my goals was to interview potters to learn details about the organization of labor in production. I tried to take into account recent criticisms about archaeological studies of organization of production, particularly the need for scholars to investigate organization of production more thoroughly. Archaeologists must investigate variation in factors such as intensity or time
spent in production, output, and scale. For example, the term *household industry* could include much variation along these lines. I asked potters questions about the time they spend in production (versus other activities such as farming), the varieties and quantities of pots they make, and distribution areas for their vessels.

I found that there is much more variation in organization of production among these family specialists than I expected. Some potters could be called “part-time” specialists because they are also farmers, while others are “full-time” producers. However, these terms are not very meaningful because there is considerable variation within each category of producers with respect to time spent making pottery vessels throughout the year, and the kinds of vessels made. Two factors that affect time spent in production are the availability of family members to help and the weather. (The drier seasons, summer and fall, are the most suitable.)

I studied vessels and workshops to see if any of this variation in organization of production would be recognizable from remains left in archaeological deposits. I noted varieties of vessels made by each potter and measured a large quantity of vessels to assess the degree of vessel standardization. I observed potters making vessels and the specific methods they used to standardize their products. Also, I measured and described the spatial areas where each step of the production process took place, including preparing clay, shaping, decorating, and firing.

One of my preliminary conclusions is that both part-time and full-time potters make highly standardized pots. It would not be possible to distinguish the difference in intensity or time spent in production by differences in degree of vessel standardization. Potters achieve remarkable standardization in shape by using their hands and simple bamboo tools. Potters have the incentive to make standardized vessels because consumers prefer to buy vessels of this kind. People told me they judge a potter’s skill at the village street markets on the basis of his ability to make vessels that look similar in size.

I have also concluded that archaeologists can learn a great deal about variation in organization of pottery production if they can identify locations in sites where different steps in production took place. Unfortunately, archaeologists often face difficulties in doing this because tools made of perishable materials are not preserved. I suggest that characteristics of work spaces can help reveal information, such as the intensity or time a potter spends in production. In Guizhou, there is much variation in the spatial
areas potters use in each step of the production process: preparing clay, shaping, decorating, drying vessels, and firing. A potter may use one or more whole rooms of a house, partial rooms, or a separate structure—a workshop. Potters who spend the most time in making vessels often choose to use relatively large workshops suitable for most steps in production.

It was a tremendous experience to observe pottery production, distribution, and use firsthand. I am extremely grateful to the local workers who provided so much assistance in studying these communities. I am also indebted to the patience and kindness of the potters and their families. I soon realized that ethnoarchaeologists have to accept the fact that local people, understandably, find our activities bizarre. Imagine if a person from another country came to your town for the summer and engaged in activities such as measuring containers in your kitchen. However, I do know that my interest and respect for the tremendous skills of the potters was appreciated. I hope that my report can help document a vibrant way of life in these villages.

**CONCLUSIONS**

The goal of my research on the Longshan Period of the Huang River valley has been to explain how specialization of pottery production changes in relation to the development of social complexity. This chapter illustrates the process I have gone through in conducting my research to date: learning about the kinds of research being done by archaeologists in China on the Longshan Period, considering theoretical arguments for change in craft specialization as complex societies develop, studying vessels from Longshan sites in China, evaluating the results of my research, and conducting an ethnoarchaeological study in order to evaluate methods for investigating specialization of ceramic production.

My concluding hypotheses about change in specialization of pottery production in a context of increasing cultural complexity should be tested at other late Neolithic sites in China. My limited data do not indicate that there was a change in organization of labor to make pottery vessels during the Longshan Period. There is no evidence for increasing standardization of utilitarian or prestige vessels, contrary to expectations of archaeologists working in other areas. However, I suspect that elites in many regions
sponsored production of a variety of labor intensive vessels for use in displays of status. More studies of change in pottery production and use should be undertaken in different regions of the Huang River valley as well as other areas, such as the Yangzi River valley, where complex societies developed. The unit of analysis should be individual settlement hierarchies, so that information on the kinds of vessels elites and other people used can be compared. It is likely that labor intensive vessels such as the eggshell-thin cups were made at centers of settlement under a system of attached specialization. Most communities, however, probably had independent specialists making many kinds of vessels for daily use. More direct evidence for pottery production at sites is needed. Change in the production and use of different kinds of pottery vessels during the Longshan Period must be studied in conjunction with change in other components of culture as more data become available. For example, did increasing warfare or the development of bronze metallurgy cause change in pottery production and use? Did increasing political centralization have an impact on the production of prestige vessels, but not utilitarian vessels?

On the basis of my ethnoarchaeological research in Guizhou province, I think that variation in organization of ceramic production within individual communities would have been common during the late prehistoric period. It is likely that there was variation in the time potters spent in production as well as the scale of production within a region, depending on the particular kinds of pottery vessels involved. Family specialization, an enduring organization of ceramic production in more than one region of China, is useful as a plausible general model for organization of labor during the Longshan Period, for the production of both utilitarian and prestige vessels—while recognizing that there may be variation in factors such as intensity or scale of production. Finally, my on-going statistical analyses of vessels from Guizhou suggest that difference in degree of vessel standardization may not always be a reliable indicator of differences in organization of ceramic production. One must consider factors such as consumer demand for standardization of particular kinds of vessels. I suggest that during the Longshan Period there was more incentive on the part of potters to standardize utilitarian vessels than prestige vessels, since efficiency in production was a major concern. However, identifying variation in spatial areas used in different steps of production may help archaeologists more profitably examine variation in
organization of labor and, ultimately, help them investigate change in specialization of pottery production in relation to the development of complex societies.

NOTES

1. I am grateful for the financial support from the Social Sciences and Humanities Research Council of Canada for my research in China on Longshan pottery vessels in 1987. My pilot project on ceramic ethnoarchaeology in Xinjiang and Guizhou provinces during 1992 was supported by the Committee on Scholarly Communication with China (Archaeology Subcommittee). My ceramic ethnoarchaeological project in Guizhou during 1993 and 1994 was funded by the National Science Foundation, Division of International Programs, Program for Research at Foreign Centers of Excellence, Grant No. INT-9303334. I also thank the Wenner-Gren Foundation for Anthropological Research for a supplemental research grant for my ethnoarchaeological research in 1993. Finally, I thank Erika Evasdottir of Harvard University for preparing Figure 2.


23. Ibid.


32. See P. Arnold, Domestic Ceramic Production.

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SUGGESTED READINGS


Government of Japan, and the Japan Society, pp. 10–14. Explains how archaeologists study change over time in ceramics and the social significance of this change.
Craft specialization is what archaeologists call the assignment of specific tasks to specific people or subsets of people in a community. An agricultural community might have had specialists who made pots or knapped flints or tended crops or stayed in touch with the gods or conducted burial ceremonies. Craft specialization is also part of the process that archaeologists believe may kickstart societal complexity. First, someone who spends their time making pots may not be able to spend time producing food for her family. The need to implement these kind of measures are also evident when we investigate $\gamma$, per-document-per-topic probabilities. td_gamma <- tidy(topic_model, matrix = "gamma", document_names = rownames(coindesk_dfm)). ggplot(td_gamma, aes(gamma, fill = as.factor(topic))) + geom_histogram(alpha = 0.8, show.legend = FALSE) + facet_wrap(~ topic, ncol = 3) + labs(title = "Distribution of document probabilities for each topic", subtitle = "Dense concentration of topic 1") Specialization is encouraged and rewarded by the CSC crafting system through increases in Tech Level and horizontal Tech Improvements. All items start with a base Tech Level of 1, these items can be improved both horizontally (adding of attributes and bonuses aka Tech Improvements) or vertically (increasing all attributes by increasing a Tech Level).