Spring 2014

Fingerprints and the Organization of the Ceramic Industry Over Time at Tell Leilan Gender and the State in Northern Mesopotamia during the Early and Middle Bronze Age

Akiva Sanders
University of Pennsylvania

Fingerprints and the Organization of the Ceramic Industry Over Time at Tell Leilan Gender and the State in Northern Mesopotamia during the Early and Middle Bronze Age

Abstract
The goal of my research is to elucidate the organization of ceramic production at Tell Leilan with respect to gender roles during from 3400 to 1700 BCE through a study of fingerprint impressions on pottery. I have developed and tested a technique for determining the proportion of men and women who formed and finished vessels in a certain ceramic assemblage using the distribution of epidermal ridge densities. There is a discrete change in the sex of potters at Leilan with the rise of urbanism and state formation at the site, but there is no alteration in this pattern that correlates with changes in the various regimes that had hegemony over the site over time during the Early and Middle Bronze Age. This result informs us about the effect of state authority on the public and private organization of crafts as well as the division of society along gender lines. Surprisingly, the change that occurs with the rise of the state at Tell Leilan does not occur at village sites in the Leilan Regional Survey. This result indicates that the changes in social fabric that occurred at urban sites with the establishment of state institutions did not occur to the same extent in hinterland settlements even though the state did control some of the ceramic production at these sites, at least during the Akkadian period. This methodology and research should allow for further evaluation of the highly theoretical literature on the relationship of gender to craft production in the ancient world.

Disciplines
Anthropology

Fingerprints and the Organization of the Ceramic Industry Over Time at Tell Leilan

Gender and the State in Northern Mesopotamia during the Early and Middle Bronze Age

By

Akiva Sanders

Submitted to the

Department of Anthropology

University of Pennsylvania

Thesis Advisor: Dr. Lauren Ristvet

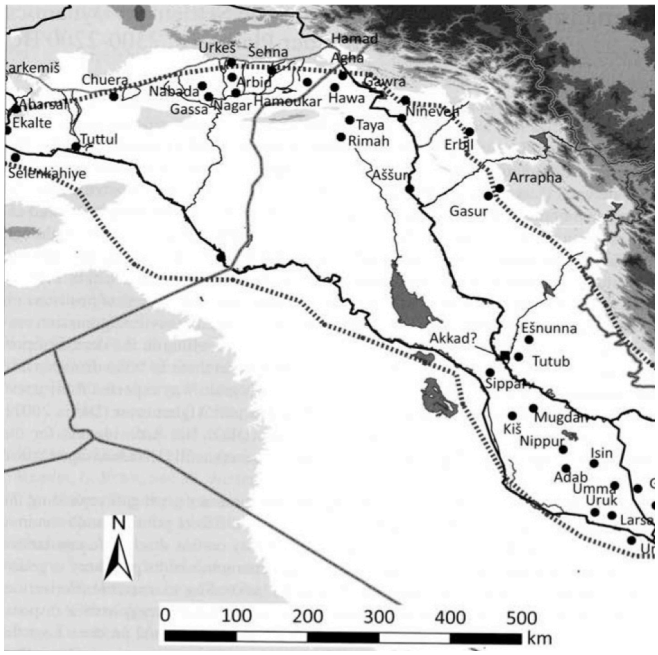
2014

Abstract

The goal of my research is to elucidate the organization of ceramic production at Tell Leilan with respect to gender roles during from 3400 to 1700 BCE through a study of fingerprint impressions on pottery. I have developed and tested a technique for determining the proportion of men and women who formed and finished vessels in a certain ceramic assemblage using the distribution of epidermal ridge densities. There is a discrete change in the sex of potters at Leilan with the rise of urbanism and state formation at the site, but there is no alteration in this pattern that correlates with changes in the various regimes that had hegemony over the site over time during the Early and Middle Bronze Age. This result informs us about the effect of state authority on the public and private organization of crafts as well as the division of society along gender lines. Surprisingly, the change that occurs with the rise of the state at Tell Leilan does not occur at village sites in the Leilan Regional Survey. This result indicates that the changes in social fabric that occurred at urban sites with the establishment of state institutions did not occur to the same extent in hinterland settlements even though the state did control some of the ceramic production at these sites, at least during the Akkadian period. This methodology and research should allow for further evaluation of the highly theoretical literature on the relationship of gender to craft production in the ancient world.

Table of Contents

Introduction



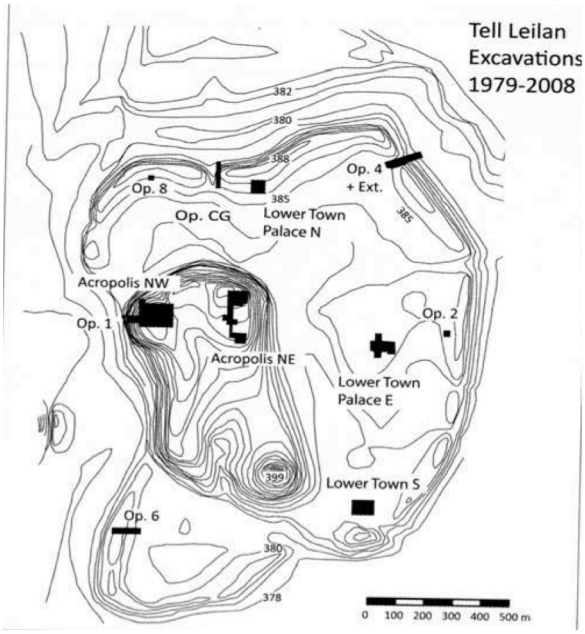


Figure 1: Early Bronze Age cities of Mesopotamia *Figure 2: Site Plan of Tell Leilan*

Tell Leilan, known as Šehna in the Early Bronze Age and Šubat-Enlil during the Middle Bronze Age, was one of the major sites during these two periods in the Habur basin in Northern Syria (Figures 1 and 2). This thesis seeks to elucidate the organization of ceramic production at Tell Leilan, particularly with respect to political authority and gender roles from 3400-1700 BC through a study of fingerprint impressions on pottery. As an innovative application of fingerprint analysis in Near Eastern archaeology, it may serve as a model for future studies of gender roles in the ancient world, and provide new information on the wider political and societal implications of these changes. This endeavor, therefore, stands in contrast to almost half a century of discussion of gender roles in the varying social and political contexts of prehistory and early polities that rely heavily on essentialist theoretical suppositions and tangentially related ethnography (see below, Chapter 4).

In this study, I will analyze the impact of the rise and operation of the state on the social

and economic organization of the city and countryside of Tell Leilan. It is tempting to apply the results of such a study to the role of "The State" on economy and society in general. However, it is important to recognize that the forces contributing to and resulting from the formation of states discussed in this paper are specific to Northern Mesopotamia in the fourth, third, and early second millennia and that the structures of "The State" and "The Economy" are determined by and embedded in the particular history and symbolic systems of the society under consideration (Polanyi 1957). As Adam T. Smith recently commented in his account of the political landscape in ancient polities: "political transformations in early complex polities were predicated on the production of very specific landscapes, thus undermining the 'real' history (a set of deterministic historical stages guiding the development of forms of political authority) that undergirds the temporocentric accounts of political life" (Smith 2003: 20). That is to say, to study the social effects of the rise of early states tells us nothing about the "natural" course of cultural evolution and the ideal form of the state, aside from undermining the assumption that these generalizations reflect reality. Rather it allows us to explore the multiplicity of ways in which complex societies can make use of their particular social and ecological environments, and put our present ideas of "State" into context by contrast.

Archaeological studies like this one lend our reflections on contemporary politics context by teaching us that our present ideas of state and economy are tied to their own development over deep history during which a wide variety of symbolic, ethical, and and ecological frameworks were at play. The cultural instance of state formation and development at hand is, in this sense, one that is particularly intriguing, as it lays the groundwork for the development over several millennia of highly complex polities in Northern Mesopotamia such as the massive Neo-

Assyrian state. These states, in turn, had a great impact on the development of political and social institutions that underlie more recent Western and Middle Eastern Civilization through an incredibly complex but uninterrupted process of building on and discarding the institutions and knowledge of previous generations. Therefore, before I describe the process and results of the present study (Chapter 5), I will put it in context by considering theories for the role of the state in the ceramic industry during each of the three periods of state hegemony represented in my sample (Chapters 1-3). I will only then discuss the theoretical work that has been done concerning gender roles within the ceramic industries of the Ancient Near East (Chapter 4).

For this project, I have chosen to focus on ceramics from a 5x5 m sounding at Leilan known as Op. 8 (Figure 2, NE corner). Material from Op. 8 spans several different periods, providing a unique opportunity to study changes in ceramics over time (Figure 3), and allows us to investigate how changes in the type and scale of political control correlate to changes in the organization of production, from the period of initial state formation in the region until the final destruction of the site: In period IIId and IIa (ca. 2600-2300 BCE) (Chapter 1) , Tell Leilan witnessed the rise of urbanization and state formation, followed shortly by a period when the site likely fell under the hegemony of a regional state centered at nearby Tell Brak (Archi 1998: 3). In period

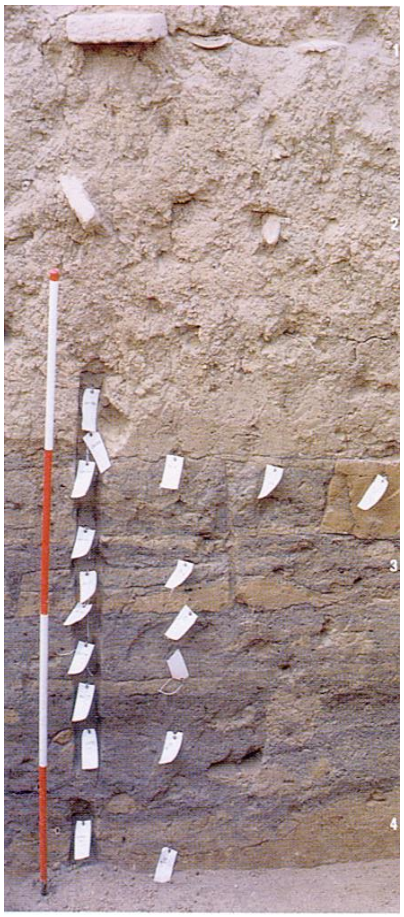


Figure 3: The strata of the Op.8 sounding

IIb (ca. 2300-2150 BCE) (Chapter 2), Tell Leilan was administered by the Akkadian Empire, arguably the world's first empire, which united a variety of disparate cultural and spatial areas under a single dynastic regime, centered in Southern Mesopotamia. Finally, in period I (1806-1726 BCE) (Chapter 3), it came under the hegemony of the Kingdom of Northern Mesopotamia, which was administered from Tell Leilan itself by Šamši-Adad. The site subsequently served as the capital of several successor states to Šamši-Adad's kingdom until its destruction by Samsu-Iluna, a king of the First Dynasty of Babylon. The broad chronological range of the Op. 8 sounding allows me to investivate how economic and administrative schemes with very different goals may have affected ceramic production. In addition, I supplemented the ceramics from Op. 8 with pottery taken from three other assemblages in order to put my results into broader chronological and spatial context. I considered ceramics from Op. 5, a domestic quarter

Figure 4: The Tell Leilan Survey Area

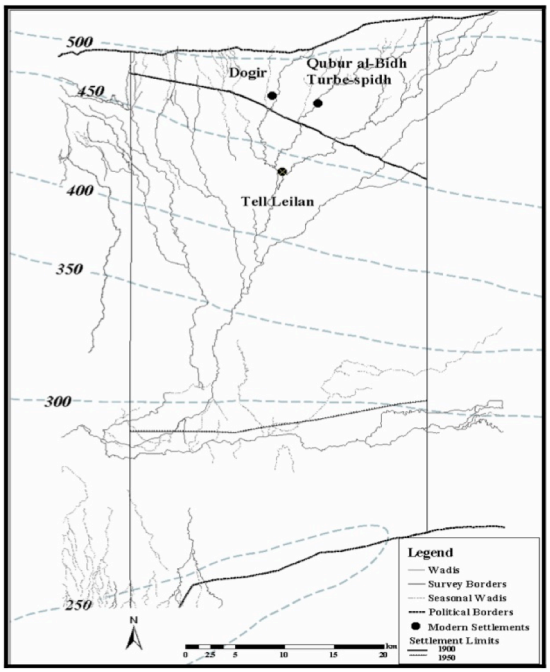


Figure 5: Detail of the Tell Leilan Survey with modern settlements

occupied during period IIb to supplement the small sample size in this phase from Op. 8. Furthermore, I used ceramics from Leilan's Op. 1 dating to the earlier pre-state Uruk (Phases V-IV) and Ninevite 5 (Phases IIIa-c) periods in order to compare practices during Leilan's prehistory to those which occurred under the complex polities of the Op. 8 sequence. Finally, I examined ceramics from parallel occupations at village sites in the 1987 Tell Leilan survey area (Figures 4 and 5) in order to study the social effects of different intensities of occupation over periods IIId-I in non-urban settlements.

Chapter 1: Pottery Production in an Early State (Periods IIId-IIa)

The "Second Urban Revolution" in Northern Mesopotamia and Syria was a period of cultural change during the mid-third millennium characterized by the appearance of cities and secondary state formation. Since the 1980s, this cultural phenomenon has been the focus of a number of excavations projects as well as comprehensive reviews (Akkermans and Schwartz 2003, Weiss et al. 1993, Porter 2002, Stein and Blackman 1993). Two decades ago, Harvey Weiss identified urbanization and indigenous state formation within Period IIId at Tell Leilan. This is a case of secondary state formation that occurred without direct military threat from established states in southern Mesopotamia, and it is the first evidence for state formation in the area of the Habur triangle during the Second Urban Revolution. In this chapter, I will discuss the political nature of Tell Leilan's early urban period. Then, I will analyze parallels from other areas of Mesopotamia to help us understand the ways that the state interacted with craft production during this period. Finally, I will discuss the political changes that took place before the incursion of the Akkadian state into the Habur in period IIb and its effects on craft production.

Evidence of Urbanization and State Formation in Period IIId

According to survey and excavation results at Tell Leilan, the site grew from a town of approximately 15 hectares to a city of around 90 hectares at the beginning of Leilan period IIId, the last century of the Ninevite V period, radiocarbon dated to around 2600 BCE (Figures 1 and 2). Excavations of domestic quarters in Op. 5 indicate that much of this expansion took place along a planned street grid, demonstrating guidance by a central authority at the site. Tell

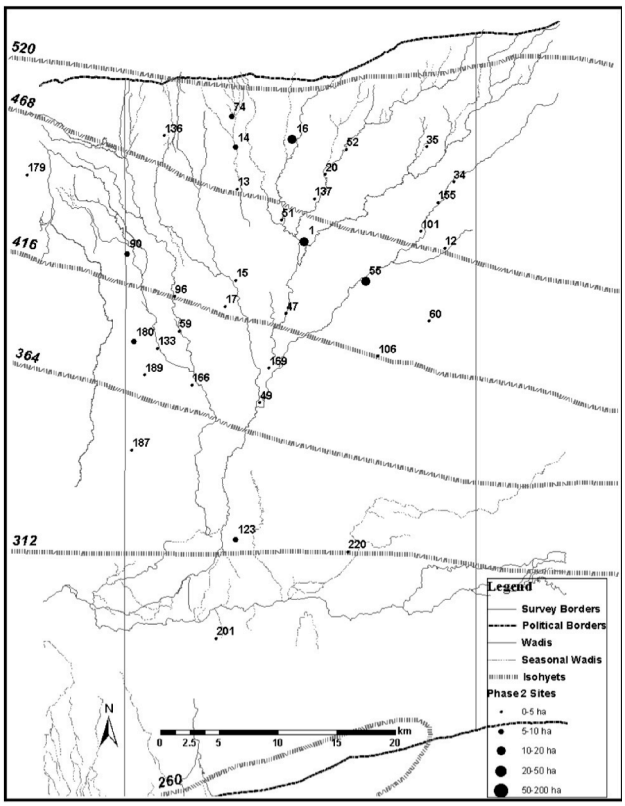


Figure 1: Leilan Regional Survey site sizes in Phases IIIb-IIIc

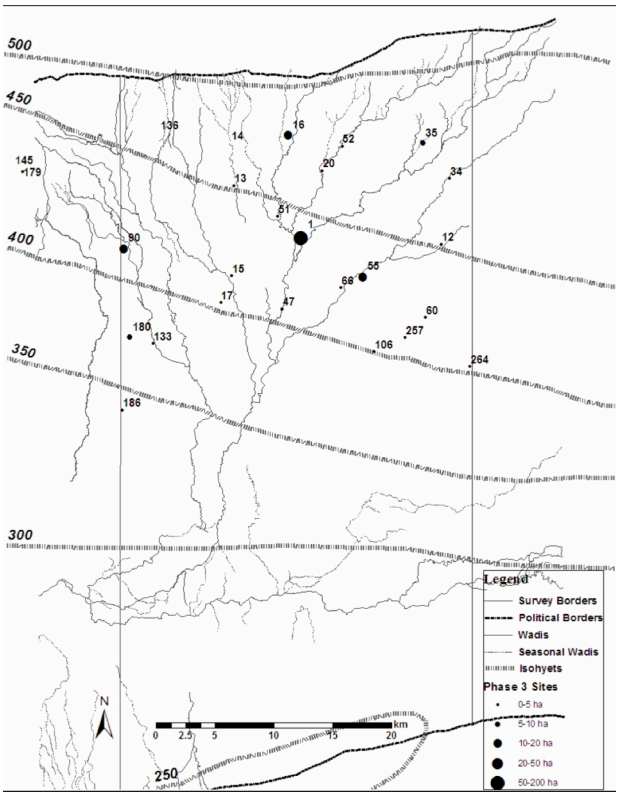


Figure 2: Leilan Regional Survey site sizes in Period IIId

Leilan's expansion was also correlated to a drop in the number of settlements in the Leilan survey area, indicating a large-scale migration to the city from the countryside (Ristvet 2005: 59, Figures 1 and 2). During this period, an administrative and storeroom complex, with evidence of large quantities of sealings from a limited number of public officials, was constructed on the site's acropolis, demonstrating the intensely hierarchical structure of this early state (Weiss 1990: 209). This complex also reveals a rapid change from the village-based economy of the previous period with a low level of craft specialization to an urban economy based on large scale storage and centralized redistribution of resources (Weiss et al. 1993: 996).

This process of urbanization and state formation at Leilan in period IIId is associated with a shift from glyptic closely comparable with Susa and the Iranian Plateau (the Piedmont Style,

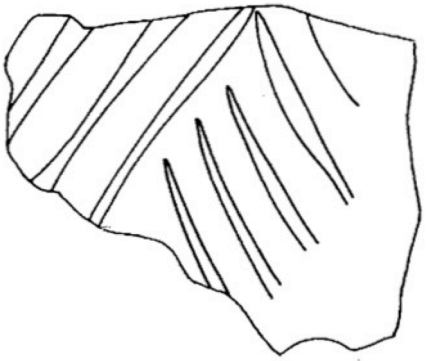


Figure 3: Piedmont Style sealing from Leilan period IIIa

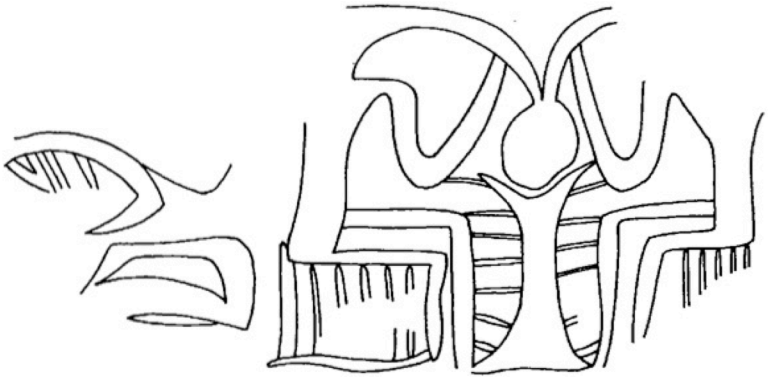


Figure 4: Figurative sealing from Leilan period IIId

Figure 3) to glyptic more closely associated with Southern Mesopotamia (figurative themes, especially banquet scenes, Figure 4). Significantly, there are stylistic and iconographic features particular to the Habur (Parayre 2003: 277). This change occurred without evidence for military incursion into the area from Southern Mesopotamia. Indeed, the acropolis was not fortified until the end of period IIId, a century after the first appearance of state-level organization (Weiss 1990: 213). However, this reorientation of cultural interaction suggests that the ideas and structures incorporated into the Leilan state came in part from the Early Dynastic city-states to the south, though likely with significant alterations to suit the environmental and cultural landscape of the dry-farming region of Northern Mesopotamia.

Parallels for Early State Craft Organization at Leilan

Because no ceramic workshops have been excavated at Tell Leilan and we do not have any administrative documents from the site dating to the first phase of urbanization, it has been necessary to consider contemporary evidence for other areas to reconstruct the relationship of state administration to craft production at Leilan. Since urbanization at Tell Leilan coincided with the adoption of Southern Mesopotamian glyptic styles, we will first consider evidence from

this area. The best-documented pottery workshop in Early Dynastic Sumer was excavated at Abu Salabikh near Nippur (Senior 1998: 153). This workshop dates from the ED II-III period and is contemporaneous with the first phase of urbanism at Leilan. At Abu Salabikh, the workshop was located within a craft quarter in the northern area of the site, although it is unclear whether the potters themselves resided there. This workshop was littered with about 20 sealings, mostly door sealings, indicating that the state had a direct role in administering the workshop and likely the craft quarter in general (Postgate 1990: 104). However, several scholars, notably Gil Stein and M. James Blackman have argued that the ceramics made by public institutions in the Early Dynastic period were produced on a small scale and were only meant for utilitarian use by the "great household" itself (Stein and Blackman 1993: 53-4). To the Northwest, Ebla is generally conceived of as one of the gateways through which Southern Mesopotamian culture was disseminated to the cultures of Northern Syria/Mesopotamia. Administrative documents from Early Dynastic Ebla show that the state supplied craft specialists with raw materials and gave them rations in return for finished products (Sollberger 1986). This attached craft production,

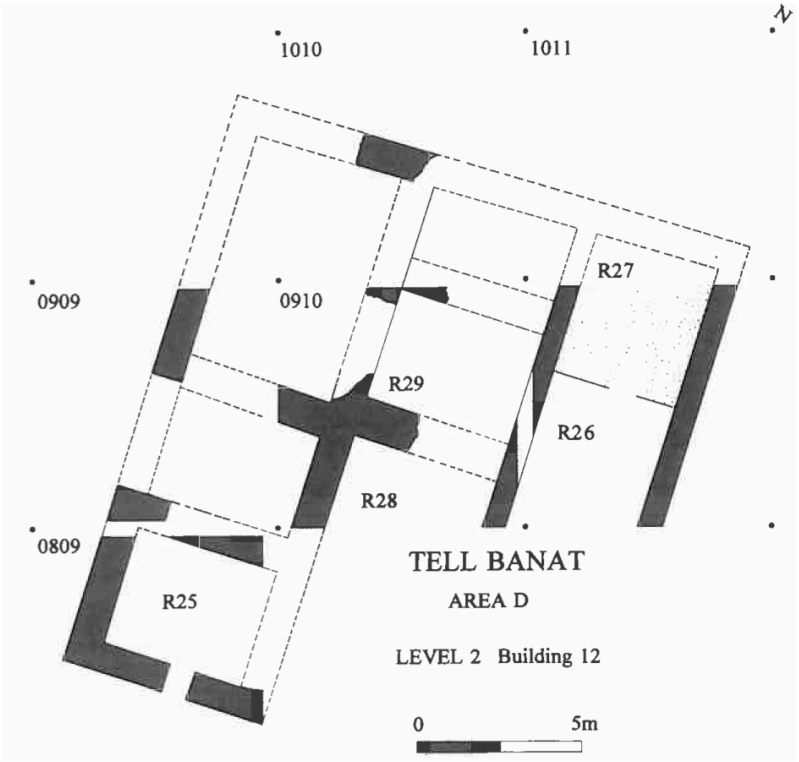


Figure 5: Tell Banat building 12

however, was probably limited to prestige items made of imported materials or to items required a high level of skill and time commitment, i.e. metals, semi-precious stones, and textiles. Ceramic production is not documented in the Ebla archives (Wattenmaker 1998: 49). Given the evidence for an attached ceramic workshop at Abu Salabikh, the lack of evidence for a similar relationship at Ebla may indicate that the context of pottery production differed in the two regions. However, it is also possible, and perhaps more likely, that administrative documentation during ED III Ebla was concerned with accounting for quantities of valuable materials themselves, rather than for labor. Thus, the lack of an administrative record of pottery production at Ebla may be due to the utilitarian nature of the product, which did not require the same level of oversight as for prestige items. In this case, the lack of documentation is not evidence for the lack of attached ceramic production.

Lisa Cooper argues that in the Upper Euphrates valley, unlike at Ebla or in Southern Mesopotamia, attached workshops did not exist even for prestige craft industries, let alone for the production of ceramics (Cooper 2006: 200). This, she asserts, is true despite the fact that the forms of ceramic vessels of all types, including cooking pots for strictly domestic use, became more standardized during this period, indicating specialization (ibid. 182-3). Cooper's argument relies on evidence from the pottery kilns at Tell Banat. Here, several kilns were found on the western edge of the tell. All but one date to Tell Banat period IV, 2600-2450 BCE, contemporary with Leilan IIId and early IIa. These kilns are tentatively associated with building 12, which the excavators identified as an administrative rather than a domestic building (Figure 5). This identification suggests that this large-scale ceramic production was organized around a public institution (Porter and McClellan 1998: 20), an observation supported by the construction of a

large public building in a different area of the site at the same time as the first use of these kilns (Porter 2002: 27). In contrast, Cooper argues that although the vessels fired in these kilns included large numbers of standardized vessels, they were found in tombs of all socioeconomic strata, suggesting that their production was not controlled by a new elite strata of the society (Cooper 2006: 198). Cooper's contention rests on the assumption that ceramics produced on behalf of an elite stratum of society would not have been redistributed to other sectors of societies. However, the pattern of recovery of standardized vessels from contexts that represent a wide range of economic strata does fit with an administrative scheme in which pottery workshops were centrally controlled by an administrative apparatus that redistributed its products to the general populace as containers for staple allotments, as has been argued for later states in Northern and Southern Mesopotamia (see Chapters 2 and 3).

Political Control and Craft Organization in Leilan IIa

Alfonso Archi asserts that prior to the establishment of Akkadian rule in the Habur, (Leilan IIa), the kingdom of Nagar centered at Tell Brak controlled the entire Habur triangle including other regional centers such as Leilan and Mozan. This argument relies on the fact that Nagar was mentioned in the records of both nearby and faraway settlements such as Ebla, Mari, and Kish (Archi 1998: 3). Furthermore, based on an analysis of the Early Dynastic administrative texts from Beydar, Walther Sallaberger asserts that the *en* of Nagar held administrative control over an area that included the nearby site of Tell Beydar (Sallaberger 1996: 105). The hegemony of Nagar would explain why there were no violent destruction levels at other sites in the Habur contemporary with the Brak phase L destruction and the subsequent

appearance of evidence of Akkadian economic policies throughout the region. Once Brak was captured, the rest of the region was easily incorporated into the new administrative structure.

On the level of the material culture, there is a visible change in the types of ceramics produced at Tell Leilan during the transition from Period III to Period II. Intricate decoration on fine ware vessels disappear and the form and volume of these vessels become more standardized. These changes suggest that fine wares moved from the category of prestige goods to that of utilitarian items (Stein and Blackman 1993: 32, 43). The previous discussion of the relationship of the state to specific crafts may seem to indicate that the fine wares of period IIId were probably produced in attached workshops while the ceramics of period IIa at Leilan were not. However, the personnel lists detailing craftsmen who received rations in the administrative texts at Tell Beydar under the administration of the palace at Nagar included potters, indicating that this remained an attached industry (Van Lerberghe 1996: 121). Indeed, a comparison of rationed personnel working at Beydar and the total likely population of Beydar and its hinterland, determined from an intensive archaeological survey, indicates that almost all the adults residing in the area were employed by the palace (Ristvet 2005: 26), which must have included a large proportion, if not all of the potters at the site.

Conclusion

Previous reviews of the evidence for pottery production during the Second Urban Revolution have minimized the role of centralized institutions. These arguments are perhaps influenced by a projection back from the end of the third millennium, a period of far greater documentation during which the high level of state control over craft production in the South

contrasts with a marked lack of state involvement in the North. However, with the continually widening textual and archaeological evidence from the Habur and upper Euphrates for the third quarter of the third millennium, it is increasingly difficult to reconcile these projections from later periods with the evidence. The level of centralization during the period of early urbanism in this region may seem surprising given the political and social developments that took place following the fall of the Akkadian state, but this should be no more surprising than the rapid rate of urbanization that took place at the beginning of this period and the rate at which it evaporated half a millennium later.

Chapter 2: The Context of Pottery Production in Akkadian Administration of the Habur (Period IIb)

Over the past two decades, much attention has been paid to the place of the attached ceramic industry in the economic and administrative systems of Mesopotamian and Syrian societies during the late third millennium BCE. These studies can be divided into two categories: (1) those concerned with textual evidence, which analyze administrative records of the account balances between potters (*bahar*) and the Ur III state from Umma (Potts 1997, Steinkeller 1996) and (2) those concerned with material culture, which have focused on the production of greenish conical open containers in the Akkadian (IIb) levels of Tell Leilan that Harvey Weiss has termed "*sila* bowls" (Senior and Weiss 1992, Blackman 1993, Roux 2003). However, little work has been done to integrate these approaches. This is due at least in part to the fact that in Southern Mesopotamia, the source of our rich written Ur III administrative record, there have been few well-documented excavations of utilitarian craft production sites. In the Habur drainage basin, and especially at Leilan, on the other hand, great attention has been given to ceramic production sites, but the area lacks detailed administrative archives. Indeed, at many of these sites, including Leilan, there is no occupation during the record-rich Ur III period (ca. 21st century BCE) (Weiss 2012). In the present study, I will attempt to fill this methodological gap. First, I will briefly describe the current understanding of the web of economic interaction between potters and the state that can be derived from the Ur III texts. I will then provide circumstantial evidence that supports the application of this model to the period of Akkadian administration in the Habur Plains. Finally, I will use the evidence from studies of the Leilan material culture to modify this model in a way which makes it more appropriate for

both periods.

Potters of Ur III Umma

Steinkeller's model of the relationship of the Ur III potters of Umma to the state was developed in his 1996 study of the dossier of relevant[1] administrative tablets. Steinkeller identifies two groups of attached potters: those associated directly with the crown and those associated with local administrators and temple households. He then subdivides the second category into potters situated within the city meeting administrative needs, and potters located in the countryside meeting local needs (Steinkeller 1996: 236). Both categories of state potters were given land allotments and rations of barley and wool (ibid. 239-40). Barley rations ranged between 30 and 60 *sila* per month (Potts 1997: 156). Potters also received resources from the state such as reeds to fuel kilns, hides to transport pots from state storehouses and unskilled laborers (Steinkeller 1996: 242). Most of the ceramics were produced for various state functions such as royal beer storage and for other uses in the royal household (ibid. 244).

After compiling the direct evidence from the Ur III tablets, Steinkeller makes certain inferences about the way the attached ceramic industry operated during this period. Most importantly, he argues that the potters documented in these texts worked from home and their primarily role was not to produce for the state. He cites several pieces of indirect evidence to support this inference. First, he points out that there are no references to supervisors for the potters and that they are responsible for distributing their products and gathering resources from distribution centers themselves. Second, he notes that the potters only worked a certain number

[1] Based mostly on MVN 1 231, MVN 1 232, and RTC 399

[2] With 68.2% confidence, this range is 2345-2209 cal. BCE and with 95.4% confidence, 2458-2203 cal. BCE(ibid.).

[3] With 95.4% confidence, this range is 2266-2211cal. BCE(ibid.)

of days for the state, although this number is never specified. Third, he argues that the profession of potter was generally passed from father to son and that there were several potters in each city. Finally, he argues there is no evidence for a royal household or palace at Umma that could have had an attached pottery workshop (Steinkeller 1996: 248-50).

None of these inferences from the texts provides convincing evidence to support household production. First, the absence of supervisors does not necessarily mean that production was not centralized. As long as the state was receiving the number of vessels they demanded, there would be no need for supervisors, and if they did not receive their quota, the state could easily discontinue or reduce the potters' rations. Steinkeller' second argument, that the potters worked only a certain number of days for the state, relies completely on conjecture. As for the third inference, the passage of the title of potter from father to son does not require that each potter worked independently. Employment could also be passed down in this way in a larger workshop,, and multiple potters could have been employed at once within a single workshop. Steinkeller's final point is particularly hard to accept since Umma was never actually excavated scientifically.

Jacob Dahl contests Steinkeller's 1996 conclusions on a number of grounds, including the discovery of two better-preserved texts. First, Dahl identifies two individuals in the potter's gang who received slightly higher barley ration (Dahl 2010: 286) and were responsible for taking raw materials and for delivering pots to the state (Steinkeller 1996: 288). Furthermore, Dahl adds that these two individuals can be identified as overseers from their seals as well as from references to them in other textual sources (Dahl 2010: 287-8). Dahl also points out that none of the individuals that Steinkeller cites as receiving land allotments were actually members of the

potters' gang (ibid. 290), suggesting that the potters had no other source of income apart from their craft. In addition, Dahl points to references to pottery workshops, establishing that the potters did work in centralized locations and not at home as Steinkeller asserts (ibid.), concluding that potters did, in fact work full-time for the state and could even be incarcerated for fleeing the workshop (ibid. 291).

Application of the Ur III Model to the Akkadian Habur

In order to use the material evidence from the Akkadian Habur to inform Steinkeller's model of administrative involvement in the system of attached pottery production, we must first establish that it is likely that the same sort of political/economic system was present in this region under Akkadian hegemony. This can only be established circumstantially by identifying elements of the Ur III textual model in the material culture of the Akkadian Habur and within the much smaller collection of Akkadian administrative texts. First, let us consider the degree and the duration of the Akkadian system of administration in the Habur. The earliest known Akkadian administrative occupation at Tell Leilan is a building in period IIb3 identified as the "tablet room" or "scribal school," based on the presence of Old Akkadian school tablets found in the building. A sample of seeds on the floor of this building yielded an uncalibrated radiocarbon date of 3845 +/- 35 BP (De Lillis Forest et al. 2007: 48), which calibrates to around 2300 BCE (Ristvet 2011: 308)[2]. Weiss estimates that the beginning of this occupation was about 2350 BCE (Weiss 2012: 6). The use of this building was contemporary with the last occupation of a pre-Akkadian Leilan IIa palace across the street, signaling that Akkadian administrative control

[2] With 68.2% confidence, this range is 2345-2209 cal. BCE and with 95.4% confidence, 2458-2203 cal. BCE(ibid.).

relied on cooperation with entrenched local authorities. During the next period, Leilan IIb2, the palace was razed and replaced with a larger complex known as the Akkadian Administration Building. In addition, construction was begun on another administrative complex, the Unfinished Building, which replaced the scribal school, along with several mud-brick residential buildings (Weiss et al. 2012: 171). This new construction began around 2300 BC, contemporary with the end of the use of the scribal room. The date of the destruction of the Akkadian Administration Building, and likely the end of Akkadian administrative control at the site was determined by radiocarbon samples from the mud-brick collapse on top of the building, which yielded a range of 2254-2220 cal. BCE with 68.2% confidence (ibid. 175)[3].

To contextualize this large-scale administrative construction more specifically within the Akkadian dynasty, we may look to the similar monumental administrative building at Tell Brak, called the "Naram-Sin Palace" by Max Mallowan, its excavator in the 1930s, which was a fortified storehouse. Confidence in this date comes from the fact that bricks in the structure were stamped with Naram-Sin's name (Oates and Oates 2001: 19). Hence, we can connect these monumental building projects as well as the great marshaling of manpower they required to the Akkadian administration, a centralized bureaucracy with this king at its head[4].

The existence of pervasive Akkadian administrative control at least during the reign of Naram-Sin at Leilan, Brak, and Mozan is further attested by the ubiquitous presence of sealings in administrative buildings with contests scenes depicting two sets of combatants in the Akkadian style with an Old Akkadian inscription (Weiss et al. 2002, Buccellati and Kelly-

[3] With 95.4% confidence, this range is 2266-2211cal. BCE(ibid.)

[4] The radio-carbon dates for Tell Brak are somewhat more problematic, however, as many were performed with a systematic error (Ristvet 2011: 311).

Buccellati 2000: 140, Matthews 1997: 139). Richard Zettler has convincingly associated this style with high royal officials of Naram-Sin's reign and standardized administrative control throughout the Akkadian state (Zettler 2007: 31). This collection of seal impressions includes one of a *šabra*, the highest level Akkadian official at Leilan in the Unfinished Building (Weiss et al. 2002) and a daughter of Naram-Sin at Mozan in the Akkadian-period palace (Buccellati and Kelly-Buccellati 2000: 140). In fact, Donald Matthews is convinced that the concentration of Akkadian seals and impressions at Tell Brak indicates that the seals themselves were manufactured locally, but in a completely Southern style that employed imported manufacturing techniques(Matthews 1997: 143). If correct, this observation indicates that the state produced administrative tools (both tablets and seals) at large sites in the Habur during the Akkadian period.

In addition, the Ur III and Akkadian states employed similar strategies of economic control, specifically as they apply to craft production. Although there are no records of state lands being given to potters during the Akkadian period in the north, the Mesag archive from Umma illustrates that this was a major strategy of Akkadian administration in the south, parallel to the Umma documents of the Ur III period (Bridges 1981: 103). Further north at Gasur, tablets record parcels of land being given to 74 state personnel (Foster 1987). In addition, the Tell Leilan survey project has shed much light on Akkadian land policies in the Habur plains. With the establishment of Akkadian administrative control in the Leilan area, the lands that were agriculturally exploited changed radically (Ristvet 2005: 61), a change that could only have been accomplished in this period of time by an Akkadian land policy that prominently featured the designation of state lands for a wide range of dependent royal personnel. The practice of land

allocation to privileged state personnel but not to potters, furthermore, matches Dahl's alternative reconstruction of the Ur III potters' texts (see above). More explicitly, Akkadian documents record rations for potters at Umma. Similar to the practice during the Ur III period, potters receive both barley (Bridges 1981: 214-5) and wool rations (ibid. 333-8). In fact, ration lists indicate that potters were given either 30 or 60 *sila* of barley per month, precisely the same wages as in the Ur III documents. The value of the *sila* measurement changed over the course of the third millennium. Only during the Akkadian period was it fixed at about 1 liter, a value that persists for millennium afterward (Ellison 1981: 40-1).

Finally, it is useful to consider the types of ceramics being produced during these two periods. In the middle and eastern Habur valley during the Akkadian period, by far the most common vessel type recovered in excavation is a particular bowl type made of a green or green-buff fabric with few inclusions that has a flat base, straight sides, and simple rim. These bowls appear in large quantities only at sites under Akkadian administration (Rova 2011: 75)[5]. At Leilan they are associated with the entire Leilan IIb period, indicating that they were produced at various levels of intensity throughout the period of the Akkadian administration (Quenet and Ristvet 2012: 194). Harvey Weiss has designated them "*sila*-bowls" due to their standard volumes of about 1 liter (Senior and Weiss 1992: 23), and they can thus be correlated with vessels of the same name that are mentioned in many administrative texts from both the Akkadian (Steinkeller and Postgate 1992: no. 26) and Ur III periods (Potts 1997: 157). Indeed, in the ceramic assemblage from Nippur, a city controlled successively by the Akkadian and Ur

[5] For Tell Leilan see: Quenet and Ristvet 2012: 194-5, for Tell Mozan: Buccellati and Kelly-Buccellati 2000: 179, for Tell Brak: Oates 2001: 156, for Chagar Bazaar: McMahon and Quenet 2007: 87, and for Tell Hamoukar: Reichel et al. 2012: 289.

III state apparatuses, the same type of simple-rimmed bowls (type O-1) persists through the Akkadian and Ur III periods and has the highest frequencies of any ceramic form (McMahon 2006: 100). These bowls, furthermore, display a very similar range of rim diameters to the *sila* bowls in the Habur, although they are not identical in form (McMahon 2006: 63, Senior and Weiss 1992: 23, Ristvet 2012a: 243). Given that attached potters during the Akkadian and Ur III periods were producing vessels with similar capacities, receiving the same rations and serving under states employing similar administrative strategies, we can confidently apply the same model to pottery production in both periods.

Details of the Model revealed at Akkadian Leilan

We are now ready to test Steinkeller's inferences about the nature of this industry against observations from *sila* bowl production at Tell Leilan. Much of the work that has been done concerning the manufacture of this pottery at Tell Leilan has focused on stacks of improperly fired bowls called "stacked kiln wasters" (SKWs, Figure 1, Senior and Weiss 1992: 22) that represent a single production event. None of these SKWs, however, was found associated with a production context; they were instead redeployed as paving in the site's acropolis and the lower town (ibid. 16 and De Lillis Forest et al. 2007: 49). From a 1993 study of the dimensions and compositions of the various bowls within an individual SKW, M. James Blackman suggested

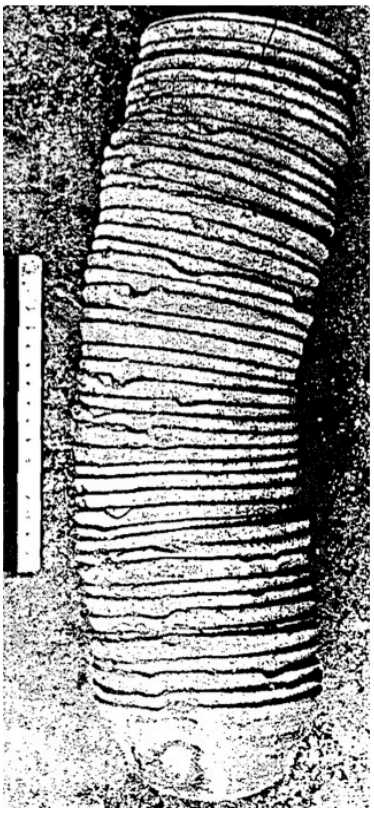


Figure 1: Example of a stacked kiln waster found at Tell Leilan

that these events represent standardized production (Blackman et a. 1993: 76). In 2003, Valentine Roux reexamined the same data with reference to ethnographic examples of standardized pottery production. She identified 9.2% variation in rim sizes within production events that Blackman found in his study as an example of what she terms "weak standardization." Using ethnographic analogy, she suggests that such weak standardization correlates with the production of up to 6,000 pots by one potter per year. (Roux 2003: 780). Based on this, a conservative estimate of the amount of time an individual potter spent producing *sila* bowls for the state would be 4000 vessels per year per potter.

This scale of manufacture would not entail full-time state production if they were produced, as theorized by Blackman, using wheel-throwing and wheel-finishing techniques (Blackman 1993: 63)[6]. However, in 1995, Roux conducted a study of third and fourth millennium ceramics, including a sample of Leilan fine wares, in order to evaluate the evidence for wheel throwing. She used observations of surface features, thin sections, and sections under an SEM to show that there is no evidence for the use of the wheel-throwing technique in the third-millennium in the Near East (Courty and Roux 1995). Furthermore, in her later 1998 study, she details four methods of coil forming and wheel fashioning that could have been used in the fourth and third millennia in the Near East and identifies surface features left by each of these techniques. Given that the *sila* bowls exhibit regular ridges and parallel grooves on their surface (Figure 2, Blackman 1993: 66) and interior stretch marks (Figure 3, ibid. 65), their characteristics match those given for the fourth techniquedetailed by Roux (Figure 4, Roux and

[6] Indeed, Buccellati and Kelly-Buccellati note that a potter could wheel throw 500 such vessels in a single day according to a California potter (Buccellati and Kelly-Buccellati 2000: 179).

Courty 1998: 751).[7] In this technique, coils are made on a rotating wheel, and they are

Figure 2: A summary of the diagnostic surface features of the various coil-wheel forming methods.

Method	Morphology of walls	Grooves	Rilling	Striations
1	Possible differential modification of external and internal faces Slight modification through RKE. Clay is not "stretched" Irregular microrelief: blisters with parallel pattern	No trace of join of coils	Rare	Striations running around the internal and/or external face
2	Possible differential modification of external and internal faces Slight modification through RKE. Clay is not "stretched" Irregular microrelief: blisters with parallel pattern	Irregular wavy lines	Rare	Striations running around the internal and/or external face
3	Strong modification of the two wall faces under the effect of RKE. Clay is "stretched"	Deep sub-parallel grooves Irregular way lines	Great variety of rilling Rilling in the form of a band crossed in the middle by a groove	Striations running around both faces
4	Strong modification of the two wall faces under the effect of RKE. Clay is "stretched"	Parallel grooves	Regular ridges out of adjustment	Striations running around both faces

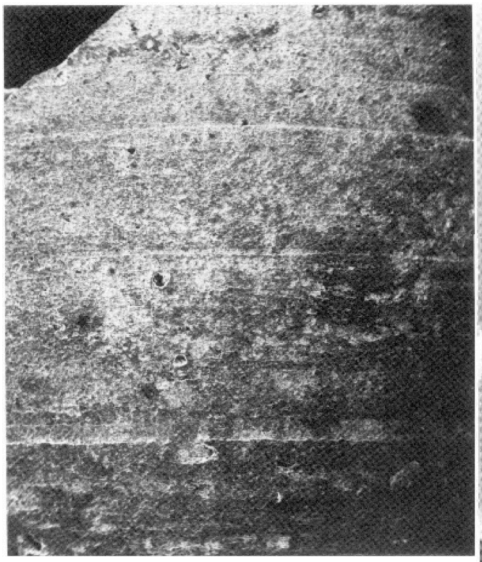


Figure 3: Detail of sila *bowl surface, highlighting its parallel grooves.*

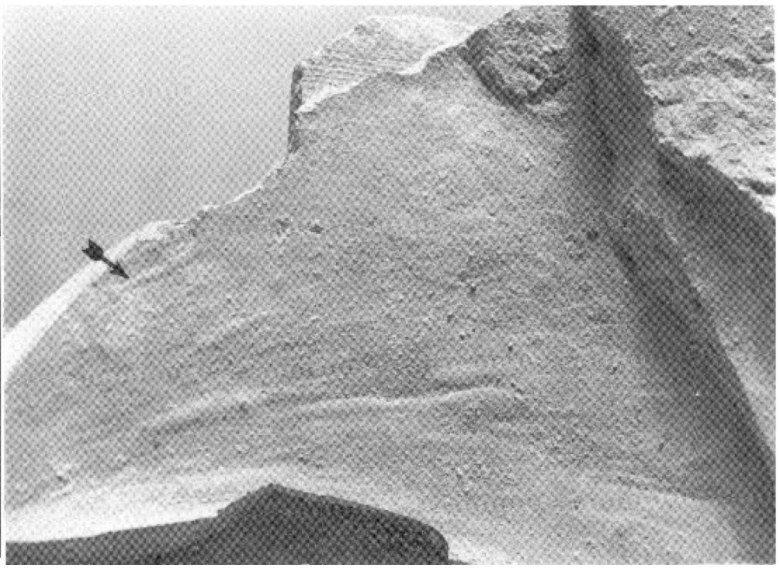


Figure 4: Detail of sila *bowl surface, highlighting its stretch-marks.*

[7] These forming techniques vary in terms of the production steps which were performed on the wheel. She identifies four steps that might have been accomplished on the wheel: forming coils, joining coils, thinning out the coils, and shaping the roughout. The first forming technique includes the completion of only the last step on the wheel, and each successive technique adds a step that is performed while rotating, in general cutting down on the forming time (Roux and Courty 1998: 750)

subsequently joined, thinned and smoothed on the wheel.

In her 1998 dissertation, Louise Senior challenged Roux's conclusions with regard to the wheel-throwing technique in the production of Leilan fine wares (Senior 1998: 994-1001). Senior supports her conclusions on the basis of observation of surface features, interviews with potters on the forming techniques used to manufacture this assemblage, and x-radiographs of several sherds. However, her line of argument is weakened by several factors. First, Senior does not conduct the same analyses of thin sections that Roux does, nor does she use Roux's SEM procedure. It is difficult to invalidate a previous study if the same materials and methods are not used. Second, in her observation of surface features, Senior notes that there are no obviously visible coil joins on the interiors of the vessels (ibid. 995), but it is to be expected that these coil joins would be visible on very few of the fine wares, as they are in general highly and carefully finished. Third, it is unlikely that modern potters who in general have no experience with wheel-coiling techniques would be able to discern the very subtle distinctions in surface features produced by wheel throwing and other wheel-forming and wheel-finishing techniques. Furthermore, the potters Senior interviewed agreed that the fine wares were “wheel manufactured” (ibid. 995), a fact that is completely uncontroversial: According to Roux's description of technique 4, as noted above, the entire process of pottery manufacture takes place on the wheel. Finally, Senior concludes from her x-

Figure 5: Example of Senior's x-radiographs of Leilan fine wares, displaying both horizontal and angled voids.

radiographs (Figure 5, ibid. 1001) that these vessels were wheel thrown due to the existence of diagonal pores. In 2011, Ina Berg conducted a study that attempted to differentiate the various forming techniques in Bronze Age Knossian vessels using x-radiographs. She observed that x-radiographs showed a combination of horizontal and angled voids in Roux's wheel-coiling method 4, in which the most pressure on the clay body is exerted on the wheel. (Berg 2011: 145).

When performed experimentally, Roux found that using forming technique 4 to make a vessel very similar to the *sila* bowl takes 30 minutes altogether (Roux and Courty 1998: 750). If a potter produces 4000 *sila* bowls per year at 30 minutes per bowl, this would total 2000 hours per year, which is about 40 hours per week. This figure does not include time spent collecting materials, preparing clays, finishing the vessels, firing them, delivering the completed vessels, and producing other ceramic forms. Alternatively, document MW124 from Ur III Umma contains a list of vessels delivered in addition to the number of work-days estimated to finish each quantity of vessel type. According to this document, each ^{dug}*sila-sa-du*, the vessel type associated with the highest quantity (61,047 produced), with a volume of 1 *sila,* took 1/15 of a work-day to produce (Potts 1997:157). If a potter produced at least 4000 a year, that would total 267 days per year working only on the production of this single vessel type. This figure may represent the total labor going into the production of each vessel including the entire aforementioned chain of production, which may have been performed by other individuals in the same workshop. Because records of deliveries to the state list a large variety of vessel forms being delivered simultaneously in both Akkadian (Steinkeller and Postgate 1992: no. 26) and Ur III period records (Potts 1997: 157), each workshop must have included multiple full-time potters and other personnel.

Blackman also compares the variation among a single SKW to the total variation among Akkadian *sila* bowl fragments found at the site. Among the entire assemblage of *sila* bowl fragments, Blackman finds an 18.8% variation (15.7% with the elimination of two outliers) in rim sizes. He takes this discrepancy between variation in a single production event and variation over the entire assemblage as evidence for multiple workshops producing *sila* bowls during the Akkadian period, in agreement with Steinkeller's model for attached potters (Blackman 1993: 76). However, on reexamining these data in 2003, Roux notes that the total assemblage variation is completely in line with the variation within a single production event, given that this assemblage was produced over a period of over a century (Roux 2003: 780). This workshop would have been limited to producing for Leilan itself and not for any of the outlying settlements. This is confirmed through the results of neutron activation analysis conducted on both the Leilan IIb fine wares and the fine wares of nearby village sites (Blackman et al. 1993: 72). This alternative reconstruction would agree with Dahl's hypothesis that there was one major central potters' workshop in Ur III Umma, associated with the governor's residence (Dahl 2010: 291). Control of the workshop producing the *sila*-bowls then likely would have been associated with the administrative duties of the *šabra*, the highest administrative official at Leilan.

Conclusion

In the Akkadian Habur, multiple potters probably worked in individual workshops producing pottery for the state. In return, they received rations, materials, unskilled workers and possibly land allocations from the royal administration. It is likely that these potters worked full-time for the state and that only one of these workshops existed in Akkadian Leilan. Given

the similarities between the administrative strategies of the Ur III state and the Akkadian state, this model of a single city workshop solely dedicated to state production is probably widely applicable for both periods.

If this is the case, we must account for the production of pottery for domestic use, assuming that attached potters did not also produce these types of ceramics (Steinkeller 1996: 251). More work must be done to elucidate this question, but I see three principal possibilities. First, these pots might have been produced on a small-scale, local level by a single part-time potter manufacturing ceramics for one or several families. Second, they might have been produced in a centralized way at each site in a workshop that was separate from the state workshop. Finally, domestic ceramics may have also been produced in the central workshop where state demand was filled, but by a different group of potters. In order to differentiate between these three suggestions, we must examine domestic vessels for signs of standardization and compare their production methods with those used for vessels produced for the state.

Chapter 3: Model and Emulation in Old Babylonian Labor Policy (Period I)

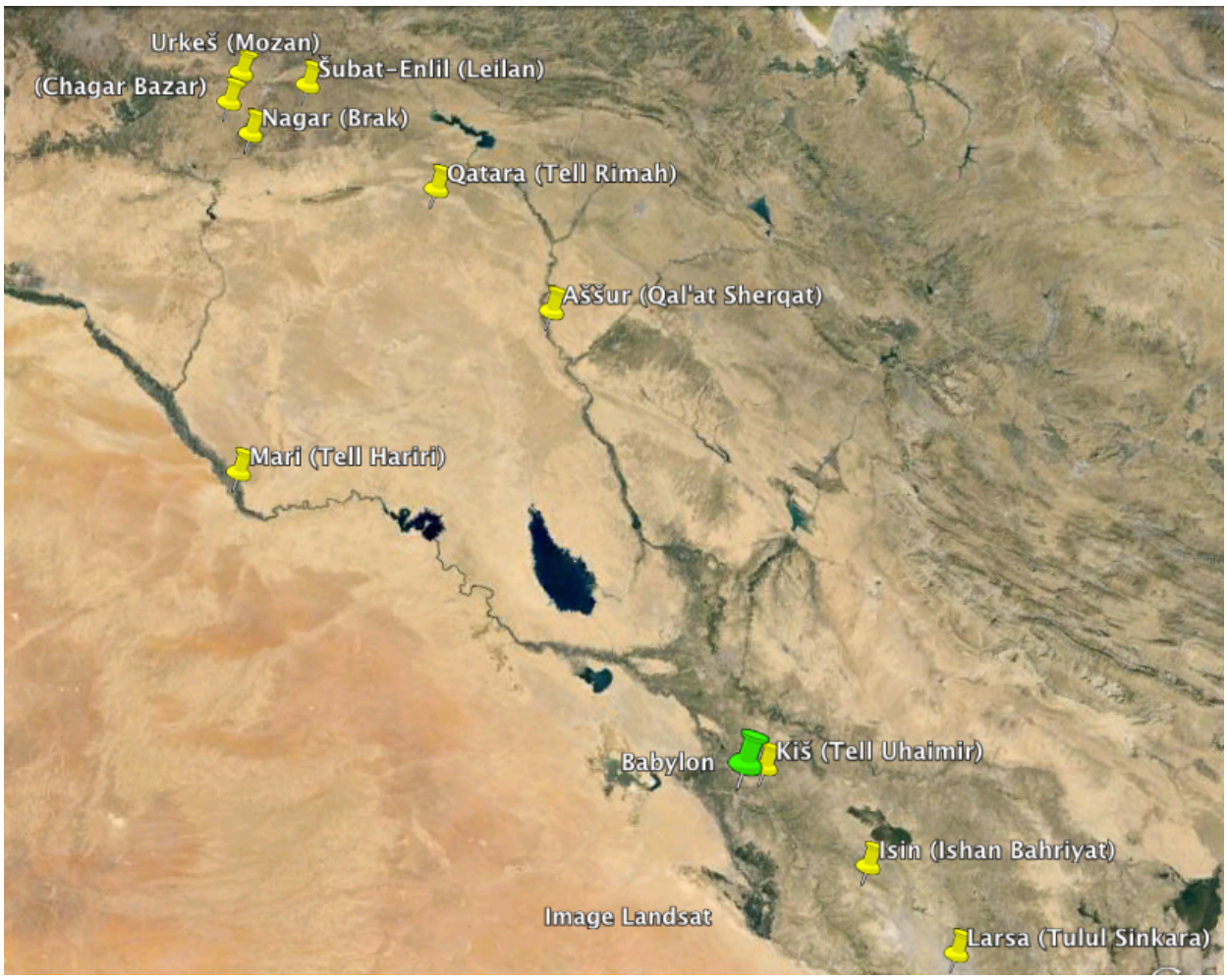


Figure 1: Relevant sites of Old Babylonian Mesopotamia

In the early 18th century BCE, an Amorite warlord, Šamši-Adad, began to construct a centralized state in Northern Mesopotamia. Originally, the base of his power was Ekallatum, just north of Aššur (Veenhoff 2008: 141). However, by the end of his life, Šamši-Adad ruled from Šubat-Enlil, at modern-day Tell Leilan in the previously unpopulated Habur Basin. Perhaps more importantly, the stage was set for the rise of the Mitanni state, seemingly a Hurrian ethno-state (referred to as Hurri or the "Hurrian enemy" by the Hittites van Koppen 2004: 20) in the

same region over the next two centuries. In this chapter I will discuss the process of these changes through the lens of Šamši-Adad's labor policies and his ideal model of a territorial state. I will argue that the economic structures of the Isin and Larsa dynasties in Babylonia provided Šamši-Adad with a framework for a certain level of centralized control over labor. However, Assyria already had an entrenched decentralized and prosperous system of economic production which did not have a ready supply of cheap labor to support the kind attached production that fits this framework. I suggest that this was the reason that Šamši-Adad's moved the state's administrative apparatus to the previously unpopulated Habur Basin. Further it seems that this move was followed by a centrally-guided policy to populate the region with mainly Hurrian prisoners of war who provided a supply of cheap labor that was necessary for the Southern Mesopotamian model of state administration.

Attached Labor in OB Babylonia

The sole event of Šamši-Adad's life preserved in Sargon II's copy of the "Assyrian King List" before his ouster of Erišum the king of Assyria (Poebel 1942: 285) is his journey to Karduniaš (Babylonia). Furthermore, Šamši-Adad allegedly shared significant portions of his lineage with Hammurabi of Babylon, as can be seen in a comparison of the "kings who lived in tents" portion of the "Assyrian King List" and the "Genealogy of the Hammurabi Dynasty" (Wossink 2009: 125). In addition, Šamši-Adad adopted the epithets "king of the universe" and "king of Agade" during his reign, emulating the Akkadian kings who reigned from Akkad about five centuries earlier (Ristvet 2005: 151). These connections between Šamši-Adad and southern Mesopotamia suggests that the contemporary southern kingdoms of Isin and Larsa were likely

the models of political authority that Šamši-Adad emulated when he built his territorial state, in contrast with the city-state decentralized model already present in Assyria. As in earlier states in the area that was to become Babylonia, a major source of income and authority for the state of Isin was the control of attached craft workshops.

For the most part, the attached workshops of the Isin dynasty observed the conventions of the Ur III period. These conventions included the division of laborers into work gangs, the accounting of work in man-days, the assignment of land plots to some state employees, and the distribution of rations (Van de Mieroop 1987: 118-9, Goddeeris 2002: 371). However there are several aspects which distinguish attached labor in the Early Old Babylonian period from the Ur III state. First, in addition to long-term rationed workers, the palace in Kiš employed some salaried workers for a single day at a time (Goddeeris 2002: 294). Furthermore, the palace contracted private traders to sell goods produced by attached workshops (ibid. 397) in contrast to Ur III workshops, which held individual potters responsible for distributing their own products (Dahl 2010: 288). These traders, however, still had semi-

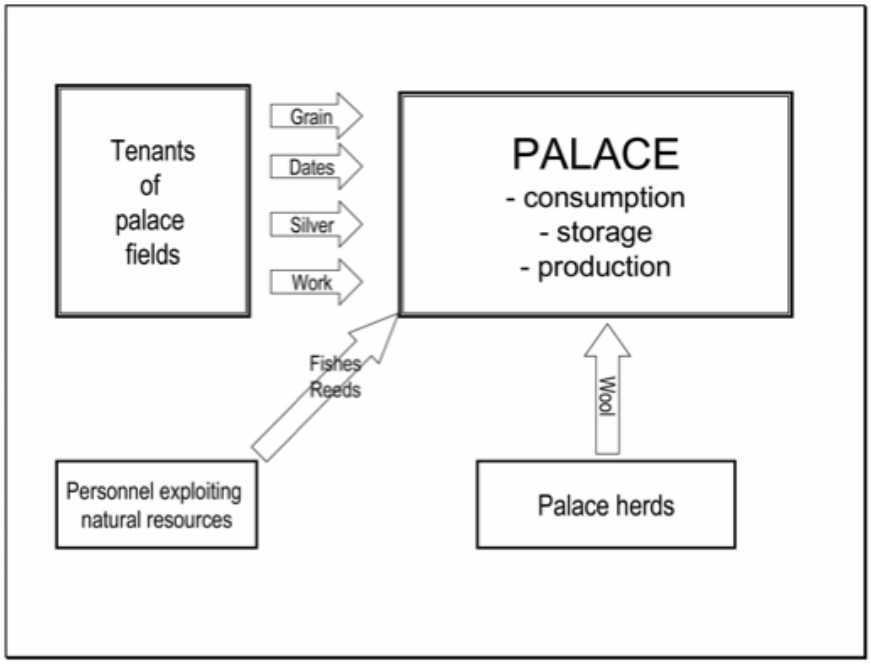


Figure 2: Sources of income for the Southern Mesopotamian state during the Old Babylonia Period

official status and were for the most part dependent on the state (Kolinski 2010: 83). Second, the Isin workshops seem to operate in general based on the concept of alternating work gangs in which each individual worked only 50% of the time, in contrast to Ur III workers who probably worked full time (Van de Mieroop 1987: 87). These changes in labor organization suggest an increase in both the number of attached laborers that engaged in private enterprise and in the number of individuals engaged in private enterprise working for the state on a contractual basis. Nevertheless, the state relied on a large body of rationed workers who were in turn dependent on the state for sustenance (Figure 2).

Labor and State in the Old Assyrian City-State

The organization of labor in the Old Assyrian city-state at Aššur is unique among well-documented economic systems in the ancient Near East. The Old Assyrian economy centered on international trade between Mesopotamia and Anatolia that was managed by Assyrian families living in trading colonies in Anatolian cities with allegiance to the city of Aššur. Treaties between Aššur and various cities in Anatolia regulated this trade, which was not subject to state coercion (Larsen 1976: 247). Hence, traders in the Old Assyrian city state, as opposed to those of Southern Mesopotamia, engaged in trade that only benefited state institutions through taxes. These trading ventures were conceived and financed privately (Kolinski 2010: 88).

In addition, unlike the situation in Babylonia, where craft production was for the most part managed by the state and was completed by dependent or semi-dependent craftsmen, the economy of Assyria was built on production and trade conducted by individual families. This situation is nicely illustrated by letters sent from an Assyrian trader in Anatolia to a female

relative, asking her to produce a certain type of textile for him to sell with a promise to pay her for each item sold (Veenhof 1972: 104 TC3/1, 17; 104 BIN 4, 10). These letters indicate that those producing goods in the Old Assyrian city-state were of a much higher social status than those in Babylonia. Unlike their Southern analogues, they owned both the means of production and the final products, which were traded by members of their own families. With the silver and gold generated from this trade, food and even prestige goods were acquired (Veenhof 1977: 115-6). Therefore, the substrate of lower-class workers that needed rations from the state to survive may not have existed in Aššur during this period. As shown above, this substrate was necessary to support the level of state-owned production that funded the Isin dynasty.

Labor and the Habur Under Šamši-Adad

After he ousted Erišum and began to rule the city-state of Aššur, Šamši-Adad immediately exerted increased control over the Assyrian trade network through a new official called the "Overseer of the merchants of Šamši-Adad" an individual who refers to the king as "my lord" (Veenhoff 2008: 140-1). This institution was adopted from the Old Babylonian states of Southern Mesopotamia in which traders had a semi-official rather than private status (Kolinski 2010: 83). This allowed his state to benefit not only financially from the extensive trade network, but also politically and ideologically, by embedding the administrative structures of the new state into the existing economic system and beginning to recreate economic institutions that he observed in Southern Mesopotamia. However, as stated above, Aššur did not have the type of population necessary to build the state modeled on Southern Mesopotamia that Šamši-Adad wanted. Šamši-Adad's state at this point relied on the income derived from control over the

Assyrian trading network, and the entrenched power of the Assyrian elites, as well as his need to retain their cooperation, likely prevented Šamši-Adad from enacting policies that could create a dependent population within Assyria.

This confluence of circumstances explains why Šamši-Adad's moved his capital from near Aššur to the Habur, which was then mostly unoccupied, avoiding all problems of entrenched power and a self-sufficient population. Evidence for the lack of settlement in the Habur from the end of the Akkadian period in the 22nd century BCE until the reign of Šamši-Adad derives from excavations and surveys from across the region (Weiss 2012). Tell Brak, one of the last sites that continued to be occupied after the fall of the Akkadian regime, was abandoned for around 200 years from the early 20th century until around 1800 with the rise of Šamši-Adad's kingdom (Oates et al. 1997: 62). Likewise even village sites in the Leilan survey disappear after the Akkadian period (Arrivabeni 2012). After the abandonment of the region, the first textual references to the Habur basin occur in the 19th century BCE, shortly before the arrival of Šamši-Adad (Ristvet 2005: 116). When Šamši-Adad built his new capital at Tell Leilan, which he named Šubat-Enlil, the city was constructed to resemble a Southern Mesopotamian city, something reflected even in the iconography of his temple, which was adopted from Ur (ibid.: 127). This again suggests that Šamši-Adad was looking to the south for a model of state power, and it strongly connects this to Šamši-Adad's move to the Habur.

Once Šamši-Adad moved the center of his state, his next task was to fill the region with a population dependent on state rations for sustenance. Šamši-Adad's near constant military campaigns encouraged the formation of a professional class of soldiers with no solid state allegiance who plundered the countryside even during peacetime (Veenhoff 2008: 332-3). The

result was a positive feedback loop in which occupying these professional soldiers with plundering enemy lands rather than their own gave state authorities an additional incentive to campaign. The rise in warfare is also seen in the settlement pattern around Tell Leilan from the reign of Šamši-Adad until the destruction of the site in 1726 BCE. This period is characterized by a high level of urbanism and great settlement instability (Ristvet 2005: 121).

Immediately after the fall of the Akkadian state, there arose the kingdom of Urkeš (Tell Mozan) and Nawar (Tell Brak) whose kings bore the Hurrian names Tiš-atal and Atal-šen (Wilhelm 1989: 9). The area was subsequently abandoned for around two centuries until the rise of Šamši-Adad's state. During Shamshi-Adad's reign, Hurrian names in the Northern Mesopotamian textual record generally belong to rationed workers (ibid. 13). According to administrative documents from Tell Leilan dating to the latter half of the 18th century, labor used by the palace did not consist of free workers, but rather of slaves who could be transferred from one service to another at will (Vincente 1991: 439). The source of this labor force was prisoners of war from a variety of neighboring states (in tablets such as Vincente 1991: text 169). There are far more Hurrian names among these laborers than among the merchants or other non-dependent individuals with whom the palace engaged (ibid. 503-533). Likewise, rationed textile workers at Chagar Bazaar during the reign of Šamši-Adad's son Yasmah-Addu have a much higher proportion of non-Semitic names, principally Hurrian, than the general population and these were likely prisoners of war (Talon 1997: 17).

Given that a high proportion of the names of rationed workers in administrative texts from the late Old Assyrian state are Hurrian, how do we know that this is a result of forced resettlement by Šamši-Adad's state rather than private state trade or the voluntary migration of

lower-status Hurrians into the Habur from neighboring regions? If either of the latter two options were the case, we would expect there to be roughly equivalent ratios of Hurrian names among documents of public institutions and those of large wealthy households with large numbers of slaves. At Tell Al-Rimah, however, the private archive of the elite household of Iltani from the reign of Šamši-Adad contains 61.5% Semitic names and 15.8% Hurrian names, while the texts of the temple, a public institution also from Šamši-Adad's reign, contain only 16.7% Semitic and 42.7% Hurrian names (Dalley et al. 1976). Indeed, there is direct textual evidence for the resettlement of an entire Hurrian community in the environs of Šubat-Enlil, during which they were transformed into a population dependent upon rations and land allotments from the state (Durand 1998: text 772). Furthermore, the coercive nature of this population transfer is made clear by its sheer magnitude. As stated above, the area of Tell Leilan was previously very sparsely occupied, if at all. By the height of Šamši-Adad's reign, however, there are enough people in the environs of Tell Leilan to enlist 10,000 troops for an expedition to Qatna (Durand 1998: text 448, Ristvet 2012b: 42). In fact, there is such a surplus of these relocated low-status populations in the Habur that this area served as a major source for slaves traded in Babylonia during the Old Babylonian period (van Koppen 2004: 15). The result of this slave trade is that Hurrians made up a substantial proportion of the low-status population of Nippur by the Kassite period (Brinkman 1981: 32). These records support the idea that the movement of Hurrians into the Habur during the Old Babylonian period was forcible and large-scale for the purposes of creating a class of rationed workers dependent on the state for subsistence.

Conclusion

In this chapter, I have considered the extent to which the desire for a particular state labor policy had important social and political ramifications. The degree to which this happened over the course of the construction of Šamši-Adad's state illustrates the extent to which state labor policy was governed by ideological concerns rather than environmental or economic realities. From the model of the contemporary Southern Mesopotamian states, Šamši-Adad envisioned an ideal state that depended on large, enslaved population engaged in production sustained through rations. To achieve his vision, he transformed the social and economic landscape of Northern Mesopotamia.

I have also described the economic and political reasons for the large influx of Hurrian-speaking people into the Habur during the late Middle Bronze Age. This is not to say that Hurrians were always slaves. They did ultimately reach the highest social rungs in Northern Mesopotamia during the later Old Babylonian period (Salvini 1998: 111-3). And by the middle of the millennium, Hurrians came to dominate the Habur under the Mitanni kingdom. However, this eventual demographic supremacy does not contradict their humble and violent origins of many Hurrians in the region. On the contrary, it provides an important model for the dramatic rise of the status of an ethnic group in a particular region from low-status outsiders to a dominant in-group within two centuries.

Chapter 4: Gender and Pottery Production Across Time in Mesopotamia

The theories that I have presented in the previous chapters establish a concrete context for the questions that this study will directly address. Those questions are: (1) What is the relationship between social and political organization in general and gender roles surrounding ceramic production? (2) What is the relationship between the scale and context of ceramic production and the gender of its producers? As difficult as it is to determine the structures of state control over attached ceramic production during these periods, the issues addressed in this section are even more speculative, given that the study of non-attached ceramic production does not have the advantage of meticulously kept, if only partially recovered, written records. Therefore, previous studies addressing questions of the role of gender in craft production have been highly abstract and theoretical and their methods have been based either on ethnographic parallels or on methods that are imprecise and widely criticized. Studies of these questions have offered four major hypotheses: (1) the gender of producers depends on the level of complexity of the administration of society; (2) the gender of producers depends on the level of technology used in pottery production. (3) the gender of potters depends on whether ceramic production is the main source of a household's subsistence, determined by the scale and context of production; and (4) the gender of potters is not related to complexity or technology, fluctuates over time, and the chain of production generally includes males and females.

Gender Roles and Potters Before the Rise of the State

Discussion of gender roles in pre-state agricultural societies builds on models of sexual division of labor in foraging societies from which these agricultural societies developed. In such

societies, men are generally thought to have hunted large game while women prepared food, gathered fruits and vegetables, and hunted small game, although this division has become increasingly less rigid in recent years (Fedigan 1986, Panter-Brick 2002). The explanations behind this sexual division of labor fall into three theoretical schools. First, the man-the-hunter hypothesis, most fully outlined at the 1966 conference of the same name states that men, by hunting large game, provisioned women who were seen as passive in resource gathering. This move toward male hunting was seen as the driving force behind human evolution (Washburn and Lancaster 1968). Second, the cooperation hypothesis asserts that the sexual division of labor results from pair bonded males and females who divide the work necessary to provision the household, located at a home base (Isaac 1978). Recently, Kuhn and Stiner have argued that this sexual division of labor yielded evolutionary advantage to the nuclear family of modern humans by allowing it to exploit a variety of resources and environments at the same time, thereby out-competing Neanderthals in Europe and Asia (Kuhn and Stiner 2006). Brown supports this assertion with scheduling theory, arguing that in non-urban societies tasks that do not require leaving the domestic space where child care takes place usually fall to females, while those that require long journeys usually fall to men (Brown 1970). The final theory, proposes that the most important bond in foraging societies was between the mother and child, and that female techniques of foraging were more efficient and reliable sources of food for children. At the same time, male hunting of large game was intermittent and unreliable and was shared across the entire community rather than focused on the nuclear family, becoming a way to increase prestige and advertise overall genetic fitness to potential mates (Bird 1999).

In a study of the wear patterns of human bones from Neolithic Abu Hureyra, Molleson

found that stress associated with completing repetitive tasks in the squatting position is documented primarily among females. She argues that squatting was the dominant sitting position during this period, and that this evidence supports the hypothesis that sitting tasks such as weaving, grinding, basketry and ultimately pottery production were undertaken mainly by women (Molleson 2007: 191-2). This study supports the use of scheduling theory to divide tasks along gender lines in early agricultural societies.

Jane Peterson, likewise, analyzed stress patterns on bones of both male and female individuals across several periods of Levantine prehistory. She found that the distinction in stress patterns across gender lines was most pronounced during the Natufian period, indicating that there was indeed a division of labor in which males spent more time hunting with spears and women spent more time engaged in tasks performed while squatting. During the following late Neolithic period, however, Peterson observed that these stress patterns become more similar allowing her to argue that with the advent and spread of agriculture, new tasks were likely shared across gender lines (Peterson 2002 143-5). Pottery production only occurs in one of the periods studied, the Early Bronze I, so it is not possible to infer change in gender roles in pottery production over time from this study. Perry has associated greater robusticity of the pronator quadratus muscles with pottery production, correlating it to activities such as kneading, coiling, and removing unwanted particles from clay (Perry 2008: 106). Peterson found that in the EBI period, just before the rise of urbanism in the Levant, the stress value for this muscle was approximately equal for males and females (Peterson 2002: 116). However, many different tasks make use of the same general motions and positions, making it difficult to identify which precise tasks are represented by a certain set of stress patterns.

Traditional Approaches to the Gender of Potters in Early States

Until the last two decades, most prehistoric archaeologists maintained that with the advent of agriculture, urbanism, and finally state formation, women's roles in society became increasingly restricted (Campbell 2008). Leacock et al. (1978), for example, attributes growing institutional antagonism between men and women, corresponding to increasing levels of social complexity, to the development of craft specialization and the rise of private property. Sacks (1982), on the other hand, associates a change in gender relations with the rise of the state during which a kin-based social structure in which women had a comparatively equal status as "sisters" was replaced by a class-based social structure in which women held dependent status as "wives." Katherine Wright suggests that one of the major changes that correspond to the rise of urban society in the Uruk period in Southern Mesopotamia was the transfer of activities traditionally associated with the household to civic institutions, including cultic ritual and craft production. The results, she argues, were the transfer of power associated with these activities to the central (male) political authorities, the shift in focus of ritual from female sexuality and reproduction to male sexuality, and the substitution of a deep respect of motherhood with a mystification of female sexuality. These changes allowed for the exploitation of female labor in secondary product manufacture, as dictated by these central authorities (Wright 2007). More generally, an increase in social complexity was associated with stricter and more hierarchical gender roles.

A primary example of this view as applied to changes in roles in craft production is Joy McCorriston's 1997 study on the change in textile production from flax-based to wool-based during the Mesopotamian Chalcolithic. This change, she argues, prevented women who

manufactured textiles from accessing materials needed to produce goods and thus alienated their labor from its products, preventing them from attaining higher economic status. This change in material also potentially allowed economic authorities (closely connected with political authorities) to create and maintain strict productive roles for certain segments in society, including women. In this case, women were given the role of supplying the labor required for industrial textile production , but were not permitted to produce or own the raw materials necessary for it, because herding was assigned to year-round pastoralists. Thus, the finished products of female labor belonged to the male-dominated economic and political elite. This change in gender roles in production, she argues, contributes to the development of all-encompassing gender hierarchies (McCoriston 2007).[8]

After the rise of the state in Southern Mesopotamia, all of the names registered on lists of potters are male[9] (Senior and Weiss 1992: 19). These lists refer only to attached potters, leaving the question of the gender of potters producing for domestic use unanswered. There are three apparent possibilities for the relationship between the production of state and domestic ceramics in this framework. First, domestic ceramics were produced on a small-scale local level with a single part-time potter manufacturing ceramics for one or several families. Second, ceramics for domestic use were produced in a centralized workshop that was separate from the state workshop at each site. Finally, domestic ceramics were produced in the central workshop after state demand was filled. Archaeological remains of pottery kilns are insufficient to differentiate

[8] This study, however, has faced criticism due to our inability to precisely track the use of various fibers in textiles over prehistoric periods, as well as the roles of women in the various tasks associated with craft production during this period (Zettler in McCorriston 1997).

[9] These potter lists come from the Akkadian, Ur III, and Old Babylonian periods.

household-based production from more centralized workshop-based production of domestic ceramics, as household ceramic production is unlikely to leave any archaeological traces that distinguish it from other household-level production involving ovens, such as bread production (Moorey 1994: 144). Furthermore, few craft quarters have been excavated due to their usual location at the edge of settlements and when kilns are discovered, their scale and function are often unclear (ibid. 157). Steinkeller suggests that the "only feasible explanation" of how private individuals acquired craft products in Southern Mesopotamia is that the same workshops produced pottery for state and private consumption (Steinkeller 1996: 253). This approach would fit neatly into the theory that the role of women became more constrained with the rise of state-organized craft production, establishing them as the sole producers of textiles, but not of pottery.

The second common theory holds that gender roles in pottery production depend on the technology of production. This is supported through ethnographic data. Kramer states that the wheel-made pottery is produced exclusively by males in all societies except in a few industrialized nations (Kramer 1985: 79). Senior combines the above two theories, suggesting that the identification of the wheel as a "male" technology coincided with the establishment of stricter gender roles that occurred with the rise of the state (Senior 1998: 184). In this framework, wheel-made pottery, including those forms produced on behalf of the state, was in all cases produced by males, while females might have produced hand-made forms.

According to Byrne 1994, household-based domestic pottery production is dominated by females in about 95% of societies where pottery production is not the major source of subsistence for the households of those engaged in the craft (Byrne 1994: 238). When this result

is combined with the previous two theories in the interpretation of archaeological data, the result is the hypothesis that wheel-made pottery was made by male specialists on a large scale, while handmade pottery was made domestically on a small scale by women. Renger (1984: 66 proposed that this was the case in second-millennium Mesopotamia, based on ethnography conducted by Robert Braidwood in Southern Turkey, in which he observed women of certain household firing their own ceramics in open-air pits. Other ethnographic observations have also confirmed that both men and women act as potters in the Near East (Kramer 1985: 83), including women in Diyana, a village in Iraqi Kurdistan, near the area addressed in this study (Matson 1974: 345)[10]. Potts maintains that the pottery produced in Mesopotamia in cities after the rise of the state is invariably wheel-made with a high level of specialization and standardization, while some portion of the forms made at village sites may have been hand-made and therefore possibly produced by women (Potts 1997:161). However, as detailed in chapter 2, the line between "wheel-made" and "hand-made" pottery cannot be drawn with any level of precision. Pottery was frequently made using a variety of hand and wheel techniques, particularly during the second and third millennia BC.

Questioning Assumptions of Women's Roles and the Definition of Potters

More recently, it has been argued that the role of women was in flux throughout prehistoric and historical periods alongside the adoption of various technologies and other culturally specific phenomena. Rita Wright and Diane Bolger have been the strongest

[10] Richard Zettler has informed me that he has seen female potters practicing their craft in villages of the Hamrin Mountains in Northeastern Iraq.

proponents of questioning the assumptions of associating gendered division of labor in pottery production with any of the factors discussed above. Bolger and Wright have argued against the hypothesis that women's roles are uniformly constrained with rising complexity in Mesopotamia by citing the many tasks, including supervisory roles, in which women are engaged according to texts, especially at Ebla (Bolger and Wright 2013: 382-4). This survey of women's roles in Northern and Southern Mesopotamia during the Ubaid, Uruk, and Early Dynastic Periods also highlights the degree to which these roles can vary across time and space, even within a limited geographical area, countering essentialist narratives of women's position in state and non-state societies. Wright, furthermore, points out that according to documents from the Ur III period in Southern Mesopotamia, women played a role in all aspects of the social structures, from administration to diplomacy to land ownership to craft production (Wright 2008).

In a landmark 1991 study, Wright argued based on excavations at Harappan sites that after the rise of urbanism ca. 2500 BCE that two parallel systems of ceramic production co-existed and both were involved in regional trade. The first system was limited to small-scale production in towns and villages, continuing the traditions of pottery production from the pre-state period, presumably including female labor if not exclusively relying on it. The second system centered on segregated craft quarters and was likely centrally administered. Wright argues that we should not assume that women did not also participate in this system of production, because there is nothing to suggest that they were not mobile enough to travel to these craft quarters. She further contends that the common assertion that women did not participate in this type of production is grounded in an assumption of the passivity of female laborers, one that is countered by the great skill and innovation involved in pottery production

before urbanization (Wright 1991). Furthermore, Bolger suggests that these segregated workshops included cooperative male and female labor throughout the various steps of the ceramic production process; a model that she argues is broadly applicable to ancient West Asia (Bolger 2013: 172-3). This model of urban cooperative labor is found ethnographically in Rajasthan, where women are not permitted to touch the potter's wheel but spend much time in close proximity to it (Kramer 1997: 49). In this case it is important to note that, comparable to the attached potters in ancient Mesopotamian, only men are accorded the official status of "potters," symbolized by their monopoly over the actual forming stage of pottery production, indicating a cultural constraint on female ceramic production in the cities, despite their actual participation in many of the production processes.

Conclusion

As I have shown, over the past half-century scholars have offered a plethora of conflicting theories about the relationship of gender to the ceramic industry, craft production, and agency in society in the context of changing ideologies, research foci, and historical backgrounds. These theories have been constructed primarily based on broader theories of ideal or "natural" gender relations within human societies and ethnographic data, in only few cases building arguments on controlled archaeological evidence. In the context of the highly varied and ideologically charged theories of gender roles in the production of pottery laid out in this chapter, the current study presents a unique opportunity to distinguish among these theories through the consideration of actual material culture. By tracking the sex of potters diachronically over periods of change in technology, scale and complexity and synchronically

across different settlement types, we can evaluate which factors in fact affected the sex of potters within the world of Ancient Northern Mesopotamia.

Chapter 5: Fingerprints, Sex and Pottery Production at Tell Leilan

Ancient fingerprints have been explored minimally, mostly with unsatisfying results. In general, pilot studies lack a considerable body of fingerprints in the assemblages studied and have attempted to find exact matches, a process that requires a vast collection of impressions of a completeness that is very rarely present on ancient artifacts (Branigan et al. 2002). With this investigation, I have vercome both of these obstacles through the application of a method that has only recently been developed in the field of criminology. A 2007 study of modern fingerprints from 500 male and 500 female individuals in the South Indian province of Karanataka has quantified the epidermal ridge density distributions according to the sex of a person who leaves the fingerprint. According to the study, female fingerprints were found to have an average of 14.6 ridges within a 5x5 mm area with a standard deviation of 0.85, while males' had an average of 12.8 with a standard deviation of 0.90 in the same area (Gungadin 2007)[11]. Through an evaluation of the concentration of epidermal ridges, it should be possible, given an adequate sample size, to determine the sex of the craftspeople who finished vessels or formed them in the case of unfinished ceramics using much more fragmentary prints than those necessary for studies of exact matches[12]. This is possible only with the assumption that these fingerprints are in fact left by the craftsmen themselves and not, for example, by their supervisors. This assumption is supported by the mostly fragmentary status of the fingerprints,

[11] These results were confirmed in 2011 by another study of South Indian individuals (Nithin et al. 2011).

[12] This is the first time such a study has been done in English, but there is one recent example in a Chinese journal (Yingjong et al. 2007) and V. Gordon Childe reports that gender was determined "by an expert in daktylography" in Russia in the 1930s (Childe 1943: 5).

their inconsistent location on the vessel, their existence on all types of wares, and by the fact that for the most part the fingerprints are difficult to find. To properly conduct this type of analysis it was necessary to quantify the shrinkage of intentional modern fingerprints through experimentation under similar firing conditions as the ancient ceramics.

Materials and Methods

The total number of fingerprints from which ridge density could be measured was 75 (Table 2). This sample was drawn from the entire Op. 8 assemblage (738 sherds in total), part of the Op. 1 and Op.5 assemblages, and the type fossil assemblages of Phases 1-3 from Gir Souar, Blaij, Farsouk Kebir, and Girdem Halime in the Leilan Survey area. The method of measuring ridge densities was based on the work of Gungadin 2007. Ridges were counted using 10x magnification within a square of 5mm x 5mm cut out of thin cardboard. Counting of extruding ridges started with a ridge in one corner of the square to the diagonally opposite corner. After checking to make sure results were consistent with this first method, photographs were taken of all of the impressions along with a scale so that the same procedure could be repeatedly digitally using ImageJ software (Figure 1). For those impressions that were too small for a 5x5 mm square to be analyzed, a 2.5x2.5 mm square was analyzed and the result was doubled. These results are marked with an asterisk. Beginning with a raised ridge, each pair of raised and lower bands was counted as a single ridge, while the final ridge was counted only as half if the entirety of the lowered band following the ridge was not included within the square of analysis (Figure 2). The results of this procedure were also found to be consistent with those of the previous method.

Because ridge density may have been increased through the process of drying and firing the ceramics, it was necessary to develop an experimental protocol to systematically account for these effects. The protocol involved a mixture of red and white cone 6 firing clays from the Upenn Fine Arts dept. that were used to make 13 briquettes of 0.5 cm thickness each. A 2cm incision was made in each briquette, and they were labeled according to their respective treatment and weighed (Figure 3). The treatments of the briquettes were devised to explore the varying effects of drying and firing shrinkage on ridge density given impressions made in various stages of the firing and finishing process. Briquettes 1-3 were impressed in the plastic state with added water to emulate fingerprints deposited during the forming process itself, during which extra liquid would have been added to enhance and preserve the clay's plasticity. Briquettes 4-6 were impressed in the plastic state without added moisture to emulate fingerprints deposited during transportation at the end of the forming process. Briquette 8a was impressed in the leather-hard state with added water to emulate fingerprints deposited during the finishing process. Briquette 7a was impressed in the leather-hard state without added moisture to emulate fingerprints deposited during transportation after the finishing process. Briquette 9 was impressed in the bone-dry state with added water to emulate fingerprints deposited during last-minute finishing touches before firing. Briquettes 7, 8, and 9a were not fired. One briquette was impressed as a control. Three measurements of the concentration of ridges within three separate loci 5mmx5mm area were taken and the locations of these measurements were marked down for reference for the taking of post-firing measurements on the experimental briquettes (Figure 4). All impressions were made with my right index finger. Several drops of water were applied to briquettes 1-3 with my index finger, after which they were impressed to various depths.

Briquettes 4-6 were then also impressed to various depths. The dimensions of all the fingerprint impressions were taken. Briquettes 1-9 were dried overnight on paper towels, at room temperature with a relative humidity of 60%. Briquettes 7a-9a were dried similarly but with plastic wrap to retain some moisture.

The following day, briquettes 1-9 were found to be dry on the outside, while briquettes 7a-9a were found to be leather-hard. Briquettes 7a-9a and 9 were weighed and their 2 cm incisions were measured. Briquette 7a was impressed, and then briquettes 8a, 9a, and 9 were dampened and impressed. The dimensions of all the impressions were taken. Briquettes 1-6, 7a, 8a, and 9 were dried in a small paragon industries kiln. The kiln temperature before firing was measured at 24c. The ramp speed was set to spd 1=111c/hr. The kiln stopped when it reached 93.3°C without soaking time. The briquettes were then dried on paper towels overnight.

The next day, all of the dried briquettes (Figure 5) were weighed, and their 2 cm incisions and the dimensions of their impressions were measured. They were fired in the same kiln (Figure 6). The initial temperature was 22.8°C. The ramp speed was spd 3= 555c/hr. The maximum temperature was 750°C and the soaking time was one hour.

On the final day of this experiment, all of the fired briquettes (Figure 7) were weighed, and their 2cm incisions and the dimensions of their impressions were measured. The concentration of ridges at the three initially specified loci was measured.

Results and Discussion

The weights of the briquettes, dimensions of the impressions, the length of the 2 cm line, and the ridge densities of the experimental impressions at various points in the drying and firing

process are shown in Table 1, along with the reduction percentages of each of these features. As expected, those briquettes that were impressed later in the drying process displayed a lower level of linear shrinkage and weight loss from the time they were impressed until they completed drying. The maximum impression shrinkage when the impression was made at any point in the drying process caused an increase in ridge density of one ridge in a 5x5 mm square. This happened only in one case, where the fingerprint was impressed in the plastic state with the addition of extra water. This increase of one ridge in a 5x5 mm square was in line with the total linear shrinkage of around 8.5% (about 1/12) among those briquettes that were impressed while the clay was plastic and wet. The vast majority of the impressions studied were made while the clay was wet (Figure 8), by comparison to my experimental impressions, though I cannot determine the state of plasticity at the time of impression by surface features.

In order to interpret these experimental results and properly apply them to the shrinkage of impressions on the archaeological ceramics, attention had to be paid to the difference in composition between the experimental and archaeological ceramic fabrics. Two relevant studies concerning the composition of regional clays and finished ceramics are Broekmans et al. 2004, a study of third-millennium ceramics from the nearby Tell Beydar, also in the Habur Basin, and Mulders 1969, a study of soils from the Middle Euphrates and the Balikh Basin to the west. The Habur Basin is dominated by "arid brown soil" which is primarily constituted of illite clay that has a high level of calcite and some quartz (Mulders 1969: 26). These major features were the same as those observed in clay samples from Tell Beydar, as well as cooking pots from the site (Broekmans et al. 2004: 96). A 1964 study of the characteristics of British clays analyzed a number of clays with several different mineralogical compositions. One group of the clay

studied, Gault clay from the Cretaceous period found in Bedfordshire, exhibited the same major features as the Habur clays (Freeman 1964: 481). This weight loss due to firing of this type of clay was measured at various firing temperatures. The weight loss at 750°C was equal to approximately 8.43% (Freeman 1964: 481: Figure 3), very close to the average of 8.29% weight loss from firing at 750°C observed in our experimental clay.

The next question we must ask is: What was the likely firing temperature of the Leilan ceramics being studied? Broekmans et al. found that in the third-millennium Beydar coarse ware, the temperature at which kaolinite loses its stability was exceeded, but montmorillonite and illite were still present in the finished product, indicating that the firing temperature was greater than 600C and less than 850°C, so 750°C is a middle-of-the-road estimate for medium and coarse ware in our assemblage. On the other hand, Senior used dilatometry to analyze the firing temperature of Leilan fine wares from phases IIId-IIb and found a bimodal distribution of firing temperatures, one mode occurring around 800°C, and the other above 900°C, some sherds reporting firing temperatures of greater than 1100°C. However, these fine wares in general show careful finishing, and in all of the samples where fingerprints were found and measured on fine wares in the assemblage, the impressions were clearly over finishing marks that were applied in the leather-hard state (Figure 9). This indicates that the impressions were made at the earliest in the leather-hard state, after much of the drying shrinkage had already taken place. The mean drying linear shrinkage for impressions made in the leather-hard state was 3.86%, while the drying linear shrinkage that caused an increase of one of the ridge density in a single 25 square mm locus was 6.81%. We can compare this difference of 2.95% to the maximum linear shrinkage observed from firing, 2.11%, and observe that the level of shrinkage added through

higher firing temperature would have been more than offset by the loss of drying shrinkage given the later stage. Thus, even in the assemblage of fine wares, the total linear shrinkage caused by drying and firing would not have caused an increase in ridge density per 25 square mm of greater than one.

We must also consider the fact that some of the coarse ware Leilan ceramics have significant grit inclusions, which would limit those ceramics' shrinkage from both drying and firing. All things considered, the amount of linear shrinkage observed in the experimental briquettes seems to be a roughly accurate model of the amount of shrinkage that occurred in our assemblage of Leilan ceramics. For each impression observed on the Leilan ceramics, therefore, we can expect that the shrinkage due to drying had caused an increase in ridge density of either 0 or 1 in the 25mm area being studied. Clearly the increase will be expected to be more common among those samples with a higher ridge density in the first place, as a discrete numerical increase in ridge density necessitates a lower proportional level of shrinkage in these samples than in samples with a lower original ridge density.

The ridge densities for all of the sherds studied by period and lot are given in Table 2. I have constructed a diagram (Figure 10) that compares the distributions of ridge densities observed for males and females in Gungadin 2007 to two distributions derived from observations of the post-state formation Leilan assemblage (n=35). The curve further to the right (post-state) indicates the proportional distribution of ridge densities that were observed among the impressions on the Leilan ceramics and represents the maximum ridge densities of the fingerprints when they were originally impressed, before drying and firing-related shrinkage. The leftmost curve (% adjusted) indicates the proportional distribution of ridge densities that

were observed minus one, representing the minimum ridge densities of the fingerprints when they were originally impressed. The true distribution of ridge densities at impression, then, lies somewhere between these two curves, likely closer to the right curve. From a comparison of these four distributions, it is very clear that the theoretical distribution of epidermal ridge densities of the individuals that impressed the ceramics studied is unimodal, and this distribution matches quite well with the observed ridge density distribution for males. The mean of the male distribution from Gungadin 2007 is 12.77, as compared to a mean of 12.94 for the observed density for the post-state Leilan distribution, and 11.94 for the distribution adjusted by 1. Assuming that the true mean ridge density of this distribution is very close to that of Gungadin's male distribution, it is, as we predicted, between the observed and the adjusted mean, but is much closer to the observed mean. This observation indicates that the majority of the fingerprints were applied at the leather-hard stage of drying or later. This conclusion is reasonable considering that most of the chains of production of the ceramics studied include a finishing step in the leather-hard state, and any visible fingerprints on the outside of the vessel, which includes nearly all of the fingerprints recorded, must have been impressed during or following this finishing stage, likely when the pot was lifted off the wheel. Since the theoretical ridge density at impression seems to be quite close to the observed ridge density on the Leilan ceramics, I will use the observed distribution of ridge density as a proxy for the initial distribution at impression, keeping in mind that these distributions should be slightly shifted.

The observed distribution among sherds from pre-state Leilan (n=33) and the post-state-formation Leilan survey materials (n=7) are given in Figures 10 and 11. They each clearly show a bimodal distribution in which the major mode corresponds with the female distribution of ridge

densities and the minor mode corresponds to the male distribution. Since the survey material includes only seven prints, the sample size is not great enough to indicate the relative frequencies of male and female-produced ceramics in the assemblage, let alone in specific periods, though it is clear that both exist at some point during state hegemony over Leilan. The types included in this sample from survey sites was limited to painted Habur Ware for Phase 1, fine wares for Phase 2, and incised Ninevite 5 sherds for Phase 3.

As far as the relative frequencies of male and female-made ceramics in specific periods of pre-state Leilan are concerned, my sample sizes (5, 6, 3, 5, and 13 respectively for periods V, IV, IIIa, IIIb, and IIIc) are once again too small to make statistically significant period-specific observations. However the plot of mean ridge densities over these periods (Figure 12) indicates that there is little or no correlation (R^2=0.048) between relative frequencies of male and female impressions and the passage of time between the beginning of the Uruk period and the rise of the state at Leilan. There is, however a strong correlation (R^2=0.825) between the sample size of each phase and the distance from its mean to the mean of the entire pre-state sample (Figure 13), a result that would be expected from random samples of varying size from a single data set, since variance decreases with larger sample size. This observation indicates that any difference in the mean values over time likely represents a statistical artifact of small sample sizes rather than a real difference in gender roles particular to the historical situation of each phase. Needless to say, larger sample sizes for each of the pre-state periods are necessary to confirm this conclusion. Likewise, the evidence from the fingerprints demonstrate that men and women each formed ceramics of the whole range of fabrics before the rise of the state (Figure 14), indicating that certain types were not relegated to gender specific production by exclusively male or female

potters.

Conclusion

The results of my study and the analysis of the ridge density distribution among fingerprint impressions on the Leilan ceramics from the beginning of the Uruk expansion to the establishment of state control at the site, show that ceramics of all types were formed and finished by both male and female potters. This result suggests that before the rise of urbanism and the state at Tell Leilan, pottery production was not a gendered task[13]. In addition, there was a discrete change that occurred with the rise of urbanism and the state at Tell Leilan such that those who handled plastic and leather-hard ceramics across the periods studied under state hegemony at Leilan itself were invariably male. Given the results of Byrne 1994, detailed above, it is unlikely that the production of domestic ceramics in any of these three periods in Leilan was performed on a household level. It is possible that these ceramics were produced in the same workshops as the pottery produced on behalf of the state or that they were produced in parallel large-scale completely private workshops.

This establishment of strict gender roles concerning male-only production of pottery occurred at the same time as the rise of the state and urbanized society and in parallel to the establishment of state administrative control over some part of the total pottery production. This social change indicates that while craft production continued to be passed down from parent to child (see Steinkeller 1996), with the larger scales of production associated with urbanization, the relationship between members of kinship groups in cities had changed to one where the

[13] Notably, during the Uruk period, the city-state structure did exist in Southern Mesopotamia and nearby sites; particularly Tell Brak and Hamoukar were urbanized during parts of this time range

division of the group along gendered lines became more important. It seems as if the stricter division of productive tasks by gender with the rise of urbanism, like the stricter division of tasks by class and by family, allowed specialization of production to be streamlined by allowing future workers to begin training in crafts at a very young age. It is very likely that these divisions also had major benefits for the ideological foundation of the Northern Mesopotamian state, reinforcing the importance of social differentiation in every sphere of human interaction.

Therefore, while the Akkadian state successfully funded and organized production of state ceramics in the Habur basin, they initially encountered a system of pottery production in which professional potters already produced every type of ceramic on a large scale. As evidenced by the difference in form between *sila* bowls in the Habur (Rova 2011: 75) and in Southern Mesopotamia (McMahon 2006: 100), it is likely that the Akkadian state made use of this professional class of potters already in place in the Habur. In addition, the existence of professional large-scale male-only production of every type of ceramic is also made evident after the site was reoccupied under Šamši-Adad. This fact makes clear that the tradition of this type of organization of ceramic production was kept alive in Syria or Northern Mesopotamia through the period of urban collapse at the end of the Early Bronze Age and was an important part of the ideal state structure that Šamši-Adad was trying to create.

The results of my analysis also indicate that this change in the relationship between gender and ceramic manufacture coinciding with the establishment of state control only occurred in the city itself and not in outlying settlements. Pottery production at outlying sites was surprisingly carried out by a mix of males and females, despite the presence of state institutions at Tell Leilan. This may indicate that although domestic gender-neutral production of ceramics

was no longer practiced at urban sites, it still existed at smaller settlements in parallel to state-controlled production (see Blackman 1993). This suggests more broadly that the deep changes in social organization that accompanied state formation in cities were less pronounced and perhaps more superficial in the hinterland, where domestic life continued to operate much as before the rise of the state.

Furthermore, this result fits with observations of female potters in modern villages in the Near East. It seems that this reorganization of gender roles in pottery production may never have occurred in all areas of rural Near Eastern settlements and that, perhaps not surprisingly, many of the social effects of state and urbanism may continue to be limited to cities in some regions. In addition, this observation undermines the hypothesis that the gender division of labor is determined by the (wheel vs. hand) technology of production, as precisely the same ceramic types[14] were being made by men at Tell Leilan and by women in the hinterland. As mentioned above, each category of ceramic types (including coarse wares, generally identified as cooking pots which were more commonly produced without a wheel) was also being formed by both men and women at Tell Leilan before the rise of the state. Furthermore, there was no major change in ceramic types from period IIIc to period IIId with the rise of the state; rather the major change occurred during the transition to period IIa around a century later. The change in ceramic producers, therefore, coincided with the rise of urbanism itself and not with the shift in ceramics being produced.

My results further supports the application of Wright's model of two parallel systems of production at different scales, contexts, and settlement types to the Habur in the mid-to-late third

[14] In fact, the pottery types that I studied from the Leilan Survey sites were precisely those that are generally thought to have taken the highest level potter skill, specialization, and wheel technology.

and early second millennia. This study confirms that women were directly involved in the small-scale system of production in villages, but shows that they were not involved in the more centralized larger scale production in cities. However, it is important to note that my results do not imply that women could not have been involved in centralized production. I have shown that those who formed, finished, and moved formed and finished but not yet totally dry vessels in urban Leilan were invariably male, but females may have participated in collecting and preparing clays, firing dried ceramics, and painting completed vessels. Nevertheless, there was clearly a restriction of women's roles in the production of pottery that accompanied urbanization and state formation at Leilan. Like the Rajasthan potters, it is likely that the official status of "potter" was limited to men in urban Leilan as indicated by their exclusive role in forming and finishing vessels despite the possibility that women participated in other, possibly lower status, stages of production (Kramer 1997).

Figures and Tables

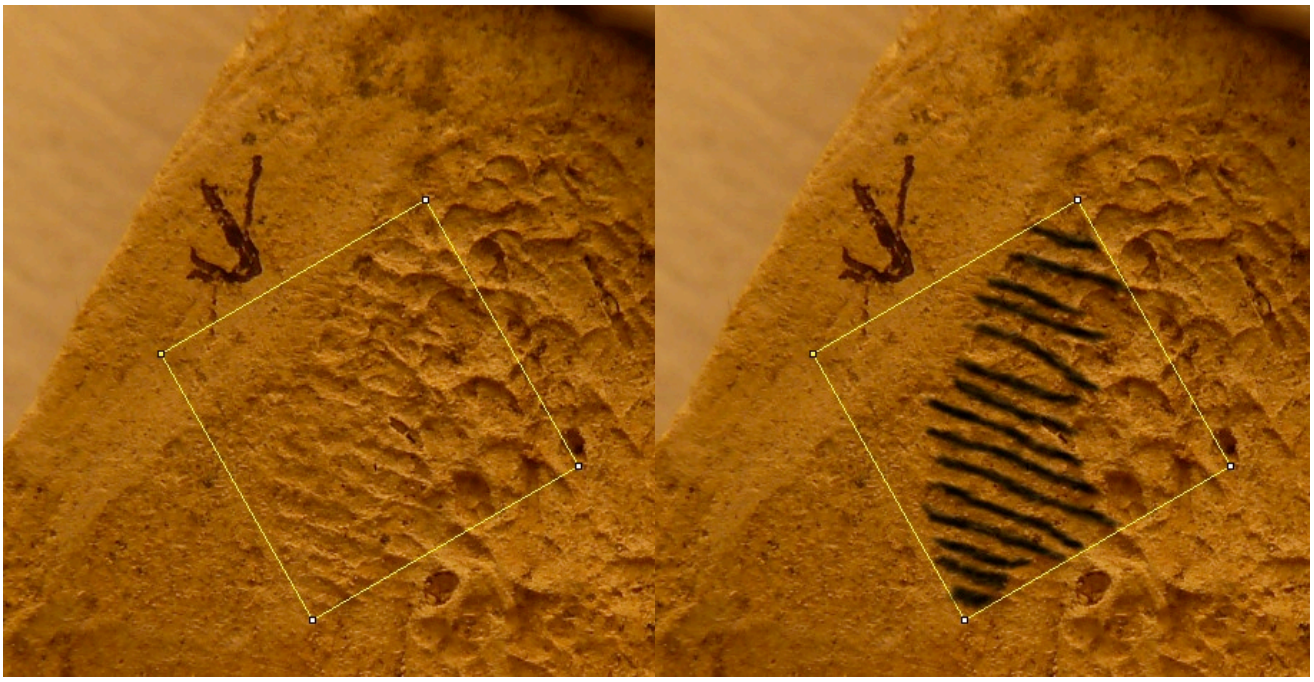


Figure 1: Illustration of the counting of 12 epidermal ridges in a 5x5 mm square on Op. 1 6/1

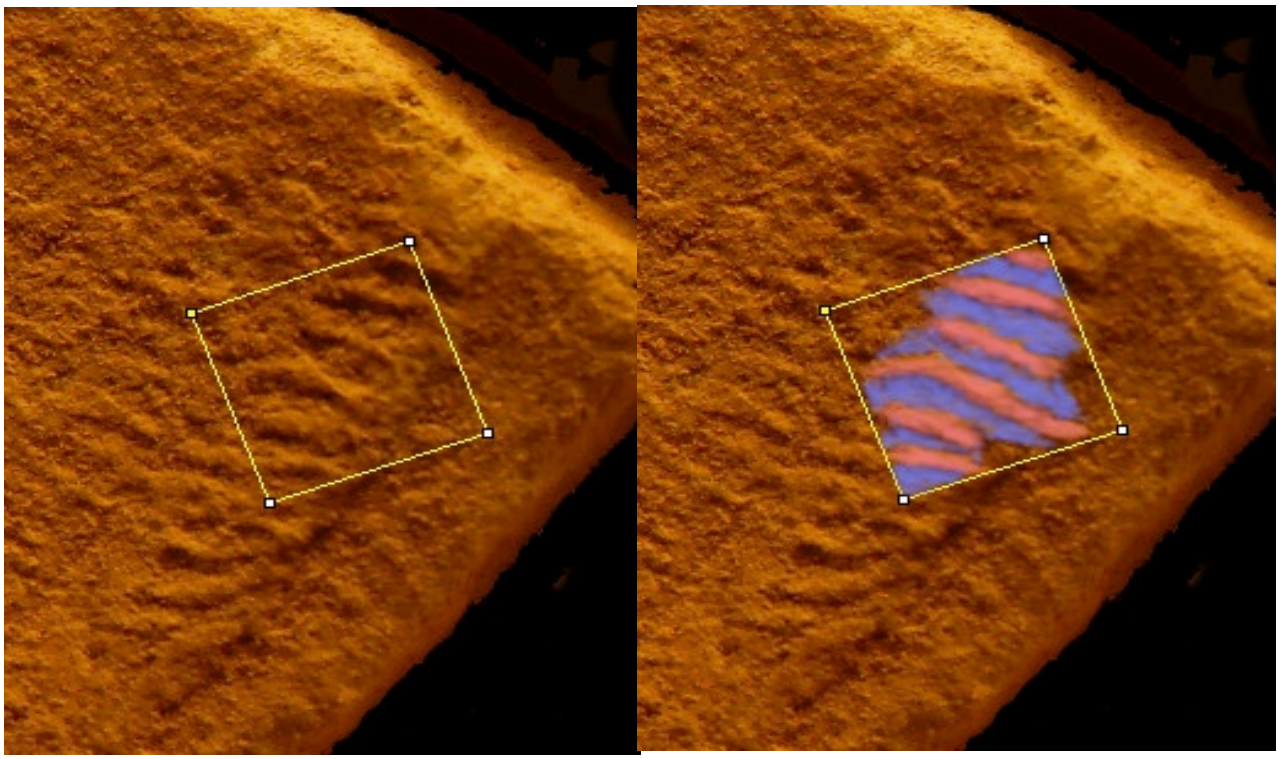


Figure 2: Illustration of the counting of 6 ridges and 6 indents in a 2.5x2.5 mm square, recorded as 12, on Op. 1 6/3*

Figure 3: Preparation of briquettes for impression

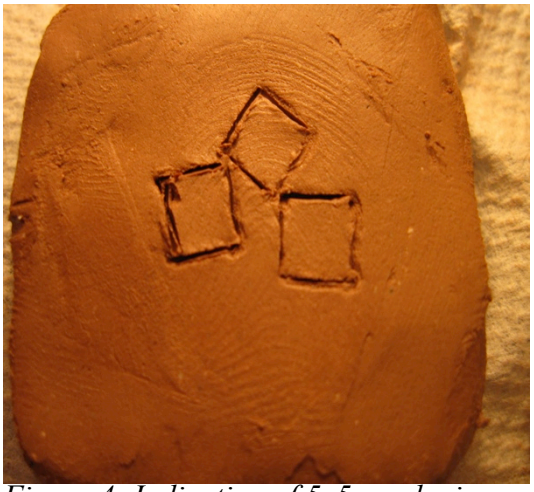


Figure 4: Indication of 5x5 mm loci monitored for changes in ridge density

Figure 5: Bone-dry briquettes with impressions

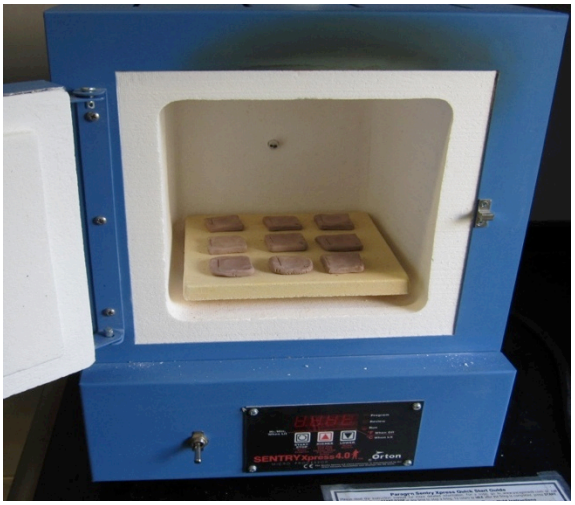


Figure 6: Placing dry briquettes in the kiln

Figure 7: Briquettes post-firing

Figure 8: Fingerprints deposited while wet observed experimentally (left) and on Op. 1 27/1

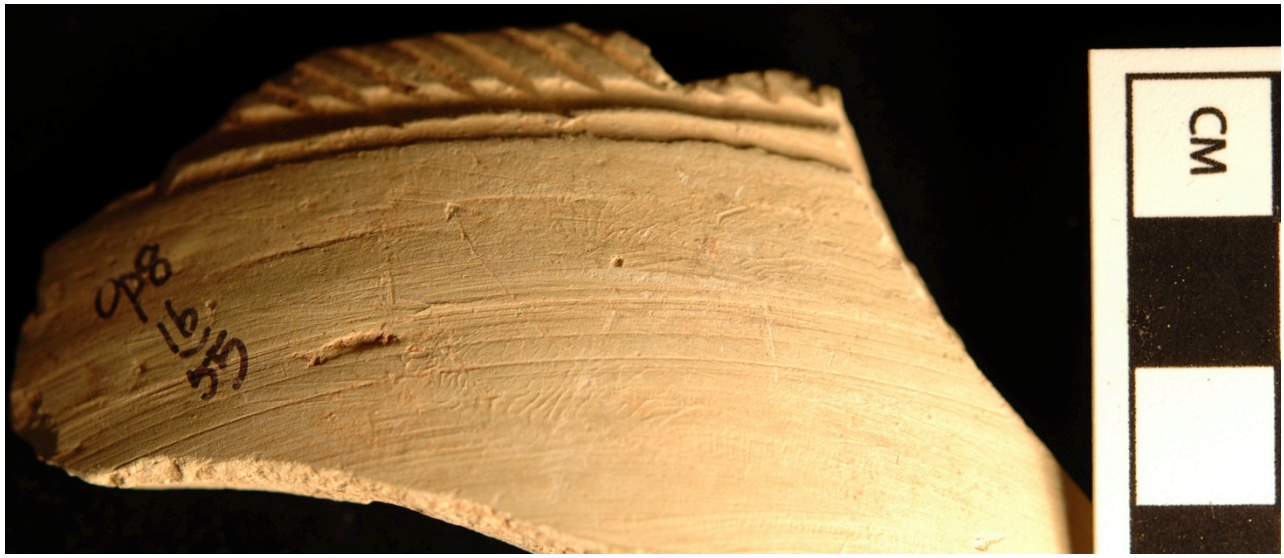


Figure 9: Fingerprints observed on top of finishing marks on Op. 8 16/55

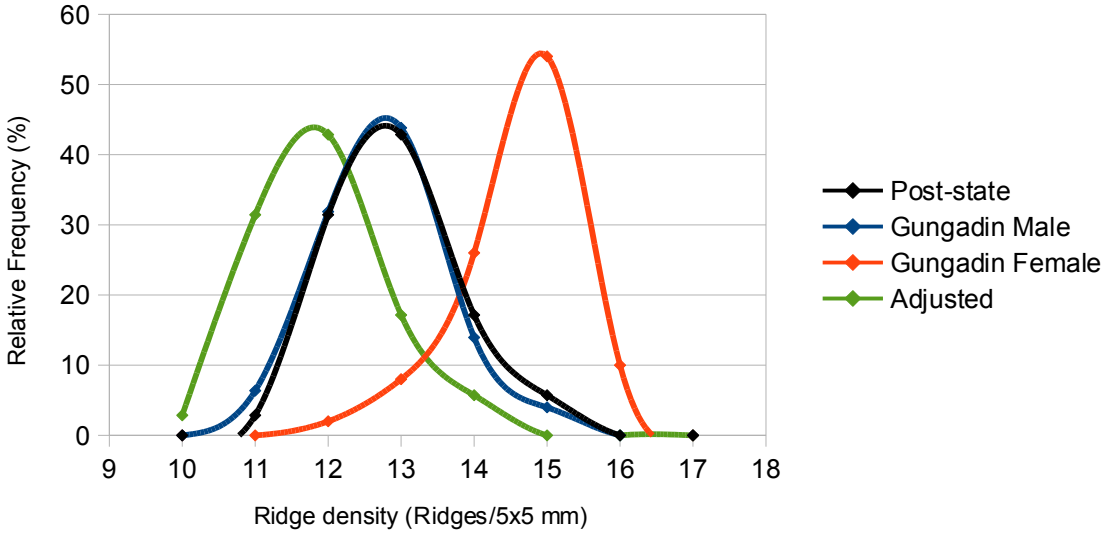


Figure 10: Relative frequency of ridge densities on Leilan ceramics after the rise of the state

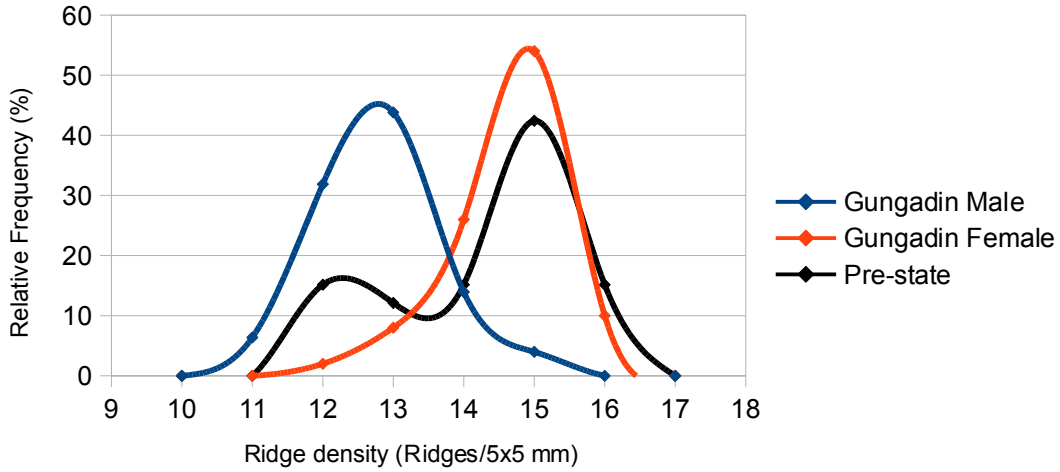


Figure 11: Relative frequency of ridge densities on Leilan ceramics from phases V-IIIc

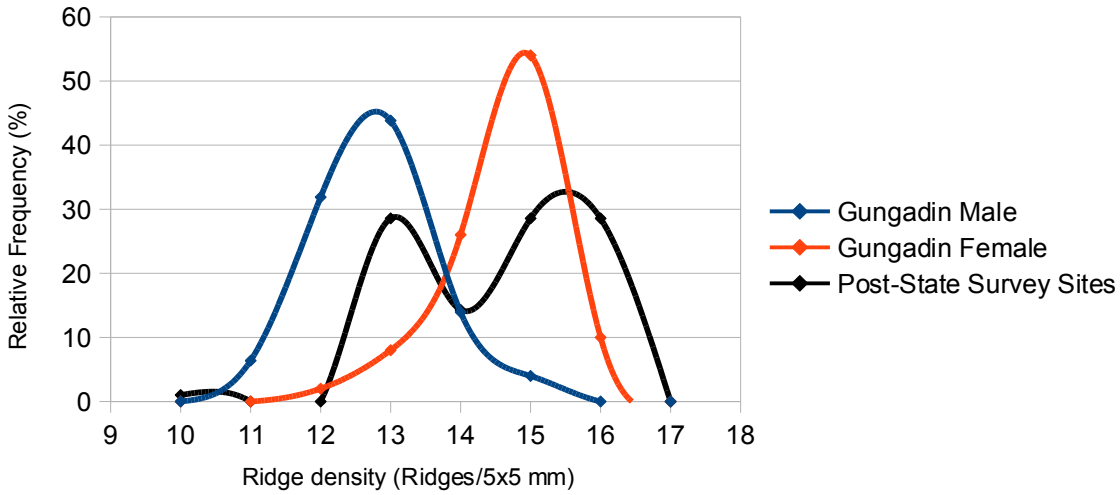


Figure 12: Relative frequency of ridge densities on ceramics from the Leilan Regional Survey after the rise of the state at Tell Leilan

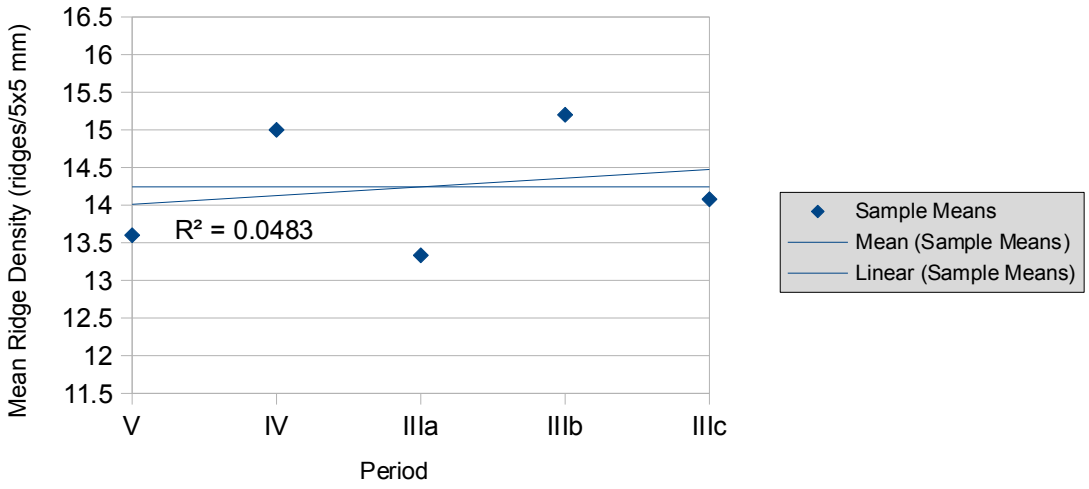


Figure 13: Mean ridge density measurements for individual pre-state phases at Tell Leilan

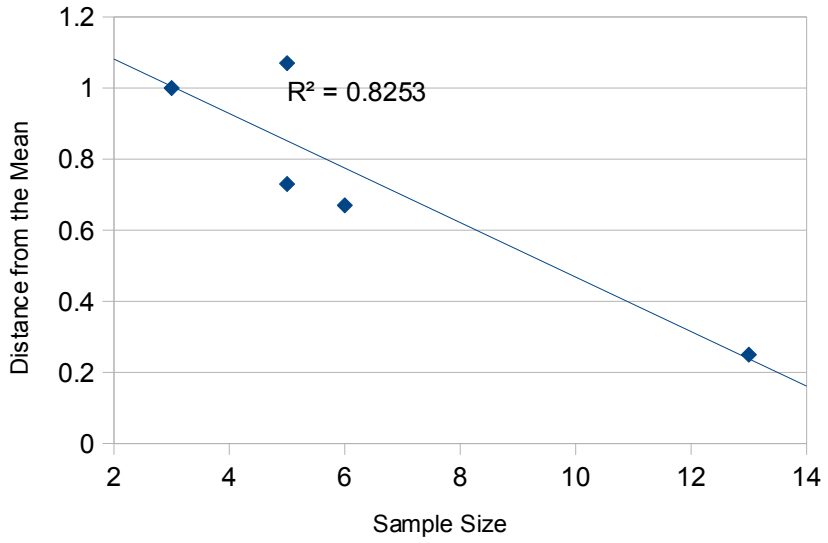


Figure 14: Monitoring the effects of varying small sample sizes on variation seen in pre-state mean ridge density across time at Tell Leilan

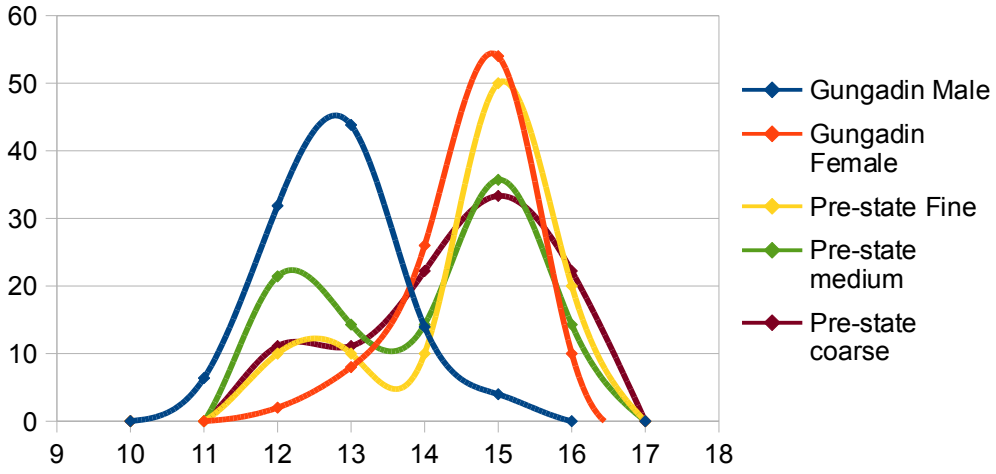


Figure 15: Relative frequencies of ridge densities for various fabrics among pre-state ceramics at Tell Leilan

Table 1: Drying and firing shrinkage for experimental impressions

Sample	1	2	3	4	5	6	9	7a	8a
Treatment	Wet, shallow	Wet, normal	Wet, deep	Plastic, normal	Plastic, shallow	Plastic, deep	Bone dry+wet	Leather hard	Leather hard+wet
Thickness before	.5 cm	.5 cm	.5 cm	.5 cm	.5 cm	.5 cm	.5 cm	.5 cm	.5 cm
Weight before	14.93	13.33	16.22	15.61	18.96	15.59	15.32	16.74	14.61
Weight at impress.	14.93	13.33	16.22	15.61	18.96	15.59	12.68	16.02	14.16
Weight dry	12.28	10.95	13.31	12.94	15.67	12.82	12.57	13.7	12
% Drying weight los	21.58	21.74	21.86	20.63	21.00	21.61	0.88	16.93	18.00
Weight after	11.36	10.1	12.3	11.95	14.46	11.81	11.61	12.64	11.11
% Firing weight los	8.10	8.42	8.21	8.28	8.37	8.55	8.27	8.39	8.01
%Total weight loss	31.43	31.98	31.87	30.63	31.12	32.01	9.22	26.74	27.45
Conc. 1 before	12	12	12	12	12	12	12	12	12
Conc. 1 after	12	12	12	12	12	--	12	12	12
Conc. 2 before	12	12	12	12	12	12	12	12	12
Conc. 2 after	13	12	12	12	--	--	--	--	--
Conc. 3 before	12	12	12	12	12	12	12	12	12
Conc. 3 after	--	12	12	12	--	12	12	--	12
L. of print before	1.954	2.071	2.463	2.336	2.16	2.447	2.381	2.412	2.454
W. of print before	1.24	1.246	1.509	1.462	1.392	1.639	1.557	1.447	1.541
2cm at impression	2	2	2	2	2	2	1.895	1.914	1.881
Length of print dry	1.899	1.942	2.26	2.198	2.129	2.431	2.376	2.325	2.36
Width of print dry	1.115	1.173	1.445	1.387	1.274	1.516	1.554	1.395	1.482
2cm line dry	1.881	1.87	1.862	1.926	1.913	1.911	1.891	1.845	1.809
Drying linear shrink	6.811	6.606	6.941	5.176	5.089	4.476	0.205	3.736	3.981
Length of print after	1.866	1.913	2.219	2.133	2.099	2.352	2.334	2.241	2.268
Width of print after	1.09	1.132	1.423	1.355	1.249	1.477	1.519	1.388	1.466
2cm line after	1.866	1.851	1.855	1.92	1.904	1.905	1.87	1.84	1.796
Firing linear shrink	1.622	2.055	1.257	1.907	1.301	2.105	1.742	1.508	1.957
Total linear shrink	8.553	8.793	8.285	7.193	6.466	6.665	1.951	5.301	6.017

Table 2: Ridge density measurements

Site	Field	Lot #	Object #	Location of Impression	Period	Ware	Ridge Density/ 5x5 mm
Gir Souar	A3	Period II		Outside	II	Medium-Fine	15*
Gir Souar	H2	Period II		Outside	II	Fine	16
Blaij	E2	Khabur ware & Late		Inside and Outside	I	Fine	16*
Farsouk Kebir	O2	Period III		Outside	III	Fine	14*
Girde Halime	A5	Period I		Outside	I	Medium	13
Girde Halime	F1	Period I		Outside	I	Medium	13*
Girde Halime	A2	Period II		Outside	II	Fine	15*
Tell Leilan	Op8	19	421	Outside	I	Medium	13
Tell Leilan	Op8	7	1	Outside	I	Coarse	12
Tell Leilan	Op8	8	139	Outside	I	Medium	13*
Tell Leilan	Op8	12	1239	Outside	I	Coarse	12
Tell Leilan	Op8	18	21	Outside	I	Medium	15
Tell Leilan	Op8	24	835	Outside	I	Coarse	14
Tell Leilan	Op8	26	405	Outside	I	Coarse	13
Tell Leilan	Op8	18	7	Outside	I	Medium-Fine	14
Tell Leilan	Op8	5	879	Outside base	I	Fine	14
Tell Leilan	Op8	6	161	Inside of Base	I	Fine	13*
Tell Leilan	Op8	6	43	Outside	I	Fine	14*
Tell Leilan	Op8	7	1249	Outside	I	Medium	12
Tell Leilan	Op8	13	240	Outside near base	I	Fine	13*
Tell Leilan	Op8	21	282	Outside	I	Medium-Coarse	11
Tell Leilan	Op8	5	891	Inside	I	Medium	15
Tell Leilan	Op8	7	3	Outside	I	Coarse	14*
Tell Leilan	Op8	34	1417	Inside near rim	I or 0	Medium-Fine	12
Tell Leilan	Op8	34	1410	Outside on base	I or 0	Fine	13
Tell Leilan	Op8	34	1467	Outside	I or 0	Medium	13
Tell Leilan	Op8	29	1067	Outside multiple	II	Fine	13
Tell Leilan	Op5	61	1	Outside	IIb	Fine	12*
Tell Leilan	Op5	61	2	Outside	IIb	Medium	13*
Tell Leilan	Op5	61	3	Outside rim	IIb	Fine	13
Tell Leilan	Op5	44	1	Outside	IIb	Medium	13
Tell Leilan	Op5	44	2	Outside	IIb	Medium-Fine	12
Tell Leilan	Op5	44	3	Outside	IIb	Fine	14*
Tell Leilan	Op5	44	4	Outside	IIb	Medium-Fine	12*
Tell Leilan	Op1	98	1	Inside under neck	IIIa	Medium	15*
Tell Leilan	Op1	98	2	Inside	IIIa	Medium	12
Tell Leilan	Op1	96	1	Inside under neck	IIIa	Medium	13
Tell Leilan	Op1	27	1	Outside	IIIb	Fine	15*
Tell Leilan	Op1	36	1	Outside shoulder	IIIb	Fine	15
Tell Leilan	Op1	37	1	Outside	IIIb	Coarse	16*
Tell Leilan	Op1	28	1	Outside	IIIb	Fine	15*
Tell Leilan	Op1	32	1	Inside multiple	IIIb	Fine	15*
Tell Leilan	Op1	14	2	Outside on base	IIIc	Coarse	12
Tell Leilan	Op1	6	1	Inside	IIIc	Medium	15

Tell Leilan	Op1	6	2	Outside	IIIc	Fine	15*
Tell Leilan	Op1	6	3	Outside	IIIc	Fine	12*
Tell Leilan	Op1	6	4	Outside	IIIc	Medium	13*
Site	Field	Lot #	Object #	Location	Period	Ware	Density
Tell Leilan	Op1	6	5	Outside	IIIc	Fine	14*
Tell Leilan	Op1	6	6	Outside	IIIc	Fine	13*
Tell Leilan	Op1	6	7	Outside	IIIc	Coarse	14*
Tell Leilan	Op1	14	1	Inside	IIIc	Coarse	13
Tell Leilan	Op1	12	1	Inside	IIIc	Medium-Fine	16
Tell Leilan	Op1	12	2	Inside	IIIc	Medium	15
Tell Leilan	Op1	12	3	Outside near base	IIIc	Medium-Fine	15
Tell Leilan	Op1	12	4	Outside	IIIc	Medium	16*
Tell Leilan	Op8	31	1145	Inside multiple	IIId	Medium	13
Tell Leilan	Op8	35	5	Outside base	IIId	Fine	12
Tell Leilan	Op8	31	40	Outside/Inside mult	IIId	Medium	12
Tell Leilan	Op8	31	1127	Outside base	IIId	Fine	12
Tell Leilan	Op8	31	33	Outside near rim	IIId	Medium	13
Tell Leilan	Op8	31	1107	Outside under rim	IIId	Fine	13*
Tell Leilan	Op8	39	1485	Top of rim	IIId	Fine	12
Tell Leilan	Op8	48	1051	Inside under rim	IIId	Fine	13*
Tell Leilan	Op1a	26	1	Outside	IV	Coarse	14*
Tell Leilan	Op1a	23	1	Outside	IV	Fine	16*
Tell Leilan	Op1a	23	2	Outside rim	IV	Medium-Fine	15*
Tell Leilan	Op1a	19	1	Inside rim	IV	Medium-Coarse	15
Tell Leilan	Op1a	19	2	Outside	IV	Coarse	16*
Tell Leilan	Op1a	37	1	Outside near base	IV	Fine	15*
Tell Leilan	Op1b	12	1	Outside near rim	IV	Medium	14*
Tell Leilan	Op1b	28	1	Outside near rim	V	Medium	12
Tell Leilan	Op1b	30	1	Outside	V	Medium-Fine	14*
Tell Leilan	Op1b	30	2	Outside rim	V	Medium	15
Tell Leilan	Op1b	32	1	Inside rim	V	Medium	15*
Tell Leilan	Op1b	32	2	Outside under rim	V	Medium-Fine	12
Tell Leilan	Op1c	35	1	Outside multiple	VI	Medium	15

Works Cited

Akkermans, Peter M. M. G., and Glenn M. Schwartz. "The Second Urban Revolution and Its Aftermath." *The Archaeology of Syria: From Complex Hunter-gatherers to Early Urban Societies (c. 16,000-300 BC)*. Cambridge, UK: Cambridge UP, 2003. 233-87.

Archi, Alfonso. 1998. The Regional State of Nagar According to the Texts of Ebla. In *About Subartu: Studies Devoted to Upper Mesopotamia: Culture, Society, Image*, ed. M. Lebeau, pp. 1-15. Subartu 4(2). Turnhout: Brepols.

Arrivabeni, Monica. "Post-Akkadian Settlement Distribution in the Leilan Region Survey." In *Seven Generations Since the Fall of Akkad*. Wiesbaden: Harrassowitz, 2012. 1-24.

Berg, Ina. "X-Radiography of Knossian Bronze Age Vessels: Assessing our Knowledge of Primary Forming Techniques." The Annual of the British School at Athens, 104 (2011): 137-173.

Bird, Rebecca. "Cooperation and Conflict: The Behavioral Ecology of the Sexual Division of Labor." *Evolutionary Anthropology: Issues, News, and Reviews* 8.2 (1999): 65-75.

Blackman, M. James, Gil J. Stein, and Pamela B. Vandiver. "The Standardization Hypothesis and Ceramic Mass Production: Technological, Compositional, and Metric Indexes of Craft Specialization at Tell Leilan, Syria." *American Antiquity* 58, no. 1 (1993): 60-80.

Bolger, Diane, and Rita Wright. "Gender in Southwest Asian Prehistory." *A Companion to Gender Prehistory*. Ed. Diane Bolger. Hoboken, NJ: John Wiley & Sons, 2013. 372-94.

Bolger, Diane. "Gender, Labor, and Pottery Production in Prehistory." *A Companion to Gender Prehistory*. Ed. Diane Bolger. Hoboken, NJ: John Wiley & Sons, 2013. 161-79.Bridges, Susan Jane. *The Mesag Archive: a study of Sargonic society and economy*. Yale University: Dissertation, 1981.

Branigan, Keith, Yiannis Papadatos, and Douglas Wynn. "Fingerprints on Early Minoan Pottery: A Pilot Study." *The Annual of the British School at Athens* 97 (2002): 49-53.

Brinkman, J. A. "Hurrians in Babylonia in the Late Second Millennium B.C." *Studies on the Civilization and Culture of Nuzi and the Hurrians*. Ed. M. A. Morrison and David I. Owen. Winona Lake, IN: Eisenbrauns, 1981. 27-36.

Broekmans, T., A. Adriaens, and E. Pantos. "Analytical Investigations of Cooking Pottery from Tell Beydar (NE-Syria)." *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* 226.1-2 (2004): 92-97.

Brown, Judith K. "A Note on the Division of Labor by Sex." *American Anthropologist* 72.5 (1970): 1073-078.

Buccellati, Giorgio, and Marilyn Kell-Buccellati. "The Royal Palace of Urkesh Report on the 12th Season at Tell MozanIUrkesh: Excavations in Area AA, June-October 1999." *Mitteilungen der Deutschen Orient-Gesellschaft* 132 (2000): 133-183.

Byrne, B. "Access to Subsistence Resources and the Sexual Division of Labor Among Potters." *Cross-Cultural Research* 28.3 (1994): 225-50.

Campbell, Stuart. "Feasting and Dancing: Gendered Representations and Pottery in Later Mesopotamian Prehistory." *Gender Through Time in the Ancient Near East*. Ed. Diane Bolger. Lanham, MD: AltaMira, 2008. 77-118.

Childe, V. Gordon. "Archaeology in the U.S.S.R. the Forest Zone." *Man* 43 (1943): 4-9.

Cooper, Lisa. *Early Urbanism on the Syrian Euphrates*. New York: Routledge, 2006.

Courty, Marie-Agnes, and Valentine Roux. "Identification of Wheel-Throwing on the Basis of Ceramic Surface Features and Microfabrics." *Journal of Archaeological Science* 22 (1995): 17-50.

Dahl, Jacob L. Proceedings of the 53e Rencontre Assyriologique Internationale Vol. 2: City Administration in the Ancient Near East. Ed. Leonid Efimovich. Kogan. Winona Lake, IN: Published for the Russian State University for the Humanities by Eisenbrauns, 2010.

Dalley, Stephanie, C. B. F. Walker, and John David. Hawkins. *The Old Babylonian Tablets from Tell Al Rimah*. London: British School of Archaeology in Iraq, 1976.

De Lillis Forrest, Francesca , Lucio Milano, and Lucia Mori. "The Akkadian Occupation in the Northwest Area of the Tell Leilan Acropolis." *KASKAL* 4 (2007): 43-64.

Durand, Jean-Marie. *Les Documents épistolaires Du Palais De Mari Tome 3*. Paris: Cerf, 1998.

Ellison, Rosemary. "Diet in Mesopotamia: The Evidence of the Barley Ration Texts (c. 3000-1400 B.C.)." *Iraq* 43, no. 1 (1981): 35-45.

Fedigan, Linda M. "The Changing Role of Women in Models of Human Evolution." *Annual Review of Anthropology* 15.1 (1986): 25-66.

Foster, Benjamin R.. "People, Land, and Produce at Sargonic Gasur." In *General Studies and Excavations at Nuzi 9/1*. Winona Lake, Ind.: Eisenbrauns, 1987. 89-108.

Freeman, I. L. "Mineralogy of Ten British Brick Clays." *Clay Minerals* 5.32 (1964): 474-86.

Goddeeris, Anne. *Economy and Society in Northern Babylonia in the Early Old Babylonian Period (ca. 2000-1800 BC)*. Leuven: Peeters, 2002.

Gungadin, Sudesh. "Sex Determination From Fingerprint Ridge Density." *Internet Journal of Medical Update* 2.2 (2007): 4-7.

Isaac, Glynn. "The Food-sharing Behavior of Protohuman Hominids." *Scientific American* 238.4 (1978): 90-108.

Kolinsky, Rafal. "Between City Institutions and Markets: Mesopotamian Traders of the 2nd Millennium BC." *City Administration in the Ancient Near East: Proceedings of the 53e Rencontre Assyriologique Internationale.* Ed. Leonid Efimovich. Kogan. Vol. 4. Winona Lake, IN: Eisenbrauns, 2010. 81-95. Babel and Bibel.

Kramer, Carol "Ceramic Ethnoarchaeology." *Annual Review of Anthropology* 14.1 (1985): 77-102.

Kramer, Carol. *Pottery in Rajasthan: Ethnoarchaeology in Two Indian Cities*. Washington: Smithsonian Institution, 1997.Larsen, Mogens Trolle. *The Old Assyrian City-state and Its Colonies*. Copenhagen: Akademisk Forlag, 1976.

Kuhn, Steven L., and Mary Stiner. "What's a Mother to Do?: The Division of Labor among Neandertals and Modern Humans in Eurasia." *Current Anthropology* 47.6 (2006): 953-81.

Leacock, Eleanor, Virginia Abernethy, Amita Bardhan, Catherine Berndt, Judith Brown, Beverly Chinas, Ronald Cohen, Jules De Leeuwe, Regula Egil-Frey, Claire Farrer, Valerie Fennell, Maurenn Giovannini, Brigitta Hauser-Schaublin, Anna-Britta Hellbom, Knud-Erik Jensen, Kirsten Jorgensen, Ann McElroy, Verena Martinez-Alier, Nalini Natarajan, Marilyn Strathern, and Susan Wadley. "Women's Status in Egalitarian Society: Implications for Social Evolution." *Current Anthropology* 19.2 (1978): 247-75.

Matson, Frederick. "The Archaeological Present: Near Eastern Village Potters at Work." *American Journal of Archaeology* 78.4 (1974): 345-47.

Matthews, Donald M.. *The early glyptic of Tell Brak: cylinder seals of third millennium Syria*. Fribourg, Switzerland: University Press, 1997.

McCorriston, Joy. "The Fiber Revolution: Textile Extensification, Alienation, and Social Stratification in Ancient Mesopotamia." *Current Anthropology* 38.4 (1997): 517-49.

McMahon, Augusta, and Philippe Quenet. "A Late Third Millennium BCEPottery Assemblage from Chagar Bazar (Area D, Period II)." In . Dudley, MA: Peeters, 2006. 69-242.

McMahon, Augusta. "Pottery." In *Nippur V: The Early Dynastic to Akkadian Transition : The Area WF Sounding at Nippur*. Chicago, Ill.: Oriental Institute of the University of Chicago, 2006. 59-118.

Molleson, Theya. "Bones of Work at the Origins of Labour." *Archaeology and Women: Ancient and Modern Issues*. Ed. Sue Hamilton, Ruth Whitehouse, and Katherine I. Wright. Walnut Creek, CA: Left Coast, 2007. 185-98.

Moorey, P. R. S. *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence*. Oxford: Clarendon, 1994.

Mulders, Michel Adrianus. *The Arid Soils of the Balikh Basin (Syria).* Rotterdam: Goudsesingel 260] Bronder-Offset, 1969.

Nithin, M.d., B. Manjunatha, D.s. Preethi, and B.m. Balaraj. "Gender Differentiation by Finger Ridge Count among South Indian Population." *Journal of Forensic and Legal Medicine* 18.2 (2011): 79-81.

Oates, David, Joan Oates, and Helen McDonald. "The Pottery." *Excavations at Tell Brak Volume 1: The Mitanni and Old Babylonian Periods*. London: British School of Archaeology in Iraq, 1997. 61-79.

Oates, David, and Joan Oates. "The Excavations." In *Excavations at Tell Brak Vol. 2: Nagar in the Third Millennium BC*. Cambridge: McDonald Institute for Archaeological Research ;, 1997. 15-98.

Oates, Joan. "Trade and Power in the Fifth and Fourth Millennia BC: New Evidence from Northern Mesopotamia." *World Archaeology* Ancient Trade: New Perspectives 24.3 (1993): 403-22.

Oates, Joan. "The Third-Millennium Pottery." In *Excavations at Tell Brak Vol. 2: Nagar in the Third Millennium BC*. Cambridge: McDonald Institute for Archaeological Research ;, 1997. 151-216.

Panter-Brick, Catherine. "Sexual Division of Labor: Energetic and Evolutionary Scenarios." *American Journal of Human Biology* 14 (2002): 627-40.

Parayre, Dominique. "The Ninevite 5 Sequence of Glyptic at Tell Leilan." *The Origins of North Mesopotamian Civilization: Ninevite 5 Chronology, Economy, Society*. Ed. Elena Rova and Harvey Weiss. Turnhout, Belgium: Brepols, 2003. 271-310.

Perry, Elizabeth M. "Agency and Gender in Prehispanic Puebloan Communities." *The Social Construction of Communities: Agency, Structure, and Identity in the Prehispanic*

Southwest. Ed. Mark Varien and James M. Potter. Lanham, MD: AltaMira, 2008. 89-108.

Peterson, Jane. *Sexual Revolutions: Gender and Labor at the Dawn of Agriculture*. Walnut Creek, CA: AltaMira, 2002.

Poebel, A. "The Assyrian King List from Khorsabad." *Journal of Near Eastern Studies* 1.3 (1942): 247-306.

Polanyi, Karl. "The Economy as an Instituted Process." *Trade and Market in the Early Empires; Economies in History and Theory*. Glencoe, IL: Free, 1957. 243-70.

Porter, Anne. "The Dynamics of Death: Ancestors, Pastoralism, and the Origins of a Third-Millennium City in Syria." *Bulletin of the American Schools of Oriental Research* 325 (2002): 1-36.

Porter, Anne, and Thomas McClellan. "The Third Millennium Settlement Complex at Tell Banat: Results of the 1994 Excavations." *Damaszener Mitteilungen* 10 (1998): 11-77.

Postgate, J. N. "Excavations at Abu Salabikh, 1988-89." *Iraq* 52 (1990): 95-106.

Potts, Daniel T.. *Mesopotamian Civilization: The Material Foundations*. Ithaca, N.Y.: Cornell University Press, 1997.

Quenet, Philippe, and Lauren Ristvet. "Late Third Millennium Ceramics from the Akkadian Administrative Building (AAB), Tell Leilan, Syria." In *Seven Generations Since the Fall of Akkad*. Wiesbaden: Harrassowitz, 2012. 193-216.

Reichel, Clemens, Tate Paulette, and Kathryn Grossman. "Early Bronze Age Hamoukar: "Akkadian and Beyond?." In *Seven Generations Since the Fall of Akkad*. Wiesbaden: Harrassowitz, 2012. 279-299.

Renger, Johannes. "Patterns of Non-institutional Trade and Non-commercial Exchange in Ancient Mesopotamia at the Beginning of the Second Millennium B.C." *Circulation of Goods in Non-palatial Context in the Ancient Near East*. Ed. Alfonso Archi. Roma: Edizioni Dell' Ateneo, 1984. 31-124.

Ristvet, Lauren. *Settlement, Economy, and Society in the Tell Leilan Region, Syria, 3000-1000 BC*. King's College, University of Cambridge: Dissertation, 2005.

Ristvet, Lauren. "Radiocarbon." In *Jezirah*. Turnhout: Brepols, 2011. 301-326.

Ristvet, Lauren. “The Development of Underdevelopment? Imperialism, Economic Exploitation and Settlement Dynamics on the Khabur Plains, ca. 2300-2200 BC.” In *Seven Generations Since the Fall of Akkad*. Wiesbaden: Harrassowitz, 2012(a). 241-260.

Ristvet, Lauren. "Resettling Apum: Tribalism and Tribal States in the Tell Leilan Region, Syria." In *Looking North: The Socioeconomic Dynamics of Northern Mesopotamian and Anatolian Regions during the Late Third and Early Second Millennium BC.* Wiesbaden: Harrassowitz, 2012(b). 37-50.

Roux, Valentine, and Marie-Agnes Courty. "Identification of Wheel-fashioning Methods: Technological Analysis of 4th and 3rd Millennium BC Oriental Ceramics." *Journal of Archaeological Science* 25 (1998): 747-763.

Roux, Valentine. "Ceramic Standardization and Intensity of Production: Quantifying Degrees of Specialization." *American Antiquity* 68, no. 4 (2003): 768-782.

Rova, Elena. "Ceramic." In *Jezirah*. Turnhout: Brepols, 2011. 49-128.

Sacks, Karen. *Sisters and Wives: The past and Future of Sexual Equality*. Westport, CT: Greenwood, 1979.

Sallaberger, Walther. "Grain Accounts: Personnel Lists and Expenditure Documents." Ed. Farouk Ismail, Walther Sallaberger, Philippe Talon, and Karel Van Lerberghe. *Administrative Documents from Tell Beydar: (seasons 1993-1995)*. Turnhout: Brepols, 1996. 89-106. Subartu Vol. 2.

Salvini, Mirjo. "The Earliest Evidences of the Hurrians Before the Formation of the Reign of Mitanni." *Urkesh and the Hurrians: Studies in Honor of Lloyd Cotsen*. Ed. Giorgio Buccellati and Marilyn Kelly-Buccellati. Vol. 26. Malibu: Undena Publications, 1998. 99-115. Bibliotheca Mesopotamica.

Senior, Louise, and Harvey Weiss. "Tell Leilan "s i l a-bowls" and the Akkadian Reorganization of Subarian Agro-production." *Orient-Express* 2 (1992): 16-24.

Senior, Louise Marie. *Time and Technological Change: Ceramic Production, Labor, and Economic Transformation in a Third Millennium Complex Society (Tell Leilan, Syria)*. N.p.: Disseration, 1998.

Smith, Adam T. *The Political Landscape: Constellations of Authority in Early Complex Polities*. Berkeley: University of California Press. 2003.

Sollberger, Edmond. *Archivi Reali Di Ebla, Testi, VI. Administrative Texts Chiefly concerning Textiles: L. 2752*. Roma: Mission Archaeolog. Ital. in Syria, 1986.

Sommerfield, Walter, Alfonso Archi and Harvey Weiss. 2004. “Why 'Dada Measured 40,000 Liters of Barley From Nagar for Sippar.'” 4ICAANE Berlin March 29-April 3, 2004 Tell Leilan Project Poster Presentations. http://leilan.yale.edu/pubs/files/poster2/poster2.jpg

Stein, Gil J., and M. James Blackman. "The Organizational Context of Specialized Craft Production in Early Mesopotamian States." *Research in Economic Anthropology* 14 (1993): 29-59.

Steinkeller, Piotr, and J. N. Postgate. *Third-Millennium Legal and Administrative Texts in the Iraq Museum, Baghdad*. Winona Lake, Ind.: Eisenbranus, 1992.

Steinkeller, Piotr. "The Organization of Crafts in Third-Millennium Babylonia: The Case of Potters." *Altorientalische Forschungen* 23, no. 2 (1996): 232-253.

Talon, Philippe. *Old Babylonian Texts from Chagar Bazar*. Brussels: Fondation Assyriologique Georges Dossin, 1997.

Van De Mieroop, Marc. *Crafts in the Early Isin Period: A Study of the Isin Craft Archive from the Reigns of Išbi-Erra and Šū-Ilišu*. Leuven: Departement Oriëntalistiek, 1987.

Van Lerberghe, Karel. "The Beydar Tablets and the History of the Northern Jezirah." *Administrative Documents from Tell Beydar: (seasons 1993-1995)*. Ed. Farouk Ismail, Walther Sallaberger, Philippe Talon, and Karel Van Lerberghe. Turnhout: Brepols, 1996. 119-22. Subartu Vol. 2.

Veenhof, Klaas Roelof. *Aspects of Old Assyrian Trade and Its Terminology*. Leiden: E.J. Brill, 1972.

Veenhof, Klaas Roelof. *Mesopotamia: The Old Assyrian Period*. Fribourg: Academic, 2008.

Veenhof, Klaas Roelof. "Some Social Effects of Old Assyrian Trade." *Iraq* 31.1 (1977): 109-18.

Vincente, Claudine. 1991. *The 1987 Tell Leilan Tablets Dated by the Limmu of Habil-kinu*. Yale University, New Haven, CT: Dissertation, 1991.

Washburn, Sherwood L., and C. S. Lancaster. "The Evolution of Hunting." *Man the Hunter*. Ed. Richard B. Lee and Irven DeVore. Chicago: Aldine Pub., 1968. 293-303.

Wattenmaker, Patricia. "Craft Production and Social Identity in Northwest Mesopotamia." Ed. Cathy Lynne. Costin, Rita P. Wright, and Elizabeth M. Brumfiel. *Craft and Social Identity*. Arlington, VA: American Anthropological Association, 1998. 47-56.

Weiss, Harvey. "Tell Leilan 1989: New Data for Mid-Third Millennium Urbanization and State Formation." *Mitteilungen Der Deutschen Orient-Gesellschaft Zu Berlin* 122 (1990): 193-

218.

Weiss, Harvey. "Quantifying Collapse: The Late Third Millennium Khabur Plains." In *Seven Generations Since the Fall of Akkad*. Wiesbaden: Harrassowitz, 2012. 1-24.

Weiss, Harvey, Marie-Agnes Courty, Wilma Wetterstrom, François Guichard, Louise Senior, Richard Meadow, and Anna Curnow. "The Genesis and Collapse of Third Millennium North Mesopotamian Civilization." *Science* 261.5124 (1993): 995-1004.

Weiss, Harvey, Francesca deLillis, Wilma Wetterstrom, Dominique deMoulins, Jesper Eidem, Thomas Guilderson, Ulla Kasten, Torben Larsen, Lucia Mori, Lauren Ristvet, and Elena Rova. "Revising the Contours of History at Tell Leilan." *Annales archeologiques arabes syriennes* 45 (2002): 59-74.

Weiss, Harvey, Stuart W. Manning, Lauren Ristvet, Lucia Mori, Mark Besonen, Andrew McCarthy, Philippe Quenet, Alexia Smith, and Zainab Bahrani. "Tell Leilan Akkadian Imperialization, Collapse and Short-Lived Reoccupation Defined by High-Resolution Carbon Dating." In *Seven Generations Since the Fall of Akkad*. Wiesbaden: Harrasowitz, 2012. 163-192.

Wilhelm, Gernot. *The Hurrians*. Warminster, England: Aris & Phillips, 1989.

Wossink, Arne. *Challenging Climate Change: Competition and Cooperation among Pastoralists and Agriculturalists in Northern Mesopotamia (c. 3000-1600 BC)*. Leiden: Sidestone, 2009.

Wright, Katherine I. "Women and the Emergence of Urban Society in Mesopotamia." *Archaeology and Women: Ancient and Modern Issues*. Ed. Sue Hamilton, Ruth Whitehouse, and Katherine I. Wright. Walnut Creek, CA: Left Coast, 2007. 199-245.

Wright, Rita. "Gendered Relations in the Ur III Dynasty: Kinship, Property, and Labor." *Gender through Time in the Ancient Near East*. Ed. Diane Bolger. Lanham, MD: AltaMira, 2008. 247-80.

Wright, Rita. "Women's Labor and Pottery Production in Prehistory." *Engendering Archaeology: Women and Prehistory*. Ed. Joan M. Gero and Margaret Wright Conkey. Oxford, UK: B. Blackwell, 1991. 194-223.

Yinghong, Li, Lang Junyan, and Bai Bin. "Portrait Bricks of Han Dynasty Unearthed in Mianyang, Guangyuan, Sichuan, and Palm Lines Mark Inspection Analysis." *Archaeology and Cultural Relics* 2007.3 (2007)

Zettler, Richard L.. "Dynastic Change and Institutional Administration in Southern Mesopotamia in the Later Third Millennium BCE: Evidence from Seals and Sealing Practices."

Proceedings of the British Academy 136 (2007): 9-35.

Acknowledgements

I would like to thank the following people for their vital help in my completion of this project:

- Dr. Lauren Ristvet for her constant feedback, advice, and support, and giving me access to the Tell Leilan ceramic material at Penn
- Dr. Marie-Claude Boileau for her advice and help in the experimental portion of my study and letting me have access to the facilities of the Ceramic Lab at the Penn Museum
- Dr. Harvey Weiss for his advice and facilitating my use of the Leilan Ceramics at the Yale Peabody Museum
- Drs. Holly Pittman, Richard Zettler, and Salam Al-Kuntar for their feedback and advice
- The Penn Center for Undergraduate Research and Fellowships' College Alumni Fund and the Penn Anthropology Department for their generous research grants