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Introduction

Craft Specialization and Social Complexity

During the last few decades, research in ethnoarchaeology has contributed much to the study of craft production and its relationship to the evolution of socioeconomic complexity.[1] One of the gaps in this knowledge, as Miriam Stark[2] argued, is information about the artisans who produce craft products. Although there are exceptions to this generalization,[3] a mass of information exists concerning the ecology, organization, and technical analyses of crafts,[4] but relatively little data exists about the people who make the pots, weave the cloth, or forge the metal.

This work aims to help fill this gap. It examines the history of production units and the changes in their organization in Ticul, Yucatán, over a period of almost forty-four years. Using narratives and images to tell the story of changes in personnel and the use of space, this work goes beyond the quantitative summaries used in my previous work, *Social Change and the Evolution of Ceramic Production and Distribution in a Maya Community*, to a more holistic understanding of the people who make the pots, where they do it, and changes in production space through time.

THE POPULATION OF CRAFTSMEN AND ARCHAEOLOGY

Knowledge about the population of craftsmen is essential to archaeological interpretation because it lies at the interface between the creation of material

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objects and the larger social system. It is one of *the* critical links between the objects archaeologists discover and their interpretations of social organization and social complexity.

Like all craft products, ceramic technology does not just consist of material objects, their constituent raw materials, and the techniques used to make them, but also involves the cognitive knowledge[5] and motor habits[6] necessary to design and produce them. This knowledge and muscle syntax (also called "muscle memory") necessary to fabricate pottery are transmitted from person to person by social processes.[7] These processes link the technology of the craft to the social patterns in the society—not just in relation to the evolution of production but also to its overall organization and its reproduction through time.[8] Similarly, pottery production takes place in a spatial context, and understanding potters' utilization of that space is critical for archaeologists' inferences of the organization of production from excavation data. But what happens to the population of potters and the spatial organization of their craft through time? The answer to this question in the present provides hypotheses for interpreting changing ceramic technology and its production space in the past, and how they reflect the evolution of social complexity.

THE SOCIAL ORGANIZATION OF POTTERY PRODUCTION

The first major dimension of production organization consists of the organization of the personnel that create the craft product. A quantitative description of this organization was compiled from informal surveys, observations, and notes made during the years from 1965 to 1997, generally described in a previous monograph. That work presented the large-scale patterns of change in potters' social organization, raw material procurement, production technology, demand, and distribution across a period of thirty-two years.[9] These patterns were presented as trend lines, but the data points were limited, and few trend lines showed high correlations with the data. Such patterns, however, did show that most of the potters in the production units were related to the production unit owner.

Another way to describe this change would be to use typologies of production organization developed by Van der Leeuw,[10] Peacock,[11] Brumfiel and Earle,[12] and Costin.[13] Brumfiel and Earle's typology,[14] for example, classified craft specialists as either independent or attached. As applied to pottery, independent specialists produce utilitarian vessels for food preparation, cooking, serving, household ritual, and general household use. Independent potters control their own production and produce pottery that is sold to, bartered,

or exchanged with ordinary consumers. Attached specialists, on the other hand, produce vessels for limited demand by a highly restricted clientele, such as elites and the social and political institutions that they control. This type of organization consists of the elite sponsorship of the production process in order to control the distribution and consumption of high-value, high-status goods.[15] Simply stated, the fundamental characteristic of attached specialists consists of the control of production,[16] which has a critical role within the political economy for creating symbols of wealth, power, and status. Consequently, access to ceramic vessels created by attached specialists is restricted to elites who control distribution by regulating production. Elites thus restrict consumption because their sponsorship controls the timing, cost, quality, distribution, and the kind of vessels available.[17]

Unlike the factors that promote attached specialists, Costin argued that different factors underlay the evolution of independent specialists.[18] Sufficient demand must exist to support specialists economically,[19] and it may be a consequence of a large population size and density.[20] Population growth does provide a feedback loop (as deviation-amplifying feedback) for the demand for ceramics and does influence the evolution of specialists, but the relationship is more subtle and nuanced than one might think.[21] Large populations provide a large market for pots, but demand for ritual pottery probably provides the greatest deviation-amplifying effect on production.[22] Further, trade and transportation networks extend the demand for ceramic products,[23] and this extension may result from higher levels of political integration.[24]

Although classification is useful to describe the different kinds of production units among the potters described here and is an important data-reduction technique, it is not a very useful tool in explaining the variability in these units and why and how they change over time. A diachronic ethnography, on the other hand, can be useful to understand how and why ceramic production changes. When applied to production organization in the ethnographic present, it provides explanations of changes in production organization that go beyond saying that "Type A" evolves into "Type B."

CRAFT PRODUCTION AND SPECIALIZATION

One of the ways of dealing with the development of social complexity focuses on the characteristics of craft specialization. Costin[25] presented four parameters of specialization, each of which consist of a range of behavior. Her description emphasized degrees of change on a gradual scale rather than just the presence or absence of different features, types, or modes of production.

She also proposed eight types using these different parameters, but she also argued that it is more important to describe specialization accurately, how it develops, and how these parameters are expressed differently in varying environmental and cultural conditions.[26]

Each of Costin's parameters was previously described, elaborated, and evaluated in my previous work on Ticul.[27] This work, however, will deal with only two of them that are most relevant to this volume: scale and intensity.

Scale

Costin's parameter of scale involves two interrelated variables: size of the production unit and the principles of labor recruitment. Size consists of the number of potters per unit, and labor recruitment consists of the composition of the unit and the way in which new production personnel are acquired. At one end of the range are small family-based units in which recruitment is based upon kinship while industrial production lies at the other end of the range, where Costin believes that recruitment is contractual and is based upon skill and availability.[28] Costin proposed that as production units grow, recruitment of close kin gives way to more distant kin, or fictive (or adoptive) kin, and, ultimately, nonrelated individuals are added to the production unit.[29]

More recently, Costin[30] separates the size of the units from their composition and calls the composition their "constitution." Similarly, Pool and Bey[31] have challenged Costin's conflation of production unit size and labor recruitment into the same variable. They argue that these two components must be separated if one is to understand the degree to which they are related.

As revealed in my previous work[32] and in this work, Costin's scenario does not quite fit the changes in personnel acquisition in Ticul from 1965 to 1997. Household production units may include affinal and collateral kin, which may be a consequence of male inheritance of house lots; these individuals may be critical production personnel quite apart from other factors responsible for the growth of the size of the units.

My research on changes in Ticul pottery production reveals the benefit of uncoupling production unit size and labor recruitment[33] and supports the point made by Costin[34] and Pool and Bey[35] that size and composition in production units should be separate. In Ticul both the principles of recruitment and the resulting composition of the production unit were complex. Although they were somewhat related, the size of the production unit, as measured in the number of potters, was highly variable, and this variability was only

partly related to principles of recruitment such as procreation, inheritance of household land, and postnuptial residence behaviors.[36] Rather, selective factors for or against becoming a potter were also responsible for production unit composition.

Intensity

Costin's parameter of intensity consists of the amount of time that potters spend on their craft. The lower end of the intensity range consists of part-time specialization whereby craft production supplements subsistence. At the other end of the range is full-time specialization whereby potters exchange their vessels for all required goods and services.

I am often frustrated by detailed discussions[37] of this parameter because they seldom conform to my own observations of real-world ceramic production by preindustrial potters in Mexico, Guatemala, and Peru. Of course, one way to deal with this lack of congruence is simply to argue that the present is different from the past and that studies of craft production in the present do not apply to the past. Obviously, there is truth in this statement, but the models and terminology of craft production come from the present, not from the archaeological data itself. As I have tried to show both in *Ceramic Theory and Cultural Process* and in my most recent book on Ticul,[38] when one considers the unique structure of clay minerals, the kind of clays and tempers used, and the forming technology, the study of contemporary ceramic production does have great relevance to understanding ancient ceramics as well.[39] The present is all that we have to understand the data from the past.

As I reflect upon my own ethnoarchaeological fieldwork, one of the incongruities with the part-time/full-time specialization dichotomy was trying to understand how my real-life experience with potters is congruent with this distinction in ethnographic situations. It was very difficult to assess empirically the amount of time that potters spend in making pottery and whether it is part-time or full-time production. Of course, it can be redefined by some other measure, such as whether pottery is made for personal use or for exchange, but then why label it in terms of the *time* spent in production? Identifying it in this way is misleading.

I am not sure that assessing part-time vs. full-time production in the past is really productive or relevant to the world of pottery production. It is, of course, relevant to theories of cultural evolution, but what if the theories are based on erroneous assumptions and not on real-life understanding of how potters behave?

I first faced this problem in trying to deal with part-time/full-time production when I struggled to write about my ethnoarchaeological work in Peru.[40] I noticed that the seasonality of pottery making was based upon the constraining effects of weather and climate on ceramic production as well as upon the scheduling conflict with agricultural responsibilities.[41] I did not notice these constraints previously in Yucatán because inclement weather only hindered pottery production; it did not actually prevent it. Because the rains always came in the afternoons, potters could plan around the predictable time of rainfall and avoid damage to their pots.

During my fieldwork in Yucatán in 1984, however, I found that inclement weather caused considerable interruption at every stage of the behavioral chain of the pottery-making process. Clay mining and delivery were delayed, pottery was not made, and if it was, it could not dry and was easily damaged. Did this interruption mean that production was part-time? If so, was full-time pottery production *ever* possible in seasonally rainy weather in the past?

During the process of searching for comparative data for *Ceramic Theory and Cultural Process*, I found that the seasonality of the craft was common around the world and part-time preindustrial pottery production could be predicted by reconstructing the nature of the local climate, because of the agricultural cycle and the environmental constraints on pottery production.[42]

Although I see these challenges to part-time/full-time (i.e., intensity) from the perspective of my own ethnoarchaeological fieldwork, archaeologists are beginning to see them from a different perspective. In the volume edited by Hruby and Flad,[43] some authors[44] argued that archaeologists should get back to basics by understanding the fundamental issues of craft production before tackling notions about what craft specialization actually is. I agree.

In Hirth's volume about craft production in Mesoamerica,[45] the authors challenge the parameter of intensity as part-time/full-time specialization.[46] In the introductory articles in the volume, Hirth[47] invites readers to reevaluate production intensity in ways that render the part-time/full-time distinction irrelevant. Rather than focus on the relative amount of time that an *individual* puts into craft production, Hirth shifts the focus instead to the *household*, a theme of the recently published book edited by Conlin and Douglas.[48]

Hirth[49] lays out three alternative concepts to the part-time/full-time distinction that are supported by the remainder of his volume. The first consists of what Hirth calls *intermittent crafting,* in which craftsmen only practice their trade for a portion of the yearly cycle. The second concept, *multi-crafting*, involves the practice of several crafts by members of a household, either at the same time or at different times. Hirth's third concept views craft production

as a *risk-management strategy* in which a household diversifies its subsistence tasks, practicing several crafts to insure adequate returns for its sustenance and thus reducing the risks that occur with a single craft.

In this work, readers will see the value of these concepts in the narratives presented here. The data are uneven across the period of this research, but even so, they verify the validity of these concepts in understanding ceramic production, not just in Ticul, but elsewhere as well.

THE CONTEXT OF PRODUCTION

The subject of this work is the community of potters of Ticul, Yucatán, Mexico, during the last third of the twentieth century and the first eight years of the twenty-first century. Ticul is one of the largest cities in southern Yucatán and is the administrative center of its *municipio*. Since 1960, it has experienced a great surge in population[50] and has become the most important producer of pottery in Yucatán.[51]

Formerly, the *municipio* was much larger than it is today, extending south over the hill ridge and including the towns of Santa Elena (formerly called Nohcacab) in Yucatán and Bolonchen in what is now the state of Campeche. According to informants' oral history, these towns were linked to Ticul as locations for their swidden fields and as the source of some migrants that fled political turmoil and became potters.

Ticul's population has roots in the Prehispanic period. Between AD 800 and AD 1000 (the Terminal Classic period), at least some of the population lived in a large settlement just north of the city[52] and in smaller sites nearby.[53] Ticul was also mentioned in the pre-Conquest narrative *The Book of Chilam Balam of Chumayel*.[54]

THE UNITS OF PRODUCTION ORGANIZATION

The Population of Potters

The largest social and spatial unit of production in Ticul is the community of potters.[55] This unit of scale is a "socially constituted" community,[56] a "local community,"[57] and a "community of practice."[58] The notion of a "community of practice" explains, in part, intercommunity variability in ceramic technology and in pottery-making communities in Yucatán and elsewhere.[59] At least in the communities of potters that I have studied in Peru, Guatemala, and Yucatán, pottery production in each community utilizes a unique set of technological and decorative practices that differs in many ways from that of other

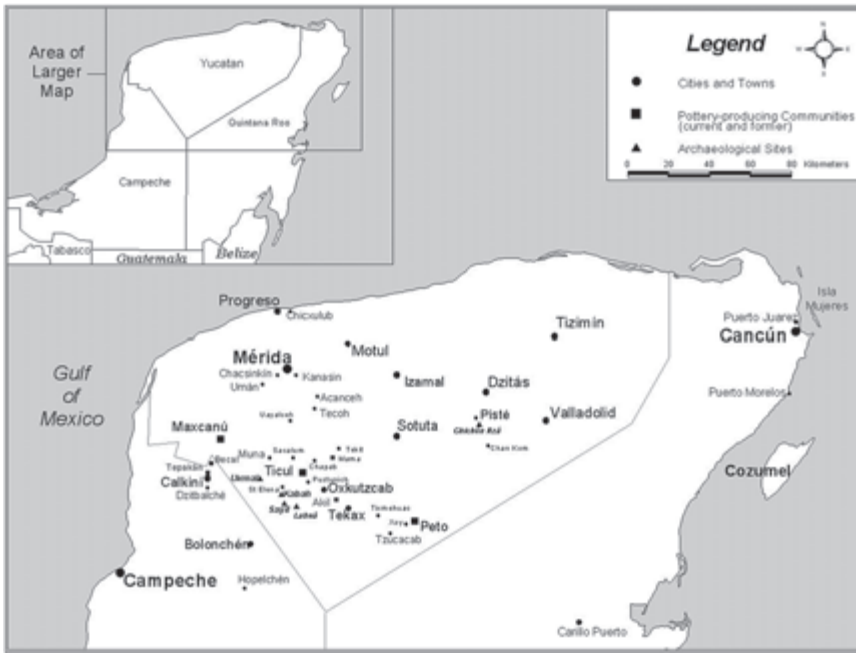

Figure 1.1. *Map of Yucatán showing major cities, towns, archaeological sites, and pottery-making communities between the late 1960s and 1994. Map drawn by George A. Pierce. From Dean E. Arnold,* Social Change and the Evolution of Ceramic Production and Distribution in a Maya Community *(University Press of Colorado, 2008), p. 34, used by permission.*

such communities. Ticul potters have practices, for example, that are unique compared with those in other pottery-making communities in Yucatán. They use different semantic categories of raw materials,[60] prepare their pastes differently,[61] and, until the late 1960s, decorated their pottery in a different way than that made elsewhere in Yucatán.[62] One could call this variability a difference in technological style, but it is more complicated than just "style."

During the last half of the twentieth century, Ticul had the largest population of potters in northern Yucatán (figure 1.1). Based upon my brief surveys of potters in Mama, Akil, and Tepakan in 1967, 1968, and 1994, the numbers of potters in these communities declined and/or became seasonal, whereas the numbers of potters in Ticul increased (figure 1.2).[63]

Ticul potters and their technology are also descendants of ancient Maya potters. Pottery found in a collapsed mine tunnel deep in the traditional clay mine of Hacienda Yo' K'at[64] and at the temper mines of Yo' Sah Kab[65] reveal

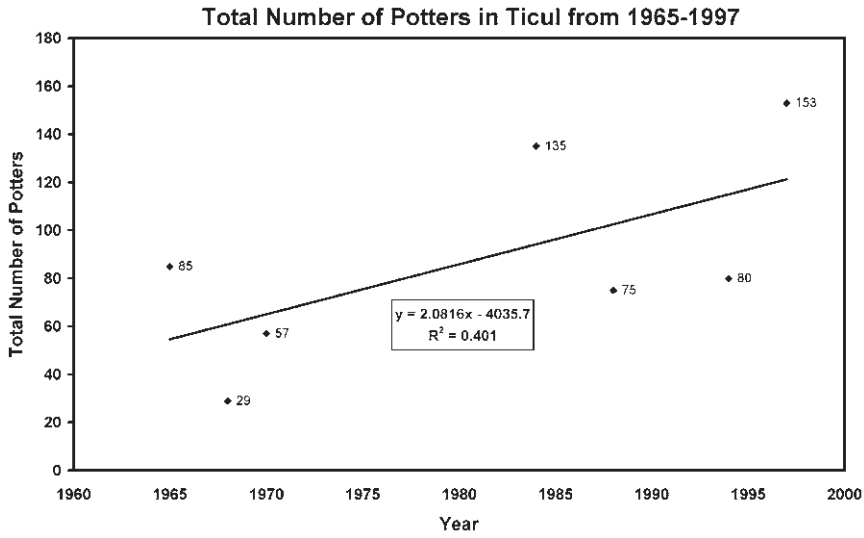

Figure 1.2. *Trend line for the total number of potters in each observation period from 1965 to 1997. Even with the small number of data points, the correlation value 0.4 suggests an upward trend in the number of potters in Ticul. From Dean E. Arnold,* Social Change and the Evolution of Ceramic Production and Distribution in a Maya Community *(University Press of Colorado, 2008), p. 35, used by permission.*

that the mining of raw materials from these sources dates at least to AD 800–1000 (the Terminal Classic period).

As for their spatial distribution, potters lived mostly in the northwest quadrant of the city in the late 1960s and were concentrated in the barrios of San Enrique and Mejorada. Since that time, they have dispersed gradually, with some moving into the barrios of San Román, Guadalupe, and San Juan.[66]

Between 1965 and 2008, the population of potters was largely kin-based and largely (but not exclusively) consisted of individuals from eleven extended families whose ancestors can be traced at least four to six generations into the past. Six of these families are represented by more than one production unit.

The Production Unit

Below the level of the population of potters, the next unit of organization consists of a group of cooperating potters that share facilities at a specific physical location.[67] In a previous work,[68] all such locations were described as

"production units." This monograph continues to use the term "production unit" but adds the designation "workshop" to refer specifically to specialized production units that use space for production that is ordinarily not used for household activities.

In 1965 and 1966, all production units (N = 29) except one consisted of households in which the members were related by descent, co-descent, and marriage. Household members slept in one house and cooked in a smaller house to the rear. Some households included one extended family made up of multiple nuclear families in a "resident corporate group."[69] In some of these households, each nuclear family had its own house for sleeping. Each made pottery in its own house and controlled its own production, but usually shared the use of the kiln with others in the house lot. Families that lived in nearby house lots occasionally shared the use of a kiln as well, whether they were related to the kiln owner or not.

SOCIAL CHANGE AND THE PRODUCTION AND DISTRIBUTION OF POTTERY

Between 1965 and 2008, dramatic social changes took place in Yucatán. The economy moved from one largely rooted in traditional subsistence agriculture to one largely based upon cash. The Mexican government expanded and improved its highway infrastructure, and the resorts along the Maya Riviera became some of the most popular tourist destinations in the Western Hemisphere.

These changes significantly affected pottery production and distribution (table 1.1). During the late 1960s potters primarily made coin banks and vessels for carrying and storing water and sold them in the markets and fiestas on the peninsula. By the early 1970s, the government had installed piped water in most of the cities and towns in Yucatán, and it precipitated a collapse in the demand for water vessels. Potters subsequently abandoned making them.

By the late 1970s, pottery production and distribution had changed again with the construction of Cancún. As tourism expanded,[70] Cancún became a significant market for Ticul pottery. To meet its demands, potters in 1984 made new vessel shapes with new decorative techniques that changed radically from the repertoire made in the late 1960s. Unlike the local market for pottery in the 1960s, the new ceramic products were produced almost exclusively for tourists in Cancún with a secondary market in the capital city of Mérida.[71]

During this same period, the production sequence became increasingly segmented. Different specialists took on tasks of raw material procurement, firing,

Table 1.1. Summary of the principal changes in ceramic production and distribution from 1965 to 1997 by period of observation

	1965–96	*1967*	*1968*	*1970*	*1984*	*1988*	*1994*	*1997*
Water source	wells	wells	wells	wells	piped water	piped water	piped water	piped water
Major vessels produced	carrying, storing water	carrying, storing water	carrying, storing water	carrying, storing water	plant pots, suitcase vessels	plant pots, suitcase vessels	plant pots, suitcase vessels	plant pots, suitcase vessels
Other pottery produced	figurines, no tourist pottery	figurines, no tourist pottery	figurines, no tourist pottery	figurines, no tourist pottery	tourist pottery	tourist pottery	tourist pottery	tourist pottery
Day of the Dead vessels produced	bowls, incense burners	bowls, incense burners	bowls, incense burners	bowls, incense burners	bowls, incense burners	bowls, incense burners	bowls, incense burners	bowls, incense burners
Cooking pots	few	few	few	few	none	none	none	none
Market	local market, fiestas	local market, fiestas	local market, fiestas	local market, fiestas	brokers	brokers	brokers	brokers
Consumers	Yucatec Maya	Yucatec Maya	Yucatec Maya	Yucatec Maya	hotels, tourists	hotels, tourists	hotels, tourists	hotels, tourists
Forming	traditional turntable, molds	traditional turntable, molds	traditional turntable, molds	traditional turntable, molds	traditional turntable, ball-bearing turntable, molds	molds, ball-bearing turntable	molds, ball-bearing turntable	molds, ball-bearing turntable

Note: This table does not include experiments of one potter with the wheel in 1984 and 1988 and another with slip casting in 1997. See also Dean E. Arnold, *Social Change and the Evolution of Ceramic Production and Distribution in a Maya Community*.

painting, and distributing the finished product.[72] Because production became separated from distribution, most potters lost direct access to the consumers of their pottery.

By 1984, most of the distribution of ceramic products was in the hands of large production unit owners who bought pottery from other potters and had the capital to buy or procure the services of a truck or construct a sales facility along the main thoroughfare through town. Two of these owners acquired their own clay sources, so that by 1994, those units had become largely vertically integrated, controlling some of the resources and almost all the tasks of production and distribution—from the procurement of clay to the distribution and sales of the finished objects.[73]

These changes continued through 2008, but by then, many of the potters from the 1960s had died. Many of their production units, however, continued in the same location, but others expanded into areas outside of the barrios where they were concentrated in 1965. How did these changes affect the individual potters, their families, their production units, and the space used for production? Answering this question forms the principal thrust of this book.

CHANGING PRODUCTION ORGANIZATION

In my previous work, I used several paradigms and theories to describe the changes in production and distribution between 1965 and 1997. In this book, I narrow my focus to production units and their spatial correlates.

Although no single paradigm is sufficient to describe the data presented here, I will largely focus on an evolutionary paradigm that helps explain the changes. It is possible to use other paradigms, of course, such as technological choice and practice theory, but these paradigms do not really apply to production unit space and its personnel. They work better when applied to the products of that population. Rather, this work fleshes out the details of the changes in the population of potters and its organization described previously.[74]

Following Darwin, Shennan[75] called the process of culture change over time "descent with modification." Applying this evolutionary analogy to cultural behavior is controversial, but evolutionary theory does provide archaeologists with one way to explain cultural changes through time. Evolutionary concepts have been adapted to ceramics in what has been called the "selectionist" model,[76] which is one way of explaining how and why pottery changes through time.

Selection occurs on two interrelated levels. First, it occurs with demand for certain types of vessels. If there is no demand for the potters' vessels and

consumers do not buy them, potters must produce new shapes and modify their decoration in order to turn their vessels into food. Some choices of shape, production, and decoration will sell better than others, and those vessels are selected for; potters then make those vessels and cease to make others.

This process is best illustrated when piped water came to Yucatán during the late 1960s and early 1970s. Local inhabitants stopped buying water-carrying and storage vessels, and potters stopped making them, turning their attention instead to making flower pots, and mold-made vessels, and painting vessels with designs inspired by vessels of the ancient Maya. Although the pottery changed through the selective forces of the market, the population was largely the same. There are, of course, some exceptions, but as this monograph will demonstrate, even as the vessel shapes changed, most of the potters came from the families that had been potters for several generations.

Second, selection also occurs on the producing agent—the potter. In this case, the selection may result from external forces over which the potter has no control, and choices must be made if the potter wants to continue to practice his or her craft. Potters may voluntarily choose their profession or leave it to engage in another, but there are also selective forces over which they have no control.

As a result, the factors that affected the population of potters between 1965 and 2008 consist of a blend of the forces that select for continuity and those that select for change. Continuity involves the successful transmission of cultural information from generation to generation, whereas change involves the discontinuity of that transmission, even though other factors may account for it as well.

Forces of Social Continuity

The principal way that humans transmit cultural information from generation to generation occurs through learning. Consequently, understanding patterns of learning helps explain the continuity of pottery production and its change through time. Since learning is a social process that occurs in a social context, those factors that create and maintain that context result in the continuity of the craft.

For making pottery in Ticul, the traditional social context of learning is the household. Since the household and its continuity are critical for the perpetuation of society, it is not surprising that the transmission of the craft from generation to generation can be described by the same processes that define, create, and perpetuate household composition and maintain its integrity through

time.[77] These processes help explain why learning patterns for many potters were still household- and kin-based between 1965 and 1997 in spite of the changes in the production of tourist pottery.[78]

Processes of Personnel Acquisition

The principal set of processes that contribute to the continuity of production units consists of how they acquire new workers. These factors include procreation, inheritance of household land, postnuptial residence behaviors, and the hiring of personnel from outside the household.[79]

First, children who are born into a potter's household often (but not always) learn to make pottery. Having children learn the craft confers both advantages and disadvantages. Unlike adults who may be involved with other subsistence activities, having children make pots does not remove them from other activities that may contribute more sustenance to the household. Rather, they provide unpaid labor to help support the household, and some households have greatly increased their wealth by using their children as laborers. Further, a household will support its children economically as they learn the craft, even though their products may not be good enough to sell.[80] Children may produce poorly made vessels initially, but the long-term goal of the children's economic contribution to the household outweighs the short-term losses of a damaged or inferior product.

A second way of acquiring personnel consists of the inheritance of household land. This behavioral pattern is also partially responsible for the composition of the production unit. Up until relatively recently, only men could inherit land. Consequently, except for 1965 and 1966,[81] the highest percentage of potters who worked in production units were the sons of production unit owners.[82] Besides members of the nuclear family and their lineal relatives, production units also included single females, widows, and unmarried or abandoned mothers because a patrilineally inherited house lot may come with a number of collateral and affinal relatives that are usually females.[83] Any of these individuals may be part of the personnel pool from which children learn the craft.

A third means of acquiring personnel consists of postnuptial residence behavior. Between 1965 and 1970, newly married couples tended to live in the household of the groom for at least several months. If the relationships between the new bride and her in-laws were good, the couple could remain permanently with the groom's family or in a new residence on the groom's parents' house lot. Then, after the father's death, the son inherited the land.[84]

Although a newly married couple was expected to live patrilocally at least temporarily, the couple alternatively might reside in or near the bride's parents'

household. This practice, however, only occurred in four circumstances: (1) when the bride's father gave land to his daughter, (2) when conflict occurred between the bride and her new in-laws, (3) when the bride was treated poorly by the groom's parents, or (4) when sickness or an accident forced the sale of the father's house and land to pay medical costs.[85]

These explanations of residence patterns, however, may change and may not involve house lot inheritance and postnuptial residence as they are traditionally understood. By 1997, for example, living near one's father was not simply the result of patrilineal inheritance of household land and patrilocal residence, but rather the parents' desire to have their children live near them. To assure this proximity, a father might buy land nearby for his sons (most frequently) and/or his daughters (less frequently). If the postnuptial household was nearer the groom's parents' house than that of the bride's, buying land for one's sons might look like virilocal residence, but it does not truly explain that behavior. Neolocal residence might occur as well, but only if one member of the couple already owned a house, had secure employment with a good salary (e.g., a schoolteacher), or possessed the financial resources to buy, rent, or construct a house.[86] Consequently, postnuptial residence behaviors (or "practices") are much more complicated than just postnuptial residence rules, as others argued previously.[87]

A fourth way that production units acquire personnel consists of hiring nonhousehold members. Although household members always form the core of a unit's production personnel,[88] household units may also recruit other potters to assist in production. Sometimes these hired potters were relatives from households nearby, but often they were not. This practice has a long history that began before 1965; historically, it was temporary, occurring only when potters needed to increase production during peak demand. In the 1960s only one production unit (Enrique Garma) hired potters from outside its own household as permanent workers, but it was only after 1970, when entrepreneurs came to Ticul, that this practice became more common, and a few families of local potters followed suit, expanding their production with paid employees.[89]

Forces of Social Change

In contrast to the forces of continuity, the forces of change modify the intergenerational transmission of the craft. Although acquiring personnel for the production units appears to largely follow a kin-based model of procreation, patrilineal land inheritance and parilocal postnuptial residence, learning the craft does not adhere to these behavioral patterns of household composition,

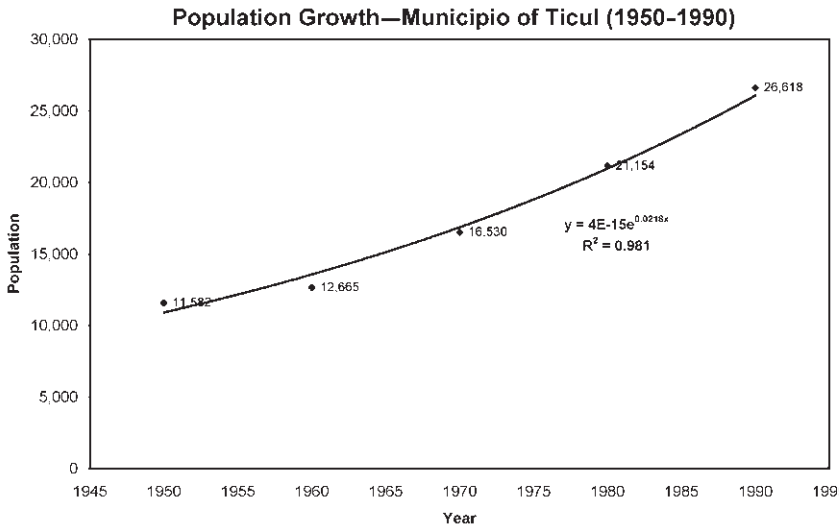

Figure 1.3. *Trend line showing the exponential growth of population in the* municipio *of Ticul, 1950 to 1990 (data from INEGI,* Ticul, Estado de Yucatán, Cuaderno Estadístico Municipal (Edición 1995) *[Instituto Nacional de Estadística, Geografía E Informática, 1996], p. 13). The* municipio *includes the rural population as well as the villages of Yotholín and Pustunich, but 86 percent of the 1990 population was concentrated in the city of Ticul. No data on percentages of population in Ticul is available for other years. From Dean E. Arnold,* Social Change and the Evolution of Ceramic Production and Distribution in a Maya Community *(University Press of Colorado, 2008), p. 32, used by permission.*

locus, and perpetuation.[90] Rather, they merely provide the personnel for that learning by providing a potential pool of learners. Further, these behaviors do not insure that all household members will learn the craft, and not all of those who do learn actually become potters. Rather, household members, like all humans, are agents who make choices; only a fraction of those children raised in a potter's household end up practicing the craft as adults.

If all the children of potters became potters in the next generation, the number of potters would grow at the same rate as the population (figure 1.3). The increase in the number of potters did not match this rate, however, but grew much more slowly and sporadically (figure 1.2). What factors led to the slower growth of the number of potters compared to the population at large?

This question can be operationalized more specifically as two other questions. Why did some potters' children become potters and other did not?

Why did some individuals who married potters learn the craft, and others who married potters did not? The answer to these questions involves the vicissitudes of individual agency and a series of mediating variables that both select for and select against the learning of the craft. These variables constrain the growth of the population of potters over time because procreation and the behavioral patterns of inheritance and postnuptial residence *alone* are insufficient to explain the perpetuation of the craft. Such mediating variables are much more complicated than inheritance and postnuptial residence behaviors, and they include both voluntary and involuntary selective factors for or against the craft.

Probably the most significant large-scale factors that exert selective pressure on the choice of becoming a potter consist of the political, social, and environmental forces from the region and/or the nation. These forces include state and national laws, national policies concerning labor and capital, large-scale conflicts, and epidemics. These factors affect all of the population, not just the potters, but they can have a dramatic selective pressure on potters by removing them from production through disease, death, military conscription, migration, or requiring them to work in a nonpottery-making capacity.[91]

The second selective factor for the learning and perpetuation of making pottery consists of the presence of social and material infrastructure necessary for learning the craft. First, learning requires the physical coexistence of both those who learn and those with the requisite knowledge and skill to teach or serve as a model to imitate. Second, facilities must be available to store raw materials and to make, dry, and store pottery. Third, equipment such as turntables, forming tools (such as molds), and a kiln must be present in order to fabricate and fire the pottery.[92]

The social and material infrastructure can affect the perpetuation of the craft both positively and negatively. First, it provides recursive feedback[93] for its continuity. Those who live in households with the appropriate infrastructure have the opportunity to participate in production, and access to this infrastructure is one reason why the young learn the craft. A nonpotter who moves into a household of a potter after marriage also has the potential to learn the craft. Pottery production thus tends to remain in households that have the infrastructure for production (figure 1.4).[94] Patrilineal inheritance of household land and postnuptial residence not only provide a means by which the household acquires new members but also provide potential learners with access to the social and material infrastructure of making pottery.

Conversely, the lack of pottery-making infrastructures provides a negative feedback loop (deviation-counteracting feedback) that inhibits the learning

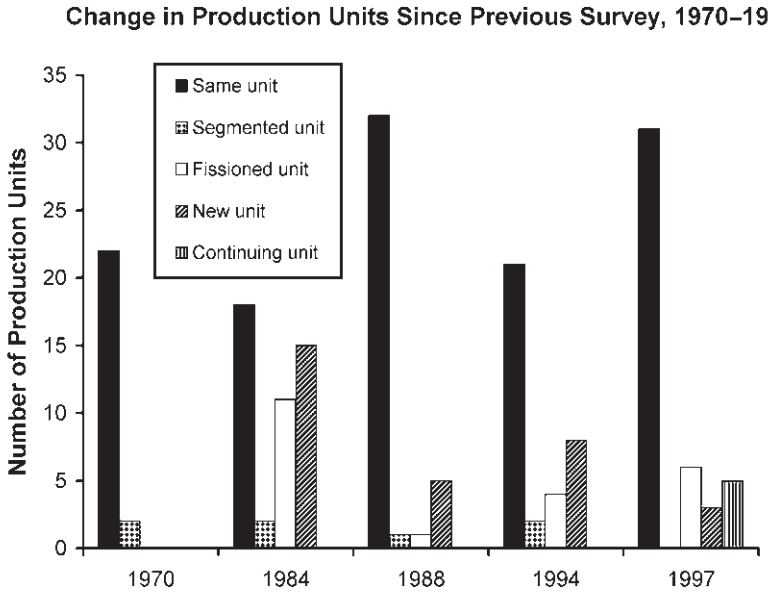

Figure 1.4. *Bar graph summarizing the changes of production units from 1970 to 1997 compared with their location in the previous survey. For example, data from 1970 is compared with the data from the 1965–66 survey, and the 1984 data is compared with the 1970 survey data. The data categories consist of the following: The Same Units category consists of the number of production units whose location did not change. The New Units category consists of new units that had been established since the previous survey. This category does not distinguish between new entrepreneurial units and "new" small-scale units. The Fissioned Units category consists of individuals who were previously part of another unit, but the space within that unit was too limited to accommodate production, and some members moved it to another location. The category Segmented Units includes units that had internally segmented into different nuclear families where married children brought their spouses to live in their parents' house lot. The Continuing Units category includes those units that made pottery during a previous survey and were either missed due to methodological bias or had temporarily stopped making pottery and then began again during a subsequent period of observation. This category also includes potters who had made pottery during a previous survey but had moved to a new location for reasons not due to fissioning of households. Slightly modified from Dean E. Arnold,* Social Change and the Evolution of Ceramic Production and Distribution in a Maya Community *(University Press of Colorado, 2008), p. 61, used by permission; and from Dean E. Arnold, "The Social Evolution of Potters' Households in Ticul, Yucatán, Mexico, 1965–1997," in* Ancient Households of the Americas: Conceptualizing What Households Do, *ed. John G. Douglass and Nancy Gonlin (University Press of Colorado, 2012), p. 178; used by permission.*

and practice of the craft. Those potters who move away from that infrastructure usually abandon the craft entirely. If they wish to begin production, they must acquire capital to obtain the tools, expand household space, and build a kiln. Potters with limited resources who permanently migrate out of Ticul thus cannot practice their craft without material infrastructure and the capital to acquire or create it.

A third selective factor involved in learning the craft is the amount of time available for an individual to learn the craft in a social context in which pottery is made. Children's residence in their natal household is long enough for them to learn the aspects of the craft required to produce a broad range of vessels. In contrast, a nonpotter who marries into a family of potters may or may not learn the craft, depending on the amount of time he or she spends in the household and whether he or she has an alternative means of subsistence.[95] On occasion, vertical-half molding is selected as a technique in these circumstances because it requires very little skill and can be learned quickly.[96]

The fourth selective factor consists of the potential role conflict of gender-based responsibilities, such as child care and household duties that may conflict with making pottery. Because only women can bear and nurse children, the tasks of full-time production can compete with a woman's child care and household responsibilities.[97] On the contrary, women's roles may be well suited for making pottery intermittently between nursing, cooking, child care, water fetching, and other household tasks in order to supplement subsistence returns.[98]

A fifth selective factor consists of the relationship of the craft to economic marginality. Making pottery may be a means for making a living by economically vulnerable households that have limited or no other means of support.[99] In terms of Hirth's terminology,[100] pottery making can be a way of buffering the risks of poor or nonexistent agricultural land, and making pottery can provide a strong selective advantage for households with limited subsistence returns and for those households with economically vulnerable women. Widows and unmarried, divorced, or abandoned mothers thus may take up the craft if they have no other means of economic support.[101] If a woman has learned pottery making during her youth, she may turn to the craft during personal economic crises. Even women who have not learned the craft may become potters in a time of crisis, using a technique that requires little skill (such as vertical-half molding[102]). Pottery making also confers a selective advantage upon other economically vulnerable individuals, such as orphaned children in an existing household, if they have no other means of support but have pottery-making infrastructure in the household.[103]

Sometimes pottery making is advantageous for other types of economically vulnerable individuals, such as immigrants and their children, when other occupational choices are not available or not viable. In Ticul, at least, two immigrant families learned from potters and worked for them, but they practiced the craft only for a generation or two.[104]

A final factor that selects against children becoming potters concerns the effect of education and vocational choice.[105] Education selects against the perpetuation of the craft in three ways. First, schooling removes children from the family work force for most of the day. As a result, they are unable to work in household production as they would if they had stayed at home. Second, attending school requires money for supplies and uniforms and thus drains capital from other household goals, such as hiring additional workers or expanding the space used for production. Lastly, education delays learning many of the required skills for making pottery so that when the time comes for individuals to choose a profession, they do not become potters.

Because potters have a low status in Ticul,[106] some potters recognize that education is the best way to improve their children's lives. So after children complete their schooling, they often choose not to make pottery because they become aware of its low social position, choosing other occupations with a higher status, more financial return, and greater security. Between 1965 and the early 1990s, becoming a shoemaker was the most attractive alternative to making pots and was one of the most frequent occupations that potters' children pursued. Potters' children also became masons, waiters, orchard workers, teachers, accountants, drivers, and technicians. A few, however, have resisted this trend; at least three adults who learned the craft as children and initially chose other professions returned to making pottery and set up production facilities after having gone to postsecondary school.[107]

CHANGES IN THE ORGANIZATION OF PRODUCTION SPACE

A second major dimension of production organization concerns the quantity, use, and structure of space. Because archaeologists want to infer the social organization of production from its spatial components, understanding the nature of production space is critical for identifying and evaluating craft specialization and thus inferring the amount of social complexity.

Ethnoarchaeological studies provide insight into ways in which production space might be organized in the archaeological record. Not long ago, limited ethnoarchaeological information was available about the organization of production space for making pottery and about its relationship to domestic and

residential structures. More recently, however, ethnographers and ethnoarchaeologists have provided information about, and/or maps or images of, the organization of production space in India,[108] Italy,[109] Mesoamerica,[110] Africa,[111] Peru,[112] Pakistan,[113] the Azores,[114] Spain[115] and Egypt.[116]

Similarly, little information formerly existed concerning the space used for ceramic production in the archaeological record. Now, however, research has provided maps and a corpus of spatial data about ancient pottery workshops (and their firing areas) in Mexico,[117] Peru,[118] Crete,[119] Honduras,[120] Syria,[121] Israel,[122] and in several areas of the Middle East.[123]

Unfortunately, little, if any, ethnoarchaeological information exists about how production space has changed over time. How does social change and the changes in the composition of the individual production units over time affect production space and their organization?

One way to present the data of these social and spatial changes is to describe the history of pottery-making families and their production units through time and to use images of production space to illustrate that history. The data for such a narrative are uneven across the forty-four-year period of this study, and the images and the floor plans of the production units are limited, but they do provide some insight into the evolutionary changes of production space.

Changes in production space must be evaluated from a baseline. In Yucatán that baseline is the traditional Maya household, which consists of a lot with an oval house more or less in the center of the property (figure 1.5). Usually a single room covered with a thatched roof with a nearby kitchen structure, the house is surrounded by a stone fence with a gate. In cities and towns, the house may be located next to the street, providing the only access to the lot behind (figure 1.6).

Pottery production in these traditional households takes place in generalized, multipurpose space. The artifacts that usually occupy this space consist of hammocks, a wardrobe, and a table that may also serve as a household altar. Hammocks are tied up on wall hooks so that the space used for sleeping during the night becomes available during the day for craft activities such as sewing, weaving hammocks, and making pottery. Such generalized space may also serve to store raw materials and to dry and store pottery (figure 1.7). Sometimes pottery making may also take place outside of the house in the shade, weather permitting (figure 1.8).

This use of generalized space for pottery production was also observed by George Brainerd, who visited pottery-making villages in Yucatán during the 1940s and early 1950s: "In the villages that I have observed, the [pottery] industry is undertaken by the family and carried on in typical family quarters. The

Figure 1.5. *The layout of the traditional Maya house lot in Yucatán in 1966. The house, on Calle 34 in Ticul, is located in the center of a lot surrounded by a stone fence. House lots contain fruit trees and other useful plants (such as the* huano *palm [right center], used for thatch). By 1997, this house had been replaced by a rectangular cement house with a flat roof next to the street.*

Figure 1.6. *A traditional Maya house situated next to a street in 1984. This pottery-making family used the porch to dry clay, small vessels, and branches of the* huano *palm. This household was the historic location of the Calle 34 Chans.*

Figure 1.7. *The inside of a traditional Maya house in 2008. Generalized living space serves as a storage area for raw materials around the walls of the structure. Such space may also serve to store drying pottery. At night, hammocks are hung from the supporting poles in the wattle and daub house shown here or, in a traditional Maya house with cement walls, from metal hooks embedded in the walls. Alfredo Tzum is talking with his cousin Elio Uc in Elio's house.*

necessary equipment is simple and no specialized structures are used except the kiln."[124] In 1965 this pattern was already beginning to change, but as this monograph will demonstrate, great changes have occurred in the use of space since the 1940s.

Although most household space is used for a variety of activities, the space used for food preparation and cooking is largely devoted to those activities. In the traditional Maya house lot, these activities occur in a smaller oval structure with a thatched roof located at the rear of the main house (figure 1.9). Often made with walls of woven sticks, this structure contained the hearth and was usually used for cooking and eating. Space was reserved to store food, water, and cooking and service ware. Sometimes pottery was also made there. In 1965 a few houses had other structures attached to them that were used for pottery production, but they were small and used for other purposes as well.

Craft activities create a spatial challenge for households because they often require additional space beyond that used for living: for storing tools, raw

Figure 1.8. *Making pottery outside in the shade during good weather at the Uc household in 1984. In households with limited space for ceramic production, pottery production may take place outside in the shade, weather permitting. A traditional thatched house lies on the left in which drying pottery and raw materials are stored. The family kiln is located behind it and to the right. Part of the cement block wall of the partially constructed workshop lies in the distance (center) at the back of the house lot. The woman is beginning the final stage of a water-carrying jar. Completed vessels are drying in the foreground.*

materials, and completed and partially completed craft products. Furthermore, weather conditions may require that some craft activities (such as forming and drying pots) take place in a protected environment.[125] As craft activities become more important to a household's economic well-being and replace or increasingly supplement other subsistence activities, more and more time must be devoted to creating craft products. This change often requires more space that competes with that needed for other, more general, household tasks.

THE STRUCTURE OF THIS BOOK

An earlier work[126] used several paradigms to explain the continuity and change in Ticul pottery production and distribution. This book, on the other hand, takes the mechanisms of continuity and change presented from that

Figure 1.9. *A thatched auxiliary structure in 1966 located behind a traditional Maya house with a rear porch. This auxiliary structure contained the hearth and was used for cooking and eating, and before piped water was installed, pottery vessels were used for water storage. Such vessels are visible here to the right of the entry into the structure (lower center). In the mid-1960s structures like this one were also used for making pottery.*

work (and summarized above) and illustrates them by describing the details of the families and the spatial composition of their production units between 1965 and 2008. Because several different paradigms and research methods were used during the forty-four years of this study, the next chapter (chapter 2) describes the history of the research and details those methods and techniques used to collect the data unique to this monograph.

Using narrative to present the data, this work approaches pottery production through a different kind of presentation than normally used in ethnoarchaeological studies. Narrative cannot substitute for rigorous methodology and quantitative presentation of the data characteristic of so many ethnoarchaeological studies,[127] but it does provide an approach to the data that is, in many respects, more holistic, recognizing more personal agency in patterns that quantified descriptions of them cannot reveal. The data presented here thus illustrate and validate the patterns described in my previous monograph with a significant difference. They reveal that any attempt at quantification, as important as it is, may reduce the number of patterns and obscure some of

the variability in the data. Finally, by using a diachronic perspective, no other approach except narrative can follow the warps and wefts of individual potters, their families, and their production units through the fabric of pottery production during the forty-four-year span of this study. Since this description also adds information about individuals and families from other sources, such as Raymond Thompson's work,[128] the threads of individuals, their families, and their production units cover more than half a century. By using oral history and additional genealogical information from church and municipal records, one family can be traced back more than 175 years. With the methodology and means of presentation established, this work turns to the actual narratives that form the heart of this work.

During the forty-four years of change described in this book, production units have evolved from predominately two sources. One source consists of generations of pottery-making families within Ticul, whereas the other source consists of the entrepreneurs who came from outside the community, set up their own production units, and employed local individuals as potters and painters.

Within these two broad categories, production units are grouped by similar historical trajectories. They are described using a narrative that traces the potters' families, or other type of organization, through the forty-four years of this study. Along with this history, the narrative includes descriptions of the changing use of space, documented by images comparing the production units of the 1960s and beyond with the images and floor plans of most units in 1997. Some images of production areas in 2008 are also included for comparison.

The first category of production units consists of those families that have a long tradition of making pottery and have practiced the craft for more than two generations. This category is divided into two subgroups based upon the kind of pottery made. The first consists of those families that made noncooking pottery. Most of the potters in this category were members of one large extended family. Because its narrative is long, it has its own chapter (chapter 3), separate from other families that make noncooking pottery (chapter 4).

The second subgroup of traditional pottery-making families consists of those potters that originally made cooking vessels (chapter 5). This familial specialization still occurred in 1965, but these potters subsequently either abandoned the craft or changed to producing noncooking pottery.

In the late 1960s the traditional potters described in chapters 3, 4, and 5 made utilitarian, ritual, service, and decorative pottery and could be defined as independent specialists. They perpetuated the craft in household settings. Chapter 6, however, marks a shift from traditional potters who learned the craft in households to those workshops that have emerged since the mid-1970s

when a new demand emerged for pottery, and the craft attracted entrepreneurs. Most of these entrepreneurs came from outside Ticul, and none were potters. This new kind of production organization attracted others into the craft who did not come from traditional pottery-making families, but learned the craft in the workshops of traditional potters or entrepreneurs. Eventually, some of these individuals formed their own production units, and these are described in chapter 7.

About 1957 Ticul potters were hired by Hacienda Uxmal, a tourist hotel adjacent to the ruins of Uxmal. Originally, they made vessels to decorate the hotel, but eventually they produced pottery for the tourist shop there. The manager of the shop supervised the potters, controlling the type of vessels made and how they were painted. This kind of production organization is described in chapter 8.

Throughout the period of this study, the use of space changed, and the footprint of production has increased greatly, expanding into structures outside of the multipurpose, generalized living space in houses. The structures themselves have changed from traditional oval-shaped Maya houses with thatched roofs to quadrangular structures of cement or cinder blocks with cement or metal roofs. Some production units also have expanded into showrooms along the highway in order to boost sales.

Although the number of potters and the number of production units increased, the mean size of those units increased only negligibly. Why, then, did the amount of production space increase after 1965? Chapter 9 explores reasons why this change occurred. In this chapter, the paradigms used are expanded to include engagement theory,[129] the changes brought about by the effect of sensory feedback of weather and climate,[130] and the amount of capital that potters have available to change their production environment. Finally, chapter 10 concludes the work, summarizes its findings, and suggests the ways in which it is relevant for archaeology.

NOTES

1. E.g., P. Arnold, "Working without a Net"; Costin, "Craft Specialization: Issues"; Costin, "Use of Ethnoarchaeology"; Costin, "Craft Production Systems"; Costin, "Craft Production"; Costin, "Thinking about Production"; Hirth, *Housework*; Hruby and Flad, *Rethinking Craft Specialization in Complex Societies*; "Specialized Production in Archaeological Contexts"; Pool, "Integrating Ceramic Production and Distribution"; Pool and Bey, "Conceptual Issues in Mesoamerican Pottery Economics"; Stark, "Current Issues in Ceramic Ethnoarchaeology."

2. Stark, "Current Issues in Ceramic Ethnoarchaeology."

3. E.g., Arnold, "Patterns of Learning"; Arnold, "Ethnography of Pottery Making in the Valley of Guatemala," 370–79; Arnold, "Cambios de Aspectos Sociales"; Horcasitas de Barros, *Una Artesanía con Raíces Prehispánicas*, 101, 130–37; Saraswati and Behura, *Pottery Techniques of Peasant India*, 175–90; Sillar, *Shaping Culture*, 31–53.

4. E.g., Arnold, *Ceramic Theory*; Arnold, *Ecology of Ceramic Production in an Andean Community*; Cuomo di Caprio, *Ceramica Rustica Tradizionale in Puglia*; Druc, "Ceramic Production in San Marcos Acteopan"; Druc, *Producción Cerámica*; Kaplan, *Mexican Folk Pottery Tradition*; Martins, *Cerâmica Modelada Feminina dos Açores*; Mohr Chavez, "Organization of Production and Distribution of Pottery in South Highland Peru"; Orton et al., *Pottery in Archaeology*; Rice, *Pottery Analysis*; Rye, *Pottery Technology*; Rye and Evans, *Traditional Pottery Techniques of Pakistan*; Schütz, *Agost/Alicante,* 54–72; Tsetlin, "Ceramic Investigations in Russia." One excellent and concise introduction to ceramic technology for archaeologists (in Italian) is Saracino, *Prima del Tornio: Introduzione all Technologia della Produzione Ceramica*.

5. E.g., Arnold, "Ethnomineralogy of Ticul Potters"; Arnold, "Design Structure and Community Organization in Quinua, Peru"; Arnold, "Social Interaction and Ceramic Design."

6. Arnold, *Ceramic Theory*, 147–49.

7. E.g., Arnold "Ethnoarchaeology and Investigations of Ceramic Production and Exchange"; Arnold, *Social Change*; Sillar and Tite, "The Challenge of 'Technological Choices' for Materials Science Approaches."

8. E.g., Sillar, "*Shaping Culture*." Such patterns may also reveal patterns of interaction (see Hardin, "Design Structure and Social Interaction"). Joyce and Gillespie, *Beyond Kinship*.

9. Arnold, *Social Change*.

10. Van der Leeuw, *Technology of Ancient Pottery*.

11. Peacock, *Pottery in the Roman World*.

12. Brumfiel and Earle, "Specialization, Exchange, and Complex Societies."

13. Costin, "Craft Specialization: Issues"; Costin, "Use of Ethnoarchaeology for Archaeological Study of Ceramic Production," Costin, "Craft Production Systems"; Costin, "Craft Production"; Costin, "Thinking about Production."

14. Brumfiel and Earle, "Specialization, Exchange, and Complex Societies."

15. Costin, "Craft Specialization: Issues," 7.

16. Costin, "Thinking about Production," 152.

17. Costin "Craft Specialization: Issues," 11–12.

18. Ibid., 12.

19. Arnold, *Ceramic Theory*, 155–66.

20. Costin, "Craft Specialization: Issues," 12.

21. Arnold, *Ceramic Theory*, 155–66.

22. Ibid., 158–65; Spielmann, "Feasting, Craft Specialization, and the Ritual Mode of Production."

23. Arnold, *Ceramic Theory*, 165–66.

24. Costin, "Craft Specialization: Issues," 11–12.

25. Ibid.

26. Ibid., 9.

27. Arnold, *Social Change*.

28. Actually, work at the ceramics factory in Ticul requires less knowledge and skill than that used by traditional potters in Ticul (Arnold, *Social Change*, 262–65).

29. Costin, "Craft Specialization: Issues," 16.

30. Costin, "Craft Production Systems."

31. Pool and Bey, "Conceptual Issues in Mesoamerican Pottery Economics."

32. Arnold, *Social Change*.

33. Ibid.

34. Costin, "Craft Specialization: Issues."

35. Pool and Bey, "Conceptual Issues in Mesoamerican Pottery Economics."

36. Arnold, *Social Change*.

37. Hruby and Flad, *Rethinking Craft Specialization in Complex Societies*; Hruby and Flad, "Specialized Production in Archaeological Contexts"; Clark, "Craft Specialization's Penumbra."

38. Arnold, *Social Change*.

39. Arnold, "Advantages and Disadvantages of Vertical-Half Molding Technology."

40. See Arnold, "Ceramic Ecology in the Ayacucho Basin"; Arnold, *Ecology and Ceramic Production*, xxi–xxxi.

41. Arnold, "Ceramic Ecology in the Ayacucho Basin"; Arnold, "Discussion and Criticism."

42. Arnold, "Ceramic Ecology in the Ayacucho Basin"; Arnold, *Ceramic Theory*, 61–98.

43. Hruby and Flad, *Rethinking Craft Specialization in Complex Societies*; Hruby and Flad, "Specialized Production in Archaeological Contexts."

44. Clark, "Craft Specialization's Penumbra"; Hruby and Flad, "Specialized Production in Archaeological Contexts"; Costin, "Thinking about Production."

45. Hirth, *Housework*.

46. Ibid.

47. Hirth, "Housework and Domestic Craft Production"; Hirth, "Craft Production, Household Diversification, and Domestic Economy."

48. Douglass and Conlin, "The Household as Analytical Unit"; Douglass and Conlin, *Ancient Households of the Americas*.

49. Hirth, "Housework and Domestic Craft Production"; Hirth, "Craft Production, Household Diversification, and Domestic Economy."

50. INEGI, *Ticul: Cuaderno Estadístico Municipal*.

51. Arnold, *Social Change*.

52. Stephens, *Incidents of Travel in Yucatán*, 1:160–70; Velázquez Morlet and Lopez de la Rosa, "Atlas Arqueológico de Yucatán."

53. Brainerd, *Archaeological Ceramics of Yucatán*; Arnold, "Maya Blue and Palygorskite."

54. Roys, *Book of Chilam Balam*, 70–73.

55. Arnold, *Social Change*.

56. Yaeger and Canuto, "Introducing an Archeology of Communities."

57. Kolb and Snead, "It's a Small World."

58. Lave and Wenger, *Situated Learning*; Mutch, "Communities of Practice and Habitus"; Thompson, "Structural and Epistemic Parameters in Communities of Practice"; Bourdieu, *Outline of a Theory of Practice*.

59. E.g., Arnold, "Ethnography of Pottery Making in the Valley of Guatemala"; Arnold, "Ceramic Variability, Environment and Culture History"; Arnold, *Ecology of Ceramic Production*.

60. Arnold, "Ethnomineralogy of Ticul Potters," Thompson, *Modern Yucatecan Maya Pottery Making*, 65–72; Hurd, "Anthropological Interpretations of Ceramic Technologies."

61. Arnold, "Does the Standardization of Ceramic Pastes Really Mean Specialization?"; Thompson, *Modern Yucatecan Maya Pottery Making*, 72–74.

62. Thompson, *Modern Yucatecan Maya Pottery Making*, 91, 94–95, 99, 100, 105–37; Torres and Rodríquez, *La Alfarería Maya de Tierras Bajas*.

63. Arnold, *Social Change*.

64. Arnold and Bohor, "Ancient Clay Mine at Yo' K'at, Yucatán."

65. Arnold, "Maya Blue and Palygorskite."

66. Arnold, *Social Change*, 62–65.

67. Ibid., 38.

68. Ibid.

69. Hayden and Cannon, "Corporate Group as an Archaeological Unit."

70. Alisky, "Relations of the State of Yucatán and the Federal Government of Mexico," 259; Baklanoff, "Diversification Quest," 230–32.

71. Arnold, *Social Change*, 114–17.

72. Arnold, "Maya Pottery after 20 Years"; Arnold, *Social Change*.

73. Arnold, *Social Change*, 148–50.

74. Ibid.

75. Shennan, "Population, Culture History and the Dynamics of Culture Change."

76. Neff, "Ceramics and Evolution."

77. Sillar, "*Shaping Culture*"; Day, "Marriage and Mobility." See also Joyce and Gillespie, *Beyond Kinship*.

78. Arnold, *Social Change*, 31–65.

79. Ibid., 49–61.

80. Arnold, "Patterns of Learning"; Arnold, *Social Change*, 42.

81. Arnold, *Social Change*, 43, 50.

82. Ibid., 50.

83. Arnold, "Patterns of Learning"; Arnold, *Social Change*, 40–65.

84. Arnold, *Social Change*, 50–51.

85. Ibid.

86. Ibid., 51–53.

87. Allen and Richardson, "Reconstruction of Kinship from Archaeological Data"; Arnold, "Patterns of Learning"; Arnold, *Social Change*, 65–67; Gillespie, "Rethinking Ancient Maya Social Organization"; Gillespie, "Beyond Kinship"; Gillespie, "Lévi-Strauss, Maison and Société à Maisons."

88. Arnold, *Social Change*, 44, 50.

89. Ibid., 54–56.

90. Ibid., 65–67.

91. Ibid., 67–70.

92. Ibid., 70–72.

93. Arnold, *Ceramic Theory*, 17–18.

94. Arnold, *Social Change*, 60–65.

95. Ibid., 72–73.

96. Arnold, "Advantages and Disadvantages of Vertical-Half Molding Technology."

97. Arnold, *Ceramic Theory*, 99–108; Duncan, *Ceramics of Ráquira, Colombia*.

98. Arnold, "Ethnography of Pottery Making in the Valley of Guatemala"; Arnold, "Ceramic Variability, Environment and Culture History"; Arnold, *Ceramic Theory*, 99–108; Hirth, "Housework and Domestic Craft Production"; Hirth, "Craft Production, Household Diversification, and Domestic Economy."

99. Arnold, *Ceramic Theory*, 168–201; Arnold, *Social Change*, 75–77.

100. Hirth, "Housework and Domestic Craft Production"; Hirth, "Craft Production, Household Diversification, and Domestic Economy."

101. See Arnold, *Social Change*, 27; David and Henning, "Ethnography of Pottery," 4.

102. Arnold, "Advantages and Disadvantages of Vertical-Half Molding Technology."

103. Arnold, *Social Change*, 77.

104. Ibid., 77–78.

105. Ibid., 79–81.

106. Thompson, *Winds of Tomorrow*, 122–23.

107. Arnold, *Social Change*, 81.

108. Kramer, *Pottery in Rajasthan*, 183–212; Miller, *Artefacts as Categories*, 211; Sinapoli, *Approaches to Archaeological Ceramics*, 35.

109. Peacock, *Pottery in the Roman World*.

110. P. Arnold, "*Domestic Ceramic Production and Spatial Organization*"; Arnold, "Ethnography of Pottery Making in the Valley of Guatemala"; Deal, "Ethnoarchaeological Approach to the Identification of Maya Domestic Pottery Production"; Deal, *Pottery Ethnoarchaeology*; Pool, "Why a Kiln?"; Sheehy, "Ceramic Ecology and the Clay/Fuel Ratio"; Williams, "Organización del Espacio Domestico," 219–21.

111. Arthur, *Living with Pottery*; Krause, *Ethnoarchaeological Study of Three African Potters*, 65, 90, 109; Petit, "Ethnographic Study of Three Betammaribé Pottery Workshops."

112. Cleland and Shimada, "Paleteada Potters," 120–24; Sillar, *Shaping Culture*, 185–97.

113. Rye and Evans, *Traditional Pottery Techniques of Pakistan*, 18, 44.

114. Martins, *Cerâmica Modelada Feminina dos Açores*, 330–31, 395, 397, 398.

115. Schütz, *Agost/Alicante*, 72–77, 86.

116. Duistermaat and Groot, "New Ethnoarchaeological Documentation Project"; Nicholson and Patterson, "Ballás Pottery Project:"; van As et al., "Potters of Fustat."

117. Pool and Santley, "Middle Classic Pottery Economics"; Pool, "Why a Kiln?"

118. Bernier, "Craft Specialists at Moche"; Pozzi-Escot, "Conchopata"; Pozzi-Escot et al., "Wari Ceramics and Production Technology"; Tschauner et al., "Un Taller Alfarero Chimú"; Uceda and Armas, "Urban Pottery Workshop."

119. Shaw, "Excavation and the Structure of the Kiln"; Van de Moortel, "Area around the Kiln."

120. Wells, "Production Scale and Organization of a Late Classic Pottery Workshop."

121. Duistermaat, "Not Fit for Firing."

122. Adan-Bayewitz, "On the Chronology of the Common Pottery of Northern Roman Judaea/Palestine," 9–10; Magrill and Middleton, "Canaanite Potter's Industries in Mesopotamia"; Tufnell et al., *Lachish IV*, 292–93.

123. Wood, *Sociology of Pottery in Ancient Palestine*, 104–13.

124. Brainerd, *Archaeological Ceramics of Yucatán*, 69.

125. See Arnold, "Ceramic Ecology in the Ayacucho Basin"; Arnold, *Ceramic Theory*, 61–98.

126. Arnold, *Social Change*.

127. E.g., Arthur, *Living with Pottery*; Longacre, *Ceramic Ethnoarchaeology*; Longacre and Skibo, *Kalinga Ethnoarchaeology*; Deal, *Pottery Ethnoarchaeology in the Central Maya Highlands*.

128. Thompson, *Modern Yucatecan Maya Pottery Making*; Morales Valderrama, "La Alfarería de Yucatán"; Rendón, "Notas sobre la Alfarería Indígena de Yucatán"; Varela Torrecilla, "La Producción Alfarera Artesanál de Yucatán."

129. Arnold, *Social Change*, 14–16; Malafouris, "Cognitive Basis of Material Engagement"; Renfrew, "Towards a Theory of Material Engagement."

130. E.g., Arnold, *Ceramic Theory*, 61–98.