UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

Evaluating Borderlands: A Regional Archaeological Social Network Analysis of the Ceramics of Late Pre-Contact Cultures in the Ozarks and Adjacent States

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

In partial fulfillment of the requirements for the

Degree of

Doctor of Philosophy

By

Paige Ford
Norman, Oklahoma
2021

Evaluating Borderlands: A Regional Archaeological Social Network Analysis of the Ceramics of Late Pre-Contact Cultures in the Ozarks and Adjacent States

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF ANTHROPOLOGY

BY THE COMMITTEE CONSISTING OF

Dr. Patrick Livingood, Chair

Dr. Scott Hammerstedt

Dr. Amanda Regnier

Dr. Sarah Trabert

Dr. Matthew Pailes

Dr. Kimberly Marshall

Dr. Rangar Cline

ABSTRACT

This dissertation investigates regional interactions within and surrounding the Ozark Plateau during the Late Pre-Contact period. In doing so, I evaluate extant assumptions that the Neosho culture (AD 1400-1650) exhibited the characteristics of a borderland community (i.e., location between major political and social formations, low population density, and increased social diversity). Neosho communities were ascribed the roles of a borderland society simply because of their geographic residence between two major environmental regions—the Eastern Woodlands and the Great Plains—and researchers have relied upon these and related categorical assumptions in interpreting Neosho regional interactions. The framework used here incorporates theories on borderland dynamics, communities of practice, and social network analysis to illustrate interpretations hinging upon taxonomic categorizations and corresponding assumptions fall short in modeling the relational dynamics of past communities.

This study has several components designed to address enduring questions about and update our current knowledge about Neosho communities as well as to investigate relationships in this region. The bulk of this dissertation focuses on the examination of approximately 6,500 ceramic sherds from 23 sites in the region to investigate networks of interaction and practice in two dimensions: restrictive learning communities of practice and broad social affiliations. Second, this study summarizes subsistence data to investigate how Neosho's practices compare to surrounding groups, consequently disregarding classificatory perspectivs seeking to categorize Neosho "Plains-like" or "Eastern Woodlands-like" in their practices and affiliations. Lastly, new AMS dates provide an updated understanding of the overall history of this area and confirm that the sites chosen for analysis were contemporaneous.

Contrary to previous research on Neosho communities, this study shows that the relationships built and maintained by peoples in this region do not indicate Neosho is a borderland group. Instead, Neosho peoples built relationships such that they were a distinct and strongly interconnected social community, while maintaining several strong relationships with several surrounding groups. As such, this research shows the importance of evaluating our existing categories like typologies and culture areas, in that they sometimes mask important patterns concerning the relationships of past communities. This research also illustrates borderlands and boundaries through time are multidimensional and shifting, emphasizing that it is essential for archaeologists to utilize relational techniques and approaches such as these to investigate and evaluate our predetermined categories and associated assumptions.

ACKNOWLEDGEMENTS

I was very lucky to have an amazing support system throughout the process of completing this research and pursuing my Ph.D. So many friends, colleagues, and family members lent me advice, shared their own experiences, and gave me a space to talk it out when I needed. First, I would like to thank my dissertation committee: Drs. Patrick Livingood, Scott Hammerstedt, Amanda Regnier, Sarah Trabert, Matthew Pailes, Kimberly Marshall, and Rangar Cline. They have always been incredibly supportive and have pushed me to achieve more than I ever thought was possible. Other influential scholars such as Dr. Matthew Peeples, Dr. Jake Lulewicz helped me find my way in this research so a deep thank you to them as well. I would also like to thank Dr. Debra Green for always being there for me, and for being a constant source of comfort for graduate students at OU. Finally, thank you to my amazing graduate student peers at OU who have shared this experience with me and continue in their studies. I wish you all luck in your endeavors.

Thank you also to the leadership of the Oklahoma Public Archaeology Network (OKPAN) for letting me learn and experiment with public archaeology, leading me on a path towards amplifying Indigenous voices in archaeology through educational programming. And in that vein, I want to share my heartfelt gratitude to the many Tribal Historic Preservation Offices, Tribal members, Native archaeologists, and others who have taught me ways to move forward in archaeology together. The list is too long to spell out, as I've had the distinct pleasure of working with many Tribal Nations in the past several years, but specifically thank you to the following for your advice and partnership: Karen Brunso, LeeAnne Wendt, RaeLynn Butler, and Turner Hunt. I look forward to continuing working with you all, to build a more ethical archaeology for the future.

A collections-based dissertation such as this would not be possible without many repositories, each of which were gracious to put protocols in place to let me come borrow or analyze collections even amid a global pandemic. Access to collections was facilitated by Susie Fishman-Armstrong and Dr. Marc Levine at the Sam Noble Museum of Natural History, Christina Garst and Dr. Robert Hoard at the Kansas State Historical Society, Dr. Neal Lopinot and Sarah Reid at the Center for Archaeological Research at Missouri State University, Jessica Boldt at the University of Missouri, Mike Meinkoth with the Missouri Department of Transportation, as well as Mary Suter and Dr. George Sabo at the Arkansas Archeological Survey. As you can see, the list of folks is long, but this dissertation would not be possible without their help and protocols. Thank you all for working with me and finding ways for me to finish this research safely.

This research was funded by the National Science Foundation through a Doctoral Dissertation Research Improvement Grant (BCS-2102764). This financial support allowed me to travel to the repositories for data collection and to date radiocarbon samples from Neosho sites. These carbon dates were analyzed by the AMS Laboratory at the University of Arizona. Thank you specifically to Greg Hodgins for his help and support through that process.

Last, but certainly not least, I want to acknowledge the support of my family and lifelong friends I've had along this journey. Without your support and confidence in me, I would not be where I am today. The list is of course too long to recite here (you know who you are), but I do want to thank my mother, Susan Ford, and father, Dennis Ford, for always believing in me and pushing me to achieve my dreams. Befitting his size, I also want to give a small shout out to Milo, my silly kitty boy, who helped keep me sane throughout this whole process. This dissertation is dedicated to all these people.

TABLE OF CONTENTS

CHAPTER Page

CHAPTER Page

CHAPTER Page

LIST OF TABLES

Table Page

Table Page

Table Page

LIST OF FIGURES

Figure Page

Figure Page

Figure Page

Chapter 1:

Introduction

Archaeology has a deep and complex history with the creation and use of categories (Kosiba 2019). Early scholars like Holmes (1886, 1914), Wissler (1914, 1917), and Ford and Willey (1941) set up the foundations of the categorical perspectives like culture areas that have since allowed archaeologists to investigate and discuss an intense amount of cultural variability. These culture areas and associated terminologies still make up a big part of our archaeological investigations. In using those taxonomies as meaningful analytic units, analysts sometimes place assumptions not only upon the data but also presuppositions about what cultural positions communities represented by those data can occupy (Feinman and Nicholas 2016; Feinman and Neitzel 2020; Holland-Lulewicz 2020). This becomes especially true when we approach the boundaries of these artificial units, where material traits often do not fit neatly into those categories (Kosiba 2019). Though archaeologists now understand boundaries and borders can be diffuse and are always inherently complex, some have struggled to find frameworks that place an understanding of the relationships within and between communities—as the main building blocks of the social groups and societal connections we wish to study—at the forefront of our analyses. Adding to the work of scholars who have been working in the past decade to emphasize relational approaches (e.g., Birch 2015; Kassabaum 2019; Peeples 2018b; Wright 2017), this research employs social network analysis (SNA) and other statistical techniques based on ceramic attribute data to evaluate the inter- and intra-regional relationships between communities within and surrounding an assumed cultural borderland. In employing these methods, archaeologists can move past the use of problematic categorical perspectives that overemphasize cultural difference towards approaches that better interpret the relationships forged by these past communities. In these ways archaeologists can better investigate the societal connections and social worlds of pre-contact groups.

Boundaries and Borders in Archaeology: Finding Evaluative Approaches

This research specifically examines Late Pre-Contact macro-regional interactions between communities that span what has been defined as a recondite and peripheral borderland—the space between the Eastern Woodlands and the Great Plains. Borderlands and boundaries, defined here as the spaces between culture areas, have been a major topic of anthropological study in the recent decades, as anthropologists move towards an examination of the actions and lives of communities in these traditionally undervalued and understudied spaces (e.g., Hu 2013; Lightfoot and Martinez 1995; Ylimaunu et al. 2014). Originally designed as heuristic devices aiming to approximate the "real/natural grouping of the material traces of human achievement" (Holmes 1914), culture areas are artificial constructions that once corresponded to large environmental breaks on the continent. They have since been parsed out into smaller sub-units in a hierarchical taxonomy.

Borderlands constitute a third space and are an indirect result of this geographic organization of communities, cultures, and regions in archaeology that help us interpret social processes and interaction. These places are often discussed as contentious spaces of culture contact for the people residing in them and are difficult for archaeologists to discuss and characterize using our existing spatial constructions. In other words, the folks living in these borderlands often do not "fit" in our existing taxonomies. Researchers now agree that the borders created by culture areas are diffuse and fundamentally etic constructions. However, historical inertia has retained their use as organizational templates, which still largely guide research on specific regions, cultures, and communities. These practices oftentimes mask the nuances of relationships that were built, maintained, and changed through time.

Fortunately, archaeology is shifting towards theories and methods that refocus our analytic efforts on the actual relationships among individuals and groups and away from simplistic categorical approaches. Many of these studies use material traits within network analyses to investigate the dynamism, complexity, and fluidity of relationships signaled by relative similarities in those traits. Especially when examining materials made and used by communities situated at supposed geographic and typological boundaries, archaeologists have a renewed interest in understanding these spaces as complex mosaics of cultural interaction and also using these techniques to evaluate these artificial categorizations and more accurately depict the social worlds and boundaries of past people (e.g., Alvarez 1995, 1999; Anschuetz et. al. 2001; Bhabha 1994; Card 2013; Deagan 1990; Gupta and Ferguson 1992; Kearney 1991; Kohl 1987; Liebmann 2013; Liebmann and Murphy 2011; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Lyman et al. 1997; Mengoni 2010; Naum 2010; Ogundiran 2014; Rodseth and Parker 2005; Rösler and Wendl 1999; Silliman 2015; Ylimaunu et al. 2014).

Social network analysis (SNA) in particular, allows archaeologists to directly evaluate and reconstruct these kinds of relational phenomena (Brughmans 2010; Brughmans et al. 2016; s 2011, 2013, 2014, 2016; Wasserman and Faust 1994). Rather than starting our investigations with existing culture area definitions and associated material correlates, we can instead use this approach and method to investigate how communities built their relationships with one another. When combined with anthropological theories on the characteristics of borderlands as well as archaeological theories on the social correlates of material evidence, we can use these approaches to evaluate our taxonomies, to better capture the relational dynamics of people in the past, and to reincorporate communities often labeled as peripheral, uninfluential, and/or marginal simply because of their geographic location.

The Case Study

This work is focused on Neosho communities who lived on the Ozark Plateau between AD 1400 and AD 1650. The Ozarks themselves, and the communities who lived there, have been labelled as a borderland (Willey and Phillips 1958). For Neosho, their association with this environment has resulted in previous work placing undue emphasis on categorical approaches as discussed above, which have ultimately deemphasized Neosho agency in regional and community-level interactions. Past research has focused on questions that sought to classify Neosho in one way or the other, either in terms of their "origins" or their cultural affiliation. Some have suggested Neosho communities developed in-situ from previous culturally conservative communities (Freeman 1959a, 1962; Purrington 1971; Vehik 1993; Wyckoff 1980), illustrating the Ozark environment is seen as a marginal borderland with little cultural influence, while others have suggested Neosho is the result of migrations of people either from the Plains or the Eastern Woodlands (Baerreis 1940, 1941; Chapman 1959; Orr 1946; Dickson 2002; Wedel 1959). Other discussions have suggested Neosho acted as brokers between groups living on the Plains and those in the Eastern Woodlands (Thomas and Ray 2002). Whatever the case, these past arguments and theories are largely impressionistic and have never been directly assessed or measured. Previous research on Neosho communities is clearly rooted in assumptions categorizing the Ozarks as a marginal borderland.

This research incorporates borderland theories within a communities of practice framework to flip the script and refocus our analytic attention on how Neosho communities built their relationships internally and externally with surrounding societies. Research on Neosho communities has been affected by an uncritical application of taxonomic classifications in archaeology that impose assumptions about the structure and quality of their relationships and interactions with surrounding groups. Rather than attempting to categorize Neosho as past researchers have based on their association with an assumed cultural borderland, this work moves towards better understanding how communities in this region built and maintained relationships with one another, emphasizing their agency in creating their social worlds. More specifically, this work uses similarities in ceramic attributes to reconstruct past social networks reflecting two main types of relationships based on ceramic attribute data: restrictive learning communities and broader affiliative relationships.

This relational or network approach forefronts an investigation of connections between communities—in this study, between sites—as a way to evaluate and understand how entanglements between actors constitute social, political, and economic structures (Emirbayer and Goodwin 1994). The perspectives incorporated in this dissertation do not abandon the idea of structuration—as past societies did build and maintain boundaries and borders—but instead promotes a more nuanced examination of individual and community agency in the actual construction and maintenance of those relationships. Rather than beginning with the assumption the Ozarks and Neosho must be peripheral because of their residence on an assumed cultural borderland, we can use these methods and approaches to evaluate those assumptions while simultaneously better understanding how communities in this region structured their own social worlds.

This dissertation not only accomplishes the above goals, but also represents a massive update in our current knowledge about Neosho communities. As this narrative moves forward, the research undertaken will hopefully clarify our understanding of Neosho's cultural practices and how those relate to surrounding groups, in the efforts to reinvigorate research in this understudied area. Chapter 2 will more fully describe the intellectual history and difficulties surrounding the use of culture areas in archaeology while Chapter 3 will provide a much-needed background for Neosho illustrating how the uncritical application of taxonomies has impacted research on these communities. Chapter 4 compiles regional subsistence data to update our current knowledge, but also to problematize the assumption Neosho communities must necessarily be more or less related to the Plains or the Eastern Woodlands, a common theme running through the extant literature. Chapter 5 builds the theoretical and methodological framework incorporating borderland theories, communities of practice, and social network analysis to answer research questions aiming to evaluate the Ozarks as a cultural borderland, Neosho's role in regional interaction, and more using ceramic data. Chapter 6 will fully describe the ceramic data, and Chapter 7 presents the social network analyses and interpretations. Finally, this narrative concludes with Chapter 8, where the research questions are scrutinized given the data and investigations undertaken in this dissertation.

Chapter 2:

The Effects of Culture History and Categorical Techniques on Borderland Research

The social sciences have often focused on the study of difference, rupture, change, and disjunction through space and time. In particular, archaeology's focus on spatial and temporal discontinuity is the result of a complex intellectual development which is predicated upon a western view of space viewing cultures and peoples as occupying "naturally" differentiated spaces (Gupta and Ferguson 1995). It is necessary for archaeologists to situate their research within space and time for many reasons, most of all to communicate how their investigations and conclusions relate to complex regional histories. Nevertheless, applications of culture historic frameworks also carry implicit, undiscussed, and unevaluated assumptions about the ways in which people interacted with one another within and between seemingly "cohesive" cultural units (Feinman and Nicholas 2016; Feinman and Neitzel 2020; Holland-Lulewicz 2020). This chapter outlines the intellectual development of culture history in archaeology and anthropology more broadly, focusing specifically on the impacts of embedded culture area definitions have on archaeological research situated at the boundaries of artificially constructed spatial (and temporal) units. This discussion will not only provide the basis for contextualizing the case study on Neosho communities and more broadly on other borderland societies to date, it will also provide the basis for the network approaches to be outlined in subsequent chapters, refocusing analytic efforts on investigating the variability of past social connections.

An Intellectual History of Culture Areas and their Embedded Assumptions

Culture history, foundational to the development of North American archaeology, has been discussed at length in numerous works (e.g., Bahn 2014; Patterson 1995; Trigger 2006;

Willey and Sabloff 1993). Here, I will highlight one aspect of the culture history framework which endures and remains a major building block of archaeological research inquiries: culture areas. Feinman and Neitzel (2020) provide a synopsis of the intellectual development of these hierarchical structures not only within archaeology, but within anthropology more broadly. Constructed during the beginnings of North American archaeology at a time when researchers were struggling to classify and interpret the intense amount of variability they encountered, culture areas and other classificatory systems were a useful mechanism for these scholars to group similar traits and social structures.

These early classifications also came at a time when racist ideologies were explicitly expressed, and interpretations based on these artificial structures often reified nationalistic and colonialist beliefs suggesting Native American cultures were inferior (Fields 2001; Wilkerson 2020). As Feinman and Neitzel (2020) discuss, these systems of classification were predicated upon racialized ideals about biological and cultural evolution, placing Anglo-Saxon societies at the top of these hierarchies. As the foundations of the culture history paradigm in the mid-nineteenth century, these organizational systems perpetuated and reinforced portrayals of Indigenous peoples as inferior, attempted to take away agency, and were complicit in government policies that took Native lands and attempted the erasure of their cultures. While Feinman and Neitzel's (2020) primary focus was to argue early culture history was rooted in racialized ideologies, my focus is instead upon the effects of these classificatory systems on understudied areas like borderlands. Most of the intentions of archaeology and archaeologists today are not sinister in nature, and culture history and archaeology overall has undergone many paradigm shifts, revisions, and more (e.g., the expansion/revision of culture area boundaries, modification of principles with new information). Even so, I will argue these classificatory systems in many instances remain uncritically embedded within research programs and often obscure the very thing we intend to understand—the relational nuances between people in the past. Other subdisciplines have supposedly eliminated the use of classifications, but archaeology still (often implicitly) utilizes these heuristic mechanisms as problematic analytic units, placing unevaluated assumptions upon the data and the people we intend to study. The discussion that follows focuses intently on the construction of culture areas and its impacts on research in the eastern Woodlands and the Great Plains, laying the groundwork for the case study to be investigated in this dissertation. This history and its impact on archaeological research is not isolated to the areas discussed below, but these discussions serve to contextualize the following chapters including background as well as theoretical and methodological resolutions.

Culture Areas and Associated Borderlands

The development of the culture area concept cannot be attributed to one scholar, but instead should be seen as a community product. In the Americas, geographic discontinuities were first utilized by museum curators to order collections in "natural" units (Boas 1930; Holmes 1886, 1914). Clark Wissler (1914, 1917) popularized and further developed the culture area concept. In 1914, he—much like the scholars before him—used variation in material culture attributes to separate major cultural regions. Culture areas were first and foremost defined through material culture as a highly desirable descriptive and classificatory device and a way to approximate the "real/natural grouping of the material traces of human achievement" (Holmes 1914).

These groupings, as outlined by Wissler (1914, 1917) and elaborated by other scholars such as Kroeber (1939), corresponded to divisions established by geologists, geographers, and biologists for the natural environment or the distribution of various food resources (Binford and Sabloff 1982; Wissler 1914). Figure 2.1 compares three maps from Wissler's (1917) original descriptions of the culture area concept. He began his descriptions with a basic understanding of food resources on the continent, and then proceeded to break those areas down further based on what he called a "totality of culture" derived from ethnographic data. Though Wissler does break cultural practices down into small units, or cultural traits, like "basketry", "sculpture", etc., eventually he compiles these into the culture areas as see in Figure 2.1, attempting to summarize cultural variation in a meaningful way (Lyman and O'Brien 2003). Essentially, these culture areas correspond directly to food and environmental areas. And, as archaeologists, we often separate our own investigations based on these environmental areas as well, classifying ourselves even as Plains, Southeastern, or Southwestern archaeologists in our works.

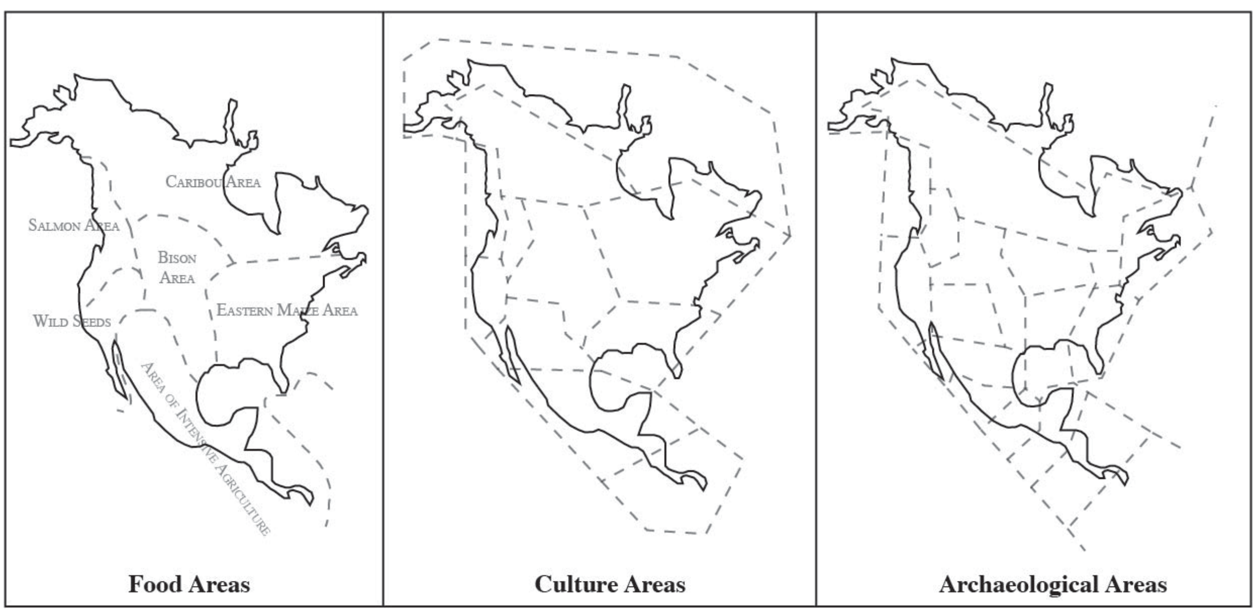


Figure 2.1. Comparison of Wissler's (1917:8, 205, 246) classificatory maps.

Essentially, anthropologists had put forth the idea in these early days that geographic and temporal continuities existed as long as the environment in which they were practiced stayed the same. Cohesion or stability in associations between elements of material culture was often attributed to large geographic regions or long temporal ranges, not necessarily that those cohesions were inherent in social and ethnic groups. Archaeologists, however, adopted a perspective designed only to describe cultural traits in terms of social and ethnic continuities. As such, cultural traits inherently possessed cohesion based upon patterns in associated attributes manifest in multiple cases (e.g., at the site level). Traits allowed archaeologists to construct types, providing "an organizational tool which will enable the investigator to group specimens into bodies which have demonstrable historical meaning in terms of behavior patterns" (Kreiger 1944:272). Thus, culture in archaeology early on was perceived as naturally cohesive and comprised of uniform cultural traits, existing at a level which went beyond the identities and nuanced practices of individuals.

As this early work proceeded, researchers struggled to develop mechanisms to describe the variation and diversity they observed in material and non-material traits within these large-scale culture areas. And even more so, they struggled to understand how to account for the "edge" or "borderland" areas—those lying between major cultural and environmental zones. Holmes (1914) noted some gradation along these areas but failed in creating a classificatory mechanism that provided a decent framework for interpreting cultural phenomena within them. Wissler (1914), noting the incredible variation within his culture areas, developed the concept of culture centers. Here, he stated researchers must determine a "pure" or "representative" culture within each region, and that one culture would then represent the truest cultural form in the region at large. All other cultures between or varying from these pure cultures then can be classified as “intermediate” or “transitionary”. Cultural traits were seen to diffuse as a result of culture contact or migration and culture change was explained using similar mechanisms of outside influence. Further, as these culture areas only first included material traits, Wissler (1917) soon expanded them to include non-material traits such as linguistic and somatic classifications. Many non-material traits corresponded to the existing material culture areas, leading to an unfortunate gratuitous expansion which assumed they encompassed a “totality of culture”.

These concepts not only set up the idea that culture naturally diffuses uniformly through space and there is one single origin for all culture in any given region, they also entrenched the extant assumptions that culture areas and cultural groups had the same boundaries and generalized traits through time. Early culture area maps based upon these assumptions confirmed racialized ideas about Native American groups as “fossilized, primordial societies that remained largely unchanged until their first encounters with Europeans” (Feinman and Neitzel 2020:2). Continuing far into the mid-twentieth century, these views of culture as homogeneous and spatially uniform entities allowed archaeologists to generalize about entire cultures based only on the materials recovered from a small subset of “type sites”, to be determined and defined by the researcher.

How these generalizations and racialized ideologies relating to culture areas affected early archaeological interpretations are exemplified when we examine how the separation between the eastern Woodlands and Plains were discussed at this time. Importantly, the separation of these two “cultural” zones were based upon incredibly incomplete datasets and operated under dominant theoretical assumptions concerning the role the environment played in cultural development. Wissler’s (1914, 1917) distinctions between the eastern Woodlands and the Plains were entirely based on the assumption the Plains were uninhabitable by humans until the introduction of the horse by Europeans, as it was believed agriculture and horticulture were impossible in those environments and the hunting of large mammals like bison could not happen without horses. Wissler, and others including Kroeber (1931, 1939), assumed a recent human migration onto the Plains. Prior to the introduction of the horse, they believed cultural influence only diffused from the eastern Woodlands into the eastern Plains or from the Southwest into the western Plains. It was not that these scholars did not have access to data illustrating the complexity of Plains societies, their sedentism, and their use of horticulture and agricultural products. These data were readily available by the time they were writing their overviews, as scholars on the Plains had been doing archaeological investigations funded mostly by state agencies (Trabert and Hollenback 2021). Kroeber and Wissler did not include the work of their contemporaries who were researching the Plains, and they were also too intensely focused on the issue of complexity. This is problematic, as their work is based on incomplete datasets and ultimately ends up perpetuating unfounded claims about Plains groups prior to European influence being less complex than their Eastern Woodlands counterparts.

Additionally, these early culture area definitions were grounded in culture evolutionary frameworks, which operated under the specific assumption the environment limited the cultural achievements of Native peoples (Feinman and Neitzel 2020). In other words, environment was the ruling factor in how people could live and persist in the area, and culture areas corresponded to environmentally distinct areas where people existed only in response to external stimuli. Agricultural societies, such as those encountered by archaeologists in the southeastern United States, fell at the top of a ranked spectrum while nomadic hunters and gatherers were seen to be less complex culturally. While many Plains archaeologists knew this to be untrue, few notable scholars like Wissler and Kroeber had determined agriculture to be impossible on the Plains prior to European innovations, limitations were placed upon the cultural achievements of the Native peoples early anthropologists encountered anywhere on the Plains. Thus, the bold line supposedly separating meaningful cultural units were based upon Eurocentric and biased assumptions, not necessarily grounded in archaeological realities. Of course, scholars rejected those assumptions as new data on the Plains proved these peoples had practiced agriculture similarly to their eastern Woodlands counterparts (Wedel 1959). But the separation between these environmental (and supposedly cultural) zones remained a guiding force in archaeological research.

Culture history as an archaeological paradigm truly developed as a result of debates surrounding the use of culture traits, their scale, and importance (Lyman et al. 1997:33). In shifting the emphasis from presence/absence of various traits to the study of the shifting concentrations of particular variations in those traits through time (i.e., types or styles), there was a corresponding shift from essentialism to materialism, leading archaeologists to better measure the passage of time. Lyman (1997:33-72) argued scholars like Franz Boas, Alfred Kroeber, James Ford, and others provided an impetus for this paradigm shift in archaeology, using existing superimposed artifact collections to investigate chronological differences among variants and to question the uniformity of culture through time. This variation through time is what early scholars like Wissler were missing from their theories and discussions. From the work of their successors came the emphasis in the 1920s and 1930s upon investigating and creating these chronologies and culture history narratives.

Culture areas and culture history more broadly received much criticism in the coming decades, but little was done to create the full paradigm shift needed to undermine their importance to archaeological interpretations overall, in terms of their artificiality and/or the unevaluated assumptions they placed upon past peoples. In fact, archaeologists continued throughout the mid-twentieth century to subdivide previously defined culture areas into smaller hierarchically organized units, most often based upon similarities in ideational categories, or "types" (Lyman et al. 1997:95). McKern (1939) developed a widely applied method for classification explicitly modeled after biological Linnaean taxonomic systems. And others developed theories arguing for the establishment of phyletic relations, though this was short lived as scholars in the late 1940s such as J. O. Brew argued it was unacceptable to argue that phylogenetic relationships existed between inanimate objects (Lyman et al. 1997:101).

It was only in the late twentieth century with the development of the New Archaeology (i.e., processualism) that refining culture histories took a back seat to the investigation of generalized laws concerning past behaviors. Though processualism was grounded upon criticisms of culture history (Binford 1965; Flannery 1967), the framework did little to revise its assumptions suggesting culture represented homogenous and spatially uniform entities (Feinman and Neitzel 2020; Johnson 2006; Trigger 1984). The "new" archaeology continued with embedded assumptions downplaying and disregarding the diverse actions of individuals and communities within archaeology's artificially defined culture areas. And while refining spatial and temporal units were no longer the main focus of archaeological research, those units and associated assumptions were (and still are) uncritically utilized in developing research agendas.

Feinman and Neitzel (2020) argued culture history and culture areas have become ingrained in the archaeology of North America, even though numerous studies of past and living peoples have weakened its assumptions. As more ethnographic data emerged, cultural anthropologists and sociologists worked in the last decade of the twentieth century on into the twenty-first to rework views of culture. These revisions explicitly emphasize and recognize human agency as well as the propensities of individuals to associate with more than one social network and constantly negotiate their membership to each. Therefore, contrary to the embedded assumptions of culture history, these new views of culture (of which most archaeologists would agree) accept that communities and individuals do not associate with stagnant, homogenous, and spatially uniform networks through time. Rather, broad group membership is dependent upon human action, is sometimes transitory, and variegated. Ethnoarchaeological research confirms these viewpoints in examining how groups and individuals signal identity through material culture (Hodder 1982; Wobst 1977).

Corresponding changes did occur within archaeology as well, contrary to Feinman and Neitzel's (2020) discussions, throughout the next several decades. As more and more data emerged, archaeology continued throughout the twentieth century to encounter new levels of diversity and variation in material culture, which continued to shake the foundations of hierarchical culture area definitions. It became increasingly difficult to characterize and categorize these data that "broke the mold" and had been the foundations of archaeology in North America for so long. What had once been strict spatial divisions became instead diffuse and arbitrary distinctions (Ford and Willey 1941). And finally, many studies emerged which discredited the homogeneity and boundedness of spatial units as used in archaeology (e.g., Benedict 1934; Mead 1928).

Most archaeologists today would agree culture area definitions do little more than to act as heuristic mechanisms for communication between researchers. Still, most of us continue to use culture areas uncritically to frame our research, in many ways accepting these assumptions implicitly. Though theoretical frameworks have been developed in archaeology (e.g., post-processualism, post-processual plus) recognizing variability and the agency of communities and individuals within seemingly cohesive cultures, archaeologists still implicitly engage and adhere to underlying assumptions seeking to classify and categorize material culture and social phenomena with broad strokes (Feinman and Neitzel 2020; Holland-Lulewicz 2020). While categorization may no longer be a primary focus, researchers rely heavily upon these entrenched foundations to situate their investigations in social and historical contexts. These unevaluated hierarchical taxonomic units (e.g., culture areas, typologies) are also problematically used as the groundwork from which scholars construct their archaeological interrogations. When used as meaningful analytic units, we inadvertently impose assumptions upon past communities about the structure and quality of their inter- and intra- societal relationships and interactions, privileging certain questions and interpretations over others. The use of such taxonomic legacies (e.g., ceramic types) as the basis upon which we build archaeological inquiries often implicitly accept unevaluated assumptions about the relational structure of the societies those categories supposedly represent and the roles they can take in local and regional interactions (Kosiba 2019).

These implicit assumptions are highlighted when we approach the boundaries of these taxonomies, where material traits often do not fit into those categories. Though researchers agree now the borders created by things like culture areas are often diffuse, obscured, and fundamentally etic constructions, these heuristic props still largely guide research. Thus, the nuances of relationships built, maintained, and changed through time are often obscured. Many have called for innovations in theory and method to overcome these issues, but an overreliance on categorical constructions continued (Brück and Fontijn 2013; Feinman and Neitzel 1984; Hart 1999, 2012; Hart and Brumbach 2003; Henry et al. 2017; Kowalewski et al. 1983; Lulewicz 2018; Nassaney and Sassaman 1995; Pauketat 2001, 2007, 2013; Sassaman 2001, 2010;

Sassaman and Holly 2016). Luckily, the tide is shifting, as archaeologists in the past five years are moving away from these tendencies, to develop approaches focusing on actual relationships among individuals and groups (e.g., Birch 2015; Kassabaum 2019; Kosiba 2019; Wright 2017). Especially concerning those communities and materials situated at geographic and typological boundaries, scholars have a renewed interest in examining complex mosaics of cultural interaction using relational and network approaches (e.g., Alvarez 1995, 1999; Anschuetz et. al. 2001; Bhabha 1994; Card 2013; Deagan 1990; Gupta and Ferguson 1992; Kearney 1991; Kohl 1987; Liebmann 2013; Liebmann and Murphy 2011; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Lyman et al. 1997; Mengoni 2010; Naum 2010; Ogundiran 2014; Rodseth and Parker 2005; Rösler and Wendl 1999; Silliman 2015; Ylimaunu et al. 2014).

From Categories to Relations: Borderlands in Anthropology and Archaeology

As established above, anthropology and archaeology fundamentally work within various spatial frameworks, relying upon the geographic organization of communities, cultures, and regions to interpret social processes. Though the definitions of these units depend upon different traits, concepts like culture areas, phases, and nation-states, researchers use them mostly to describe and order the world in comparable terminologies. These spatial and temporal groupings have indirectly created what some have broadly referred to as "borderlands"—those areas between environmental, political, and cultural boundaries (Parker 2006). Borderlands have historically been deemed to be problematic or messy—not fitting within the neatly ordered categories of the cultural world—and as a result are often understudied. And, unfortunately, many of the borderlands created by these artificial boundaries remain unevaluated, meaning people and communities residing in those areas are assumed to embody hypothesized borderland relational dynamics—as reclusive and peripheral to regional interactions, or as necessarily serving as brokers between cultures residing in supposed “centers.” The danger with placing these assumptions upon “borderland” communities is it takes away their agency and actions in crafting their regional and interactive identities, forging their own relationships and roles within regional interactions.

In the past two decades, researchers have discussed the cultural boundaries crafted around material culture and environmental circumstance do not correspond to the ways in which peoples envision their own personal and cultural worlds. Combined with more recent theories of subjectivity, globalization, practice and performance, anthropologists are rediscovering the complexity and multivocality of these interstitial cultural spaces (Naum 2010). Contemporary research is working towards reconceptualizing borderlands as interesting, fluid, and naturally ambiguous places. Though these studies to date have mainly focused on societies impacted by colonialist encounters or pre-contact ones involving interaction between state-level societies (e.g., Card 2013; Deagan 1990; Liebmann 2013; Liebmann and Murphy 2011; Lightfoot et al. 1998; Mengoni 2010; Naum 2010; Ogundiran 2014; Rodseth and Parker 2005; Silliman 2015; Ylimaunu et al. 2014), it is clear the concepts utilized by these scholars are translatable to contexts like the ones discussed in this dissertation regarding Pre-Contact societies. As spaces in which relational and categorical identities combine, manifest, and co-occur, borderlands provide anthropologists an opportunity to examine the coincidence of local and global practice (Appadurai 1990; Gupta and Ferguson 1992; Kearney 1991; Mische 2011; Ong 2005; Rösler and Wendl 1999; Tsing 1994, 2000).

Borderlands in anthropology are now widely recognized as extremely dynamic and sometimes unstable spaces of cultural practice and interface (Hu 2013; Lightfoot and Martinez

1995; Parker 2002, 2006; Stein 1998; Ylimaunu et al. 2014). As a whole, this concept should allow archaeologists to develop nuanced interpretations of agency, multivocality, ethnogenesis, and hybridization (Naum 2010). Numerous studies attempt to understand how borderlands manifest or are produced through social, political, and cultural circumstance and in turn how this construction impacts such things as interaction, cultural construction, as well as individual and group identity. Such perspectives have proven particularly useful for examining colonial and political contexts and instances of instability, rebellion, and systemic violence (Adelman and Aron 1999).

The relationships between borderlands and surrounding areas have been characterized on a continuum of boundary dynamics which ranges from harsh and static to soft and fluid (Parker 2006:81). Parker (2002) proposes four fluid categories to characterize the nature of boundaries: static, restrictive, porous, and fluid. Importantly, he expands his discussion to illustrate the multidimensionality of borderlands, in that different activities cannot be characterized or bounded in the same way. Various scholars have also expanded upon this point, as every geographic borderland encapsulates multiple overlapping and shifting boundaries (Elton 1996; Lightfoot and Martinez 1995; Parker 2002, 2006). Parker distills this multidimensionality into five main categories—which themselves overlap quite a bit archaeologically—including geographic, political, demographic, cultural, and economic datasets. It is recognized this model is useful in characterizing borderland situations but does little to investigate the processes behind the cultural dynamics involved. This model does give archaeologists a testable way to progress in our understanding of borderlands generally and specifically as well as to evaluate assumed culture area boundaries using extant methods and theories.

Parker's (2002, 2006) theories give archaeologists the freedom not only to critique lingering ideas of rigid borders which create barriers in our understandings of multiscalar relational dynamics between communities in the past, but also to better capture the inherent ambiguity and fluidity of boundaries anthropologists have been discussing for the past several decades. By recognizing the multidimensionality of borderland spaces, this framework can better capture the diversity of relational interactions between people and communities. We should not expect similarities in the types of material remains we study will conform to the same boundaries set out by our anthropological forefathers such as Wissler (1914, 1917) and the later on those set by archaeologists following taxonomic classification systems like those of McKern (1939). For example, lithic tool types and materials do not necessarily signify the same activities or relationships as ceramic styles and decorations, and as such would not conform to the same borders we've drawn on our culture area maps through the years. In recognizing this, archaeologists can better examine the complexity of interactions between communities and their active roles in crafting and maintaining those interactions through time. The borders we draw based on a totality of similarities in material culture are problematically based in Western assumptions and conceptions of space relying solely upon politically negotiated borders. Ironically, even in this Western framework and in the modern day, these rigid boundaries do little to capture the nuances of interpersonal interactions and social histories. Parker's framework can allow us to look deeper into these nuances to better capture these histories not necessarily limited by political boundaries.

The ideas discussed above can be easily operationalized for archaeological analyses seeking to better characterize and describe the complexities of interregional interactions. However, in order to use this framework one would need a rather robust and diverse dataset, which is often lacking in the areas most in need of these studies—the areas defined as "borderlands." An important first step, and the one to be undertaken and discussed in this dissertation, is to first systematically evaluate the roles of supposed borderland communities in inter- and intra-regional interactions without the *a priori* assumptions. As stated above, culture areas and other typological taxonomic systems are often problematically used as analytic units. In using these constructions to build research programs, propose research questions, and more, archaeologists place predetermined assumptions not only upon the available data, but also dictate what cultural positions communities represented by those data can occupy (Feinman and Nicholas 2016; Feinman and Neitzel 2020; Holland-Lulewicz 2020).

Though researchers agree now the borders created by these culture areas are diffuse, obscured, and fundamentally etic, arbitrary constructions, these heuristic props still largely guide research on specific regions, cultures, and communities, often masking the nuances of relationships built, maintained, and changed through time as well as stripping away the agency of these communities in making those connections. Many have called for innovations in theory and method to overcome these issues, but an overreliance on categorical constructions has continued (Brück and Fontijn 2013; Feinman and Netizel 1984; Hart 1999, 2012; Hart and Brumbach 2003; Henry et al. 2017; Kowalewski et al. 1983; Lulewicz 2018; Nassaney and Sassaman 1995; Pauketat 2001, 2007, 2013; Sassaman 2001, 2010; Sassaman and Holly 2016). Luckily, the tide is shifting, as archaeologists in the past five years move away from these tendencies, to develop approaches focusing on actual relationships among individuals and groups (e.g., Birch 2015; Kassabaum 2019; Kosiba 2019; Wright 2017). Especially concerning those communities and materials situated at geographic and typological boundaries, scholars have a renewed interest in examining complex mosaics of cultural interaction using relational and network approaches (e.g., Alvarez 1995, 1999; Anschuetz et. al. 2001; Bhabha 1994; Card 2013; Deagan 1990; Gupta and Ferguson 1992; Kearney 1991; Kohl 1987; Liebmann 2013; Liebmann and Murphy 2011; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Lyman et al. 1997; Mengoni 2010; Naum 2010; Ogundiran 2014; Rodseth and Parker 2005; Rösler and Wendl 1999; Silliman 2015; Ylimaunu et al. 2014).

Holland-Lulewicz (2020) and Feinman and Neitzel (2020) provide important discussions of emerging theoretical and methodological approaches promoting relational perspectives in archaeology over traditional categorical approaches. Recent studies not only provide a new foundation for archaeologists to draw upon, but essentially resituate how we view the past through archaeological data. Refocusing our perspectives to understanding the relationships built by past peoples rather than the categories defined by past archaeologists, these innovative studies promote a set of principles allowing archaeologists to investigate the diversity and variation in multiscalar interactions. Though many of the examples discussed in Holland-Lulewicz's (2020) and Feinman and Neitzel's (2020) syntheses do not necessarily deal strictly with borderlands, they serve to illustrate archaeologists must move towards an overreliance on categorization towards an emphasis on relational perspectives.

Conclusions

The discussions above do not serve to burn the strawman of culture-history and culture areas, as most archaeologists recognize the weaknesses inherent in these categorical approaches. Rather, the discussion serves to characterize and rationalize the relational and network approaches to be described in later chapters of this dissertation as well as to emphasize categorical approaches are still foundational analytic pieces of many research programs in archaeology in North America. The heuristics afforded by these taxonomic legacies are still useful in situating research in space and time, but similar to approaches discussed above, archaeologists have developed advances in method and theory in the recent decades to proceed without the use of these as meaningful analytic units. The next chapter will integrate the above discussions within a discussion of the case to be investigated in this manuscript. In fully describing the background and history of archaeology on the Neosho phase, the full effects of categorical principals and approaches on understudied communities such as Neosho can be seen in how researchers have studied and characterized this culture through time.

Chapter 3:

The Neosho Culture, Interactions with Surrounding Communities, and the Effects of Categorical Approaches on Neosho Research

The Neosho phase is interesting to researchers because the associated materials diverge considerably from preceding cultures in the area. Little is known about the communities attributed to the phase, but in tracing the intellectual history of archaeological research on these peoples it becomes clear Neosho is not only difficult to define, but it is difficult to understand their relationships to preceding and contemporaneous communities in surrounding areas (Ford 2019a). With such limited knowledge, researchers have been unable to answer what they've defined as the most important questions: where did Neosho come from and who are they ancestral to? Existing arguments concerning the identities of Neosho communities rely upon material trait lists derived from a small subset of sites, prioritizing culture historic categorical taxonomies over discussions of relationships and connections between communities (Ford 2019a; Holland-Lulewicz 2020).

This chapter provides a discussion on the environment of the Ozarks in order to set the stage and reiterate the principals discussed in previous chapters, a background on existing knowledge about Neosho and how researchers have attempted to answer their questions, discussions illustrating our overall lack of understanding of Neosho's relationships to surrounding contemporaneous cultures, how previous research highlights the effects of categorical approaches on archaeological scholarship, and finally site backgrounds for the sites analyzed in this project. These discussions work in concert with previous and subsequent chapters, which lay out justifications for the theoretical and methodological frameworks to be employed in this dissertation deemphasizing unproductive discussions of taxonomic similarities in favor of approaches prioritizing an understanding of interregional relational ties.

The Ozark Environment

Neosho peoples lived on the Ozark Plateau during the Late Pre-Contact period (AD 1400-1650). As a physiographic area, the Ozark Plateau is made up of five subregions and Neosho sites lie within the Springfield Plateau, located on the southwestern fringe (Figure 3.1). Overall, the Ozark Plateau is a dissected landscape comprised of deep-seated river valleys and gentle sloping uplands. In its formation, this region has been modified by repeated erosional and uplift events. The varied relief of the Plateau results from these various events as well as the overall structure and differential resistance of the natural bedrock types to weathering or erosion (Rafferty 1980).

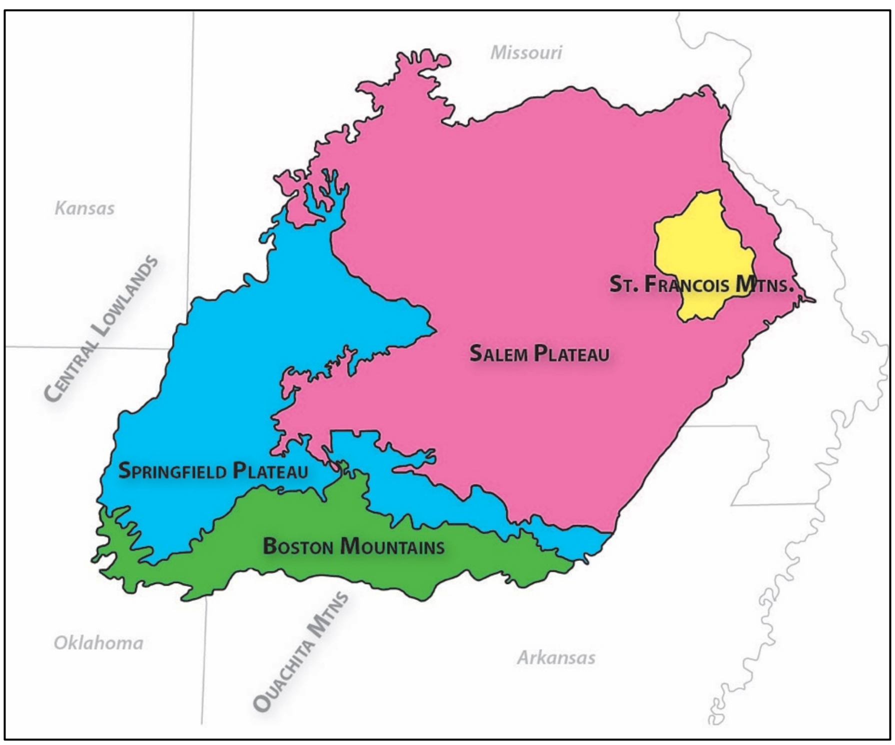


Figure 3.1. Ozark Subregions.

More specifically, Neosho peoples resided near the western border of the Springfield Plateau subregion. Broadly, this area has less relief and, according to Rafferty (1980), has better soils than the other subregions. The Springfield Plateau is a gently rolling plain with some upland elevations upwards of 1500 feet. The river valleys in this area are broad but not deep. In the limestone portions of the Springfield Plateau there is karst topography typical of other portions of the Ozarks, including caves, sinkholes, and solution valleys (Ray 2013; Ray and Lopinot 2006; Vogele 1990). We know Neosho peoples, as discussed below, took advantage of these topographical features, more specifically rockshelters, while living in the Ozarks.

Lithic resources occurring in bedrock outcrops, residual deposits, and gravel bars in this area include chert, hematite, limestone, dolostone, limonite, and shale. High quality chert resources many peoples in Pre-Contact periods would have likely utilized include Jefferson City, Compton, Pierson, Reeds Spring, and Burlington-Keokuk (Ray 2006a). Ray (2007, 2013) also writes of a quarry of high-quality chert located in Ottawa County in far northeastern Oklahoma, referred to as Peoria chert. He suggests Neosho peoples likely utilized this quarry in Ottawa County, but was unable to definitively prove this hypothesis with the dataset available in assemblages from the quarry site. Ray (2020) suggests also that communities living on the Plains also used some of these Ozark chert resources, most intensively utilizing Burlington chert. Neosho people intensively quarried and processed Burlington chert at sites like Dahlman (23LA259), and artifacts made from this chert also appear in small quantities at contemporaneous Great Bend Aspect sites (Blakeslee and Hawley 2006). Based on Ray's (2020) discussion, it is possible that interactions between Neosho and Great Bend Aspect (i.e., Lower Walnut) communities involved the trading of these lithic resources. This dissertation research has shown Neosho communities utilized many of these high-quality chert resources, seemingly focusing most intensively on local high-quality cherts.

Many soil types occur in the Springfield Plateau (Soil Survey Staff 2021), though the uplands are generally dominated by Clarksville series soils. These soils are excessively drained with extremely cherty characterizations. These upland hillslope soils are not easily farmed. Less cherty soils are present in the stream and river valleys, and these are more susceptible to cultivation. Examples of these soil series include Bates, Dennis, and Parsons soils. The Ozark landscape is complex and variegated, and little is known about the geoarchaeology of the region as a whole—save a few studies out of Missouri. As will be discussed later, little is known about how Neosho peoples (and those who came before) utilized this landscape other than their settlement in rockshelters and use of local chert resources. Very few open-air sites have been located in this area. More research is needed to better understand the convergence of geological and cultural processes in the Ozarks overall, to investigate if and how Ozark populations cultivated crops and more.

Climatologically, the contemporary Springfield Plateau is characterized by warm summers and, like much of the southeastern United States, variable winter weather. Rainfall ranges from considerable amounts in the summer to low/moderate amounts in the winter. The driest months are typically December-February and the wettest are May and June (Ray 2013). Several paleoclimatic studies have noted shifts in the climate of midcontinental North America during the past 15,000 years. Few geoarchaeological studies in southwestern Missouri in the vicinity of Neosho sites have supported these climatic shifts, including investigations at Rodgers Shelter (Wood and McMillan 1976) and at the Big Eddy site (Lopinot et al. 1998, 2005). Data from these studies corroborate a warming period about 12,000 BP to 11,000 BP followed by a

1,000 year cooling period known as the Younger Dryas. Gradual warming trends follow the Younger Dryas, resulting in various successive changes in vegetation in the Ozarks. Glacial spruce forests are displaced by oak-hickory deciduous forests, lasting until about 8,000 BP. Following 8000 BP there is a warm dry period named the Hypsithermal, during which the deciduous forests receded and vegetation typical of prairie regions expanded in forest-prairie ecotonal areas like the Ozarks. Following the Hypsithermal period's end circa 4,500 BP, the climate of the Ozarks shifts towards what we know it as today with increased moisture and the return of deciduous forests. At the time when Neosho peoples were residing in the area, the climate would look much like it does today. In the following section I will discuss other significant climatic events through time (i.e., drought events) that impacted the communities in this and the surrounding area.

As a final word on the environment of the Ozarks, and more specifically the Springfield Plateau within which Neosho peoples would have lived their daily lives, this area has incredibly diverse plant and animal resources available for exploitation. Varied faunal resources were and continue to be available throughout the Ozarks, including but not limited to those species utilized for meats and furs such as elk, deer, bison, bear, otter, beaver, racoon, squirrel, and more. Marine resources include mussels, turtle species, gar, and other fish species. Avifauna include species such as the turkey and quail. Depending upon the season and vegetation, the quantity and availability of these species would vary, but communities living in the Ozarks had a diverse set of animal resources to draw upon for various purposes. Plant resources are likely very similar, though modern logging and cultivation has altered the plant communities in the Ozarks (Ray 2013).

As discussed in earlier chapters, the Ozark environment—and the communities who lived there—has been characterized by past researchers as marginal, conservative, and peripheral in many ways. It is clear by this brief environmental discussion that the Ozarks, as a physiographic region, had much to offer communities in terms of resources, not accounting for any cultural significance the area might have had to these communities through time. Regionally, as a natural border between the Eastern Woodlands and the Great Plains, the Ozarks have been caught in a long-standing archaeological debate concerning the best way to characterize and investigate similar borderland areas. Rather than characterizing this environment and the communities who lived their lives there as peripheral, we must acknowledge uplands like the Ozarks—and other mountainous regions categorized as "natural" boundaries—were places where people chose to reside for many factors, some of which include the incredibly diverse environments facilitated by their ecotonal setting. Though the Ozarks may be situated between two larger physiographic zones and may be an environmental borderland, this does not necessarily mean this place also represents a meaningful cultural borderland for its Native inhabitants prior to European colonization. Rather than assuming the communities living in the Ozarks were peripheral to cultural interactions or were "backwoods" peoples simply due to geographic location, the narrative for this region in particular must shift to one which emphasizes the importance of human agency and action in making places meaningful (Gupta and Ferguson 1992), and archaeologists must begin to utilize relational techniques and tools to evaluate these categorical assumptions.

What follows is a background of what researchers currently know about Neosho and surrounding communities, as well as a discussion illuminating how the main debates and unanswered questions about Neosho people manifest themselves within the broader narrative of peripheries, borderlands, and problematic categorical tendencies in archaeology.

A Summary of Neosho Research and the Effects of Categorical Approaches

Though many scholars have begun the important work of developing methodological and theoretical links to replace categorical questions with relational ones (Chapter 2), there remain instances in which our arbitrary classifications seem rigid and unmovable. These areas are understudied for various reasons—lack of research interest, sample sizes, etc.—and the communities living within them lie at boundaries crafted through taxonomic classifications and are often difficult for archaeologists to characterize using existing categorical frameworks. Neosho communities (AD 1400-1650), for instance, are situated within the Ozark Plateau and between two major environmental and cultural zones.

Willey and Phillips' (1958:124-125) characterized the Ozarks as culturally conservative, stating "it is a remarkable fact that the culture of a region so close geographically to the centers of maximum intensity of formative development in the Mississippi Valley could have been so impervious to cultural influences from these centers." Surrounding the Ozarks—which supposedly represents a meaningful environmental and cultural borderland between the Plains and eastern Woodlands (Brown 1984; Harrington 1960)—past researchers observed complex, agriculture-based communities with elaborate religious and social systems. Due ultimately to a lack of research in the area, the ideas these developments never permeated the boundary drawn around the uplands persists—an assumption which demonstrates the seemingly unbreakable link between culture, environment, and rigid categorization in the area. The Ozarks historically are termed as an "island" of cultural development, not significantly affected by outside influences

(Harrington 1960). Though archaeologists today recognize these assumptions and ideas are untrue in any region or borderland (e.g., Brown 1984), research on many Ozark communities, like those of Neosho, remains unchanged and unchallenged. Instead, the categorical assumptions associated with defining this space as a borderland have continued to guide research.

These problems are best exemplified when reviewing past research on Neosho societies. Neosho peoples lived on the southwestern fringe of the Ozark Plateau from AD 1400 to 1650, more specifically extending into areas of northeastern Oklahoma, southeastern Kansas, southwestern Missouri, and northwestern Arkansas. Though much research has been conducted on the material remains of Neosho peoples since the early 1940s (Baerreis 1940, 1941), little is known about this culture save a few broad categorizations concerning settlement and subsistence. Researchers recognize Neosho peoples likely resided in rockshelters within the Ozarks during the winter months and resided in open air sites during warmer months where they could practice horticultural activities (Cobb 1976; Conner 1999a; Dickson 2002; Ray 2017; Ray and Lopinot 2008; Thomas and Ray 2002; Wyckoff 1964). All known burials have been found at rockshelter locations, though these conclusions could be due to a dearth of research on open air sites. Along with some evidence of horticulture (Lopinot 1999), Neosho peoples practiced hunting and gathering of bison and local resources for subsistence. Finally, it has been shown Neosho communities residing in southwestern Missouri likely engaged in widespread trade networks spanning the Great Plains and southeastern United States (Thomas and Ray 2002).

Due to an intensive amount of material studies, much is known about the typical artifact types found at Neosho sites. The phase was first recognized at Mode (34DL39) and among the materials excavated at other sites by WPA crews in Delaware County, Oklahoma in the late 1930s (Dickson 2002). Materials representing Neosho peoples in the archaeological record include implements such as bison scapula hoes, shell hoes, end scrapers and side scrapers, Harahey (alternatively beveled diamond shaped) knives, small triangular projectile points, and shell-tempered pottery (Freeman 1959a, 1962). Neosho peoples utilized animal bone frequently to manufacture tools like awls, hoes, beamers, flakers, and more. They also manufactured decorative materials from shell and bone such as beads (Pillaert et al. 2018). Notably, these materials are quite similar to those found to represent other surrounding and contemporaneous Late Pre-Contact cultures, as well as preceding Plains Village communities (AD 900-1400). Subtle differences in material culture include production of lithic tools using raw materials local to the Ozarks (e.g., Reeds Spring and Peoria cherts), but use of local resources is quite prevalent in Late Pre-Contact cultures (Ray 2006a, 2007, 2013).

The only truly distinctive artifact category attributed to the Neosho phase is Neosho Punctate pottery, described as a decorated variety of a widely utilized shell-tempered ceramic type named Woodward Plain. Defined by Freeman and Buck (1960:11-12), Neosho Punctate pottery attributes include the following characteristics:

> "Paste and surface finish characteristics are essentially the same for both types [Woodward Plain and Neosho Punctate]…technique of decoration is limited to punctating, incising, and applique nodes. Punctates are most characteristically wedge shaped and deeper at the straight end than at the rounded end. Alternatively, and in the minority, are elliptical or round punctates. Incised lines are usually 3 to 4 mm wide but may also be about 1 mm wide. Often the decoration is not well executed...Decoration appears on the lip of vessels…lower rim and upper shoulder."

This description has been utilized throughout research on Neosho peoples to identify new Neosho sites and to investigate the origins and identity of Neosho peoples to preceding and modern cultures. Decoration configuration and execution is highly variable at sites identified as Neosho by Freeman (1959a, 1962) (Figure 3.2). Because of this incredible variability and the ephemeral type description, pottery is often identified as Neosho Punctate because manufacturers included punctated or incised designs. Notably, potters living in surrounding cotemporaneous communities, like those identified as Fort Coffee and Lower Walnut complexes, also utilized incised and punctated decorations, though no systematic research has been done to investigate the relationships of these communities to Neosho peoples (Rohrbaugh 1984, 1985; Stein 2012). It is possible some of the pottery identified as Neosho Punctate could in fact have been made by non-Neosho potters, representing movement of peoples from these adjacent areas, a sharing of ideas, trade networks, and more. This dissertation in part will investigate these relationships.

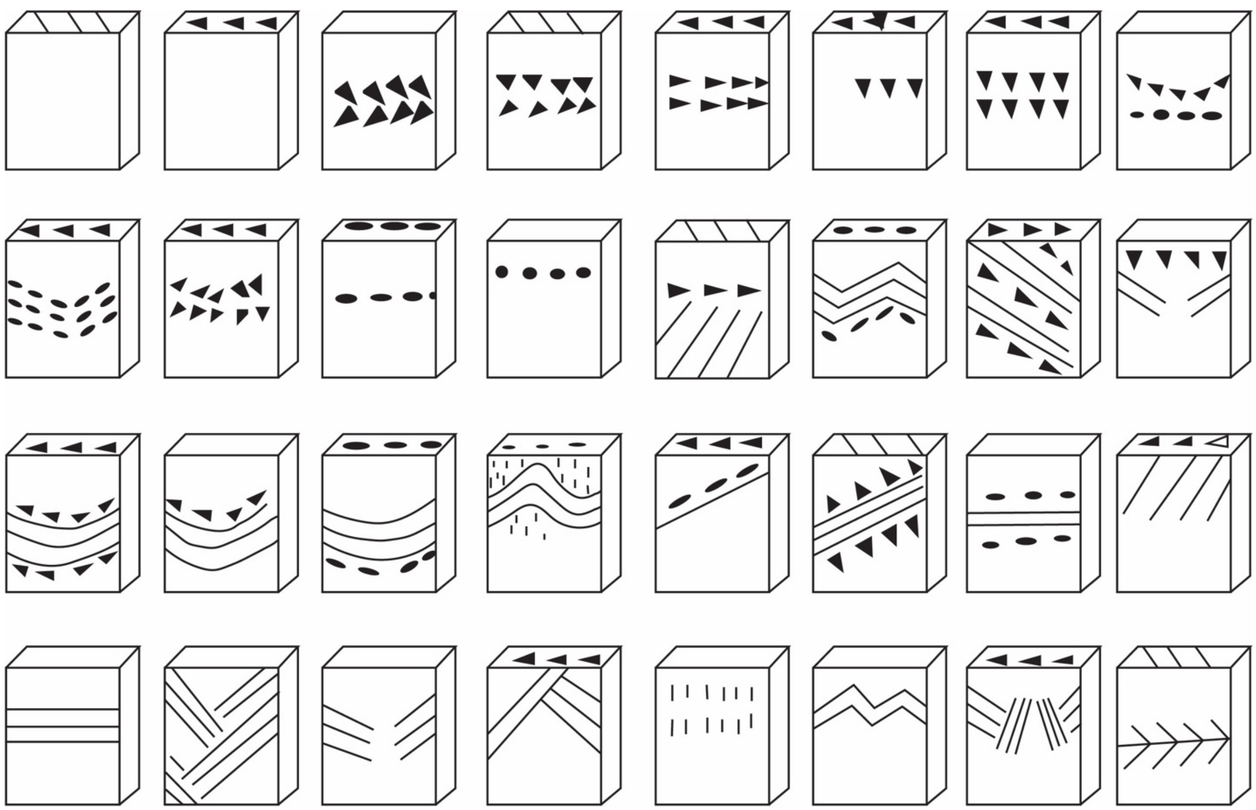


Figure 3.2. Range of Neosho Punctate Design Configurations (Hammerstedt and Savage 2021:Figure 5.8)

The majority of work done on Neosho was by the WPA, reservoir survey reports, a few dissertations (e.g., Cobb 1976; Dickson 1991; Freeman 1959a, 1962; Wyckoff 1980), as well as site investigations (e.g., Conner 1999a; Wyckoff 1964). The phase is mentioned in many publications (e.g., Regnier et al. 2019; Sabo and Early 1990), though discussions do not extend past its mention and characteristics, simply because relatively little is known about Neosho. Much speculation exists about Neosho's relationships to surrounding archaeological complexes, but no systematic investigations have been undertaken to formally evaluate these hypotheses. The above comprises a synopsis of the main characteristics attributed to Neosho and the little researchers know about their daily lives. Intensive research on existing collections—much like is completed in this dissertation—as well as new excavation is needed to better understand the lifeways of Neosho communities and their relationships to other Late Pre-Contact peoples (Ford 2019a).

While the available literature concerning Neosho sites, people, and material culture is sparse, two main questions emerge, both relating to the identities of Neosho people. Circling around the classification of Neosho people as being related to preceding and succeeding cultures in the Eastern Woodlands or Great Plains, researchers have been mostly concerned with identifying Neosho's origins or their modern cultural affiliations. These questions are inherently intertwined, as Neosho origins will necessarily impact arguments of cultural affiliation. As such, the following discussion will show these debates are inextricably linked, following the trajectory of research past archaeologists have taken in attempting to resolve them.

Upon its initial definition by Baerreis (1940, 1941), researchers began discussing Neosho's origins and potential affiliations. The materials they encountered in excavations were unlike those of preceding time periods in the Ozarks, and archaeologists were curious to understand from where these traits originated. Many researchers hypothesized Neosho represented a migration of extra-regional peoples into the Ozarks. The first of these theories proposed Neosho to be related to cultures located historically to the north, resulting from a migration event from the southeastern United States onto the Ozark Plateau (Baerreis 1940, 1941; Chapman 1959; Harrington 1960). Chapman (1959) discussed this hypothesis most intensely, concluding from an examination of historic Osage origins Neosho represented a migration of proto-Osage peoples into the southwestern Ozarks from the Lower Mississippi Valley. He argued Neosho ceramics held macroscopic ceramic similarities to historic Osage and Oneota communities, though he completed no systematic analyses of ceramic design to confirm these suspicions. This would mean Neosho represented the first Osage manifestation in this area, suggesting Osage peoples migrated through the Ozark Plateau rather than through Oneota territories in the Midwestern United States. Harrington (1960:180) also speculated Neosho, as "post bluff-dweller" peoples were likely related to the Dhegiha Siouan Kansas or Osage, mostly because the Osage inhabited the Ozarks historically and Neosho was the latest Pre-Contact group recognized in the area.

Chapman's (1959) and Harrington's (1960) conclusions were later refuted, as their theories went against the accepted conclusion illustrating the emergence of the Osage in the area was affiliated with Oneota communities, meaning Osage ancestors did not necessarily travel through the Ozarks in their migrations (Yelton 1991). O'Brien and Wood (1998:348) noted no reasons to believe ancestral Osage peoples resided in the areas in which the Neosho phase has been identified. Dickson (2002:210), Vehik (1993:232-233), and others including Freeman (1962) noted Osage ceramics most closely resemble Oneota materials and not Neosho, refuting Chapman's (1959) conclusions and confirming the widely held belief that ancestral Osage peoples are more related to Oneota traditions. Dickson (2002:210) stated "The few illustrated examples do not suggest a close relationship, however, and the illustrated sherds from the Little

Osage Village Site (23SA3) do not even vaguely resemble Neosho phase sherds". More research on Pre-Contact ancestral Osage sites is needed to evaluate any relationships between these communities.

Similarly, the Oneota culture is often cited as a possible influence on Neosho culture due to similarities in ceramic decoration. Dickson (2002) argued the best case when arguing about Neosho affiliation based solely upon trait lists comes in relating Neosho to the Chiwere Siouan Oneota of Missouri, Nebraska, Iowa, and Wisconsin. Baerreis (1940) was the first to argue Neosho to be related to Oneota cultures due to similarities in pottery designs. Wedel (1959:111-119) and Henning (1970:57-75) provided the best descriptions of Oneota pottery. Both Neosho and Oneota ceramics incorporate the use of trailed and incised lines as well as punctates. Design configuration on both types also form ridge and valley motifs as well as chevron and herringbone shapes. There are also many differences between Neosho and Oneota ceramics. Oneota forms vary from those of Neosho, being more flattened and globular. Neosho sherds tend to include oblique and slanting punctations whereas Oneota ceramics overwhelmingly utilize rounded impressions. And finally, basal sherds on Neosho vessels are flat whereas Oneota bases are rounded. These differences in design configuration and vessel shape have led archaeologists to hypothesize that any Oneota influences represent transmission through diffusion and not a direct association (Dickson 2002; Henning 1970, 1998; Purrington 1971). Importantly, none of these conclusions concerning potential relationships to historic Osage people or the Oneota culture have been systematically investigated or verified. As Dickson (2002:211) stated, "a comparison of trait lists will not suffice to identify cultural groups at this time".

It has also been postulated the traits attributed to Neosho represent more "Plains-like" adaptations than previously defined cultures in the area (Dickson 2002; Orr 1946; Regnier et al.

2019). The traits attributed to Plains cultures that became prevalent in Neosho assemblages include things like bison scapula hoes as well as alternatively beveled diamond-shaped knives (also called Harahey knives in some instances) and end scrapers. These artifact types have suggested to some there is an increase in bison hunting activities, which are often exclusively attributed to Plains cultures. It is possible, of course, Plains groups moved eastward into the Ozarks and other areas. The reason for a potential migration include major climatic events beginning in the Late Pre-Contact. Lorrain (1967:34) noted an extensive drought occuring on the Plains of northern Texas and southwestern Oklahoma between AD 1400 to 1500 which could have prompted this movement eastward. Additionally, Wedel (1959:628-629) discussed a drought event in western Kansas and Nebraska between AD 1439 and 1464 which could explain a movement of people related to the Upper Republican aspect to move northward into the Dakotas and/or into the Neosho area. Bison ranges potentially shifted more eastward due to these climatic shifts, resulting in the movement of peoples into the Ozarks from the Plains. Even so, no researchers have been able to directly associate the Neosho phase with any specific group of Plains peoples, leaving these theories unevaluated.

Notably, the contemporaneous Fort Coffee phase in and surrounding the Spiro locality and to the south of the Neosho culture is also noted to include an increase in "Plains-like" traits (Regnier et al. 2019). There is evidence of a major drought event prior to the beginning of the Fort Coffee and Neosho phases coinciding with the end of ceremonies at Craig Mound at the Spiro site in the Arkansas River Valley (Brown 2017; Regnier et al. 2019). These and other climatic shifts could have contributed to the somewhat dramatic changes in cultural practices we see from the preceding Mississippian periods into the Late Pre-Contact phases in the Arkansas Valley and the Ozarks. Rogers (2006) discussed Fort Coffee's increased use of bison resources likely was brought about by an overall increase in the number of bison on the southern Plains. Ultimately, a dramatic shift in material practices is what has defined the break between the earlier and more eastern Mississippian-focused Spiro phase to the more western focused and "Plains-like" practices of the Fort Coffee phase. At the end of the Spiro phase at AD 1450, the peoples in the Arkansas River Valley adopted artifact and feature styles more reminiscent of Plains groups (Rogers 2006). Combined with the dissolution of the Mississippian ceremonialism at Spiro and other nearby mound centers, there was a shift in practices perhaps corresponding with a greater availability of bison on the southern Plains overall alongside an overall drier climate.

Evidence from the past 5,000 years also illustrated the climate in eastern Oklahoma has shifted considerably through time and as a result the boundary between the Plains and Eastern Woodlands has also changed numerous times (Albert 1981). This evidence suggested, as proposed above by various researchers, biome boundaries have moved considerably in response to climate change throughout the history of these environments. These shifts would naturally correspond to the movement of plant and animal resources such as bison. As such, an alternate hypothesis to Neosho being a movement of peoples into the area could be a change in cultural practices corresponding in part to shifting biome boundaries. In other words, some of Neosho's practices being "Plains-like" could be explained by a subsistence shift in response to an influx of bison into the area and the drier and more "Plains-like" environmental conditions (Regnier et al. 2019).

Other researchers have suggested Neosho to be an in-situ development (Cobb 1976; Freeman 1962; Rohrbaugh 1984; Sabo and Early 1990) or related to Caddoan populations in the area. Freeman (1962:3, 7) noted in her research there are continuities in artifacts between Late

Pre-Contact communities identified as Neosho and preceding cultures in Delaware County, the hub of the Neosho area. Point types present in the Archaic and Woodland periods such as Gary, Langtry, and Smith are also present in Neosho layers, according to her findings. Importantly, it is unclear in her investigations to what extent the rockshelter occupations she was analyzing were intermixed. In their analysis of a type site for Neosho, 34DL47, Baerreis and Freeman (1959) illustrated refitted sherds can be separated as much as 10 six-inch levels. Dickson (2002:212) suggests Freeman's (1962) conclusions stating Neosho represented an in-situ development is heavily impacted by site preservation issues and stratigraphic uncertainty. Additionally, Freeman (1962) did not fully elaborate on how the Neosho phase could have developed from local Caddoan traditions. Wyckoff (1980) suggested the Neosho phase represents a Caddoan culture. He hypothesized these communities stemmed from poorly understood preceding Caddoan peoples living in the Ozark Plateau north of the intensive ritual activity happening at large ceremonial Mississippian centers like Spiro. Vehik (1993:231-252) also concluded—after evaluating myriad evidence for Dhegihan, Chiwere, and Caddoan cultural groups—Neosho communities are related to Plains Caddoan or Arkansas River Valley Caddoan traditions. She noted many similarities between Caddoan cultures, and finds the arguments in favor of a Dhegihan (Osage or related) origin to be unfounded.

The possibility Neosho communities are related to Caddoan traditions in the area can be explained in two ways. The first, discussed briefly above, suggests some Plains Caddoan agriculturalists, like the ancestral Wichita, were forced eastward by severe drought conditions. As stated, there is no evidence to support this conclusion at this time. An alternate hypothesis to the movement of peoples suggests climatic changes resulted in corresponding cultural shifts where Fort Coffee and Neosho communities adopted some "Plains-like" practices (Regnier et al.

2019). A second possibility, summarized by Dickson (2002:212-213), suggested communities contemporary with the Fort Coffee phase Caddoan people living along the Neosho (Grand) River came into contact with Oneota or other groups and chose to borrow decorative motifs and styles from those peoples and applied them to traditional vessel forms found in the area. This theory could account for the similarities between the material culture of Fort Coffee and Neosho communities in terms of tool technology while also interpreting the variation in ceramic design elements. Sudbury (1976:110-119) and Bell et al. (1967) did not show any similarities in punctate decorative styles between Fort Coffee phase vessel and those found at Deer Creek, an ancestral Wichita village in north-central Oklahoma. It has been shown there are similarities in vessel forms of Woodward Plain between the Neosho and Fort Coffee phases, with flat bottomed jars and bowls. Whatever the explanation, the above theories proposing Neosho communities to be related to Caddoan traditions are more widely accepted than those suggesting a Siouan origin.

These debates illustrate archaeologists have and continue to grapple with how best to investigate and interpret practices of cultures living between major environmental and cultural regions (Ford 2019a). Especially in areas like the Ozarks where immense gaps remain in our knowledge of Pre-Contact lifeways, these difficulties are paramount. Places like the Ozarks remain understudied for numerous reasons, including the incorporation of unconfirmed and archaic assumptions suggesting cultures residing in mountainous zones and areas “in between” are culturally conservative and isolated as well as the use of rigid typological categories, trait lists, and other culture historic or evolutionary frameworks. It is clear researchers have struggled to fit Neosho into pre-existing culture area and typological frameworks, which indirectly perpetuated an untested assumption that the Ozarks, and the communities residing there, are marginal, conservative, and peripheral to cultural interactions. This assumption ignores the actions communities take in forging and modifying social, cultural, and economic practices and in building relationships to surrounding groups. In other words, this can be interpreted as meaning people living in the Ozarks like Neosho inhabited a marginal cultural "island"—concurrently a supposed borderland—resistant to exchange, or they represent a natural bridge for exchange from one region to the next, an assertion that overamplifies the importance of unconfirmed and unexamined heuristic devices as analytic units.

Discussions of Neosho communities as peripheral also ignores the historical trajectory or and social histories in this region overall. Communities living in the Arkansas River Valley and the Ozarks were interacting before the Late Pre-Contact, most specifically in the immediately preceding Mississippian time periods. At mound sites in the Ozarks like Reed and Lillie Creek, which both date to similar phases at the height of Mississippian ceremonialism in this region, there is clear evidence that these groups were deeply involved with groups in the Arkansas at sites in and surrounding Spiro (Brown 1984; Regnier et al. 2019). Connections between groups in the Arkansas River Valley and in the Ozarks likely existed prior to the Mississippian period, and, as this dissertation will illustrate, endured into the Late Pre-Contact as well. The hypotheses given to explain Neosho origins and cultural affiliations so far do not account for the entanglements between communities throughout the history of this region. Additionally, part of the reason Neosho is classified as marginal is not only due to their location on the Ozarks, but because of the ongoing changes in the region overall. The cessation of ritual mound use in the area with the dissolution of the Spiroan ceremonial systems at around AD 1400 and the beginning of the Neosho and Fort Coffee phases could have lead archaeologists to view the changes as somewhat of a retreat or deliberate movement towards isolation from the surrounding groups.

As briefly discussed above, borderlands like the one Neosho communities supposedly inhabit are often most directly associated with geographic barriers and ecological differences (Peeples and Mills 2018:28). We can see the effects of these definitions in the archaeology of Neosho in that numerous discussions ask about their categorical affiliation with the Plains or the eastern Woodlands. Neosho communities are not the only culture which is noted to have an increase in "Plains-like" traits appearing during this time period. Contemporaneous Fort Coffee communities to the south in the Spiroan locality and surrounding areas are also noted to begin using similar tool types. The tool types discussed as evidence for the intrusion of Plains cultures in the area are in fact widespread throughout the area, and not necessarily diagnostic. In fact, these assumptions further prove research on Neosho has been heavily affected by lingering categorical assumptions in the region and environmental determinism is still heavily utilized in interpretations of cultural activities in understudied areas.

Relating to the effects of environmental determinism, assumptions concerning the subsistence of past communities often factors into the categorical limitations placed upon them as well. For instance, archaeologists often associate intensive bison-hunting with the Great Plains almost exclusively due to the activity's categorical association with Plains cultures, though this activity was not restricted to the Plains. Several studies have illustrated the importance of bison procurement in the southern and central Plains during the Late Pre-Contact has been overemphasized in archaeological literature for various reasons (e.g., Barsh and Marlor 2003; Brooks and Flynn 1988; Buehler 1997; Cooper 2008; Todd et al. 2001; Wedel 1986). As noted above, many Neosho researchers have noted an increase in what could be interpreted as traits associated with Plains lifeways, most of which correspond to the perceived increase in use of bison. Even with these observations, no systematic investigations have been undertaken to investigate the importance of bison to Neosho peoples in relation to the use of other faunal resources and no comparative studies have attempted to illustrate the potential of shared traditions across this broad (and ecologically diverse) region encompassing Plains and Woodland environments. Thus, the uncritical categorization of Neosho activity as “Plains-like” as mentioned above demonstrates once more that categorical assumptions have impacted previous interpretations of Neosho lifeways and have also entrenched the cultural separation between these two major environmental zones.

Though Neosho is noted to have intrusive “Plains-like” traits, there is no equal representation addressing what could possibly be connections to the Eastern Woodlands. These discussions highlight a southeastern archaeological bias. Noting intrusive traits and associating them solely with a Plains way of life is problematic, especially as both Neosho and Fort Coffee are also so close to the southeastern United States. Additionally, the most glaring issue to be tackled in this dissertation is the idea these communities should be labelled as either Plains or Eastern Woodlands at all. As established by the perspectives in Chapter 2, borderland communities do not need to be associated with any of archaeology’s previously established categories. These perspectives have already proven to be barriers to our understandings of groups living in between culture areas and other taxonomic boundaries. Groups like Neosho—which are to date only hypothesized to be a borderland community—really shouldn’t be labeled as either “Plains-like” or “Eastern Woodland-like” until an adequate evaluation of their relationships can be undertaken. Therefore, this dissertation instead tries to dissolve and problematize this dichotomy, taking a step back to examine relationships and refocus our analytic efforts on the social and relational histories of communities in this region.

Moving Neosho Research Forward

To date, Neosho researchers have relied almost exclusively upon similarities and differences in established ceramic and lithic typologies (most specifically referencing Neosho Punctate-the only distinctive material culture in these assemblages) to investigate this Late Pre-Contact community. These rigid classifications embed assumptions about the nature of community relationships from the top-down, before a systematic evaluation of those relationships can actually be undertaken (Ford 2019a, 2019b; Holland-Lulewicz 2020). Although many researchers have proposed ideas to explain Neosho origins and affinities, none have completed such a systematic study to investigate Neosho's relationships to surrounding contemporaneous groups using a bottom-up approach like social network analysis, which can shift the scale of analysis to focus on inter- and intra- cultural connections. The study of Neosho communities presents an ideal case in which to implement a relational network approach, which will be used to evaluate the nature of Neosho's relationships, their connections to surrounding communities, and their position in these networks rather than relying solely upon problematic taxonomic legacies.

The difficulty researchers have come across in their investigations into Neosho communities seems to be an inability to reconcile seemingly "intrusive" or "inexplicable" traits with local and regional culture histories—something, I would argue is quite prevalent in areas where culture history and categorical frameworks remain dominant approaches. How can Ozark communities like Neosho, as many have noted and used as a basis for their examinations, are "culturally conservative", showing continuity and little change through time, but also innovate and develop new strategies and distinctive decorative techniques? The innovative techniques are often deemed to have stemmed from outside sources, relating decorative patterns to surrounding cultures and technologies to other regions or environments, inadvertently stripping away the agency of communities and keeping them within their rightful “conservative” space. Especially situated, as Neosho communities are, in a borderland between our artificially defined culture areas and recognized environmental zones, archaeologists already have difficulties interpreting social phenomena and change in these spaces because they often don’t “fit”. Our categorial approaches which use culture areas as meaningful analytic units, unfortunately do not provide the investigative freedom from which to directly evaluate how relationships between people and communities change, and how those changes affect the material culture we excavate. Instead, they impose assumptions about how communities must have interacted as arbitrarily assigned “cohesive” units.

Therefore, what is needed, as stated in previous sections, is for researchers to take a step back analytically to critically examine the ways in which Neosho peoples constructed their relationships to surrounding groups. Rather than beginning with the assumption that the Ozark Plateau—and therefore all communities who resided wherein—constitute a meaningful analytic borderland, it is essential to evaluate patterns in the relationships built by communities in the past.

The discussions above contextualize the background on Neosho in such a way to illustrate the categorical approaches used to date in investigating Neosho communities has led to an overall lack of understanding of their relationships to surrounding peoples. In part, the difficulties in interpreting the archaeology of Neosho stems from them residing on the Ozark Plateau as well as in between two major environmental zones: the Great Plains and Eastern Woodlands. Borderland spaces have given archaeologists difficulties in characterizing the cultures living within them, as they do not often fit within existing spatial schema and categories.

In many ways, previous research on Neosho communities falls prey to the lingering dominance of using culture areas as meaningful analytic units. Such a strategy has intellectual roots from the earliest scholars in our discipline and are heavily biased towards Western conceptions of space privileging neat hierarchical taxonomies over approaches that more directly evaluate and depict the nuances of cultural relationships and connections.

As such, and to be discussed in the following chapters on method and theory, this research uses relational approaches in archaeology to supplant the categorial research questions previously posed about Neosho communities (i.e., are they Plains or Woodland communities). Instead, this research was designed to ask the following, which more directly investigate social connections between communities in this region and evaluate impressionistic assumptions about Neosho as a borderland society:

- Were Neosho communities, in fact, peripheral to regional social networks (i.e., disconnected and isolated)?
- Does this part of the Ozark Plateau exhibit the characteristics of a cultural borderland (i.e., weak and diverse ties)? If not, where did these communities construct their boundaries?

Pairing these questions with an overall evaluation of regional network structures constructed from data on ceramic manufacture and design, this dissertation moves to better understand how various communities built interpersonal as well as broad political relationships. The next section will provide a background on the Neosho sites investigated in this dissertation, as well as those of surrounding and contemporaneous communities.

Known Neosho Sites, Site Descriptions, and Relationships to Surrounding Groups

Table 3.1 lists all known Neosho sites in the Springfield Plateau region (N=36), relevant citations for previous investigations, known radiocarbon dates, as well as which sites contain Neosho Punctate pottery in their assemblages. The sites analyzed in this research have also been designated in that table. There are several other sites not listed in this table noted to contain Neosho Punctate pottery, though these were not assigned to the Neosho phase because they are located outside of the Ozark Plateau. Those sites include 34LF68 (Hall) and 34RO19 (Osborn) (Wyckoff 1980:215). I find it likely any Neosho sherds found at 34LF68 could represent interactions between Fort Coffee and Neosho communities whereas 34RO19 could potentially represent a Neosho occupation, due to its proximity to the core area of Neosho as defined by Freeman (1959a, 1962). Of course, analysis of the sherds from these sites is needed to confirm if they are indeed Neosho Punctate pottery.

Some sites in the table below were classified as Neosho despite not having any Neosho Punctate present. Their ultimate affiliation to this time period and phase is because their assemblages included lithic tool assemblages typical of the Late Pre-Contact, including small triangular projectile points, alternatively beveled diamond-shaped knives, as well as end and side scrapers. For instance, 34CK79 was noted to have a Neosho occupation but no ceramics were available for analysis. This designation was likely assigned based on the presence of an alternatively beveled diamond-shaped knife I located in the collections as well as a deer bone shaft wrench Dickson (2002:222) states is, "a commonly found Neosho phase bone tool". I have retained these sites on the list of total Neosho sites presented below because their assignment to this phase seems likely.

In obtaining permissions and examining site collections, it became clear there were issues with some of these Neosho legacy datasets. Some of the ceramic samples were much smaller than anticipated, some of the multicomponent sites had little to no stratigraphic control, and some collections could not be located (Table 3.1). Overall, there are 4 Neosho sites for which the collections were unavailable for various reasons and 2 sites with no available ceramics, leaving 24 Neosho sites available for analysis. I examined 17 of these 24 available Neosho sites for this research. There were 7 Neosho sites examined not included in the network analyses described in Chapter 6, due to their small sample size, but they were investigated to better understand Neosho pottery manufacture and design, described more fully in Chapter 5. Below, I will describe each Neosho site included in these investigations based on available literature. Sites affiliated with surrounding communities including Fort Coffee, Lower Walnut, Oneota, and Unaffiliated Eastern Woodland will be described in subsequent sections of this chapter.

Sites with Neosho Components

34DL20 - Kariho

The Kariho site was recorded by Baerreis in 1955 and is mentioned in Freeman (1962:2) as containing Neosho Punctate pottery, but the sherds were not analyzed at the time of publication. This is a rockshelter occupation, much like many of the other Neosho sites. The site file from the Oklahoma Archeological Survey (OAS) reveals the site included ceramics, projectile points, faunal remains, bedrock metates, as well as bone beads. Rogers (1978) noted the assemblage also includes many retouched flakes as well as scrapers. Pillaert et al. (2018:19-21) completed an analysis of the faunal remains from the site.

Table 3.1. All Known Neosho Sites in the Project Area

Site Number	Calendrical Dates	Neosho Punctate present	Citations of Previous Investigations	Analyzed in this Project	Notes
34DL10		X	Pillaert et al. 2018; Purrington 1971; Regnier et al. 2019		Large collection; unknown Neosho levels
34DL11		X	Pillaert et al. 2018; Purrington 1971; Regnier et al. 2019		Large collection; likely multicomponent; Neosho levels may be 1-4
34DL20 (Kariho)		X	Freeman 1962; Pillaert et al. 2018; Rogers 1978	X	Less than 100 sherds
34DL27 (Ballard)		X	Pillaert et al. 2018; Rogers 1978	X	
34DL28 (Evans I)		X	Bell and Baerreis 1951; Freeman 1959a, 1962; Pillaert et al. 2018; Rogers 1978	X	
34DL29 (Evans II)		X	Bell and Baerreis 1951; Freeman 1959a, 1959b, 1962; Pillaert et al. 2018; Purrington 1971; Rogers 1978; Wyckoff 1980:212	X	
34DL30 (Copeland I)		X	Freeman 1959a, 1959c, 1962; Pillaert et al. 2018; Rogers 1978; Wyckoff 1980:212	X	
34DL31 (Mode II)			Bell and Baerreis 1951; Orr 1946; Rogers 1978	X	Less than 100 sherds; no decorated wares
34DL32 (Mode III)		X	Bell and Baerreis 1951; Orr 1946; Rogers 1978	X	

Table 3.1 (continued)

Site Number	Calendrical Dates	Neosho Punctate present	Citations of Previous Investigations	Analyzed in this Project	Notes
34DL38			Baerreis 1951; Freeman 1962		Primarily archaic occupations; Small amount of Neosho material; unknown if Neosho punctate present
34DL39 (Mode I)		X	Bell and Baerreis 1951; Baerreis 1939; Freeman 1959a, 1962; Pillaert et al. 2018; Rogers 1978; Wyckoff 1980:213	X	
34DL42 (Smith II)			Freeman 1959b (report); Baerreis and Freeman 1959; Hall 1951; Pillaert et al. 2018; Wyckoff 1980:213		
34DL47 (Copeland II)		X	Freeman 1959b; Baerreis and Freeman 1959; Pillaert et al. 2018; Wyckoff 1980:213		
34DL48 (Cooper VI)			Lentz 2015; Pillaert et al. 2018; Purrington 1971:40-432; Wyckoff 1980:213		
34DL55 (Smith I)			Freeman 1959b; Baerreis and Freeman 1959; Hall 1951; Pillaert et al.; Wyckoff 1980:214		

Table 3.1 (continued)

Site Number	Calendrical Dates	Neosho Punctate present	Citations of Previous Investigations	Analyzed in this Project	Notes
34DL59 (Caudill)			Baerreis 1951:32; Freeman 1962; Pillaert et al. 2018		Primarily archaic occupations; Small amount of Neosho material; unknown if Neosho punctate present
34DL96		X	Freeman 1962:2	X	Less than 100 sherds
34DL141 (Mitchell Shelter)		X	Wyckoff (1980:219)		Unable to Locate Collection
34MY18	AD 1400+/-100; AD 1625 +/-100	X	Dickson 1991:279; Kerr and Wyckoff 1964:78-84; Ray 1965; Rohrbaugh 1984; Wyckoff 1963, 1964, 1967, 1980; Wyckoff, Robison, and Barr 1963:37-42	X	Dates coming from Feature 6 – Neosho component
34MY54 (Pohly Shelter)		X	Kerr and Wyckoff 1964:78-84; 1965; Wyckoff 1980; Wyckoff, Robison, and Barr 1963:37-42	X	Less than 100 sherds; Neosho component Levels 1-5; supposedly represents southern component of Neosho
34MY66 (Packard)			Kerr and Wyckoff 1964:78-84; Ray 1965; Wyckoff 1964a, 1964b, 1980; Wyckoff, Robison, and Barr 1963:37-42	X	Less than 100 sherds (none decorated); Neosho component Levels 1-3; supposedly represents southern component of Neosho

Table 3.1 (continued)

Site Number	Calendrical Dates	Neosho Punctate present	Citations of Previous Investigations	Analyzed in this Project	Notes
34MY77 (Shetley Shelter)			Kerr and Wyckoff 1964:78-84; Ray 1965; Wyckoff 1964, 1980; Wyckoff, Robison, and Barr 1963:37-42		Supposedly represents southern component of Neosho
34MY79 (Satterfield Shelter)			Kerr and Wyckoff 1964:78-84; Ray 1965; Wyckoff 1964a, 1964b, 1980; Wyckoff, Robison, and Barr 1963:37-42		Supposedly represents southern component of Neosho
34CK79			Dickson 2002		No ceramics available for analysis, Neosho affiliation made based on presence of diamond-shaped knife
23LA45 (Spring river earthwork)	AD 1560 +/-50		Conner 1999a; McMillan 2012		No ceramics available for analysis
23LA259 (Dahlman)	AD 1400 +/-350	X	Conner 1999a; McMillan 2012; Ray and Lopinot 2008; Thomas and Ray 2002	X	Fort Coffee Braden wares present (previously identified as Neosho Punctate); Less than 100 sherds
Bontke shelter (23MD43)	AD 1425 +/-60; AD 1385 +/-50	X	Cobb 1976; Dickson 1991: 279	X	
23MD139 (Cloud Williams Shelter)		X	Dickson 2002, 2011; McMillan 2012		Collections unavailable for analysis

Table 3.1 (continued)

Site Number	Calendrical Dates	Neosho Punctate present	Citations of Previous Investigations	Analyzed in this Project	Notes
23MD147 (Henson Cave)	AD 1300-1550	X	Conner 2006; Kelly 2006; Lopinot and Powell 2006; McMillan 2012; Ray 2006a, 2006b; Ray and Conner 2006	X	
23MD148 (Henson Shelter)		X	Conner 2006; Kelly 2006; Lopinot and Powell 2006; Ray 2006a, 2006c; Ray and Conner 2006	X	Less than 100 sherds
3BE174 (Albertson Shelter)	AD 1500 +/- 105	X	Dickson 1991, 2002, 2003		Collections unavailable – sold by Don Dickson
3BE181 (Wolf Creek Shelter)		X	Dickson 1991, 2002		Collections unavailable – excavated by Don Dickson
3BE187 (Praig Shelter)		X	Mintz 1985	X	
3WA19 (Gibson Shelter)		X	Mintz 1985		Less than 100 sherds
14BO407			Hoard 2012a:34; Sabo et al. 1990; Stein 1984		No existing collections
14CT303			Hoard 2012a:34; Sabo et al. 1986; Stein 1984		Less than 100 sherds

34DL27 - Ballard

The Ballard site is also a bluff shelter occupation excavated by members of the Oklahoma Historical Society (OHS). . Rogers (1978) noted OHS excavated half of the site and the latter half was excavated a decade later. The site includes the burial of two infants associated with two bowl fragments. Artifacts in the assemblage include ceramics, knife blades, oval scrapers, projectile points, drills, a bone awl, shell, manos, red ochre, and faunal remains. Pillaert et al. (2018:22-24), in their investigation and analysis of the faunal remains, noted it primarily contains a Neosho occupation, with disturbance eliminating any evidence of prior occupations

34DL28 – Evans I

Evans I was discussed in several reports, surveys, and investigations. This bluff shelter site includes two occupational zones delineated by Freeman (1959a:170-246). The first of these represents a temporary hunting camp by a Woodland-period community and then a subsequent and more permanent settlement by a Neosho community. The materials at Evans I noted by Rogers (1978) include ceramic sherds, chipped points, bone awls on a bed of hematite (associated with one of the burials), one obsidian artifact, knives, scrapers, and more. The two burials at the site are likely associated with the Neosho occupations. Once again, Pillaert et al. (2018:40-42) completed an evaluation of all faunal remains.

34DL29 – Evans II

Of the Neosho assemblages, Evans II is the most intensely excavated and prolific bluff shelter site (Bell and Baerreis 1951; Freeman 1959a, 1959b, 1962; Pillaert et al. 2018; Purrington 1971; Rogers 1978; Wyckoff 1980:212). Again, there are two occupational zones delineated by Freeman (1959b:278-280) of which there is a sharp distinction. A Woodland community is represented up through level 7, with the Neosho occupation represented from levels 6 and above.

Much like Evans I (34DL28), the Woodland group likely utilized this rockshelter as a temporary camp whereas the Neosho community had a more permanent settlement. Materials recovered include bovid bones, knives, pottery, mussel shells, bone awls, projectile points, side scrapers, end scrapers, manos, shell hoes, and more. A likely Neosho phase burial is also located in this shelter, associated with a small bowl, shell beads, and grooved abrading stone (Rogers 1978). The small bowl associated with this burial is located in the collections at the Sam Noble Museum of Natural History (SNMNH), and while not included in these analyses due to NAGPRA, does suggest a Neosho affiliation with fingernail punctates along the lip of the vessel. Pillaert et al. (2018:42-46) analyzed the faunal remains at Evans II.

34DL30 – Copeland I

Copeland I is yet another cave site with two temporal occupations. Freeman (1959c) delineated these occupations based on pottery distributions. The first of these, the Woodland occupation, represents a seasonal hunting camp whereas the more robust Neosho occupation was likely a family group living in the rockshelter year-round (Freeman 1959c:78-87). Materials recovered include ceramics, pipes, projectile points, shell hoes, a metate, knives, end scrapers, and other typical Neosho artifacts (Rogers 1978). Pillaert et al. (2018:47-54) analyzed the faunal remains at Copeland I.

34DL31 – Mode II

The collections for Mode II are very ephemeral and there have been little to no investigations of this site to date. It was recorded by Orr (1946) in his original study defining the Neosho culture, and included materials such as bone, projectile point fragments, manos, sherds, and clay beads (Rogers 1978). It is assumed based on Orr's (1946) description this site is a single

Neosho occupation. Any faunal remains have not been analyzed. The site was inundated in the creation of the Grand Lake of the Cherokees.

34DL32 – Mode III

Mode III has also not been intensely investigated due to its minimal collections. Much like Mode II (34DL31), this site was part of Orr's (1946) original study of the Neosho culture. The assemblage consists of sherds, points, projectile point fragments, and tool fragments (Rogers 1978). It is assumed, based on Orr's (1946) descriptions this represents a single Neosho occupation. Faunal remains have not been analyzed. The site was inundated in the creation of the Grand Lake of the Cherokees.

34DL39 – Mode I

Mode I is an open-air village site, associated with Mode II (34DL31) and Mode III (34DL32). The artifacts at this site suggest it is representative of a single and intensive Neosho occupation. This site includes refuse pits and post holes supposedly representative of a structure, suggestive of a more substantial and long-term occupation. Freeman (1959a:275-277) has suggested based on an abundance of agricultural implements and a lack of hunting tools that this community focused mainly upon horticulture and gathering for subsistence. It does seem a likely hypothesis that open-air sites like Mode I are associated with the nearby rockshelter occupations in the defined Neosho area showing evidence of intensive hunting activities.

This site is one of the type sites for Neosho as defined by Orr (1946). In these early discussions, as discussed above, we can see researchers struggling to determine the origins of these materials. From a brief observation of the decorated assemblage, hypothesized relationships are likely due to the similarity of design configurations and combinations of punctations and incised designs to nearby Oneota groups in central Missouri. The collection includes end scrapers, projectile points, manos, bone tools, knife fragments, sherds, and faunal remains (Rogers 1978). Pillaert et al. (2018:70-73) analyzed the faunal remains from the site. This site, like Mode II and III was inundated in the creation of the Grand Lake of the Cherokees.

34DL96

This site was noted by Freeman (1962:2) to contain Neosho Punctate pottery. The site is another rockshelter that has not been intensely investigated and the collections associated with it are minimal. Based on Freeman's (1962) description, it is assumed this site represents a single Neosho occupation. Based on information in the site file (likely from Orr's field notes), manos, points and fragments, shell, sherds, drills, bone awls, and knives were recorded at the site.

34MY18 – Jug Hill

Jug Hill was excavated as part of the Oklahoma River Basin Survey project and was subsequently inundated in the creation of the Markham Ferry Reservoir (Wyckoff 1964). Like Mode I (34DL39), this site is an open-air village off of Wolf Creek, which drains into the Neosho (Grand) River. Jug Hill includes an Archaic occupation indicated by several dart point forms typical of the time period, including Castroville, Edgewood, Marcos, and more. Wyckoff (1964:47-48) noted this occupation was small and temporary, with no definitive evidence of associated firepits or features and the distribution of lithic debris suggesting several short-term occupations.

The second component at the site represents the Late Pre-Contact period, most likely representative of a Neosho community (Wyckoff: 48-50). Radiocarbon dates place some features at the site – Feature 6 which included Neosho Punctate pottery – solidly within the Neosho temporal range. Two samples obtained from these features returned dates of AD 1400 +/- 100 and AD 1625 +/- 100 (Wyckoff 1967:6-8). Other associated artifacts include knives, end scrapers, milling basins, grinding stones, and small triangular projectile points. Wyckoff (1964:48) noted Neosho Punctate pottery as well as Woodward Plain were found in “the thin mantle of refuse bearing stratum and in refuse pits and postholes.” He also noted the possibility of a house pattern associated with refuse pits, suggesting this represents a place intensively occupied by a Neosho community. Faunal remains at this site have not been analyzed, though tools crafted from deer bone and antler are present.

34MY54 – Pohly Shelter

Pohly Shelter is a rockshelter mentioned by Wyckoff (1980:226) to be potentially representative (alongside 34MY18 and 34MY66 also included in these analyses) of a southern extension of the Neosho phase. The site was excavated in 1959-1960, and represents a multicomponent occupation associated with the Archaic, Woodland, and Late Pre-Contact periods (Ray 1965). These excavations revealed intact features and burials, with a substantial amount of cultural material. Based on my own examination of the material at the site, the Neosho component is likely represented in levels 1-5. Materials at the site included pottery (with Neosho Punctate noted to be present) as well as small triangular projectile points and beveled knives. No faunal remains have been analyzed at the site.

34MY66 - Packard

Much like Pohly Shelter (34MY54), the Packard site was noted by Wyckoff (1980:226) to have an occupation representative of a southern extension of the Neosho phase. This site is also likely multicomponent and based on my examination of the material at the site, the Neosho component is likely represented by levels 1-3. Much like other Neosho sites in the region, the assemblage is dominated by lithic tools.

23LA259 - Dahlman

The Dahlman site is located in southwestern Missouri and represents an intensely occupied Neosho community village site along the Spring River, near a potential Late Pre-Contact earthwork at 23LA45 (Spring River Earthwork). Carbon samples dated from the site place it within the Neosho temporal range: AD 1400 +/- 350 (Conner 1999b:93). Conner (1999b:86-96) suggests there are three primary activity areas including households and potentially trash disposal. Post molds and secondary refuse pits indicate this was an intensively occupied village.

These excavations, along with those at Henson Cave (23MD147) and Henson Shelter (23MD148), are the only Neosho investigations to deliberately sample and examine botanical remains, and the evidence suggests the Neosho community at Dahlman had access to corn of various maturities, suggesting horticulture was undertaken at the site or nearby. However, no grinding stones or other agricultural implements were recovered. Botanical evidence also supports Neosho people utilized local plant resources like hazelnuts (Lopinot 1999:71-81). Faunal evidence and associated lithic assemblages indicate hide processing was important, and the hunting of local fauna including deer, turkey, potentially bison, and various riverine fauna were also important (Yelton 1999:82-85).

This site in particular has been argued to represent what network analysts would refer to as a “broker”. Thomas and Ray (2002) argue the presence of exotic goods from areas on the Plains, as well as evidence of materials from elsewhere in the Ozarks, at Dahlman suggest this site functioned as an important hub of exchange in Late Pre-Contact social relations. They suggest chert resources and bison were traded from the Plains to the Eastern Woodlands in part through Dahlman. Hide processing of some kind was clearly very important at the site based on the lithic assemblage, though only one bison mandibular molar was recovered from the site (Yelton 1999). Ray (2020) examines a lithic cache at Dahlman and suggests that the exchange of chert resources was common between Neosho and contemporaneous Great Bend Apsect groups on the Plains. Burlington chert, local to the Ozarks and the area surrounding Dahlman, is found in limited quantities at sites on the Plains. Also, at Dahlman were exotic cherts stemming from the Flint Hills on the Plains, such as Florence A, Florence B, and Wreford. This evidence suggests that the Neosho community at Dahlman had solid trade connections with contemporaneous groups on the Plains. Such discussions confirm assertions like those discussed above suggesting groups like Fort Coffee and Neosho had more solid connections to the west than to the east, in contrast to communities in preceding time periods. At this point there is more evidence of Neosho communities interacting and trading with Plains groups than those in the Eastern Woodlands. As such, while Ray's (2020) analyses confirm important trade connections between Neosho and Plains groups, it does not necessarily suggest that Neosho was a "broker" between Plains and Eastern Woodlands groups. More research is needed to illuminate what materials Neosho provided to groups in the east.

23MD43 – Bontke Shelter

Bontke Shelter is a multicomponent rockshelter site, with occupations extending from 6000 BC to AD 1600 and later. The site was excavated in 1972 and is most intensely described by Cobb (1976). He notes the bulk of the occupations represented at the site are Late Pre-Contact, which he defines as AD 1000-1600. Thus, a good deal of Neosho material exists in these collections. In his thesis, Cobb (1976) refers to the Neosho focus, but also to the "Top-Layer" culture, which is culturally and temporally identical to Neosho. This term was coined by Harrington (1960) when examining the top layers of rockshelters in the Ozarks, differentiating these stratigraphic contexts from the earlier Woodland and Archaic phases. Cobb (1976) is among the first to note these are the same communities.

There is an abundance of archaeological material at the site, including lithic and bone tools, ceramics, faunal remains, and limited botanical samples (mostly nut remains). Based on the evidence, Cobb (1976:594-599) asserted Neosho people used this shelter seasonally and were semi-sedentary. He suggested based on perishable remains, structural features, and other available evidence that Bontke was not singularly a hunting camp, but may have served several purposes for the associated Neosho community, including a base camp for hunting and gathering, for storage, and for the processing of various materials.

23MD147 – Henson Cave

Henson Cave is a rockshelter in southwestern Missouri originally recorded by Missouri Department of Transportation (MoDOT) archaeologists. The site was likely occupied multiple times over the last 6,000 years (Ray 2006a). During the Archaic period, it is likely the cave was a short and occasional stop for various people, as a temporary camp site. In the Woodland and Caddoan Mississippian time periods, communities utilized this space more frequently and maybe seasonally. Like many of the other rockshelter sites included in the current research, the primary occupation at Henson Cave is affiliated with Neosho communities. Radiocarbon dates place these occupations at AD 1300-1550, solidly within the Neosho time frame. Diagnostic artifacts include Neosho Punctate pottery, diamond-shaped knives, small triangular projectile points, and more.

Ray (2006a:86) postulated Neosho communities would have used Henson Cave as a seasonal base camp, and the faunal and botanical remains suggest they targeted local upland resources when residing there. The animal remains show Neosho people were hunting mainly large mammals, especially deer, and the animals were brought to the cave to be processed. Bison remains were also discovered but are in limited quantities (Kelly 2006). Plant remains indicate the community camping at Henson Cave collected and consumed mostly wild plant resources, including nuts, persimmon, and wild grapes. Cultigens such as maize, chenopod, and barley, were also discovered in small quantities suggesting, like some of the other Neosho rockshelters, people used this space as winter storage (Lopinot and Powell 2006). Taking the evidence altogether, it is likely Neosho people used Henson Cave as a fall/winter camp for collection, hunting, and storage of cultigens. After its excavation, a portion of Henson Cave was destroyed in the expansion of US 71.

Overall, 177 sherds were available for analysis in the Neosho occupations at Henson Cave, including 12 decorated sherds.

23MD148 – Henson Shelter

Henson Shelter is associated with Henson Cave (23MD147) investigated by MoDOT archaeologists. Much like the associated cave, this site was occupied at various intensities for over 6,000 years (Ray 2006a). The occupations and durations are much the same as Henson Cave, with the most intensive being during the Neosho time period. This shelter seems to have been more intensively utilized during Caddoan Mississippian times, with more substantial features and remains dating to that time period. Plant and animal use by Neosho communities is much the same as Henson Cave, with hickory nut and deer dominating the assemblages (Kelly 2006; Lopinot and Powell 2006). A burial was also discovered at the site, associated with either the Caddoan Mississippian or Neosho time periods. Evidence suggests once again Neosho families utilized this shelter in the fall and winter. This shelter was entirely destroyed by the expansion of US 71.

3BE187 – Praig Shelter

Limited information is available for Praig Shelter, but it is noted Praig includes Neosho Punctate and Woodward Plain pottery (Mintz 1985:52-57). The occupations at this rockshelter are not as extensive as other shelters in the area but was robust enough in the ceramic assemblage for inclusion in this study. This site was occupied at various points in history based on the ceramic data (Mintz 1985:86-103), with a Neosho occupation in the upper levels.

Neosho's Relationships to Surrounding Communities

As stated above, little is known about the Neosho culture and the lifeways of Neosho peoples. There are some extant discussions of Neosho material culture within research investigateing surrounding cultures, but it is apparent that a lack of understanding or clarity in Neosho research hinders any conclusions about Neosho's relationships to these surrounding contemporaneous cultures. Here I will give a brief background of all contemporaneous surrounding cultures, discuss what archaeologists studying these surrounding cultures have surmised about Neosho culture, as well as their relationships to these groups. Figure 3.3 illustrates the geographic position of these surrounding cultures in relation to Neosho communities. The communities discussed here are included in the research design of this dissertation in order to clarify interregional relationships during the Late Pre-Contact period, to investigate interregional dynamics spanning two different environmental zones, and to better understand the roles supposed borderland communities like Neosho can play in these interactions. These points will be discussed further in subsequent sections and chapters.

Fort Coffee Phase (AD 1450-1660)

Fort Coffee phase communities located in the Spiro locality and broader Arkansas River region to the south of Neosho have been most intensely examined by Charles L. Rohrbaugh (1982, 1984). Distinguished from the preceding Spiro phase, Rohrbaugh (1984:272) discussed the material culture of Fort Coffee communities becomes less diverse because of the breakdown of the complex ritualized social systems at the end of the Spiro phase. The decline in ritual ceremonial activity and associated change in social structures is what researchers have utilized in defining these two phases.

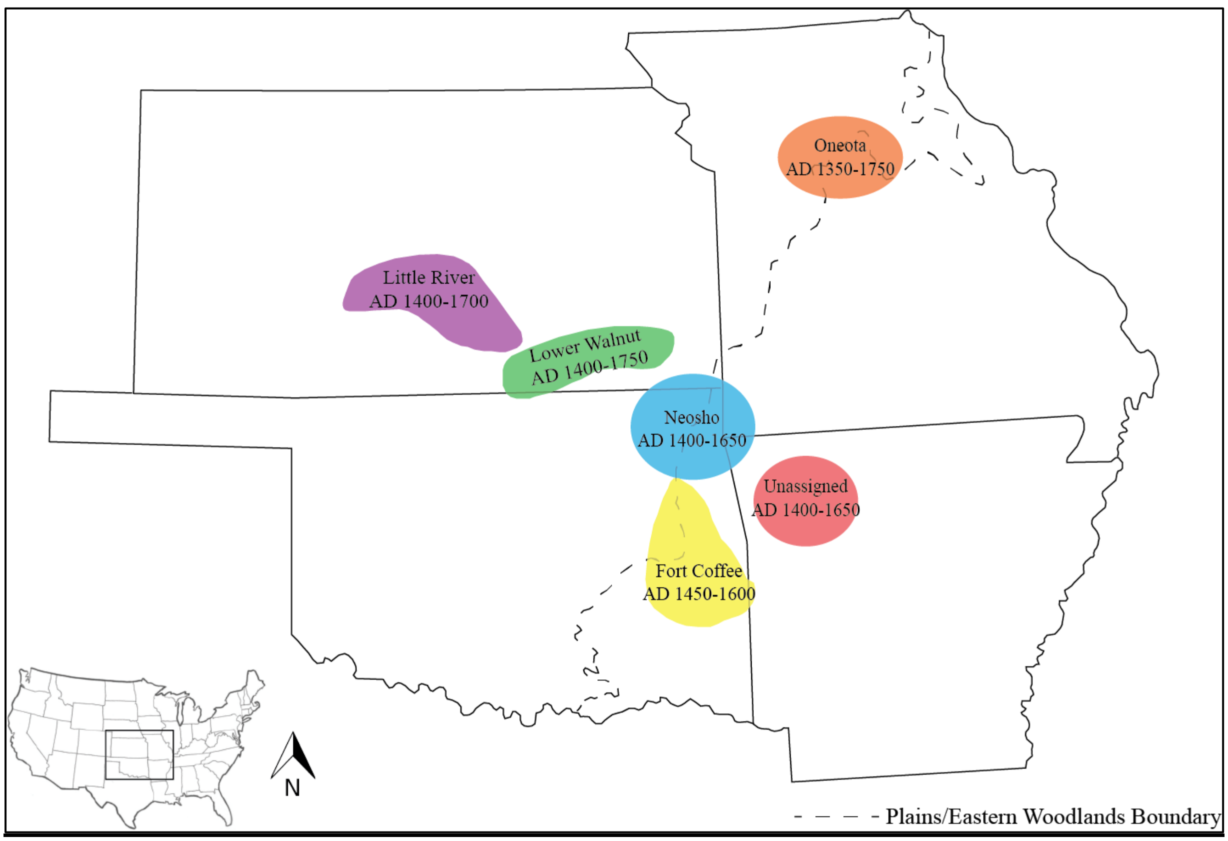


Figure 3.3. Geographic position of Neosho culture area and surrounding contemporaneous cultures, according to extant literature. These are placed in reference to the position of the Plains/Eastern Woodlands ecological boundary.

Like Neosho, Fort Coffee phase communities engaged in agriculture, given evidence like bison scapula and mussel shell hoes as well as limited evidence of cultigens in pit features, though the intensity of these activities is unknown (Rohrbaugh 1984:281). These communities also continued hunting and gathering activities. There is no evidence of an intensification of these activities from preceding phases, though there is an apparent increase in the consumption of bison meat based on research conducted by Pillaert (n. d.). As will be discussed later and was presented briefly above, increases in use of bison is often given as indication Fort Coffee and Neosho communities represent the migration of Plains communities into the area or at least a shift in the material practices of local peoples towards more “Plains-like” subsistence.

Rogers (2006) discussed the shift from the earlier Spiro phase to the Fort Coffee phase to evaluate the cultural and material shifts characteristic of this phase distinction. The Spiro phase was characterized by intensive ceremonialism within the Mississippian systems of the southeastern United States, with complex ritual activity occurring at many mound sites in the Arkansas River Valley as well as into the Ozarks. As discussed in earlier sections of this chapter, researchers have noted climatic shifts at the end of the Spiro phase corresponding to the end of this intensive ritual activity at sites like Spiro alongside an intensification of the exploitation of bison on the southern Plains. The distinction between the Spiro phase and the Fort Coffee phase corresponds to these cultural changes, especially the ritual decline and Fort Coffee communities’ material assemblages becoming more “Plains-like”. Some scholars have attributed these material changes to an intensification of the ties between Fort Coffee and groups on the Plains (Drass 1997; Rogers 2006:25). Ties to the Eastern Woodlands were steadily declining in the years immediately preceding the Fort Coffee phase, and those ties to the west were increasing. Domestic materials and features similar to the Washita River phase (AD 1250-1450) on the

Great Plains steadily expand in the Fort Coffee area including increased evidence of bison hunting and processing as well as similar storage pits. These changes seemingly correspond to the climatic shifts and the dramatic decline in ritual activity at ceremonial mound centers in the region (Rogers 2006).

The Fort Coffee phase also sees a decline in the apparent and complex social hierarchies of the previous Spiro phases. There is evidence of intensive local interactions still occurring between Fort Coffee communities in the absence of those hierarchies, illustrating the social cohesion in this region did not dissolve entirely after the dissolution of the preceding Mississippian systems (Rogers 2006:25). These changes were relatively abrupt and may have been due to an overall scarcity of prestige goods as the exchange networks in the east dissolved. Whatever the case, there is a clear distinction between the earlier Spiro phase and Fort Coffee, with many cultural and environmental factors contributing to an overall shift in cultural practice and relational network interactions.

There are many similarities attributed to Fort Coffee and Neosho communities. While most excavated Neosho sites represent rockshelter occupations and Fort Coffee phase communities are open air, broad similarities do occur between these two geographically separated areas. The difference in occupation strategies likely reflects sampling strategies of WPA excavations in investigating Neosho sites, and not necessarily the practices of Neosho peoples. Similar toolkits found at Fort Coffee sites are also found at Neosho sites, with the presence of bison scapula and shell hoes as well as grinding basins indicating agricultural activity. Collecting resources was also important to both communities, as was hunting. Both communities are hypothesized to represent a possible migration of Plains peoples due to the increased exploitation of bison, though these conclusions have yet to be formally investigated.

Bone artifacts and faunal remains suggest similarities in exploitation of faunal resources (Rohrbaugh 1984:283). Additionally, the ceramic type Woodward Plain increases in use in both communities. The main distinction between Neosho and Fort Coffee comes when examining decorated ceramics. Neosho punctate, as discussed above is a decorated variety or Woodward Plain distinctive to the Neosho phase. Fort Coffee communities also utilized punctates and incisions on decorated vessels, with Braden Incised and Braden Punctate being the most closely related to Neosho Punctate forms (Rohrbaugh 1984:284). Braden wares, however, are relatively distinct from Neosho Punctate, with near exclusive use of fingernail zoned punctations—as opposed to the characteristic wedge tool punctates of Neosho wares—and herringbone incisions—as opposed to the chevron motifs of Neosho wares. The relationships between these decorated varieties remains uninvestigated.

Though the connections between Fort Coffee and Neosho have not been fully assessed, we can hypothesize that these communities likely interacted with one another due to relationships known in preceding time periods. Specifically, during the preceding time periods we know communities living at mound centers in the Arkansas River Valley and on the Ozark Plateau interacted and were integrated within the same Mississippian ceremonial systems (Regnier et al. 2019). The Reed site in Delaware County consists of platform mound constructions, evidence of ritual ceremonialism, and dates to the Harlan and Norman phases, immediately preceding the Neosho phase in this portion of Oklahoma. Additionally, the Lillie Creek mound also dates to the Harlan and Norman phases. The communities living at and around these Mississippian ceremonial centers were all integrated within the complex ritual systems seen at Spiro in the time immediately preceding the Neosho phase, illustrating relationships between Arkansas Valley and Ozark populations existed prior to these Late Pre-Contact phases.

This suggests relationships illumined by the investigations that follow between Neosho and Fort Coffee groups could represent enduring connections between communities in these areas.

The above comprises the bulk of the discussion of interactions between these two contemporaneous communities and preceding complexes. Clearly, these discussions mostly stem from the point of trait lists and artifact typologies, as well as inferences of activities based on those typological traits. More excavations and research are needed to fully understand the lifeways of Neosho and Fort Coffee communities, as well as how they are related. This dissertation in part seeks to investigate the relationships between Fort Coffee and Neosho communities with respect to pottery manufacture, using existing collections—the same collections these early researchers utilized in their typological definitions. In doing so, I hope to better understand not only broad political and social affiliations, but also how these communities crafted their relationships with one another through ceramic practice. Below I briefly describe the two Fort Coffee sites chosen for these analyses.

34HS9 – Robinson-Solesbee

The Robinson-Solesbee site is a Fort Coffee phase community investigated because of the Oklahoma River Basin Survey to salvage archaeological information before inundation. It is an open-air village site, showing evidence of 3 separate habitation areas (Bell et al. 1969:34-36). It is a relatively small permanent or semi-permanent occupation, interpreted to be representative of a few families who used the site for horticulture as well as hunting and gathering. Faunal remains suggest these communities focused mainly on hunting deer and bison, though the full faunal assemblage analysis has not been published. Additionally, no burials were present at the site. Based on the similarities of assemblages and radiocarbon dates from surrounding sites like

Sheffield and Tyler, Bell et al. (1969) suggested Robinson-Solesbee was occupied solidly during the Fort Coffee phase, from around AD 1450-1530.

Rohrbaugh (1982:156-158) summarized the remains located at Robinson-Solesbee in relation to the other sites examined in his dissertation on Fort Coffee communities. He also notes researcher's difficulties in distinguishing Neosho Punctate wares from Braden Punctate and Braden Incised, noting most of the sherds at Robinson-Solesbee are likely Braden based on his analysis of local Fort Coffee ceramic production. His discussion highlights the occupations of this site are typical of Fort Coffee communities, with a more restricted (i.e., less finewares represented) ceramic assemblage than the other sites he examined in his work in Le Flore County, Oklahoma with associated cemeteries. This site was chosen for the current analyses because of the representation of these later Braden style wares in relation to the Neosho Punctate ceramics.

34HS24 – Tyler-Rose

The Tyler-Rose site (Cartledge 1969) is another open-air Fort Coffee village site much like Robinson-Solesbee (34HS9). The site includes pits and post holes, though no house patterns were immediately recognizable. This site represents a single occupation based on the evidence from the pit features (Rohrbaugh 1982:194). Once again, much like the Robinson-Solesbee site, Rohrbaugh (1982:195) discussed the difficulties Cartledge (1970) had in assigning types to the decorated sherds. They were originally designated as Neosho Punctate, though Rohrbaugh reassigns these, based on drawings in the original report, to Braden Incised, more definitively associating them to Fort Coffee communities. Other pottery at the site includes Poteau Plain and Avery Engraved, commonly found at Fort Coffee phase (and earlier) sites.

Great Bend Aspect – Lower Walnut Phase (AD 1450-1700)

Late Pre-Contact communities on the southern Plains west of Neosho communities are generally attributed to be ancestral Wichita peoples. The Great Bend Aspect is in south-central Kansas just off the Ozark Plateau. First defined by Wedel (1959) using the Midwestern Taxonomic System, this aspect is made up of two foci: the Little River and Lower Walnut. The main differences between these two foci are their location and ceramics. The Little River focus is located along the Little Arkansas River in central Kansas, whereas the Lower Walnut focus is found along the Lower Walnut River in south-central Kansas (Figure 3.3). These two components are contemporaneous, with the Lower Walnut focus persisting into later time periods (Drass 1998; Hawley and Vehik 2012; Hawley et al. 2008; Wedel 1959). Some of these sites were likely occupied as Spanish and French explorers like Coronado and Oñate traversed the area between AD 1541 and 1601 and are likely referenced in those accounts (Drass 1998:441-442).

Neosho researchers have postulated relationships to Great Bend Aspect communities, because these two groups share commonalities like alternatively-beveled knives, bison scapula hoes, shell-tempered jars, and features like bell-shaped pits (Regnier et al. 2019). Because of these similarities, in many arguments concerning the origins of the Neosho complex it has been assumed that Neosho represents either a migration of Plains people eastward or the adoption of many Plains-like traits due to climatic changes in the preceding time periods. Lower Walnut communities are noted to be representative of Plains groups in extant Neosho hypotheses, and similarities between the two have led some to argue that Neosho is more "Plains-like". As discussed above, such classifications are problematic, not only due to their categorical leanings but also because of the presuppositions they place upon the communities we investigate. In this dissertation I investigate the relationships between Lower Walnut and Neosho as contemporaneous communities with many similarities, but eliminate the conclusion that this means Neosho is "Plains-like".

Like Neosho and Fort Coffee communities, there is limited knowledge of how Great Bend Aspect communities lived their daily lives. We do know they occupied large villages, engaged in intensive maize agriculture, and also engaged in hunting and gathering activities. These peoples also constructed council circles consisting of shallow ditches surrounding low mounds indicating potential ceremonial activities, as is typical of ancestral Wichita Plains sites (Drass 1998:443; Hawley and Vehik 2012; Wedel 1959). Other artifacts found are typical of Plains assemblages, including bison scapula hoes, other bone tools, as well as small triangular projectile points, ovate and beveled knives, and end and side scrapers. There is some variation between Little River and Lower Walnut communities in the construction of bison scapula hoes in terms of hafting (Wedel 1959:578). From the faunal assemblages, it is clear exploitation of bison predominates, but these peoples also hunted deer, elk, and other animals in abundance.

Non-local artifacts found at sites attributed to these communities indicate relationships with groups in the American Southwest, including trade in pottery, obsidian, and turquoise (Drass 1998:444). Ancestral Wichita groups also utilized cherts coming from Ozark Plateau formations, indicating potential relationships with their Neosho neighbors to the east (Hawley and Vehik 2012:31). Additionally, European trade items like chain mail and glass beads confirm relationships to early Spanish explorers (Vehik 2012; Wedel 1959).

Ceramic artifacts differ between Lower Walnut and Little River communities, one of the only characteristics used in separating these two foci. Though similar in vessel form and method of manufacture, these types differ in temper and some decorative aspects. Gneseo wares are tempered predominately with sand and are most often associated with Little River sites. Geneseo pottery has mostly round bases, though flat bases are also present. Though most Geneseo pots are plain, there are a few pots with simple-stamped surfaces or a red wash. Incised lines, nodes, and punctates are rare but sometimes present on lips of these vessels. Lower Walnut types are referred to as Cowley wares, and are tempered predominantly with mussel shell. Plainwares also predominate this vessel type, but punctated and incised designs are more common on these than on Geneseo wares (Drass 1998:443).

Stein (2012:322-327) discussed potential relationships between Lower Walnut and Neosho communities based on similarities in pottery designs. Sherds classified as Neosho Punctate have been excavated at multiple Lower Walnut sites though the relationships between Neosho, Cowley, and Geneseo wares is unclear. Cowley types are very similar to Neosho Punctate types, both utilizing incised and trailed lines on the neck and upper shoulder of vessels, as well as utilizing similar design configurations (i.e., chevrons with bordering punctates and nodes). Stein (2012:324) noted Neosho potters utilized wedge punctates most commonly whereas Lower Walnut potters used round punctates. Vessel forms are also similar. Stein (2012:325, Figures 11.67-11.68) also associated Neosho with Fort Coffee ceramic types defined by Rohrbaugh (1982, 1984) (e.g., Braden Punctate and Braden Incised), highlighting the lack of clarity in our understanding of the regional relationships between these many communities.

Much like Neosho, the origins of the Great Bend Aspect are unknown. Most relevant for the research presented here, several have postulated the Great Bend Aspect is tied in some way to Neosho and Fort Coffee (Vehik 1976; Wyckoff 1980), though little research has been conducted to systematically investigate these ties. Vehik (1976), in efforts to clarify the origins of the Great Bend Aspect, utilized presence and absence of ceramic attributes at the site level to investigate ties in the region. She concluded Lower Walnut sites are most closely tied to Neosho sites as well as to some sites located in central Oklahoma whereas Little River sites are more closely related to the Pratt complex just to the west of Great Bend (Vehik 1976:204). Interestingly, she suggested an in-situ development for Lower Walnut out of early Plains Village cultures, with influence stemming from Neosho groups. It is clear from Stein's (2012) and Vehik's (1976) discussions that Great Bend Aspect communities were in some way tied to Neosho and Fort Coffee communities, though research is needed to investigate these relationships. Again, this dissertation serves to fill gaps in our understandings of these regional interconnections. Below I briefly describe the two Lower Walnut sites chosen for these analyses.

14CO1 – Larcom-Haggard

The Larcom-Haggard site is an open-air village site associated with the Lower Walnut phase, which is contemporaneous with Neosho and Fort Coffee. Schoen et al. (2012:107-108) and Schoen and Garst (2012:129-133) provided a background on the investigations of the site, its geographic location in relation to other Lower Walnut sites, and the excavated features. The site dates to around AD 1250 to 1650 based on carbon dates (Hoard 2012b). This site and the Arkansas City Country Club site (14CO3) were utilized by Wedel (1959:359-360) in original definitions of Cowley Plain and decorated varieties.

For the purposes of this discussion, I will focus most intensively on patterns in faunal, botanical, and ceramic patterns. A more in-depth discussion of the investigations at all of these Arkansas City area sites can be found in Hoard's (2012a) report. The sites examined in the Arkansas City investigations are all open-air village sites with potential house patterns and many pit features. Faunal analyses (Haury 2012; Morey and Bleam 2012) supported previous knowledge on Lower Walnut communities, confirming these people hunted various animal resources including bison, deer, box turtles, and more. By far, the meat procured from bison overshadows the resources obtained from the other animals, which is typical of many Plains groups. Botanical remains include cultigens such as maize, beans, squash/pumpkin, and tobacco at these Lower Walnut sites as well as wild plant resources (Adair 2012). Maize was clearly the primary focus of cultivation for Lower Walnut communities.

Stein (2012) examined the pottery assemblages at Larcom-Haggard as well as the Arkansas City Country Club site (14CO3), noting the majority of these represent the local Cowley wares. Within his discussion of the pottery at Lower Walnut phase sites, Stein (2012:325) classified several sherds from two Fort Coffee phase sites, 34HS11 and 34HS24 (discussed above), as Neosho Punctate. As discussed above, it is likely these sherds represent local Fort Coffee wares—Braden Punctate and Braden Incised (Rohrbaugh 1982). This highlights some of the issues to be elaborated upon below. While some of the wares Stein (2012) identifies as Neosho Punctate do seem to represent the ceramics crafted by Neosho communities, others like those at 34HS11 and 34HS24 likely represent Fort Coffee pottery, manufactured in the Arkansas River Valley.

The distribution of Cowley pottery throughout the region indicates a wide-ranging geographic and cultural network of exchange during this time period among other contemporaneous groups (Hoard 2012c:493). Other trade networks are indicated in the examinations of stone resources. Perttula et al. (2001:157-158) discusses this site’s and Lower Walnut communities’ relationships to Caddo peoples in the Red River region. In examining the Larcom-Haggard materials, they note one instance of a Keno Trailed bottle likely produced in the Red River region in the Late Caddoan phase (AD 1400-1700) and transported to the Lower Walnut community through trade and direct interaction. Other potential interactions with surrounding communities will be discussed later in this chapter's examination of overall ceramic trends.

14CO3 – Arkansas City Country Club

The Arkansas City Country Club site is an open-air village site associated with the Lower Walnut phase, which is contemporaneous with Neosho and Fort Coffee. Schoen and Garst (2012:133-136) give a background on the investigations of the site, its geographic location in relation to other Lower Walnut sites, and the excavated features. The site dates to around AD 1500 to 1700 based on carbon dates (Hoard 2012b). A summary of lithic tools, ceramic artifacts, faunal remains, and botanical analyses can be found in Hoard's (2012a) report. See the above description for 14CO1 for a discussion of the investigations and remains discovered at the Arkansas City Lower Walnut sites. This site and the Larcom-Haggard site (14CO1) were utilized by Wedel (1959:359-360) in original definitions of Cowley Plain and decorated varieties.

In examining the Arkansas City Country Club assemblage, Perttula et al. (2001:158) noted a red-slipped shell-tempered sherd likely representing either Avery Engraved or Poteau Plain. If the sherd is representative of Avery Engraved, these sherds are quite common in Caddo contexts in the Red River region during the McCurtain phase, after AD 1300. They do note based on personal communications with Dr. Susan C. Vehik that local copies of red-slipped wares are often found in Late Pre-Contact Plains sites in the area, so it is not certain this sherd represents direct interaction or trade with Caddo communities in the Red River region. Other potential interactions with surrounding communities will be discussed later in this chapter's examination of overall ceramic trends.

Classic Oneota Horizon in the Chariton River Region (AD 1350-1650)

As will be discussed further in subsequent sections, researchers have suggested Oneota groups were influential to the origins of Neosho communities in the Ozarks. These assumptions are based on ceramic design similarities. The Oneota complex represents an Upper Mississippian cultural manifestation encompassing not only a large geographic region, but also a large temporal range (Henning 1970, 1998). For purposes of clarity, this dissertation focuses on components contemporaneous with Neosho communities in the Chariton River Region of central Missouri—the closest manifestation with an abundance of evidence. As such, this brief background focuses on the Classic Oneota horizon (AD 1350-1650) as employed by multiple researchers through time (Hall 1962; Henning 1998; Overstreet 1997; M. Wedel 1959).

The Chariton River Oneota manifestations begins in AD 1350 and ends with historic Missouri occupations in AD 1777 (Henning 1970). Sites attributed to these communities in the Chariton River region are geographically constrained to areas surrounding the confluence of the Chariton and Neosho (Grand) rivers with the Missouri River (Figure 3.3). Most research has been conducted at the Utz site (Henning 1998), though other sites have also been investigated in the region. Henning (1970, 1998) discussed the most relevant sites to the current research, illustrating a strict occupational sequence between the excavated Oneota sites in this region. These communities engaged in intensive agriculture as well as hunting and gathering practices, much like the communities discussed above. Oneota is known in previous periods to have connections with the Plains, southwestern United States, Caddoan peoples, and more as evidenced through trade of pottery and other goods (Henning 1998:388). Pottery at sites contemporaneous with Neosho include chevron motifs bordered with rows of punctations and/or tool impressions, as well as an abundance of small triangular projectile points and end scrapers.

Bison scapula hoes as well as deer bone tool fragments have also been recovered, illustrating broad typological similarities in assemblages between Oneota, Neosho, Fort Coffee, and Great Bend Aspect communities. Nonetheless, no systematic investigations have been conducted to investigate the connections between these communities, save inferences based on trade goods. This dissertation will not only evaluate the hypothesized ties between Oneota and Neosho as presented below, but will investigate the cultural and affiliative relationships between communities in this region. Below I briefly describe the Oneota site chosen for these analyses.

23SA131 - Guthrey

The Guthrey Site is an Oneota village site in the Chariton River region of central Missouri (Henning 1970: 18, 57-103). Based on radiocarbon dates from the site, the relevant occupation extends from AD 1350 to 1400. In consultation with Dr. Dale Henning (personal communication), he recommended this Oneota site would be ideal for my analyses of potential relationships between Oneota and Neosho communities, due to its relative proximity and presumed similarities in ceramic design.

The ceramic assemblages are not assigned to types but show various similarities in design techniques to Fort Coffee, Neosho, and Lower Walnut phase communities. These similarities include a reliance on shell temper as well as the use of varying combinations of incised/trailed lines and punctations on the shoulders and rims of vessels. As discussed in previous chapters, Neosho is often compared to Oneota based on macroscopic similarities in pottery design techniques. Patterns in ceramic design will be discussed later in this chapter but will illustrate these similarities and supposed relationships are partially due to a lack of clarity in typological descriptions and a lack of consistency in the identification of representative ceramic materials. Combining this chapter's discussion of ceramic trends and Chapter 6's discussion of networks will hopefully help clarify any potential relationships. Limited botanical remains were analyzed from the collections at Guthrey and indicated the presence of maize. Other plants utilized include persimmon, plum, and hazelnut. Bison and deer bone are also present at the site, as well as other mammal, marine, and bird remains.

Unaffiliated/Unassigned

East of where Neosho communities resided are contemporaneous occupations that remain unassigned and unaffiliated with any cultural complex (Figure 3.3). Limited material is available on their excavation, but it has been suggested these sites are somehow related to either Neosho or Fort Coffee communities (Sabo personal communication 2020), but these relationships have yet to be investigated. Below I briefly describe the unaffiliated site chosen for these analyses.

3CW11 – Beaver Pond

Beaver Pond represents material collected from three separate shelter overhangs in the Arkansas Ozarks (Raub 1976). Based on the materials in this collection, it is likely multiple occupations are represented. Thick basal sherds typical of Fourche Maline (300 BC – AD 800) occupations in the Arkansas River Valley were noted by the author, but not recorded as part of these analyses. Substantial amounts of perishable material are available at this site. There is also evidence of intensive deer hunting throughout the Pre-Contact period occupations. This site was flooded and affected by construction of the Pine Mountain Dam after excavations.

Radiocarbon Dates

As part of the analyses undertaken in this dissertation to update our knowledge about Neosho communities, 18 AMS dates were submitted to the University of Arizona AMS

Laboratory for Analysis. Funding for these dates were provided by the National Science Foundation (2102764). In part, these analyses were intended to ensure the sites examined in this research were contemporaneous and also to update our chronological understandings of sites in the Ozarks of northeastern Oklahoma.

Previously to this study, there were very few radiocarbon dates from Neosho sites. Those dates previous researchers obtained are listed in Table 3.1. As discussed above, when Neosho was defined as a phase, the dates assigned to it were based purely upon the dating of "diagnostic" materials (e.g., Harahey or alternatively beveled diamond-shaped knives) and assumed affiliations with surrounding cultures (Baerreis 1941; Freeman 1959a, 1962). The date range established for Neosho is AD 1400-1650 and is mostly based upon those culture historic taxonomies. The dates obtained by previous researchers do not call this age range into question, but the relatively small number of samples from Neosho contexts (12 in total) does not provide much confidence in the details of this chronology (Cobb 1976; Conner 1999a; Dickson 1991, 2003; Ray 2006; Ray and Lopinot 2010; Wyckoff 1964, 1980). Some of these extant dates can also be called into question, as they were run by the University of Wisconsin in the 1960s, which have been shown to be consistently inaccurate at sites in Oklahoma (Hammerstedt et al. 2010; Regnier et al. 2019). Reliable dates from Neosho sites prior to this dissertation included those from three sites in Missouri (Conner 1999a; Ray 2006; Ray and Lopinot 2010) and from one Neosho site in Arkansas (Dickson 2003). In line with many other researchers in surrounding regions (e.g., Birch et al 2016; Birch et al 2020; Krus 2013, 2016; Lulewicz 2017; Manning 2020; Manning et al 2018; Roper 2013; Roper and Adair 2011, 2012; Thompson and Krus 2018), this research obtained AMS dates to update our knowledge of the Late Pre-Contact period in the Oklahoma Ozarks in order to confidently situate the above cross-regional network analyses.

Though scholarship on chronometric hygiene and its associated principals (e.g., Pettitt et al 2003; Spriggs 1989; Taché and Hart 2013; Walker 2005; Waters and Stafford 2007) illustrate the most reliable samples should come from things like annual plant products and organic residues, the lack of research on Neosho has resulted in small sample sizes of carbonized materials and poor documentation concerning remains suitable for these kinds of chronometric analyses. I also encountered difficulties in implementing these analyses for the dissertation. Due to the COVID-19 pandemic, I initially had to rely solely upon museum catalogs to derive a list of available carbonized materials for analyses. Using that database was able to make a list of 17 samples from Neosho contexts and then one from a Fort Coffee site in Le Flore County, Oklahoma from the Oklahoma Archeological Survey. However, upon entering the museum to pull these samples, I was unable to locate several of these in the collections. The samples represented in this dissertation are from known Neosho and Fort Coffee sites in Oklahoma, with a few of these likely representing earlier occupations. Nonetheless, these dates update our chronological understandings of the area and also highlight some important issues.

Of the 18 samples submitted, seven were wood charcoal, three were nut remains, and eight were derived from carbonized material on pottery sherds. Table 3.2 presents these data, including laboratory sample numbers, uncalibrated age, as well as the calibrated calendar age. In examining these dates, a few observations can be made. Four dates fall within the expected range for the Neosho phase (34DL11, 34DL29, 34DL96). I also obtained one date from a Fort Coffee phase site (34LF1624) that also falls within the expected range as well. Several of the dates fall within a century of the expected dates for Neosho, some even just a few decades off. Five dates

Table 3.2. AMS Dates from known Neosho and Fort Coffee Sites. Dates that fall within expected ranges are highlighted.

Site	Museum Catalog Number	Lab Number	Material	Uncalibrated C14 Age	95% Calibrated Calendar Age[1]	Notes
34DL11	11.558	X36801	Charcoal	793 +/- 35 BP	AD 1179 to 1281	
34DL11	11.924	X36802	Charcoal	557 +/- 34 BP	AD 1309 to 1432	
34DL11	11.116	X36804	Charcoal	802 +/- 36 BP	AD 1175 to 1280	
34DL11	11.211	X36805	Charcoal	749 +/- 35 BP	AD 1221 to 1298	
34DL28	28.247	X36812A	Pottery Residue	173 +/- 22 BP	AD 1662 to present	Plain shell tempered sherd associated with Neosho Punctate Sherd
34DL29	29.475	X36807	Pottery Residue	382 +/- 35 BP	AD 1445 to 1633	
34DL29	29.100	X36810A	Pottery Residue	141 +/- 24 BP	AD 1672 to 1944	
34DL29	29.152	X36811A	Pottery Residue	854 +/- 23 BP	AD 1160 to 1260	Plain shell tempered sherd associated with Neosho Punctate Sherd
34DL29	29.115	X36813A	Pottery Residue	452 +/- 23 BP	AD 1422 to 1465	Plain shell tempered sherd associated with Neosho Punctate Sherd
34DL38	38.1525	X36803	Charcoal – nut	105 +/- 33 BP	AD 1681 to 1940	
34DL38	38.1526	X36815	Charcoal – nut	1353 +/- 29 BP	AD 641 to 774	Primarily Archaic (Baerreis 1951; Freeman 1962)

Table 3.2. (continued).

Site	Museum Catalog Number	Lab Number	Material	Uncalibrated C14 Age	95% Calibrated Calendar Age[1]	Notes
34DL38	38.1552	X36816	Charcoal – nut	1372 +/- 29 BP	AD 605 to 771	Primarily Archaic (Baerreis 1951; Freeman 1962)
34DL39	39.31	X36808A	Pottery Residue	1220 +/- 23 BP	AD 705 to 884	Incised Shoulder Sherd – Freeman noted it to be Neosho Punctate; Resembles Braden Incised
34DL39	39.59	X36809A	Pottery Residue	814 +/- 24 BP	AD 1180 to 1273	Plain shell tempered sherd associated with a punctated sherd
34DL55	55.353	X36806	Charcoal	32 +/- 32 BP	AD 1694 to 1917	
34DL59	59.309	X36817	Charcoal	1128 +/- 28 BP	AD 774 to 994	Primarily Archaic (Baerreis 1951; Freeman 1962)
34DL96	96.109	X36814	Pottery Residue	458 +/- 33 BP	AD 1409 to 1478	Neosho Punctate Pottery Rim Sherd
34LF1624	-	X36818	Charcoal	361 +/- 34 BP	AD 1455 to 1635	

are about one to two centuries off, clustering around the 13th century range and then four are way off, generating dates more aligned with the Woodland periods.

First, I want to discuss the dates falling right within the expected range. Two of the Neosho sites from which these dates were derived (34DL29 and 34DL96) are included in the ceramic and network analyses presented in subsequent chapters. One of the samples from 34DL29 (X36813A) is an undecorated sherd, but was in a context associated with a Neosho Punctate sherd. It is encouraging to see the date aligns with the previously defined Neosho phase. The sample derived from 34DL96 was taken from carbonized residues on a decorated shell-tempered rim sherd, with incised/trailed line decorations configured in a chevron pattern (Figure 3.4). Once again this had been assigned the type name Neosho Punctate, and the site had also been assigned to the phase but had not been definitively dated. As we can see from the dates provided in Table 3.2, the residue on that Neosho Punctate sherd place 34DL96 solidly within the early Neosho phase. 34DL29 and 34DL96 are both included in the ceramic and network analyses following in subsequent chapters of this dissertation.

The dates derived from the component at Reed (34DL11) align with my expectations upon examining the collection prior to my analyses. Though one of these dates does fall somewhat within the expected range for Neosho (X36802), the rest are much earlier and cluster in the 13th century. 34DL10 and 34DL11 are both at the Reed site, a ceremonial mound center in Delaware County, and these components had both been previously dated to the Neosho phase. These dates were derived from the University of Wisconsin in the 1960s, which researchers have illustrated are consistently off by a century or more (Hammerstedt et al. 2010; Regnier et al. 2019). When examining the collection prior to beginning my ceramic attribute analyses, I noted many of the decorated ceramic materials resembled those of time periods solidly within the

Figure 3.4. Carbonized Neosho Punctate sherd from 34DL96 dated to AD 1409-1478.

Caddo Mississippian age rather than those typical in the Late Pre-Contact. As a result, I chose not to include 34DL11 in the following ceramic and network analyses, but did want to date materials to confirm my suspicions. The resulting dates do show 34DL11 is earlier than the Neosho time period, 85consistently by a century or more. This confirms the issues surrounding the University of Wisconsin dates from the 1960s and also corroborates what I suspected in my examination of the assemblage.

Several other dates are also about a century or two off from the expected Neosho phase range, and I believe this to be the case for several reasons. Many of these rockshelters and sites are multicomponent sites and some of these dates may reflect older deposits. However, dates like those from 34DL28 (X36812A), 34DL29 (X36811A), and 34DL39 (X36809A) associated with Neosho Punctate sherds may highlight some of the issues with investigating and interpreting rockshelter deposits. Rockshelter and cave deposits are often stratigraphically complex and variable due to the geomorphologic formation processes taking place in those environments. If strict stratigraphic control is not kept during investigations, interpretations can be heavily affected. Due to the relatively high geologic activity in rockshelters and due to processes like erosion, cultural materials often become heavily mixed and stratigraphic control is lost anyways (Straus 1990). I suspect the dates resulting from these plain shell tempered sherds found in contexts associated with Neosho Punctate sherds may have been affected by the mixing of these deposits and a lack of stratigraphic control. Dickson (2002) has noted these issues in past interpretations of the Neosho phase.

Finally, there are several dates falling very far out of the range for the Neosho phase but instead align more with the Woodland period in the Ozarks. This is again likely a result of these sites being multicomponent. The dates derived from 34DL38 (X36815 and X36816) as well as from 34DL59 (X36817) all fall somewhere between AD 605 to 1000. Baerreis (1951), Freeman (1962), and Pillaert (2018) all noted these two sites had primarily archaic occupations with small amounts of Neosho materials in upper levels. As a result of their analyses, I did not include these two sites in the ceramic and network analyses presented later in this dissertation.

Curiously, the date derived from an incised shell-tempered sherd from 34DL39 (X36808A) resulted in a very early date of AD 705-884 (Figure 3.5). This is interesting as Freeman (1959a, 1962) had noted this sherd to be Neosho Punctate and I have noted in my analyses it resembled Braden Incised as Rohrbaugh (1982) discusses. I will expand upon the issues surrounding these typological definitions in Chapter 6 but suffice to say this date comes as a surprise. While Braden Incised is not restricted to the Fort Coffee phase, these dates are much earlier than expected and may again highlight the issues with examining rockshelter deposits (Straus 1990).

The last carbon date was derived from charcoal from a Fort Coffee phase community in Le Flore County, Oklahoma (34LF1624). The assemblage at this site is distinctive of the Fort Coffee phase and included multiple instances of Braden Punctate and Incised sherds. The dates provided by the sample submitted to the University of Arizona (AD 1455-1635) give us confidence the Fort Coffee phase and Neosho phase were contemporaneous communities and as will be shown later these groups not only likely exchanged ceramics but also ideas and information, as they were connected relationally.

Figure 3.5. Incised shell-tempered sherd from 34DL39 dating to AD 705-884.

Conclusion

This chapter served to provide a background on the case to be investigated in this dissertation, alongside integrating the previous chapter's discussions on the intellectual history of culture areas, culture history, and the effects of borderlands on the study of these many communities. The following chapters will discuss the methodologies with which I will answer these questions, using relational techniques like social network analysis (SNA) as well as borderland and relational theoretical frameworks which deemphasize the importance of categories and resituate our focus on understanding the nuanced relationships of various communities as well as social and political groups.

Chapter 3 Notes

[1]These calibrated dates were derived using OxCal v4.4.4 Bronk Ramsey (2021) and IntCal20 Northern Hemisphere Radiocarbon Age Calibration (Reimer et al. 2020).

Chapter 4:

Evaluating Regional Subsistence

The next several chapters will investigate the dynamics of interaction in this region through the examination of ceramic practice to investigate how the communities constructed their social worlds, relationships, and boundaries. To inform the conclusions built in those chapters and to also evaluate and problematize the extant assumptions that Neosho's subsistence is more "Plains-like," this chapter will summarize and examine subsistence practices in the region utilizing existing data collected by previous researchers. I will investigate the similarities and differences in how these communities procured and used bison, as this resource is the cause of much debate concerning Neosho peoples. While this discussion is only a starting point for future work which can directly examine affiliative questions, it will hopefully provide a foundation for our understanding of similarities and differences in subsistence practices across the region and add to the conclusions built in subsequent chapters.

Regional Subsistence: An Ongoing Investigation

The discussions below rely upon existing data which was collected by various researchers in the region. Importantly, only a few of the sites used in the analyses last chapter have had subsistence data collected and analyzed. Nonetheless, I have been able to locate data from Lower Walnut, Fort Coffee, and Neosho assemblages to facilitate the construction of a regional narrative of subsistence. This section will describe the plant resources utilized by these communities before then discussing and analyzing regional trends in faunal procurement and use.

Plant Resources

Floral resources in and surrounding the Ozark Plateau have changed substantially due to the settlement of European Americans in these areas. These are not the only resource and landscape changes to have occurred in the area, as significant changes in plant communities also occurred at various points in Pre-Contact periods. These shifts occurred because of droughts, climatic shifts, as well because of human activities. I have briefly discussed the Ozark environment in previous chapters and the various climatic (and resulting floral and faunal) shifts this space has undergone. There is significantly less data and research concerning how human activities affected plant resources in this area, and even how humans utilized these resources on a day-to-day basis.

Lopinot and Powell (2006:146) discussed the archaeobotanical remains recorded from sheltered as well as open air sites in the western Ozarks. They note the assemblages collected from sheltered sites are small, unsystematically recovered, and are derived from mixed contexts. The summaries and investigations provided by prior researchers focused upon desiccated plant remains from rockshelters often collected from mixed contexts because of bioturbation, post-depositional human activities such as pothunting, as well as the intensive use of these spaces by Pre-Contact peoples (Fritz 1984, 1986a, 1986b, 1990, 1997; Gilmore 1931; Hilliard 1980, 1986). Despite these difficulties, these researchers have shown people living in this southwestern part of the Ozarks were full-blown horticulturalists by the Late Archaic period. Domesticated plants like squash, gourd, chenopodium, sunflower, and marsh elder were all present in these earlier contexts. Later in time, communities intensified their production of plant resources, incorporating the domestication and use of maize, squash, tobacco, and maygrass. The collection of wild plant resources did not cease with this increased production, as there is robust evidence for continued collection and the importance of things like nuts. Sheltered sites in southwestern Missouri as well as northwestern Arkansas have been more intensively investigated (Benn and Lopinot 1993; Lopinot 1992, 1997; Parmalee et al. 1976), whereas rockshelter sites in northeastern Oklahoma have only produced evidence of nut remains due to an overall lack of systematic collection of archaeobotanical data.

The archaeobotanical record from open-air sites suffer from the same sampling issues as those from sheltered sites, and there are few investigations of these resources. These data are virtually nonexistent for sites in northeastern Oklahoma. Again, Powell and Lopinot (2006:147-148) summarized plant use from the Late Archaic through the Late Pre-Contact in the Missouri and Arkansas Ozarks. Of particular interest to the current research, they discuss based upon evidence from these open-air sites, communities after AD 1250 and on into the fourteenth century were more intensively cultivating various food resources. Expectedly, maize and beans become more prevalent, with the continued cultivation of tobacco, barley, squash, and other domesticates. It is also clear settlements at open-air sites have more permanence with the existence of evidence for postholes and other house patterns. According to botanical data, it is likely maize was the main crop of Late Pre-Contact peoples in this area, much like other areas at the same time. In particular, as will be discussed below, the Neosho residents at the Dahlman site (23LA259) cultivated maize almost exclusively based on evidence from storage pits, but also continued the collection of wild resources such as hazelnuts. Based on their summary, Lopinot and Powell (2006:148) asserted the Pre-Contact occupants of the Ozarks did not lag behind surrounding communities in terms of the cultivation and propagation of local and tropical domesticates. The only reason it may seem that way is overall due to a lack of robust datasets, as a result of a lack of systematic archaeobotanical research in the area.

For the Late Pre-Contact period, there are several key investigations of plant use by the communities living in this area. These researchers investigated floral remains at Neosho and Lower Walnut sites, respectively. The investigations on Neosho sites in the Ozarks are the only ones to have taken place to date which implement deliberate collection and interpretation of plant use. Due to the overall lack of data, this section will only summarize these investigations and associated conclusions. Ultimately, more data is needed to understand plant resources in the area as well as the relationships between humans and plants in the Pre-Contact periods.

Plant Use in Neosho Communities

In this section, I will review plant use data collected from three Neosho sites. These investigations all stem from sites in southwestern Missouri—in the area traditionally defined as the Neosho culture area—excavated by archaeologists at the Missouri Department of Transportation as well as from the Center for Archaeological Research at Missouri State University. All three of these sites were presented in previous chapters and the ceramics from these sites were analyzed as part of this dissertation.

The first of these investigations took place at Henson Cave (23MD147) and the results are reported by Lopinot and Powell (2006:151-157). The contexts investigated represent flotations from six features and several column samples. Typical of all rockshelter investigations, due to post-depositional processes (natural and resulting from human activities), context mixing occurred at this site. Nonetheless, the majority of archaeological remains at Henson Cave represent the Late Pre-Contact period (AD 1300-1600), corresponding mostly to times associated with Neosho communities. Wood charcoal is the most prevalent plant material represented in these samples, and upon taxonomic identification seems to represent at least nine woody species.

The vast majority represents the oak family, with more red oak than white oak. The dominance of this type of wood illustrates the cave was within an oak-hickory forest throughout its use.

In addition to wood charcoal, nut remains at Henson Cave were also quite prevalent. In other Neosho rockshelter contexts it is clear nut resources were an important staple of these communities' diets (Cobb 1976; Dickson 1991). The assemblage at Henson Cave is dominated by hickory nuts and constitutes the most abundant plant food remain in all but one of the samples collected. Acorn, black walnut, and hazelnut shell remains also occur. Based on the overall assemblage, it seems black walnuts and hazelnuts were secondary resources to hickory nuts (Lopinot and Powell 2006:153). It is unclear how important acorns were to these Late Pre-Contact communities. It is also suggested hickory nut and walnut shells are utilized as fuel for fire, and the volume of carbonized hickory nuts at Henson Cave definitely suggests it was used in this way. These rockshelter sites may have been more intensively occupied during the winter during the Late Pre-Contact.

Maize also occurred in contexts excavated from Henson Cave. These samples do not derive from the features, but rather from the column samples. There is a relatively small amount of corn represented in these samples, which diverges from what one would expect of a Late Pre-Contact site. The paucity of these remains suggests Henson Cave was not occupied year-round or at least not during the growing season, but could potentially have been occupied in the winter, which aligns with earlier conclusions (Lopinot and Powell 2006:154). Seed remains at Henson Cave include evidence of the importance and use of three main resources: chenopod, persimmon, and wild grape. Fifteen other taxa are represented in the sample of seedy remains, but in relatively small proportions. The chenopod seeds represented at the site indicate these specimens were neither wild nor domesticated, likely derived from weedy plants hybridized with domesticated plants. The other food remains prevalent include persimmon and wild grape, each of which would have been available during the fall. The other taxa represented likely represent naturally occurring materials, entering into the archaeological record because of the “hitchhiker effect”.

In the same report, Lopinot and Powell (2006:157-164) discussed the botanical remains collected from Henson Shelter (23MD148). Henson Cave and Henson Shelter are closely associated contexts, located 15-30 meters from one another. Once again, these materials were collected as the result of flotation samples from feature, midden, and column contexts. This site was also utilized by Neosho communities. Wood charcoal represents the second most abundant plant material at Henson Shelter, with nutshell representing the most abundant. Taxonomic identification of the wood resources at the site identified 11 different species including pine (potentially utilized by Archaic or Woodland communities at the site) and oak. Oak represents the most abundant of these species represented. Other taxa represented in small proportions include hickory, maple, ash, walnut, plum/cherry, willow/cottonwood, elm/hackberry, and red cedar. Other fuel resources noted in these assemblages are bark, twig/vine fragments, cane stem fragments, and fungal tissues, likely utilized for tinder and kindling. As stated above, nutshell was the most abundant plant material recovered from Henson Shelter. Like the materials recovered at Henson Cave, this assemblage is dominated by hickory nut shell, with various proportions of walnut shell, acorn, and hazelnut as well. Once again, it seems Neosho populations preferred hickory nuts over acorns and other nut resources (Lopinot and Powell 2006:159).

Maize also occurs at Henson Shelter, but this time from the samples associated with features. All but one of these samples represent kernels, with at least one radiocarbon date yielding a median age of AD 1225. Maize use likely continued into the time periods in which this site was utilized by Neosho communities. Lopinot and Powell (2006:160-161) stated the lack of cob fragments is noteworthy, since groups in the Late Pre-Contact periods likely incorporated maize as a central element of their diets. They postulate the lack of cob fragments could be because the maize consumed at Henson Shelter was transported from another location to this site in the form of shelled kernels. It is likely the corn had been grown and/or processed at a different location and then transported to Henson Shelter for storage and consumption. One piece of squash rind was also present in this assemblage.

Carbonized seeds were also prevalent in the sample, representing 21 taxonomic classifications (Lopinot and Powell 2006:161-163). Once again, chenopod seeds dominate the assemblage, and there is also evidence for the use of persimmon and wild grape as food resources for the populations at Henson Shelter. The other taxa represented likely do not represent deliberately utilized plant resources. Chenopod is less common at Henson Shelter than at Henson Cave, and the assemblage of chenopod at the shelter site represent two distinct cultivated populations, likely indicating some human intervention in nearby populations of these resources. Once again, neither of these populations represent fully domesticated varieties of chenopod, but rather hybrid varieties. Other seeds represent little barley and maygrass, though these features date to AD 635 and AD 870 so they represent use of these plant resources by communities prior to Neosho. Fruits such as hackberry, persimmon, and wild grape are also found in this assemblage.

The final investigation on Neosho botanical remains of note was completed at Dahlman (23LA259), an open-air village site occupied during the Late Pre-Contact by a Neosho community. Lopinot (1999:71-79) reported these findings and interpretations. The assemblage comprises materials recovered from unit samples as well as feature samples. Wood charcoal dominates this assemblage, with some evidence of grass, bark, and fungal tissues also being utilized as fuel resources. Based on taxonomic identification of wood resources, most of these specimens represent oak with the next most prevalent resource being hickory. Other taxa include maple, ash, walnut, sassafras, and elm/hackberry. Lopinot (1999:76) concluded the diversity of the wood charcoal assemblage at Dahlman is seemingly consistent with activities suggesting the collection of dead wood and limbfall in the surrounding area.

As is suggested by the other Neosho investigations, nut resources were also important to these communities as represented by the assemblage at Dahlman. The community at Dahlman, differs in that they utilized mostly hazelnut resources rather than the hickory nuts represented at Henson Cave and Henson Shelter. Other nuts represented include walnut, hickory, and acorn, but it seems the Neosho community at Dahlman preferred hazelnuts. This potentially reflects the abundance of hazelnut bushes in the area as indicated by GLO records (Lopinot 1999:76). Maize cob and kernel fragments also occur in all of the botanical samples taken at Dahlman (Lopinot 1999:77-78). The specific species represented seems to be Midwestern Twelve Row maize, which was cultivated quite often during Pre-Contact times in the Midwest. There is currently no evidence for the cultivation of Eastern Eight Row varieties of maize at Dahlman. The assemblage is dominated by cob fragments, at a ratio of 3:1 with kernel fragments. This indicates maize was likely cultivated at or near the site, assuming that if maize was cultivated elsewhere and then transported to the site the assemblage would be dominated instead by kernels.

The seed assemblage at Dahlman is quite small. Seeds not represented at this open-air site that are seen in the assemblages at Henson Cave and Henson Shelter include chenopod, maygrass, and little barley. Additionally, there is no evidence for the use of sunflower, marshelder, beans, or tobacco at Dahlman. Fleshy fruit seeds were common at this site, including wild grape which would have been collected during the fall and was also found at the other sites discussed above. Other fruits represented include plum, which represents a species most commonly collected during mid- to late summer, as well as persimmon and blackberry (Lopinot 1999:78-79).

Based upon the above investigations of Henson Cave (23MD147), Henson Shelter (23MD148), and Dahlman (23LA259) we can build some limited interpretations of plant use by Neosho communities in the Late Pre-Contact period in the Ozarks. Clearly, all of these communities were engaged in varying activities involving the direct procurement and manipulation of local and domesticated plant resources. The assemblages from the two rockshelter sites emphasize wild plant resources—in addition to domesticates and cultigens—remained important staples of the diets of Neosho communities in the Late Pre-Contact period. It is clear from the remains found at Henson Cave and Henson shelter that these rockshelter sites were not occupied during the growing season, and any cultigens present were transported in processed forms. In contrast, the community at Dahlman showed evidence suggesting domesticated plants such as maize were likely grown at or nearby the site and transported on the cobs as well as in more processed kernel forms. This confirms some of the conclusions other scholars have provided based on Neosho communities' use of rockshelters (Cobb 1976; Freeman 1959a, 1962) showing these spaces were used seasonally whereas the open-air sites represent more substantial year-round occupations.

Archaeobotanical data on Neosho communities is very limited, as evidenced by the above discussion. More deliberate systematic collection of plant remains is needed to build more robust conclusions and to better understand the interactions between humans and plants during the Late

Pre-Contact period in the Ozarks. Below I will summarize an investigation of plant remains recovered at Lower Walnut communities in and around Arkansas City, Kansas, and compare this knowledge to our limited conclusions about Neosho lifeways.

Plant Use in Lower Walnut Communities

In the investigations of sites in and surrounding Arkansas City, Kansas, Adair (2012:455-476) reported the results of archaeobotanical analyses on Lower Walnut assemblages. Overall, these data are slightly more available for sites on the Plains and are reported more often than from sites on the Ozark Plateau. Here I highlight the discussion of assemblages most relevant to this dissertation. Two of the sites discussed in Adair's (2012) investigations (14CO1 and 14CO3) are also included in the analyses presented in previous chapters of this dissertation. All of the assemblages reported here were recovered from feature fill excavated from Lower Walnut sites, and the purpose of Adair's (2012) analyses were to record the use of plants during the times at which these sites were occupied, to learn more about the various subsistence strategies of these communities prior to contact with Europeans. Thus, wood charcoal remains are not reported in these investigations. Based on her investigations, various plant species are represented in these samples including cultigens, medicinal plants, weedy annuals, fruits, nuts, and other miscellaneous seeds.

Cultigens found in these assemblages include maize, squash, gourds, beans, marsh elder, little barley, and sunflower. Maize is the most abundant of these cultigens, represented mainly by kernel remains, indicating the crop was likely processed near the growing fields (Adair 2012:474). Domesticated and wild varieties of beans are also found in these collections, the common bean being one of the last tropical cultigens to be introduced in North America (Adair 2012:464). Communities on the Plains likely introduced this cultigen into their diets sometime in the 12th to 13th century and are commonly identified in sites on the Central and Southern Plains. Squash and gourds have also been found at these sites, specifically those varieties that are quite widespread at this time. Little barley is a crop located throughout North America and was found in sizeable quantities at 14CO1. The small amounts of sunflower represented at these sites indicates Lower Walnut communities selected both wild and domesticated varieties of this plant both of which were common on the Plains. We can already see some overlap in the food crops Lower Walnut and Neosho communities were utilizing based on these limited datasets.

In terms of medicinal or spiritual plant use, something not yet researched for Neosho communities, two main species are present in the Lower Walnut assemblages: tobacco and nightshade (Adair 2012:470). Tobacco on the Plains is found as early as the Late Woodland, and the seeds and residue in pipes are associated with many Late Pre-Contact Plains occupations. Nightshade was also recovered from these Lower Walnut assemblages, though in different proveniences than the tobacco, suggesting these plants were not closely associated.

Other plant remains include weedy annuals like goosefoot, pigweed, pokeweed, chenopodium, and smartweed. Fruits exploited by Lower Walnut communities include plum and cherry, wild grape, and black haw. Unlike what was seen in the Neosho assemblages, nuts were very limited in the Lower Walnut botanical remains. Those present were dominated by black walnut and walnut species, with some oak and hickory. Their limited presence suggests they were not important staples in the diets of Lower Walnut communities (Adair 2012:472).

Much like the Neosho assemblages, poor preservation, inadequate recovery techniques, and an overall lack of systematic collection of archaeobotanical remains decrease our understandings of the full range of plants utilized by Lower Walnut groups (Adair 2012:473). It is clear maize was an important staple to the diet of these communities. In combination with other domesticated crops such as bean, squash, little barley, and sunflower, we know Lower Walnut peoples were engaging in intensive horticultural activities much like their Neosho neighbors. Adair (2012:475) noted a shift in subsistence practices between the earlier Central Plains tradition and the Great Bend aspect (here discussed solely for Lower Walnut focus assemblages). The Central Plains tradition communities also exploited various native and cultivated crops. The Great Bend, and Lower Walnut, folks instead focused their efforts on cultivating fewer crops, with a greater reliance on maize. While the use and collection of wild plants did not cease, it potentially contributed less to the diet of Lower Walnut communities than it had in previous time periods.

Conclusions: Plant Use in the Late Pre-Contact

Ultimately, based on the above discussions, more data is needed to fully discuss the relationships, similarities, and shared traditions of plant use between Neosho and Lower Walnut groups. The data on Neosho plant use is obviously skewed towards rockshelter occupations, which potentially overemphasizes collection strategies over horticultural practices. The opposite may be true for Lower Walnut communities, with most data coming from long term village occupations rather than shorter term seasonal encampments, where collection may have been more important in the subsistence of these people.

Interesting similarities and differences are present in the data summarized above. Neosho communities utilized nuts as an important part of their diet in both rockshelter and open-air village occupations, whereas it seems Lower Walnut groups did not. Maize was important to both groups, much like many Late Pre-Contact communities throughout the Eastern Woodlands and the Plains. Both groups did cultivate and collect many other resources, some wild and some not, in varying quantities.

Based on even this small amount of data, there is evidence that Neosho communities cultivated various plant resources, and horticulture was an important part of their lifeways. The Ozark Plateau has many floodplains with arable soil; these people likely heavily utilized these areas. Further investigation of these areas is needed. A better understanding of the geoarchaeology of the region could help identify more open-air sites and much-needed information on the plant use of Neosho groups. Nonetheless, the Ozark Plateau was not an environment devoid of plant resources, but rather was a rich and diverse environment within which these people hunted, collected, and implemented horticultural techniques. Hunting is often overemphasized in discussions on Neosho communities and their overall identities, in that their use of bison resources makes them more "Plains-like" than other groups. This association with an increased use of presence of bison representing a "Plains-like" way of life is ironic considering the above discussion of plant use on the Plains, highlighting the categorical issues presented by these classificatory schemas reliant upon incomplete datasets. This discussion of plant resources serves to make our understanding of subsistence more wholistic, emphasizing the importance of all resources to these communities.

Faunal Resources

Faunal data overall are more prevalent in these datasets than plant data. This is no surprise, as animal remains are more often collected than plant remains, and many discussions of Neosho and other communities build robust conclusions based upon faunal subsistence and the use of faunal remains for tools. However, there are inconsistences in how these data are reported by region and by site, which frustrates certain types of systematic comparisons. Much like the plant data, not all the sites discussed in previous chapters have analyzed faunal data. Nonetheless, I have compiled reports and resources from Neosho, Lower Walnut, and Fort Coffee sites to investigate the importance of various faunal resources to the subsistence of these communities. I will focus most intently on the procurement and use of bison, as this resource has been the cause of much debate surrounding the identities of Neosho as well as Fort Coffee groups. Rather than building conclusions which answer those questions about identity, I will focus on understanding potential shared traditions in the region, building upon the conclusions presented in previous chapters concerning social networks of ceramic practice. Once again, more data representing the subsistence of groups in the Eastern Woodlands is needed for comparative purposes, to continue problematizing these dichotomous viewpoints on subsistence and practices.

Overall, the data summarized in this narrative illustrate there is immense overlap in the faunal resources these groups utilized, but also highlight many differences. Presentation of these data is difficult because the range of animals and species is quite large. As such, in the background descriptions below I will report the range of species utilized and provide relevant citations for the reports where specific proportions are presented. Additionally, this helps minimize the impact the inconsistent reporting will have on these discussions overall. Later, in discussing the varying contributions of bison in these assemblages, I will present proportions and specific measurements for the purpose of comparison between communities.

Faunal Resources in Fort Coffee Communities

There are very few reports or studies of faunal subsistence for Fort Coffee communities. Neither of the Fort Coffee sites presented in the ceramic discussions have reports fully describing their faunal assemblages. The reports associated with 34HS9 and 34HS24 do discuss the use of animal bones for tools, but these descriptions do not expand upon the overall faunal subsistence practices of those communities (Bell et al. 1969; Cartledge 1969). Therefore, Fort Coffee faunal trends will be based upon the presentation of data by Rohrbaugh (1982:563-571) from the Moore site (34LF31), one of the sites he utilized in defining the Fort Coffee phase. These remains were analyzed by Elizabeth Pillaert (n.d.), who also participated in the identification of faunal remains from many Neosho sites in northeastern Oklahoma, more discussed below. Many of the remains represented were likely utilized in toolmaking as well, including the use of deer antlers, deer bones, and elements like bison scapula for various purposes and activities. Overall, in the Fort Coffee assemblage reported by Rohrbaugh (1982), the sample is dominated by mammals, with the highest proportions being bison as well as white-tailed deer. Most of the bison remains present at the Moore site are worked scapula pieces, perhaps representing their use as hoes for horticultural activities. The lack of many other elements of the bison is interesting to note and will be more fully discussed in subsequent sections. Deer remains are more diverse, with more elements represented in the assemblage. Other mammals represented include eastern cottontail, black-tailed jackrabbit, opossum, eastern gray squirrel, beaver, eastern woodrat, black bear, and racoon.

The second-most prevalent animal resource utilized by the Fort Coffee community at Moore were reptiles, with varying proportions of turtles represented. Specific species include the common box turtle, red-eared turtle, soft shelled turtles, snapping turtle, musk turtle, and eastern mud turtle. Aquatic resources include various fish species, such as the longnose gar, catfish, freshwater drum, bigmouth buffalo, and golden redhorse. Freshwater drum overwhelms the sample of fish, followed by longnose gar and catfish. All of these resources are available in nearby environments in the Arkansas River Valley. Though not mentioned in Rohrbaugh's (1982) catalog, it is likely Fort Coffee communities exploited other aquatic resources such as mussels. Large amounts of fresh-water shell have been noted in Fort Coffee collections in the Sam Noble Museum of Natural History, and some of these shells were utilized as hoes by these communities. Finally, the assemblage at Moore also included several bird species, including mallard, turkey, and northern bobwhite.

The range of species hunted and exploited by Fort Coffee communities is quite broad, with a greater emphasis being on the hunting of various mammals and reptiles. Most of the consumable products likely stemmed from the hunting of mammals, with the others being supplemental parts of their diets. Based on the representation of bison elements (i.e., mostly worked scapula pieces) in the assemblage, I am unable to definitively say if Fort Coffee groups either hunted these bison on their own or maintained relationships to Plains groups with which they traded for these specific elements. Nonetheless, it is clear the community at Moore almost exclusively utilized bison scapulae, and most of these were worked and used as tools. More data is needed on Fort Coffee faunal subsistence to solidify these conclusions.

Faunal Resources in Lower Walnut Communities

Hoards (2012a) report on Lower Walnut communities included an extensive overview of faunal resources for the sites discussed in that study. Here I discuss all these data, including the data derived from the two Lower Walnut sites discussed in previous chapters, 14CO1 and 14CO3. These data are split into two categories: vertebrate (Haury 2012:341-441) and mollusk resources (Morey and Bleam 2012:443-454). The sites examined in this report and used in the comparative evaluations presented below include the following Lower Walnut assemblages:

14CO1, 14CO3, 14CO331, 14CO332, 14CO382, 14CO385, 14CO501. Only two of these sites are also included in the ceramic analyses presented in this dissertation due to issues with collections access because of the COVID-19 pandemic. This section considers the vertebrate samples most intensively, as the reporting of mollusk resources is uncommon in the other communities discussed in this dissertation.

Overwhelmingly, the assemblages at these Lower Walnut sites are dominated by bison elements. Deer, pronghorn, and elk are also present in the assemblage, but were clearly of less importance than the bison to these communities. The next most common resource in terms of dietary contribution is turtles, though this also pales in comparison to the food resources indicated by the bison in the assemblage. The other animals hunted and used by Lower Walnut groups overlap quite a bit with the Fort Coffee communities, including such resources as turkey, mallard, rabbit, squirrels, freshwater drum, gar, catfish, and more. There are also domesticated dogs in this sample, and these are unlikely to have been utilized for food.

As stated above, bison overwhelm the assemblages at these Lower Walnut sites near Arkansas City. These animals for these communities represented not only a source of meat, but also a source of hides and other animal products. In terms of meat resources, the average yield from a single large bull is about 800 lbs whereas a female yields about 400 lbs (Haury 2012:344). These animals clearly provide a large amount of meat even if only one is procured at any one given time. Some of the long bones show evidence of impact blows and spiral fractures, indicating marrow extraction was also an important activity in processing these animals. Bison bones are also commonly utilized for tools. The most important element utilized for tools is the scapulae, which were used as hoes in the cultivation of various plants. Other modified bison include ribs, tibiae, and other long bones used for digging tools as well as ribs, vertebra, mandibles, and phalanges. It seems in the assemblages presented by Haury (2012) nearly all bison elements are represented at these sites, juxtaposed with the near exclusivity of scapulae in the Fort Coffee sample discussed above. Below I will compare the use of bison between these communities.

Deer were also an important resource for Lower Walnut groups but were not utilized in the same proportions as bison. This could be due to the very nature of the animals themselves, in that bison are herd animals living in open grasslands whereas deer are more solitary and reside in the woodland and forest habitats. As a result, people necessarily hunt deer on an individual basis and deer overall yield much less meat than bison. In the fall and winter, deer congregate in "yards" where there is enough food and shelter (Jones et al. 1985:313), expanding their foraging to target acorns and other resources that increase their fat stores for the winter. This time of year could have been ideal for Lower Walnut communities to hunt deer as the bison herds are breaking up into smaller winter groups (Haury 2012:356). Much like bison, deer were not sought solely for the meat they provided, but also for antlers and bones to be modified as tools or processed for marrow.

The animals represented in these samples, the discussion of bison and deer hunting, as well as the above presentation of botanical data illustrate Lower Walnut communities did not enact a subsistence strategy exclusively exploiting any one resource. They held preferences towards several domesticates and towards the use of bison resources, but also gathered, cultivated, and hunted various other resources. Bison hunting on the Plains in these later periods has been overemphasized in the literature (Barsh and Marlor 2003; Brooks and Flynn 1988; Buehler 1997; Cooper 2008; Todd et al 2001; Wedel 1986), and in part I believe this has contributed to the discussion of Neosho and Fort Coffee communities as "Plains-like" entities.

This classification as “Plains-like” has been mostly attributed to trait similarities with Lower Walnut groups as representing the Plains, as the immediate neighbors of Neosho groups at this time (Regnier et al. 2019). Lower Walnut groups, as discussed earlier, are ancestral Wichita peoples that originated out of the Eastern Woodlands, and likely also have ancestral connections to the Great Plains. The classification of Lower Walnut representing the Plains is thus somewhat inaccurate because of their social histories, and their over association with bison use is also somewhat inaccurate as they have been shown above to use many different resources. Just because these ancestral Wichita populations lived on the Plains does not necessarily mean they represent a Plains subsistence pattern. As such, in these discussions I will continue to eliminate the dichotomous view of Plains versus Eastern Woodlands to instead note that Lower Walnut, Neosho, and Fort Coffee have many similarities in their subsistence practices but also many differences. I chose to focus on bison resources in this section to problematize this view that bison use is exclusive to the Plains, and to also illustrate that groups living on the Plains like Lower Walnut also used many non-bison resources. Subsequent sections will delve deeper into the use of bison by these communities, incorporating a comparative perspective to evaluate these assumptions.

Faunal Resources in Neosho Communities

There are several reports in which researchers have analyzed faunal resources for known Neosho sites on the Ozark Plateau. Many of these sites are included in the ceramic analyses presented in this dissertation. Because the Neosho culture area crosses into numerous states and has been subject to research by many different scholars, the consistency in reporting these faunal data varies considerably. Relevant citations for each site are presented in Chapter 2 for each site.

The reports and publications which include some degree of faunal analysis include the following: Cobb (1976), Yelton (1999), Dickson (1991), Kelly (2006), and Pillaert et al. (2018). Due to the inconsistencies in reporting, and for the purposes of these analyses, I have chosen to focus these discussions on Pillaert et al.'s (2018) analysis of faunal remains from Delaware County in northeastern Oklahoma. In discussing their research, I will be able to have an in-depth discussion of dietary contributions of animals to the diets of Neosho communities, and it will allow me to better stage the comparisons to be presented below. Pillaert et al.'s (2018) research includes a majority of the Neosho assemblages investigated in subsequent chapters dissertation. The sites reported in their analyses with known Neosho components are as follows: 34DL10, 34DL11, 34DL20, 34DL27, 34DL28, 34DL29, 34DL30, 34DL39, 34DL42, 34DL47, 34DL48, and 34DL55. Some of these sites are included in the ceramic analyses in this dissertation while others are not for various reasons (i.e., small sample size of ceramics).

Overall, in examining the data Pillaert et al. (2018) analyzed, Neosho communities were hunting deer almost exclusively. Most of their food resources from animals came from these and other mammals (including bison which will be discussed below), supplemented with other animals also seen in the assemblages for Fort Coffee and Lower Walnut communities. Such species include turkey, turtles, longnose gar, catfish, freshwater drum, raccoon, squirrels, beavers, woodrats, eastern cottontail, and more in varying proportions.

In their analyses, Pillaert et al. (2018) have investigated the relative proportions of meat sources for each site, and overwhelmingly have illustrated deer makes up most of the meat resources exploited by Neosho people. This makes intuitive sense from an environmental standpoint, as the Ozark Plateau is a more woodland environment than the Plains grasslands, and as briefly discussed above is an environment where deer would thrive and be plentiful throughout the year. The next most common resources vary by site, with some assemblages including more birds and reptiles than bison. Bison procurement was also important, though in far less quantities than deer. Below I will investigate and discuss dietary contributions of bison for these communities to comparatively evaluate the subsistence strategies of these groups in terms of faunal resources.

Much like was discussed above, animals were not exclusively a source of meat for these communities but were also a source of marrow and resources for making tools. Deer provide antlers that can be modified to make tools past people would use in manufacturing lithic implements, as well as manufacturing tools used in the manufacture of clothing. Additionally, many of these Neosho sites had domesticated dog remains in their samples, which were not a food resource for Late Pre-Contact populations (Pillaert et al. 2018:31).

This brief description of Neosho communities' exploitation of local faunal resources serves as a foundation for the subsequent comparative discussions. Based on these data presented by various scholars on faunal as well as floral remains at Neosho sites, it becomes evident these communities exploited a wide range of resources much like their neighbors. Even so, we can see a general trend towards the preference of certain plant and animal species, potentially reflecting the environment itself, availability or access to resources, or even cultural and community preferences. Though Neosho communities may have hunted bison more often than earlier groups—an argument sometimes cited to classify them as more "Plains-like" in the traditional sense—those animals did not comprise most of their diets.

Dietary Contributions: Comparing Communities

Below I present data compiled from the various reports discussed above to compare the faunal subsistence strategies of Neosho, Lower Walnut, and Fort Coffee communities. As the main discussion of faunal subsistence in the extant literature on Neosho has revolved around the increased intensity in the use of bison resources, this section focuses its efforts on an evaluation of the relative contributions these animals provide to the diets of the different communities included in this study. Additionally, I juxtapose these data on bison procurement and use with deer procurement, since those mammals also represent significant contributions to the diets of these communities.

Tables 4.1 and 4.2 present the minimum number of individuals (MNI) of bison and deer by site and by community, respectively. It is important to note the relative proportions of these animals present in these samples because already we can see general trends emerge. As such, a ration of the importance of bison was generated for each site, calculated by dividing the total number of bison divided by the total number of deer plus bison. These were then converted to percentages. Though MNI is not necessarily an accurate representation of the dietary contribution these animals provided for these communities, white-tailed deer are represented more in the Fort Coffee and Neosho assemblages than in the Lower Walnut assemblages and bison are more prevalent in the Lower Walnut assemblages. Recalling the above discussions, Haury (2012) noted the almost exclusive use of bison by Lower Walnut communities, and this conclusion is supported by the MNI represented below.

Breaking this down by elements represented (where available), there are other interesting trends between Fort Coffee and Lower Walnut communities. As briefly discussed above, of the bison bones in the Fort Coffee sample at Moore (34LF31), almost all the identifiable specimens

Table 4.1. Minimum Number of Individuals (MNI) for Bison and Deer by Site (Haury 2012; Pillaert et al. 2018; Rohrbaugh 1982).

Site	Phase	Bison MNI	Deer MNI	Bison Importance
34LF31	Fort Coffee	17	53	24.3%
34DL10	Neosho	1	4	20%
34DL11	Neosho	2	176	1.1%
34DL20	Neosho	1	11	8.3%
34DL27	Neosho	2	13	13.3%
34DL48	Neosho	1	51	1.96%
34DL28	Neosho	1	8	11.1%
34DL29	Neosho	2	62	3.1%
34DL30	Neosho	-	14	-
34DL47	Neosho	3	93	3.1%
34DL55	Neosho	7	29	19.4%
34DL42	Neosho	1	40	2.4%
34DL39	Neosho	3	9	25%
14CO1	Lower Walnut	18	7	72%
14CO3	Lower Walnut	12	6	66.6%
14CO331	Lower Walnut	9	2	81.8%
14CO332	Lower Walnut	4	2	66.7%
14CO382	Lower Walnut	9	2	81.8%
14CO385	Lower Walnut	4	0	100%
14CO501	Lower Walnut	8	2	80%

Table 4.2. Total Minimum Number of Individuals (MNI) for Bison and Deer by Community (Haury 2012; Pillaert et al. 2018; Rohrbaugh 1982).

Community	Bison MNI	Deer MNI	Bison Importance
Fort Coffee	17	53	24.3%
Neosho	24	510	4.5%
Lower Walnut	64	21	75.3%

are worked scapula pieces (90%). Contrarily, the assemblages examined at the Lower Walnut sites (see Haury 2012:356-357 for the breakdown of bison elements) have a wider range of elements in their sample, though scapula fragments are also the most prevalent. Bison scapulae were often preserved and used most often as hoes in Lower Walnut communities (Haury 2012:399-434). This seems to also be the case for the Fort Coffee community at 34LF31 as well as for the Lower Walnut communities discussed here, though it is curious this element dominates the sample at 34LF31 rather than having the full animal represented. While more data is needed to understand faunal exploitation by Fort Coffee groups, two competing hypotheses emerge from this observation: 1) Fort Coffee groups maintained connections to communities like Lower Walnut in order to procure bison scapulae for meat and also cultivation tools or 2) Fort Coffee groups hunted bison occasionally on their own and more often preserved the scapulae for use as tools. Whatever the case, Neosho and Fort Coffee groups clearly exploited bison less often than their Lower Walnut neighbors.

The identifiable elements for the Neosho sites discussed by Pillaert et al. (2018:107-155) seem to suggest whole animal procurement, but the elements are in such small proportions that this conclusion is tenuous. Curiously, Pillaert et al.'s (2018) report of bison elements for Neosho assemblages is lacking the number of scapulae fragments seen in the Lower Walnut and Fort Coffee assemblages, but it is unknown to what degree site preservation and WPA collection strategies impact these analyses.

Next, in examining relative dietary contributions, we can produce a more in depth look at the roles both bison and deer played in the subsistence of Neosho and Fort Coffee communities, specifically. Unfortunately, the Lower Walnut data is not presented such that calculations of dietary contributions (kg) are possible at this point. Tables 4.3 and 4.4 present these data by site and by community, respectively. In examining these data, it becomes clear Neosho communities predominately hunted, ate, and used deer resources. This aligns with Pillaert et al.'s (2018) conclusions about the sample and poses some interesting conclusions for this dissertation to be discussed below. The Fort Coffee community at 34LF31 presented by Rohrbaugh (1982) shows a preference towards bison in terms of dietary contribution (mostly represented by scapulae elements), but it is unknown if this pattern would hold with the representation of more Fort Coffee sites. More data is needed to investigate Fort Coffee's faunal subsistence strategies.

Table 4.3. Estimated Kilograms of Meat by Site. Highlighted value was reported by Pillaert et al. (2018) but is likely a typographical error (Haury 2012; Pillaert et al. 2018; Rohrbaugh 1982).

Site	Phase	Bison (kg)	Deer (kg)
34LF31	Fort Coffee	294.8	45.4
34DL10	Neosho	294.8	181.4
34DL11	Neosho	589.7	7983.4
34DL20	Neosho	294.8	499
34DL27	Neosho	589.7	589.7
34DL48	Neosho	294.8	2313.3
34DL28	Neosho	294.8	362.9
34DL29	Neosho	589.7	2812.3
34DL30	Neosho	0	2035
34DL47	Neosho	884.5	4218.4
34DL55	Neosho	2063.8	1315.4
34DL42	Neosho	294.8	1814.4
34DL39	Neosho	884.5	408.2

Table 4.4. Estimated Kilograms of Meat by Community (Haury 2012; Pillaert et al. 2018; Rohrbaugh 1982).

Community	Bison (kg)	Deer (kg)	% Bison	% Deer
Fort Coffee	294.8	45.4	86.65	13.35
Neosho	7075.9	24533.4	22.39	77.61

As alluded above, though bison are represented in the assemblages for Neosho sites, the relative contribution of bison to the diet of these communities is much lower than white-tailed deer. Again, this makes sense if we examine the Ozark environment as a more "woodlands" type environment where deer populations would thrive and be more plentiful than bison. In presenting Pillaert et al.'s (2018) data for Neosho communities, it presents a narrative not necessarily contrary to that provided by past archaeologists who studied Neosho but provides important context and a basis for future research. Past researchers have argued Neosho communities are more "Plains-like" than groups living in the Ozarks during previous time periods, due to an intensification in the use of bison resources and tools interpreted as bison-hide processing implements and an increased presence of bell-shaped pits (Baerreis 1940, 1941; Chapman 1959; Orr 1946; Dickson 2002; Wedel 1959). However, these data show bison represented more of a supplementary resource for Neosho communities, rather than a primary means of faunal subsistence. Additionally, though bison scapulae hoes are seen at these sites, tools like scrapers likely indicate an intensification of hide processing, but not necessarily solely of bison hides.

As some have suggested, the increase in traits similar to groups on the Plains like Lower Walnut could be due in part to changes in environmental conditions (Regnier et al. 2019). It is possible climatic shifts caused bison ranges to move eastward, meaning populations like Neosho who previously did not exploit bison intensively were able to access and hunt these animals more easily (Lorrain 1967; Wedel 1959). Clearly from the discussions presented in previous chapters there is evidence of subsistence and cultural shifts corresponding to these climatic events. Or it could be the increased presence of bison in Neosho and Fort Coffee assemblages represent more intensive relationships with groups like Lower Walnut on the Plains. There is an increase in the availability of bison on the central and southern Plains during this time, and evidence that connections between communities in the Arkansas River Valley (i.e., Fort Coffee) and groups on the Plains intensified (Drass 1997; Rogers 2006). Corresponding shifts likely occurred on the Ozark Plateau, as Neosho and Fort Coffee communities were likely continuing the interactions they had established as part of the preceding Mississippian ritual systems at mound sites like Reed and Spiro. It could be the transitions from the Spiro phase to the Fort Coffee phase are like the shifts we see archaeologically between Neosho and earlier time periods. These connections between the Arkansas River Valley and the Ozarks through time need more investigation, but I find it likely these changes are related in many ways.

The ceramic data presented in subsequent chapters will show relationships between Fort Coffee, Neosho, and Lower Walnut certainly existed in the Late Pre-Contact in terms of ceramic practice and direct exchange, so it is not entirely out of the realm of possibility interactions for bison and other resource procurement did occur. More research is needed to fully investigate these hypotheses. Additionally, research is needed to compare subsistence diachronically more directly, combined with a full discussion of climatic shifts and its impact on plant and animal resources.

Conclusion

The above discussions illustrate there are clear differences in the faunal subsistence strategies undertaken by the communities represented in this study. Lower Walnut communities as well as the Fort Coffee community at Moore (34LF31) more intensively exploited bison resources, with the Fort Coffee group almost exclusively using bison scapulae as tools for cultivation. Neosho communities, on the other hand, chose to hunt deer as their primary source of meat and animal resources. The differences between Lower Walnut and Neosho could in part reflect overall environmental differences and the availability of these animals in their expected ranges. Deer are more readily available in woodland environments, whereas bison range more in grasslands. Thus, these data are unsurprising. These data show previous discussions of Neosho as “Plains-like” in extant literature do not account for the relative proportions of these animals or their contributions to the diets of these communities, and also overemphasize dichotomous schema that do not account for the social histories of groups like Lower Walnut. While bison use may increase in the Late Pre-Contact Ozarks, white-tailed deer remain a primary resource for Neosho communities. The increased presence of bison could be due to many factors, including climatic shifts resulting in the ranges of these animals changing, or it could be the result of direct exchange with Neosho’s neighbors on the Plains. It could also reflect a new and deliberate procurement strategy enacted by Neosho people differing slightly from previous groups in the area.

Whatever the case, this discussion has illustrated a relatively brief evaluation of the available evidence allows us to resituate our understandings of Neosho communities and discuss their practices and activities in new and exciting ways. Rather than assuming Neosho is “Plains-like,” it is important to discuss their subsistence holistically (i.e., in how they utilized both plant and animal resources) and how their subsistence compares to neighboring groups both on the Plains and in the Eastern Woodlands. At the same time, we must also acknowledge that these neighboring groups have their own complex histories, making their classification as representing Plains or Eastern Woodlands essentially meaningless. These groups all used a wide variety of resources, though there were clear preferences towards certain local and cultivated plants and animals. Similarities and differences between Neosho, Lower Walnut, and Fort Coffee groups reflect not only the deliberate actions of these people in implementing subsistence strategies, but also likely reflect the environments within which they lived and potential interactions between groups in the region.

The next chapter will fully describe the methodological and theoretical approaches to answering the main research questions presented in Chapter 3. More specifically it will integrate the prior discussions of Neosho communities, the effects of categorical approaches on archaeological research, and borderland perspectives with the methodological approaches like social network analysis (SNA) as well as ceramic analysis and associated theories.

Chapter 5

Building a Functional Framework: Moving from Categories to Relationships

The previous chapters have discussed the limitations of categorical methodologies and theoretical frameworks, especially when studying areas at the edge and between culture areas. For archaeologists researching Neosho people in particular, categorical schema as well as outdated and unevaluated assumptions about borderland communities has created a barrier in our understanding of the relationships forged by peoples during the Late Pre-Contact period in and surrounding the Ozark Plateau. These limitations have favored narratives characterizing Neosho people as marginal, peripheral to regional interactions, and overall culturally, socially, and politically uninfluential entities, mostly because of their geographical location at an environmental borderland between the Eastern Woodlands and the Great Plains.

As borderlands have been shown to be extremely dynamic spaces of cultural practice (Parker 2002, 2006), what is needed now is a relational approach to place emphasis on relationships among people in the past rather than relying upon often unevaluated categories as analytically and interpretatively meaningful (Holland-Lulewicz 2020). This chapter weaves together previous chapters' discussions of theoretical tenets and the background of the case study to be explored in this research along with the relational methodologies selected to evaluate and reincorporate borderland spaces into broader regional narratives. Subsequent chapters will present, discuss, and interpret the data utilizing these frameworks in the efforts of better understanding Neosho communities, evaluating the Ozark Plateau as a meaningful cultural borderland, as well as characterizing the regional network of relationships and associated boundaries forged by these and surrounding groups.

Ceramic Manufacture as a Multifaceted Relational Practice

Spatial structures are inherent and essential in archaeological research to understand how past communities utilized the landscape, lived their daily lives, and even how they viewed the world through their own cultural lens. As discussed in previous chapters, sometimes archaeologists attach preconceived ideologies and assumptions on the meaning of geographic locations prior to an evaluation of archaeological data concerning the lives of the communities who lived there. As discussed in previous chapters, a prime example of these assumptions manifests at environmental borderlands, more specifically in mountainous landscapes like the Ozarks. These unevaluated inferences place unintended limitations on our interpretations of the lives of past peoples, and place undue emphasis on the spatial element of research rather than an interpretation of the relationships and activities of the peoples who made the space meaningful. Sometimes the culture area categories persisting as spatial organizers in archaeology control the narrative, when the relationships of the people living in those areas should take precedent. The strategies implemented in this research seek to resituate our archaeological focus on relationships over categories, as a way to evaluate the preconceived assumptions of the Ozarks, and Neosho communities, as peripheral to regional cultural interactions.

As is the case with many borderland communities, the understudied nature of these spaces and cultures provides incredible opportunities for the development of creative approaches to further our understanding of relational connections in the past, with perhaps less than ideal datasets. This research in part investigates the nature of relationships between Neosho communities and surrounding societies using attribute analyses on ceramic materials then input into social network analyses (SNA). As such, this study more directly evaluates interactive connections based on pottery manufacture, learning, and teaching. Incorporated within communities of practice and borderland theoretical frameworks, these techniques transfigure traditional categorical approaches and use material traits and legacy data in new ways to help us better understand how people built, maintained, and (eventually) changed their relationships through time.

Keeping in mind the discussions from previous chapters, it was essential to select units of analysis, materials, and methods to help illuminate nascent variation and connections within and between communities in this region. As established in previous chapters there is a long history of archaeologists using categories in culture history (particularly the assumptions relating to culture areas), but there is also a long history of archaeologists using categories in typologies as well. The history of the use of these two separate categorical approaches has some similarities that have both contributed to an overall lack of understanding of the relationships of the communities in the region in question. For instance, typological systems—while essential for communication between researchers and for interpretations—are often inconsistently applied for various reasons and often go unevaluated much like culture areas (Whittaker et al. 1998). Typologies are often difficult to apply because their definitions are ambiguous in identifying relatively distinctive stylistic elements and as a result our interpretations of the relationships between communities relying upon these categories become murky (Clay 1976).

Many researchers are utilizing relational perspectives to reevaluate existing typologies and to also be critical of what the material traits of artifacts really signify. Most explicitly, Kassabaum (2019) challenged lingering categorical perspectives tied to typological definitions of platform mound use in the southeastern United States. She traced the use of platform mounds throughout the history of the region, illustrating the identification of patterns in mound construction and use is nearly impossible, due to the time depth of these practices and the variability of use in any given period. She stated, "the variability within any given [time] period is as great as, if not greater than, the variability between periods" (Kassabaum 2019:230). She argued to understand patterns in use, archaeologists must use caution in relying on previously established categories which set preconceived expectations on these data. She emphasized in relying heavily on categorical approaches to understanding mound-building and use, archaeologists place undue emphasis on understanding the mounds themselves rather than understanding the actions and interactions of mound builders and mound users within communities and, more broadly, within regions.

Her work represented an important cautionary tale in more than one sense. She illustrated culture history has a dangerous desire to prematurely build overarching conclusions and interpretations from a relatively limited dataset (much like was discussed in earlier chapters concerning culture areas), and archaeologists must be mindful of what the traits and attributes we study signify different aspects of human life. Of course, archaeologists must be careful in using the categories set forth by culture history because of the ways those constructs were created—in ways that often do not fully represent the variation present in the sample but are based upon specific "type sites" or cases. Alongside this important corrective, she also illustrated the solutions Feinman and Neitzel (2020) proposed and discussed above to tackle the complacency in archaeology's use of culture historic categories do not work if we are not mindful also of what attributes indicate things like interaction and which represent something else. This is incredibly important from a borderlands perspective, as boundaries and borders are inherently multivariate, rather than the all-encompassing boundaries culture history pursues and perpetuates (Parker 2002, 2006). Therefore, if we are after an investigation of where those boundaries lie in terms of interaction, we must be mindful of which attributes we are examining.

Adapting Kassabaum's (2019) conclusions to the questions to be tackled in this dissertation concerning borderlands, it is important to use theoretical and methodological approaches first emphasizing our understanding of the complex relationships among communities and individuals, rather than relying upon previously established and unevaluated taxonomic categorical constructions like culture areas and typologies. These two categorical perspectives have limited our understandings of Neosho up to this point, in varying ways. As such, I argue it is essential to begin with an examination and evaluation of the roles communities living in assumed borderlands play in inter- and intra-regional interactions. In investigating attributes relating to pottery manufacture specifically reflecting interaction, I more directly investigate regional relationships to circumvent the issues surrounding the assumptions culture area definitions have imposed upon Neosho communities as well as the difficulties in associated typological definitions.

As presented in the dialogue on the background of Neosho research, the only diagnostic materials in Neosho assemblages are the decorated ceramics called Neosho Punctate. And importantly, it is unclear how Neosho Punctate relates to other decorated types made by surrounding communities outside of the Ozarks. Many surrounding communities also utilized varying configurations of punctates and incisions on their decorated wares, and there has been no systematic analysis to illuminate what differentiates these supposedly different types from one another. This immense overlap in typologies has resulted in difficult to implement ceramic categorizations, which has hindered past Neosho researchers in building interpretations about regional interactions. Much of the debate concerning Neosho origins has stemmed from the similarity of this Neosho Punctate pottery type to surrounding groups, and thus it was important to incorporate the ceramic technology and design as the first piece of these analyses. In order to incorporate the SNA techniques, the sample used must be more robust than the decorated ceramics would allow—in the most robust Neosho samples there are only about 20 decorated sherds—and consequently this study incorporates the examination of plainware ceramics as well as decorated ceramics to investigate multiple scales and intensities of relational connections between communities in this region. Importantly, when examining relationships between communities at a regional scale, pottery is in many ways an ideal material, as it can illuminate both small world or more interpersonal connections as well as larger scale social and political affiliations.

Scholars have demonstrated similarities in technological aspects of style relating to ceramic manufacture can reflect shared learning networks or similar enculturation into communities (Carr 1995). This study conscripts those logics to move away from broad typological characterizations which often limit our knowledge concerning Neosho people and towards an approach investigating community connections through similarities in pottery manufacture and design. Just as borderland theories are a building block of this research, communities of practice provide a foundation through which the network analyses can be interpreted. Ultimately, the techniques and procedures people used in crafting items like pottery are inherently social (Lemonnier 1993:2). At each step of the process, potters have intentions which become manifest in the material world, embedding these materials with information illuminating connections between those technical processes and the social worlds in which they inhabited. A potter's intentions and the process they enact in making their products essentially express their own social interests as well as those of the communities in which they lived (Latour 1993). Perspectives on communities of practice in archaeology emphasize the importance of the social context of learning production and the idea practice manifests habitus through production techniques (Bourdieu 1977, 1990; Dietler and Herbich 1998; Giddens 1991; Pauketat 2001; Pauketat and Alt 2005; Sassaman and Rudolphi 2001; Wenger 1998; Worth 2017).

The above ideas comprise the basic tenets in interpreting the construction and decoration of archaeological ceramics. The social interests encoded upon ceramics are variable by individual and community, and the differences in these materials can take many meanings. In the same sense, similarities in these materials can mean different types of connections and interactions are present between various potters' social worlds. Thus, ceramic materials are deeply embedded in many social networks and contexts (Appadurai 1996; Gosden and Marshall 1999; Gosselain 2000). When examining ethnoarchaeological studies, we can see potters often utilize techniques and tools identifying them as members of particular communities. Often, the techniques of clay processing, vessel formation, and even decoration are shared by groups of individuals at various scales. For instance, the groups representing potters who process and temper the clay similarly are more restrictive than those who decorate their vessels in the same way (Gosselain 1995, 1998, 2000). The groups to which these techniques are associated can be attributed to communal, local, or regional traditions.

From a material sense, and thinking archaeologically, meaningful distinctions can be made between high visibility and low visibility aspects of a pot's manufacture and design. Thinking about the different scales at which these networks of potters interact socially, in learning and practicing their craft, and thinking about the similarities of the techniques they utilize, we can make social and cultural inferences just from examining attributes of these ceramic materials. The visibility of attributes on ceramics has been shown to correlate to the types and intensities of relationships between groups, as briefly discussed above. For instance, lower visibility attributes relating to clay processing and vessel formation are more difficult to replicate unless a potter is taught these techniques within a community of practice (Bourdieu 1977, 1990; Crown 2014; Dietler and Herbich 1994, 1998; Giddens 1984, 1991; Minar and Crown 2001; Pauketat 2001; Pauketat and Alt 2005; Sassaman and Rudolphi 2001; Wendrich 2012; Wenger 1998; Wobst 1977; Worth 2017). Relative similarities in these low visibility attributes may signal more restrictive networks of interaction and practice in pottery manufacture (Dietler and Herbich 1998; Gosselain 1995, 1998, 2000, 2008, 2011). On the other hand, high visibility attributes like decoration type and design configuration are highly transmissible and replicable through wider networks of people (Gosselain 2000). Similarities in these higher visibility attributes impart information on broader networks of affiliation, as communities use these more visible elements to signal group membership. Both high and low visibility attributes are included in this study, not only to investigate relational connections at multiple scales and intensities in the region, but also to evaluate the Ozarks as a meaningful cultural borderland as these populations have constructed their lives there. This piece of the puzzle takes us one more step forward in making the meaningful unit of analysis the relational connections between communities rather than pre-determined typological categories.

The distinction between high and low visibility attributes allows this study to investigate cultural elements—in this case ceramic attributes and similarities signaling variable networks of social interaction—in a way which illustrates those relational connections are inherently multifaceted and variable (Gosselain 2000). This is an essential element for the framework of this study, as it allows for the incorporation of borderland theories emphasizing the multidimensionality of these spaces. Numerous scholars emphasize geographic borderlands encapsulate multiple overlapping and shifting social, economic, and political boundaries (Elton 1996; Lightfoot and Martinez 1995; Parker 2002, 2006). The models set forth by these scholars gives archaeologists a testable way to progress in our understanding of cultural borderlands, and a way to evaluate their efficacy in characterizing and interpreting archaeological datasets. The materials we study as archaeologists are all proxies for various overlapping and distinctive social processes, none of which should result in concurrent boundaries sharing the same meaning (Parker 2002, 2006). This research uses certain ceramic attributes as a proxy for social interaction and cultural connections between communities (e.g., Carr 1995; Hart 2012; Hart and Engelbrecht 2012). Importantly, the separation of high and low visibility attributes of ceramic manufacture and design already investigates two different levels of interaction, and these should not be expected to result in concurrent boundaries using the borderland theoretical logics.

Therefore, by stitching together a communities of practice framework with borderland theories, we deemphasize essentialized ceramic typologies which sometimes mask important and variable social relationships in favor of approaches asking questions about how societies at multiple scales organized themselves and forged their connections to other peoples. For the investigation of Neosho communities' relationships to surrounding groups, this meshwork of relational theoretical perspectives mitigates the categorical issues surrounding previous research and allows us not only to characterize the complex networks of connections between people in this region but will also evaluate preconceived assumptions communities residing in the Ozark Plateau were peripheral to these regional networks.

Integrating Social Network Analysis as an Evaluative Tool

Social network analysis (SNA) is an ideal tool to utilize in investigating these multifaceted connections between communities because of its relational perspective (Borgatti and Halgin 2011; Borgatti et al. 2013; Knappett 2011, 2014, 2016; Mische 2011). As already established, a relational perspective is essential in any archaeological research, especially one such as this. Network analyses and associated perspectives have become increasingly popular in the social sciences in the last fifty years, and there has been an increase in its application in archaeological research in the past two decades (see Borgatti et al. 2009 and Mills 2017 for recent reviews). Their popularity is in part because the approach emphasizes the connections—known as ties in the network lexicon—between various entities rather than on the categorical entities themselves. The meaning of these ties, as with any relationship, varies considerably from study to study. They can represent relationships based on economic transactions (e.g., trade networks) or even shared identities at various scales. Network approaches are inherently interdisciplinary, as they are utilized in concert with a wide set of theories spanning numerous fields. In the current study, for instance, the relationships are constructed from shared ceramic practices ultimately signifying two levels of interaction: affiliation (cultural and social) and potentially shared learning communities.

Formal network applications in archaeology mostly manifest in the use of SNA, which is a set of methods and theories developed mostly in sociology (Mills 2017). The recent popularity in its use in archaeology no doubt stems from the ability to use these perspectives in conjunction with different research-specific and goal-oriented theoretical orientations to investigate how communities and individuals structured their relationships (Knappett 2013). Ties between entities—formally called nodes—indicate relationships then interpreted using a wide range of anthropological theories. When used in conjunction with theories such as the ones presented above (i.e., borderland and communities of practice), SNA is an effective tool to map social interactions between nodes representing sites, communities, households, and peoples (Golitko and Feinman 2015; Golitko et al 2012; Lulewicz 2018; Östborn and Gerding 2014; Peeples 2011, 2018b; Thompson et al. 2017).

Broadly, archaeologists are commonly interested in understanding past human activities which can be modeled, interpreted, and explained using relational concepts. Network perspectives and SNA has allowed archaeologists to better investigate and express assumptions about relationships between various entities, what those relationships may signify, how they affect other relationships in the network, as well as the behaviors and opportunities afforded by those connections (Brughmans et al. 2016). Researchers have utilized the tools available within SNA and associated network perspectives to investigate the connections between power and cultural roles (e.g., Borgatti 2006; Borgatti and Everett 2006; Faust 1997), to inform archaeologists about connections via identity and affiliation (e.g., Hart and Engelbrecht 2012; Peeples 2011, 2018b), to investigate the structure of networks of trade and exchange (e.g., Golitko and Feinman 2015; Golitko et al 2012; McPherson et al. 2001; McPherson and Smith-Lovin 2002), to consider the effects of migration or other social transformations on social networks (e.g., Borck 2016; Borck et al. 2015; Mills et al. 2016; Peeples 2011, 2018b), and to explore social histories through time (e.g., Lulewicz 2018).

Unlike those fields of study directly examining relationships between contemporary peoples, archaeological applications of SNA must rely upon material proxies to infer relationships. Provenance studies are commonly utilized in these analyses, to deduce potential relationships between communities based on raw material procurement and trade (e.g., Mills et al. 2013; Peeples 2011, 2018b). Provenance is not necessary to suppose relationships in the archaeological record. This study takes inspiration from others (e.g., Birch and Hart 2018; Hart and Engelbrecht 2012, 2017; Hart et al. 2016; Hart et al. 2017; Lulewicz 2018, 2019; Mills et al.

2015; Peeples 2011, 2017, 2018b; Peeples and Mills 2018) which seek to understand relationships between entities via assumptions concerning various forms of practice—in this case, the practice of manufacturing and decorating ceramics. Material similarities are utilized in these studies as a proxy for understanding social relationships and interaction through those practices. As discussed above, practice theories emphasize various social relationships can be inferred from similarities in the material manifestations of those practices. In a network sense, we can take those theories one step further to map those connections and understand the overall structure of the relationships in question. For this study, combining the relational network perspectives with the outlined theoretical framework, we are able to investigate the overall structure of relationships in this region based on similarities in ceramic practice and design as well as evaluating the interconnectedness of Neosho communities living in an assumed borderland to surrounding groups.

When utilizing network approaches, it is important to make note of several points. Much like any other archaeological research, the design of this study and interpretations come from etic contexts assuming the attributes selected for analysis (e.g., surface treatment, temper) infer a social relationship. Though variation in these attributes does likely reflect certain relationships, it does not necessarily mean these variables were meaningful in the construction of social identities or played a significant role in maintaining the structure of regional networks of interaction. Similarities in the selected attributes selected infer social interactions did occur between these communities but does not mean these attributes and their similarities are significant to these groups in terms of the maintenance of these relationships. These issues are not unique to the current study, but are noteworthy, nonetheless.

Additionally, network perspectives and SNA techniques are utilized in this study partially as a means of evaluating our presuppositions about cultural borderlands, such as the one assumed to exist in the Ozarks. This is not to say network approaches assume natural or social boundaries do not exist. On the contrary, network approaches emphasize meaningful boundaries are identifiable utilizing these methods, the difference is these boundaries are not presupposed prior to beginning analyses (Terrell 2013). SNA provides archaeologists a route towards evaluating our constructed typologies and taxonomies, as well as reconstructing networks which can identify those boundaries based on our theoretical understandings of social relationships and their overall construction.

While SNA gives researchers a toolkit to evaluate and investigate relationships, borderlands, and categories using archaeological data, it does also require input and decisions from the user in order to build the networks. In other words, these techniques, though powerful tools for the analysis and visualization of relational networks, still requires some level of input from the archaeologist running the analyses. In the protocols this research utilizes, for example, there are several points requiring decisions to be made to determine not only the spatial extent of the study, but also clustering solutions based on the data compiled in that spatial extent. As a regional study, this research begins at a stage which eliminates previously defined typologies proven to be difficult for researchers to implement and have limited our understanding of regional interactions, and instead moves towards an attribute analysis compiling regional data on pottery manufacturing and design to construct a network based on similarities of those various techniques at the site level. In this process, a key stage is summarizing the data based on statistical analyses to determine and define clusters of ceramics with similar attributes, and the number of clusters to be utilized is ultimately up to the archaeologist's understanding of these data and interpretation of preceding statistical tests. Ties in the network are constructed from similarities in count data comprising the number of sherds in each cluster at the site level. This discussion is to highlight while SNA is a valuable tool to evaluate and investigate relationships, it is not without researcher bias and input. Importantly, these techniques do still allow archaeologists to move away from presupposed categories to more relational approaches, and is therefore still useful in understanding and characterizing networks of human interaction.

Building the Protocol: SNA on Neosho and Surrounding Communities

Building upon the previous discussions of communities of practice and borderlands, we see the research design presented here changes the meaningful unit of analysis to relational connections between communities at multiple scales or intensities based on pottery manufacturing techniques as illumined through smaller-scale attributes rather than pre-determined categorical differences. SNA has already been proven to be an effective tool in mapping social interactions between peoples and communities at various scales (e.g., Golitko and Feinman 2015; Golitko et al 2012; Lulewicz 2018; Östborn and Gerding 2014; Peeples 2018b; Thompson et al. 2017). When combined with an SNA approach, which is inherently relational, we can visualize the connections elucidated by similarities in high- and low-visibility attributes relating to pottery manufacture and design. As such, we can examine Neosho communities' positioning within intra-and inter-regional interactions and evaluate impressionistic assumptions of Neosho as a borderland society (Borgatti and Halgin 2011; Borgatti et al 2009, 2013; Brughmans 2010; Brughmans et al. 2016; Crabtree and Borck 2019; Knappett 2011, 2013, 2016; Mills 2017; Mische 2011; Peeples 2019).

Researchers have already proven the validity of conducting SNA analyses in conjunction not only with communities of practice frameworks, but also with existing borderlands theories or in critique of the perceived stagnation of groups who reside therein (e.g., Borck 2016; Hart and Engelbrecht 2012, 2017; Hart et al. 2016; Hart et al. 2017; Hart et al. 2019; Lulewicz 2018, 2019; Peeples and Mills 2018). Studies such as those completed by Lulewicz (2018, 2019) and Borck (2016) illustrate the need to reexamine and reevaluate traditionally understudied regions like borderlands and illustrate the analytic power of SNA an ideal tool in helping interpret and understand the role of communities living in these areas as active agents. Other studies have used SNA to examine the fluidity of boundaries through time (e.g., Hart and Engelbrecht 2012, 2017; Hart et al. 2016; Hart et al. 2017).

The important work undertaken by Peeples and Mills (2018) as well as Hart et al. (2019) resulted in the development of techniques and tools to examine borderland and frontier contexts using SNA. Specifically, they provide explicit methodologies for identifying and investigating these spaces with archaeological datasets. These researchers set a foundation in SNA borderland research that identifies the relational network properties of communities that do indeed reside in edge regions (i.e., a borderland as discussed in the current study). These archaeologists use network approaches to investigate regional relationships and then evaluate those ties using a compiled list of borderland features that can be found in anthropological theories on edge regions (Anschuetz et. al. 2001; Fowles 2018; Gupta and Ferguson 1992; Herr and Harry 2018; Kohl 1987; Lightfoot and Martinez 1995; Rodseth and Parker 2005; Rösler and Wendl 1999; Stein 1998). Essentially, based on their work, we know that in examining network relationships constructed from archaeological datasets we can evaluate if they exemplify the common features of borderlands: location between major political and social formations, low population density, and increased social diversity (Herr and Harry 2018). In SNA terms, a borderland can be characterized by diverse and weak ties in relation to strong and homogeneous ties that occupy centralized areas (Peeples and Mills 2018:34). The communities with a higher proportion of weak ties also had a greater diversity of ceramic wares, suggesting that the social relationships of these communities were more widespread and diverse, a key characteristic of borderland groups. Likewise, it has been hypothesized that groups inhabiting an edge region may have acted as brokers between larger political and social entities, and these characteristics have been examined utilizing centrality network measures (e.g., Hart et al. 2017; Hart et al. 2019; Peeples and Haas 2013). These studies essentially built the foundation upon which this study was designed and that will evaluate impressionistic assumptions of Neosho as a borderland community.

As established in previous chapters, the barriers in Neosho research mostly stem from the unevaluated assumption that the Ozark Plateau represents a meaningful cultural borderland. And borderlands are often most directly associated with geographic and ecological differences (Peeples and Mills 2018:28). As discussed in the previous paragraph, these are not and should not be the only criteria in characterizing a space as a borderland. And ultimately, topography should never be a sole characteristic utilized in determining if a space is at the edge, in that it is more important that archaeologists examine the actions and relationships of the communities in that area, which ultimately make that space meaningful (Gupta and Ferguson 1995). These basic tenets are the impetus for the research design of this study, in hopes of better understanding regional relationships, evaluating the Ozarks as a meaningful cultural borderland as Neosho communities constructed their social worlds, and hopefully overall gaining a better understanding of Neosho communities overall.

More specifically, this study has been tailored to the unique conditions presented by existing Neosho assemblages and our understanding (or lack thereof) of the lifeways of Neosho peoples and surrounding groups in the Eastern Woodlands and Great Plains. Most intensively utilizing the only distinctive material type available in these collections—ceramics—this study is the first in decades to intensively investigate Neosho communities. For emphasis, the research questions of this study are reproduced below:

- Were Neosho communities, in fact, peripheral to regional social networks (i.e., disconnected and isolated)?
- Does this part of the Ozark Plateau exhibit the characteristics of a cultural borderland (i.e., weak and diverse ties)? If not, where did these communities construct their boundaries?

As established above, a meaningful distinction is made here between low- and high-visibility attributes in terms of the types of relationships they signify—communities of practice of manufacture versus broader political/cultural affiliations, respectively (Bourdieu 1977, 1990; Crown 2014; Dietler and Herbich 1998; Giddens 1984, 1991; Minar and Crown 2001; Pauketat 2001; Pauketat and Alt 2005; Sassaman and Rudolphi 2001; Wendrich 2012; Wenger 1998; Wobst 1977; Worth 2017). This distinction is made to investigate different types of relationships between Neosho and surrounding groups more intensively. Table 5.1 outlines the attributes examined in these analyses, separated by relative visibility, as well as the potential relationships that their similarity can signify. Equally as important, the protocols followed in this study reflect the overall nature of Neosho assemblages in such a way that maximizes the use of available data.

Based on a pilot study completed in 2018 (Ford 2019b), it was determined that this research would need to include plainwares as well as decorated ceramics, to make the sample meaningful and robust for the SNA operations, and also to make those meaningful distinctions between visibility of attributes and associated relationships. This sample also allows for a more intensive discussion of relational differences between high- and low-visibility aspects of ceramic practice. The study sample, to be described more fully in subsequent chapters, was chosen to ensure that there was a minimum of 100 sherds to be examined from each site.

Table 5.1. Attributes and Social Correlates Examined

Attribute Type	Attributes	Correlates
Technological (low-visibility)	Thickness; Temper(s); Temper Sorting; Method of Manufacture; Surface Treatment (non-decorated)	Communities of practice of manufacture; networks of teaching and learning; face-to-face interaction; kinship;
Decorative (high-visibility)	Decoration Type; Decorative Intent and Configuration; Decoration Location; Punctation shape; Incised/Trailed line Spacing	Signaling networks; cultural affiliations; networks among heterogenous communities; non-kin networks

Most explicitly, the main SNA statistical protocols followed in this study mirror those of Peeples' (2011, 2018b) examination on network connections of technological attributes on corrugated ceramics in the southwestern United States. What follows is a general description of the protocol that will be more fully elaborated in Chapter 7. Once the attribute data has been collected, it will be separated based on relative visibility. Three networks are to be constructed, one using the relatively low-visibility attributes collected on plain sherds and two that examine high-visibility decorative elements. Correlative measures are run to investigate the relationships between variables within and among site data, to eliminate attributes constrained by functionality rather than social processes. After these analyses, the attribute data is converted to similarity matrices which summarize the relative similarities of every sherd against every other sherd in this region. Gower's general coefficient of similarity is utilized to calculate these similarities, as it operates on multiclass data such as the nominal, ordinal, and continuous variables included in these analyses. The resulting similarity matrix is then converted to a Euclidean distance matrix that is then subject to principal coordinates analysis (PCoA), an ordination method similar to principal components analysis, that operates on distance rather than correlation or covariance matrices. PCoA is used to model the variation present in the data and highlight the strongest associations.

The PCoA scores are then subject to a K-medoids cluster analysis that ultimately will help the researcher define groups of similar vessels based on those Euclidean distances. This cluster analysis assigns each sherd in the region to a particular cluster or group. These statistical operations allow us to then organize the regional ceramic data into a matrix such that each site will have counts of sherds belonging to each cluster. That information is then utilized to construct a second similarity matrix, this time using the Brainerd-Robinson (BR) statistic, which is a measure of similarity that operates on single-class data to show the differences in proportions of individual categories (Habiba et al. 2018). The BR scores ultimately represent the data that is input into the network analysis to construct the network ties based on technological and design similarity. The statistics and similarity measures are all calculated using code developed in R (Luke 2015; Peeples 2011, 2017, 2018b) and the networks are constructed, manipulated, and analyzed using UCINET, an intuitive network analysis software (Borgatti et al. 2013).

These operations are run multiple times, once on the low-visibility ceramic attributes collected on plainwares and then twice more examining high-visibility decorative attributes. The decorative attributes were separated based on decoration type (i.e., punctated versus incised) in order to control for the effects that missing data might have on the networks themselves. Thus, there are two separate networks for the decorated wares in this regional sample. This also allowed for a more in-depth examination of the affiliative relationships as constructed from the data collected on the punctated ceramics, which were the type that was most intensively utilized (unsuccessfully) by previous researchers to hypothesize about Neosho's relationships to surrounding groups. The networks constructed on low-visibility attribute data using this protocol assume that communities that made and used similar numbers of sherds in each of the clusters are also communities that were inhabited by potters that utilized similar manufacturing practices, therefore representing relationships between more restrictive learning communities. The networks constructed using high-visibility decorative attributes represent broader cultural, social, or political affiliations and connections.

Unfortunately, the data reported here was not robust enough to utilize the statistical methods set out by Peeples and Mills (2018) and Hart et al. (2019). Instead, the networks were constructed to highlight the strongest relationships and were evaluated holistically, meaning in examining the overall structure of regional networks ties, using centrality measures to investigate potentially central sites in the network, and in examining the interconnectedness of sites included in the study. In examining these network characteristics, this research will be able to investigate Neosho in similar ways to these other SNA and borderland scholars, but in ways that make the most use of the data collected. By examining the overall network structure and interconnectedness of the sites in the region, this research will investigate if Neosho communities maintained strong affiliative ties to one another—distinguishing their cultural community from that of surrounding groups—and as a result also evaluate if these relationships share the characteristics of a cultural borderland (i.e., weak and diverse). If ties between Neosho communities are relatively weak (i.e., low BR scores) but they have numerous strong ties to the surrounding communities, this may mean that the Ozarks do indeed represent a cultural borderland when examining ceramic practices. Conversely, if Neosho maintained strong ties to one another (i.e., they are strongly interconnected) and only preserved a couple ties to the surrounding groups, this instead suggests that the Ozarks are not a cultural borderland.

Conclusion

Using these theories, strategies, inferences, and interpretations, this study examines Neosho communities' place in these regional networks, evaluates the Ozarks as a meaningful cultural borderland, and additionally can potentially signify where communities in this region built and maintained their own boundaries in terms of ceramic practices. By incorporating an innovative set of theories and methodologies emphasizing archaeology's new focus on relational perspectives, I ask new questions which investigate the Ozarks as a space that is dynamic and complex within which communities were crafting nuanced relationships with one another.

The specific protocols followed will be more fully described in subsequent chapters, as these analyses are undertaken. The above operations and theories were selected to best characterize the network relationships accounting for the nuances of Neosho and surrounding datasets. Unlike other regions where network analyses have become commonplace (e.g., the southwestern US), the current study area does not have the robust datasets that those areas are privileged to incorporate. Nonetheless, the protocol designed above is designed to operate on what some would call "less than ideal" datasets, to begin the important work of intensifying the study of these understudied areas and to further develop evaluative tools to investigate presumed cultural borderlands. The next two chapters will characterize the regional ceramic data and construct the social networks in order to answer the research questions as presented above and contextualized within earlier discussions.

Chapter 6

Characterizing the Regional Ceramic Dataset

The site sample was chosen not only to update our current knowledge on Neosho communities and their relationships to surrounding groups, but also to maximize what we could learn about Neosho ceramics overall. This chapter aims to discuss the ceramic typologies of plain and decorated wares in the region to better understand the difficulties past researchers encountered and to contextualize the attributes chosen for measurement on these ceramic materials, as well as to utilize the data collected from each site discussed in Chapter 3 to analyze trends in the ceramic sample. This discussion represents an intensive update in our knowledge on Neosho ceramics in the region and their relationships to the ceramics of surrounding groups, in the hopes that future researchers are better equipped to understand these Late Pre-Contact communities. This chapter also presents the foundation upon which the subsequent social networks and associated interpretations will be built.

Setting the Stage: Collection Difficulties and Sample Sizes

As stated above, the sample of sites in these investigations were chosen to maximize what could be learned not only about relationships in the region—focusing intently on Neosho communities—but also to better understand Neosho ceramic design overall. In total, I analyzed the ceramics from 23 sites in the region, including 17 Neosho sites, 2 Lower Walnut sites, 2 Fort Coffee sites, 1 Oneota, and 1 Unaffiliated site. Chapter 3 describes the current knowledge of each Neosho site in these analyses as well as the sites chosen to represent the surrounding regions. The sites incorporated into the network analyses vary, as the sample sizes for each site varied considerably. If a site only had one sherd that fit the criteria for any given network (e.g., if only one was punctated and/or incised), it was excluded from the construction of that network. As such, not all of the Neosho sites examined were included in each network, due to their small sample size. The ceramic sample is described below in its entirety, and I describe the network analysis samples in the subsequent chapter. One of the main points of this research is to understand if and how researchers can use these less-than-ideal datasets to investigate complex relational questions and to utilize new methodologies and theoretical frameworks in doing so. Thus, while the sample was difficult to define and obtain, the work will show that such research is worthwhile to undertake.

As briefly discussed in Chapter 3, there were issues with some of the Neosho legacy datasets, leaving only 24 known Neosho sites available for analysis. Other unanticipated issues include that the unaffiliated Eastern Woodlands site samples were much smaller than originally anticipated, leaving 1 site robust enough to include in these analyses. Table 6.1 describes the ceramic sample in each of the sites examined and Table 6.2 describes the sample in terms of the community or culture to which they have been assigned.

Additionally, during these investigations several difficulties emerged because of the COVID-19 pandemic as well as the very nature of working with legacy collections. Access to collections was difficult to obtain during the pandemic. Data collection was due to begin in March 2020 but was postponed to August 2020 due to shutdowns and restrictions. Originally, this research aimed to examine all known Neosho collections as well as a more robust comparative dataset from surrounding regions. The sample was adjusted to maximize the amount that I could learn about Neosho communities and their relationships to surrounding groups and simultaneously to work within museum restrictions and time constraints. Rather than completing data collection on site at the repository at the Kansas State Historical Society (KSHS), I was

Table 6.1. Number of Sherds by Site

Site	Plain	Decorated	TOTAL
34DL20	13	1	**14**
34DL27	185	13	**198**
34DL28	214	22	**236**
34DL29	751	76	**827**
34DL30	212	19	**231**
34DL31	30	0	**30**
34DL32	115	9	**124**
34DL39	722	50	**772**
34DL96	40	2	**42**
34MY18	285	22	**307**
34MY54	25	17	**42**
34MY66	16	0	**16**
23LA259	61	18	**79**
23MD43	178	10	**188**
23MD147	165	12	**177**
23MD148	56	1	**57**
3BE187	106	1	**107**
34HS9	963	35	**998**
34HS24	250	26	**276**
14CO1	989	46	**1035**
14CO3	264	8	**272**
23SA131	272	121	**393**
3CW11	87	10	**97**
TOTAL	**5,999**	**519**	**6,518**

Table 6.2. Number of Sherds by Culture

Culture	Plain	Decorated	TOTAL
Neosho	3,174	273	3,447
Fort Coffee	1,213	61	1,274
Lower Walnut	1,253	54	1,307
Oneota	272	121	393
Unaffiliated	87	10	97
TOTAL	**5,999**	**519**	**6,518**

required to borrow collections and adjusted the sample to examine two Lower Walnut assemblages (as opposed to the original 8 included in the research design), both of which were utilized by Wedel (1959) in the definitions of Cowley Plain and decorated varieties still referred to today. Additionally, I originally aimed to include 3 Little River phase communities in these samples, as they are contemporaneous and neighboring to Lower Walnut, but those were eliminated due to the restrictions at KSHS. To keep the datasets from surrounding groups balanced, I adjusted the sampling of Fort Coffee phase communities as well to examine 2 assemblages (as opposed to the original 10 that I intended to examine). These difficulties and limitations on the sample are not a hindrance to the overall conclusions of this research but do highlight the need for continuing work on these questions and datasets.

The following sections will outline the reasons that I believe previous Neosho researchers had difficulties building interpretations and conclusions about regional relationships and will present the ceramic data and analyze meaningful trends.

Building the Ceramic Analysis: Typological Differences, Attribute Selection and Rationale

As discussed in Chapter 3 of this dissertation, archaeologists have long been interested in understanding Neosho's relationships to their neighbors and predecessors. In fact, these two questions comprise the majority of the research on Neosho since its original definition in the 1940s. The primary tool that archaeologists have utilized in their many attempts to answer these questions are the ceramics, primarily the punctated ceramics as these have shown to be the only distinctive material culture of Neosho communities. As touched upon briefly above, one of the big barriers for understanding any and all relationships between Neosho communities and surrounding groups likely stems from a lack of understanding of the similarities and differences between these materials as manufactured by various communities in the region.

In designing this regional study, the issues surrounding the implementation of these many typologies and its impact on past research has come more into focus. In zooming out to evaluate and examine regional relationships, it has become clear that the typologies that are discussed below were difficult for past researchers to implement in their analyses and interpretations of Neosho identity. Because of the ways typologies are generated, there are not often any cross-regional comparisons that can fully describe the variation that archaeologists see in the assemblages, and consequently there is limited understanding of the similarities and differences between ceramics produced by the many communities living in this area. Additionally, it is difficult to write a precise and reproducible typology that will aid in the identification of ceramics produced by any given group, let alone to construct theories and interpretations about identity based on their comparison. This is especially apparent in the region studied in this dissertation, where there are area-specific terms for plain wares (though they are all shell-tempered with similar manufacturing techniques), but also no real lucidity in how to distinguish between the decorated wares in the area, other than their geographic location. If a punctated sherd was found at a site in the Ozarks of northeastern Oklahoma and dated to the Late Pre-Contact, it was often uncritically categorized as Neosho Punctate without any inquiry into what made that decorated sherd Neosho rather than that produced by another community. I expand upon this discussion below, but essentially this illustrates not only why a regional study is needed, but also why an attribute approach was taken to ignore the existing typologies in favor of analyzing regional patterns and characteristics.

During the Late Pre-Contact period, groups heavily utilized shell temper in their ceramics in varying quantities, built similar vessel forms, and utilized similar decorative techniques (i.e, combinations of incised/trailed lines and punctates). Fort Coffee communities continued to manufacture some fineware types consistent with Arkansas River Valley and Red River Caddoan Mississippian contexts that are more readily distinguishable, but specifically I am referencing the types Braden Punctate and Braden Incised as well as the other types in the region like Neosho Punctate and decorated varieties of Cowley Plain. All these ceramics include some combination of decorative techniques including incised lines, punctations, and appliqué appendages in highly variable configurations. To date, before the completion of the current analyses, there have been no systematic investigations of the similarities and differences between plain and decorated ceramics in the region.

Table 6.3 compares the established ceramic typologies for plainwares in the region in question, focusing most intently on the wares that have immense overlap, causing confusion among archaeologists. These types are essentially just area-specific terms for plainwares, and there is no indication from the extant discussions that meaningful differences exist between them. Though Freeman and Buck (1960) once split Woodward Plain into two varieties (i.e., Reed variety and Neosho variety), researchers do not distinguish between these varieties anymore in their analyses. Therefore, I have also collapsed these varieties into the general category as discussed by Hall (1951) and Brown (1971). The only supposed typological difference based on these comparisons comes from the Oneota plainwares, which have rounded bases while the other plainwares all have flat bases (Henning 1970:30-42; 1998:352-360). Another typological

Table 6.3. Typological Comparison of Plain Wares

Ware	Temper	Surface Treatment	Bases	Rims	Distribution	Citations
Woodward Plain	Crushed shell in varying amounts	Smoothed/Plain	Flat, circular	Incurvate, Flaring, recurved; flat, thinned lips	Arkansas River Valley and the Ozark Plateau; Fort Coffee, Neosho affiliations	Brown (1971); Freeman and Buck (1960); Hall (1951); Rohrbaugh 1982 (415-420)
Poteau Plain	Crushed shell in varying amounts	Slipped (mostly exterior); burnished	Flat, circular	Direct, flaring; lips can have notches or tabs	Arkansas River Valley and the Ozark Plateau; Fort Coffee, Neosho affiliations	Brown (1971:184)
Cowley Plain	Crushed shell, sometimes sand inclusions (natural)	Smoothed/Plain	Flat, Circular	Straight/vertical most common, recurved/flaring; lips rounded, rarely flattened	Walnut River Valley; Lower Walnut affiliations	Wedel (1959:360-361); Stein (2012:255, 256-258)
Oneota (no type)	Crushed shell in varying amounts	Surface polishing/burnishing	Rounded	Straight/vertical, recurved, flaring	Chariton River region, Oneota affiliated	Henning (1970:30-42; 1998:352-360)

difference is in Poteau Plain that has been found throughout the region, with the surface of these sherds being slipped and often burnished (Brown 1971:184). However, Brown (1996) and Hammerstedt and Savage (2021) have illustrated that Poteau Plain is also difficult to distinguish because of the wide variation within this category. Shell temper was widely utilized at this time in varying quantities, and in some instances, there are inclusions like grit and sand that may be natural inclusions in the clay, though more research is needed to investigate this hypothesis. As can be seen from this brief discussion, while there seems to be some differences between plainwares in the region, an overreliance upon these typologies, which essentially are just area-specific names for plain shell-tempered ceramics, has made it difficult for researchers to fully understand regional relationships. For these reasons, the current study takes an attribute approach to the study of these ceramics in order to analyze the characteristics of these ceramics and the practices of the potters who made them, investigating instead the connections between these communities.

Importantly, due to the small sample size of decorated wares in these assemblages, many archaeologists chose to define these decorated ceramics as varieties of their plain counterparts. Table 6.4 fully describes these decorated ware typologies as outlined by scholars in this region. It is also worth noting that much of the decoration for these ceramics is restricted to the upper shoulder, rim, and lips of vessels, and as such it is entirely possible that some plain sherds associated with Woodward Plain, Cowley Plain, and Oneota plainwares actually represent portions of decorated ceramics such as Neosho Punctate, Braden Punctate, Braden Incised, Cowley Decorated, and Oneota decorated wares. In examining the decorated ceramic typologies, it is obvious that there is immense overlap in the types of decoration applied to the vessels, with

Table 6.4. Typological Comparison of Decorated Wares

Ware	Temper	Surface Treatment	Bases	Rims	Distribution	Citations
Neosho Punctate	Crushed shell	Decorated shoulder, rim, lip; more smoothing on rims; decoration limited to punctating (oblique tool, tooled, fingernail) incising, trailed lines, and applique nodes	Flat, circular	Incurvate, Flaring, recurved; flat, thinned lips	Ozark Plateau; Neosho affiliation	Freeman and Buck 1960
Braden Punctate	Crushed shell	Punctations from shoulder to rim, some also incised; fingernail punctations dominate, though reed punctations (hollow) also occur	Flat, circular	Direct, Flaring, recurved; flat, thinned lips	Arkansas River Valley; Fort Coffee affiliation	Brown (1971:153); Rohrbaugh (1982:460-464)
Braden Incised	Crushed shell	Incised lines from shoulder to rim; lines arranged in triangular areas (herringbone); similar to Canton Incised (Suhm and Jelks 1962:23-24)	Flat, circular	Direct, Flaring, recurved; flat, thinned lips	Arkansas River Valley; Fort Coffee affiliation	Rohrbaugh (1982:456-460)
Cowley (Decorated Variety)	Crushed shell	Diagonal incisions on lip, some punctations (fingernail); applique nodes on handle; some trailed and incised lines; some slipped sherds	Flat, circular	Straight/vertical, recurved/flaring; lips rounded, rarely flattened	Walnut River Valley; Lower Walnut affiliation	Wedel (1959:360-361)
Oneota Decorated (no type)	Crushed shell	Trailed lines, punctations (oblique tool) on body/shoulder/rim; post-decorative smoothing; notched lips	Rounded		Oneota -Chariton River region affiliation	Henning (1970:30-42; 1998:352-360)

each type including some combination of incised or trailed lines, punctations, and in many instances appliqué attachments. The differences manifest, based on the analyses to be presented below, in the types and location of punctations (i.e., the tools used), variation in the width and depth of incisions and trailed lines, as well as overall design configuration and complexity. Various scholars (e.g., Freeman and Buck 1960; Henning 1960) in each of the areas in question have discussed design configuration within their own culture areas and speculated upon potential relationships to surrounding groups, but none have completed a systematic evaluation of regional similarities and differences (see Figure 3.2). The current study represents the first to fully evaluate these ceramics regionally, based on a suite of ceramic attributes deliberately selected to capture any potential variation in the sample.

Based on the existing typologies and discussions of the decorated ware varieties in this region, it is unsurprising that there is confusion about the relationships in the region overall. Within Oneota and Neosho Punctate alone, there is an incredibly wide range of design configurations. According to Freeman and Buck (1960:12), there are 32 separate design configurations that fall underneath the category "Neosho Punctate" alone (Figure 3.2). Some of these Neosho designs, based on their description and drawings, overlap with the descriptions of Oneota decorated wares as well as with Fort Coffee's Braden Incised and Braden Punctate types. Rohrbaugh (1982:156-158, 195) notes that Braden Punctate and Braden Incised were misidentified in the original investigations at 34HS9 and 34HS11 as Neosho Punctate. Stein (2012:325), in his evaluation of Lower Walnut ceramic assemblages and their relationships to surrounding groups, also identifies what Rohrbaugh (1982) has classified as Braden Incised or Braden Punctate at Fort Coffee sites as Neosho Punctate. Thus, within the available literature and before any discussion of the data collected in the current study, we can see that there is confusion amongst archaeologists in the region in examining these ceramic types.

As such, this study was designed to collect data that will hopefully clarify the story of this region in terms of ceramic manufacture and design. The attributes presented in Chapter 5 (Table 5.1) were selected not only to build a robust sample for the network analyses to be described in Chapter 6, but also were tailored to systematically investigate similarities and differences in decorative techniques and design configuration. In doing so, this work aims to inform and aid future researchers in their analyses of ceramics in this region overall, hopefully leading to a better overall understanding of the interactions and relationships within and between these various communities. Based on the above typologies, attributes were selected in particular to examine potential variation in the overall construction and manufacture of ceramics in the region (i.e., temper, temper concentration, thickness based on vessel portion, method of manufacture) as well as to investigate potential nuances in decorative techniques (i.e., decoration type and configuration, punctation shape – interior and exterior, punctation depth and width, incised line width and depth, incised line interior shape, etc.). The next section will take an in depth look at the ceramic data to analyze patterns and trends statistically but will also summarize observations made by the author in her analyses that should not only inform future researchers, but the discussions found in subsequent chapters.

Describing Trends in the Ceramics: Clarifying the Regional Story

Before constructing the networks in the subsequent chapter, it was important to analyze trends in the ceramic data collected in this regional sample, to gain a better understanding of what potentially constitutes typical ceramic practice for Neosho communities versus that of surrounding groups. This section will go through the attributes examined in this study to fully examine and describe any variation present in the sample. I will begin with the attributes collected on all ceramics, focusing on the attributes that could illuminate differences between plainwares in the region, and end with a discussion of the variation in the decorative techniques. Reasoning for attribute and category selection will be presented within each variable discussion. In the final section of this chapter, I will present correlative measures to investigate the relationships between all of these variables. In doing so, I will be able to investigate which attributes to eliminate or include in the construction of the networks later in this dissertation. These discussions will provide a robust base upon which the network analyses in Chapter 7 will be built.

Thickness and Vessel Construction

Thickness was measured in mm using digital calipers for each of the sherds examined in the sample. To examine variation in vessel construction, these measurements were paired with an observation that noted what portion of the vessel was represented, as this would likely affect the thickness in some instances. The vast majority of sherds (82%) were representative of the body of the vessels, with other observed vessel segments including the rims (9%), bases (5%), shoulders (3%), and handles (1%). The average thickness was calculated at each site based upon the vessel segment represented. Table 6.5 presents these data by site and Table 6.6 examines these thicknesses by culture to illuminate any variation in vessel construction. Overall, it seems that handle fragments represent the thickest segments followed by basal sherds.

As noted in the above typological comparisons, most of the plainwares seem to be constructed in similar ways. We can see these similarities manifest in the thickness measurements, with the Neosho, Fort Coffee, Lower Walnut, and Unaffiliated wares having

Table 6.5. Average Thickness (mm) by Site and Vessel Portion

Site	**Culture**	Rim	Body	Base	Shoulder	Handle	**Sample Size**
34DL20	Neosho	-	6.38	-	4.20	4.95	**14**
34DL27	Neosho	7	6.25	8.86	4.1	-	**198**
34DL28	Neosho	5.87	5.84	7.06	6.00	10.4	**236**
34DL29	Neosho	5.85	6.19	7.24	7.8	8.02	**827**
34DL30	Neosho	5.54	6.01	7.23	5.83	8.9	**231**
34DL31	Neosho	7.1	7.34	8.6	-	-	**30**
34DL32	Neosho	4.63	7.42	6.95	5.5	8.7	**124**
34DL39	Neosho	5.71	6.31	6.94	6.48	9.1	**772**
34DL96	Neosho	5.38	6.82	-	6.4	-	**42**
34MY18	Neosho	6.45	7.47	10.15	6.8	9.85	**307**
34MY54	Neosho	6.06	7.91	-	5.47	-	**42**
34MY66	Neosho	-	7.01	-	-	-	**16**
23LA259	Neosho	5.96	6.38	8.24	6.49	10.4	**79**
23MD43	Neosho	5.43	6.29	11.88	6.9	10.4	**188**
23MD147	Neosho	6.53	5.95	7.46	9.55	-	**177**
23MD148	Neosho	4.3	5.98	4.4	5.5	-	**57**
3BE187	Neosho	5.74	5.88	9.65	5.45	8.75	**107**
34HS9	Fort Coffee	6.17	6.63	9.27	6.63	11.91	**998**
34HS24	Fort Coffee	6.05	6.46	10.17	6.27	7.3	**276**
14CO1	Lower Walnut	5.88	6.19	9.97	6.19	13.3	**1035**
14CO3	Lower Walnut	5.72	6.54	8.69	6.51	14.22	**272**
23SA131	Oneota	7.44	4.37	-	5.29	-	**393**
3CW11	Unaffiliated	6.27	6.87	9.16	6.93	9.4	**97**

Table 6.6. Average Thickness (mm) by Culture and Vessel Portion (important differences highlighted)

Culture	Rim	Body	Base	Shoulder	Handle
Neosho	5.89	6.37	7.7	6.28	8.78
Fort Coffee	6.14	6.59	9.45	6.48	11.45
Lower Walnut	5.85	6.26	9.76	6.27	13.56
Oneota	7.44	4.37	-	5.29	-
Unaffiliated	6.27	6.87	9.16	6.93	9.4

similar proportions in measurements. Some differences do occur, including that Neosho handles seem to be thinner overall than the rest, but it also seems that strap handles were more common in that sample than those for Fort Coffee and Lower Walnut sites. Neosho vessel bases are also thinner on average than the other cultures in the sample, but it is unknown to what extent the sample size is affecting these measurements.

Oneota vessels are unusual in their form according to these typologies, making it impossible to distinguish basal and body sherds. The reader will note that no basal sherds were examined in the Oneota sample. In examining thickness based on vessel portion, I wanted to examine if any other important differences manifest between Oneota plainwares and the other plainwares mentioned in the region. Especially as Neosho and Oneota are often compared to one another (mostly in terms of decoration and design configuration), the relationships between the wares in their samples were particularly important to understand.

As one can see in Table 6.6, there is another important difference to note between Oneota ceramics at the Guthrey site (23SA131) and the other communities represented in the sample. The rims of Oneota ceramics are the thickest in this sample overall, and based on these averages, they are the only communities to consistently construct rims that are thicker than the vessel’s shoulders and bodies. Additionally, the bodies and shoulders of Oneota ceramics are much thinner than the other communities. To ensure that the thin bodies of these pots would not collapse under the weight of the thick rims, it is likely that Oneota people were in many ways distinct in their community of practice for overall vessel construction.

Of course, differences in vessel thickness represented not only signifies potential differences in those lower-visibility and more restrictive communities of practice relationships but is also constrained by the function of the vessel overall. What the vessel is used for after its construction, whether it be storage or cooking, will necessarily affect how the vessel is made. It is possible that the differences in the thickness of some parts of Oneota vessels represent some varying functionality when compared to the other communities in the sample, but their pottery did also stand out in the original plainware typologies presented earlier in this chapter (i.e, rounded bases), so it is unsurprising that this variation carries into an examination of these attributes that more intensively examine vessel construction.

Temper and Concentration

Another variable that was important to better understand was the type and concentration of temper present in the clay bodies for each of these communities. Temper concentration is essential in clay recipes, often tailored not only to the unique characterization of the clays being used in vessel construction but are also often passed down through generations of potters and taught as part of ceramic communities of practice (Gosselain 2000). In the typological descriptions above, the predominate temper for each community is shell in varying concentrations, though no systematic observations of the variation in these concentrations has occurred. Variance in the concentration and size of shell temper could be constrained by many different factors, including the practices taught in various learning communities, but also by the clay itself and what is optimal to ensure the vessel is useable, and in some instances could be affected by form and function as well.

Some researchers also noted various other materials in the clay bodies, including grit and sand, though these were mostly dismissed as natural inclusions. For the purposes of these investigations, the author makes no assumptions on the deliberateness of the materials included in the clay bodies. More research is needed on clays in the region to understand these potential differences. Temper was categorized by type (i.e., bone, grit, grog, limestone, sand, and shell) and then by concentration at various levels (i.e., Fine, Medium, Coarse). Additional temper was also noted and is discussed below.

Tables 6.7 and 6.8 present the main temper types by site and by phase, respectively. These tempers were classified as the main tempering agents in the clay bodies of these vessels and are in higher concentrations than any other material present. As expected, the predominate temper used by all these communities is shell (94%). This observation is consistent with the above typological descriptions. Interesting variation does exist in the other materials used as main tempering agents. For instance, when these communities weren't using shell to temper their pottery, it seems that Neosho sites also contained many grit- tempered sherds, in higher concentrations than the other communities, and Lower Walnut people more often used sand and grog. Fort Coffee communities also utilized sand and grog in various instances and Unaffiliated Eastern Woodlands communities also utilized grog.

While the patterns mentioned above and presented in the tables below illustrate some degree of uniformity in the tempering agents that these communities used, it was observed by the author during data collection that sherds in the Ozarks at Neosho sites seemed to include more grit than others in the sample, and that Lower Walnut sherds often included a great deal of sand,

Table 6.7. Main Temper by Site (% of Total)

Site	Phase	Bone	Grit	Grog	Limestone	Sand	Shell	Sample Size
34DL20	Neosho	-	-	-	-	-	100	**14**
34DL27	Neosho	-	5.56	1.01	-	-	93.43	**198**
34DL28	Neosho	-	0.4	-	-	-	99.58	**236**
34DL29	Neosho	-	1.93	-	-	-	98.07	**827**
34DL30	Neosho	-	-	-	-	-	100	**231**
34DL31	Neosho	-	56.67	-	-	-	43.33	**30**
34DL32	Neosho	-	6.45	-	-	-	93.55	**124**
34DL39	Neosho	-	0.65	-	-	0.13	99.22	**772**
34DL96	Neosho	-	9.52	-	-	-	90.48	**42**
34MY18	Neosho	-	0.33	-	-	-	99.67	**307**
34MY54	Neosho	-	11.90	-	-	-	88.10	**42**
34MY66	Neosho	-	25	-	-	-	75	**16**
23LA259	Neosho	-	3.80	-	-	1.27	94.94	**79**
23MD43	Neosho	-	1.56	1.06	-	-	97.34	**188**
23MD147	Neosho	0.56	-	-	0.56	-	98.87	**177**
23MD148	Neosho	-	1.75	-	3.51	-	94.74	**57**
3BE187	Neosho	-	-	-	-	-	100	**107**
34HS9	Fort Coffee	-	-	0.1	-	0.1	99.98	**998**
34HS24	Fort Coffee	-	-	-	-	-	100	**276**
14CO1	Lower Walnut	-	0.19	3.19	-	13.53	83.09	**1035**
14CO3	Lower Walnut	-	-	2.21	-	43.01	54.78	**272**
23SA131	Oneota	-	-	-	-	-	100	**393**
3CW11	Unaffiliated	1.03	1.03	3.09	-	-	94.85	**97**

Table 6.8. Main Temper by Culture, Important Observations Highlighted (% of Total)

Phase	Bone	Grit	Grog	Limestone	Sand	Shell
Neosho	0.00	2.29	0.12	0.09	0.06	97.44
Fort Coffee	0	0	0.08	0	0.08	99.84
Lower Walnut	0	0.15	2.98	0	19.66	77.21
Oneota	0	0	0	0	0	100
Unaffiliated	1.03	1.03	3.09	0	0	94.85

important points of variation that could be explained in numerous ways, including that these are naturally occurring elements in the local clays themselves. Nonetheless, this is an important observation to make, as this variance is not captured by the original typologies and descriptions written and relied upon by various archaeologists in the past.

As stated above, temper concentration was also recorded. These concentrations are parsed out in two ways: particle size (fine to coarse) and then concentration (1 to 4) (Figure 6.1). In order to understand any differences present in the sample of shell-tempered ceramics (the predominate wares in the region as discussed in the above typologies), the author investigated variation in the particle size and concentration of shell temper based on community. Table 6.9 presents these data as percentages of the total number of shell-tempered sherds in each culture's sample.

Several observations can be made immediately based on these percentages. First, Oneota ceramics once again differentiate themselves from the other plainwares. Particle sizes of the shell in Oneota ceramics are overall much larger and present in higher concentrations, with nearly half (46.06%) being of medium particle size in the highest concentration category. Additionally, Oneota ceramics have a higher proportion of coarse shell temper than the other communities represented (19.59%). Neosho and Lower Walnut ceramics seem quite similar in the size of shell particles and concentrations utilized in their ceramics. There are similar proportions present in their samples of fine and medium shell particles, though Lower Walnut assemblages do show more instances of using coarse grains as well. Fort Coffee and Unaffiliated communities seem more likely to use medium-sized shell particles, representing 64.68% and 65.63% of the sample of shell-tempered sherds in those assemblages, respectively.

There are interesting variations as well in the additional temper present. This attribute was recorded only based on the type of temper present, rather than also recording grain size and concentration. When present, this attribute constitutes materials that do not comprise the majority of the material present in the clay body. As stated above, it is currently unknown if these additional tempering agents were deliberately added to the clay by the potters in question, or if they are natural inclusions that were simply not removed from the clay itself. Either way, it could be argued that keeping those inclusions is in some ways deliberate action on behalf of the individuals crafting the pots themselves. In this research, no argument is made either way, as more research is needed to understand the clays in these areas.

Tables 6.10 and 6.11 present the proportions of additional tempers added to the clays at each site and within each community or culture, respectively. It seems that Neosho ceramics include a higher concentration of grit (61.6%) in the clay body as a secondary temper. Lower Walnut vessels have higher proportions of sand (7.35%) and shell (11.78%) than the other communities represented in the sample. Thus, it seems there is variation present to suggest that these wares may be distinguishable by additional temper.

The differences in temper particle size and concentration are interesting to note in this regional sample. However, communities did not focus solely on any one of these attributes in teaching, learning, and creating their pottery. The narrative built by this chapter will set up the

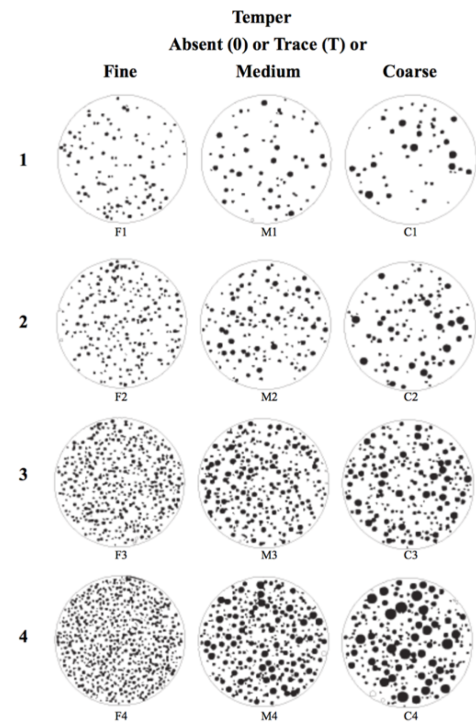


Figure 6.1. Temper Concentration Diagram (after Orton et al 1993:Figure A.4 and Matthew et al. 1991).

Table 6.9. Shell Temper Particle Size and Concentration by Culture (% of Total), Important Observations Highlighted

Culture	Fine				Medium				Coarse			
	F1	F2	F3	F4	M1	M2	M3	M4	C1	C2	C3	C4
Neosho	0.21	5.56	21.21	15.35	0.06	4.94	29.40	16.16	-	1.49	3.66	1.96
Fort Coffee	0.08	1.02	12.79	7.22	-	2.75	33.28	28.65	-	0.39	8.40	5.42
Lower Walnut	0.10	2.87	20.71	11.50	-	3.37	29.34	17.84	0.10	1.68	7.83	4.66
Oneota	-	0.25	6.36	6.11	-	0.25	21.37	46.06	-	0.25	8.14	11.20
Unaffiliated	-	-	13.54	10.42	-	-	31.25	34.38	-	1.04	5.21	4.17

Table 6.10. Additional Temper (when present) by Site (% of Total)

Site Number	Phase	Bone	Grit	Grog	Sand	Shell
34DL20	Neosho	-	0.07	-	-	-
34DL27	Neosho	0.07	4.87	1.16	0.15	0.51
34DL28	Neosho	-	2.91	-	-	0.07
34DL29	Neosho	-	18.40	1.16	0.07	0.36
34DL30	Neosho	-	3.35	0.07	-	-
34DL31	Neosho	-	0.65	-	-	0.15
34DL32	Neosho	-	5.89	-	-	0.22
34DL39	Neosho	-	14.91	0.15	-	0.44
34DL96	Neosho	-	0.36	-	-	0.22
34MY18	Neosho	-	3.85	-	0.22	0.07
34MY54	Neosho	-	0.95	-	-	-
34MY66	Neosho	-	0.29	-	-	-
23LA259	Neosho	-	3.27	-	0.44	0.29
23MD43	Neosho	-	0.73	0.58	0.65	0.36
23MD147	Neosho	-	0.29	-	-	-
23MD148	Neosho	-	0.44	-	-	-
3BE187	Neosho	-	0.36	0.29	-	-
34HS9	Fort Coffee	-	1.38	0.22	-	-
34HS24	Fort Coffee	-	0.22	-	0.07	-
14CO1	Lower Walnut	-	1.67	1.60	5.60	6.69
14CO3	Lower Walnut	-	0.07	1.02	1.75	5.09
23SA131	Oneota	-	3.05	-	-	-
3CW11	Unaffiliated	-	2.04	0.22	-	-

Table 6.11. Additional Temper (when present) by Culture (% of Total), Important Observations Highlighted

Phase	Bone	Grit	Grog	Sand	Shell
Neosho	0.07	61.60	3.42	1.53	2.69
Fort Coffee	-	1.60	0.22	0.07	-
Lower Walnut	-	1.75	2.62	7.35	11.78
Oneota	-	3.05	-	-	-
Unaffiliated	-	2.04	0.22	-	-

conclusions in which I will discuss the overall sample's variation and correlative measures will illuminate what attributes vary significantly by site and then also by culture or community.

Surface Treatment

Surface treatment on the ceramics in the region is often discussed only in terms of decorative techniques. Variation in decorative techniques and design will be explored later in this chapter. Some scholars in their descriptions of typical ceramics in this region do mention instances of burnishing and polishing, as well as one of the types being defined based on the presence of a slip. This attribute, in concert with the others recorded in this study, will hopefully illuminate potential points of variation upon which future researchers can build with more data. Variation in surface treatment can correspond to important differences between the communities represented in this sample. These differences can mean many different things, including once again the rules and parameters set out in different learning communities. Some surface treatments also have to do with functionality, ensuring that vessels could withstand the activities that the potters and communities intend. For instance, burnishing and polishing can ensure that a vessel is able to hold water, but this is not necessarily required. And other surface treatments are a function of vessel manufacture and finishing practices (e.g., scraping). Finally, for those surface treatments like slipping and of course decorations that are more highly visible, variation could signify meaningful differences between communities in terms of broader affiliations. Surface treatment was recorded as a nominal attribute, with each sherd categorized as having any one or combination of the following: plain (or smoothed), burnishing, decoration, brushing, polishing, scraping, and/or being slipped or filmed. The treatment of exteriors and interiors were recorded separately.

Tables 6.12 and 6.13 present the data for exterior surface treatment as percentages by site and culture, respectively. As expected, most of the sherds observed in these data are plain. The Oneota ceramics from the Guthrey site (23SA131) once again stand out, in that a higher proportion of the vessels (28.49%) had some form of decoration on the exterior. This difference could be due to excavation sampling bias and not due to underlying cultural factors. Excluding the plainwares from the sample, we see that potters in each community were in many instances choosing to burnish the exteriors of these vessels. The highest proportion of burnishing occurs at Lower Walnut communities (36.84%) as well as the Unaffiliated community at Beaver Pond (3CW11) (53.06%). Burnishing is a very deliberate act by the potters, as it requires an extra investment on their parts in finishing the vessel even before applying any decoration. Oneota ceramics observed in this study also have a higher proportion of burnishing on the exterior of vessels combined with decoration than the other communities (9.67%). Other exterior surface treatments occur in small proportions across all communities, including brushing, scraping, and slipping. At least one slipped vessel represents an Avery Engraved sherd located at one of the Fort Coffee sites.

Interior surface treatment was also recorded for each sherd in this sample. Tables 6.14 and 6.15 present these data as percentages for each site and community, respectively. Interior surface treatment in some contexts can illustrate vessel formation practices. It was clear to me in these analyses that the potters in all these communities were using the coil and scrape method, though some chose to smooth the interior of the vessels or apply other surface treatments. Once again, interior surfaces are predominately plain or smoothed. However, in some communities, there are higher proportions of scraping on the interior of the vessels. Oneota vessels have the highest percentages of scraping (12.56%). Oneota potters at the Guthrey site are also burnishing

Table 6.12. Exterior Surface Treatment by Site (% of Total)

Site Number	Plain	Burnished	Decorated	Brushed	Polished	Scraped	Slipped	Burnished, Decorated	Burnished, Slipped	Burnished, Slipped, Decorated	Decorated, Scraped	Slipped, Decorated	Sample Size
34DL20	76.92	15.38	7.69	-	-	-	-	-	-	-	-	-	**14**
34DL27	57.07	34.03	2.09	0.52	-	-	0.52	5.24	-	0.52	-	-	**198**
34DL28	80.26	9.87	6.01	-	-	0.43	0.43	3.00	-	-	-	-	**236**
34DL29	66.34	23.50	6.98	-	-	0.49	0.24	2.45	-	-	-	-	**827**
34DL30	70.80	19.47	6.64	-	-	1.33	-	1.77	-	-	-	-	**231**
34DL31	92.86	7.14	-	-	-	-	-	-	-	-	-	-	**30**
34DL32	89.83	-	7.63	-	-	-	2.54	-	-	-	-	-	**124**
34DL39	90.90	2.21	6.37	0.13	-	-	0.26	-	-	-	-	0.13	**772**
34DL96	60.98	34.15	2.44	-	-	-	-	2.44	-	-	-	-	**42**
34MY18	89.07	3.97	6.62	-	-	-	-	0.33	-	-	-	-	**307**
34MY54	35.71	30.95	23.81	-	-	-	-	9.52	-	-	-	-	**42**
34MY66	100.00	-	-	-	-	-	-	-	-	-	-	-	**16**
23LA259	44.30	31.65	12.66	-	-	1.27	-	10.13	-	-	-	-	**79**
23MD43	46.20	45.65	1.63	1.09	-	1.09	-	4.35	-	-	-	-	**188**
23MD147	74.42	18.60	4.07	-	-	0.58	-	2.33	-	-	-	-	**177**
23MD148	70.37	24.07	1.85	-	-	1.85	1.85	-	-	-	-	-	**57**
3BE187	60.82	38.14	1.03	-	-	-	-	-	-	-	-	-	**107**
34HS9	83.18	9.83	3.14	1.42	-	0.81	1.11	0.41	0.10	-	-	-	**998**
34HS24	53.82	34.91	6.18	-	-	-	1.09	2.91	0.36	0.73	-	-	**276**
14CO1	54.32	39.77	2.42	0.29	0.10	0.19	0.48	2.04	0.39	-	-	-	**1035**
14CO3	70.96	25.74	2.57	0.37	-	-	-	0.37	-	-	-	-	**272**
23SA131	46.56	21.63	18.32	0.51	-	2.54	0.25	9.67	-	-	0.25	0.25	**393**
3CW11	34.69	53.06	8.16	-	-	-	2.04	2.04	-	-	-	-	**97**

Table 6.13. Exterior Surface Treatment by Culture (% of Total), Important Observations Highlighted

Phase	Plain	Burnished	Decorated	Brushed	Polished	Scraped	Slipped	Burnished, Decorated	Burnished, Slipped	Burnished, Slipped, Decorated	Decorated, Scraped	Slipped, Decorated
Neosho	74.18	17.01	5.97	0.12	-	0.38	0.30	1.98	-	0.03	-	0.03
Fort Coffee	76.78	15.29	3.80	1.11	-	0.63	1.11	0.95	0.16	0.16	-	-
Lower Walnut	57.79	36.84	2.46	0.31	0.08	0.15	0.38	1.69	0.31	-	-	-
Oneota	46.56	21.63	18.32	0.51	-	2.54	0.25	9.67	-	-	0.25	0.25
Unaffiliated	34.69	53.06	8.16	-	-	-	2.04	2.04	-	-	-	-

the interiors of their pots more often than the other communities (13.33%). Additionally, it seems that Oneota communities were applying decoration to the interiors of the vessels more often than other communities (4.61%). This difference will be elaborated upon in subsequent sections of this chapter, but the author has observed a tendency for Oneota potters to apply punctates to the interior lip of their vessels, something that is distinctive of these wares overall. These punctates are not applied to the full extent of the interior lips but seem to skip over handle appendages. Other communities were also punctating the lips of vessels, but these were applied to the exterior. All other interior surface treatments happen in small proportions at all communities.

Decoration

This section will fully describe and elaborate the variation present in the sample in terms of decoration. As discussed above and in earlier chapters, decoration of vessels is one of the main points of contention between scholars who discuss Neosho "origins" and also their affiliations with either communities on the Plains or the Eastern Woodlands. Decoration was focused upon heavily in the analyses presented here because of the aforementioned difficulties in differentiating between what decorations people used in these various areas, what overlap there is, and what distinguishes them (if anything). I discussed the difficulties that discrepancies in scholars' interpretations of typological descriptions have created, leading to a confusing narrative of interaction upon which scholars do not agree.

As such, it was essential in the current study to parse out any and all variation that may exist in decorative techniques used by potters throughout the region. This meant creating an exhaustive attribute list to understand how these potters were applying decorations to their vessels, where these decorations were applied, and what design configurations communities were

Table 6.14. Interior Surface Treatment by Site (% of Total)

Site Number	Plain	Burnished	Decorated	Brushed	Polished	Scraped	Slipped	Burnished, Decorated	Burnished, Scraped	Burnished, Slipped	Slipped, Scraped	Sample Size
34DL20	92.31	7.69	-	-	-	-	-	-	-	-	-	**14**
34DL27	74.19	23.12	-	-	-	2.69	-	-	-	-	-	**198**
34DL28	97.00	0.86	0.43	-	-	1.29	0.43	-	-	-	-	**236**
34DL29	86.79	9.14	-	-	-	3.95	0.12	-	-	-	-	**827**
34DL30	92.04	3.10	-	-	-	4.87	-	-	-	-	-	**231**
34DL31	96.30	3.70	-	-	-	-	-	-	-	-	-	**30**
34DL32	96.49	1.75	-	-	-	0.88	0.88	-	-	-	-	**124**
34DL39	99.74	-	-	-	-	0.13	0.13	-	-	-	-	**772**
34DL96	87.80	9.76	-	-	-	2.44	-	-	-	-	-	**42**
34MY18	97.59	1.03	0.34	-	-	1.03	-	-	-	-	-	**307**
34MY54	80.00	15.00	5.00	-	-	-	-	-	-	-	-	**42**
34MY66	100.00	-	-	-	-	-	-	-	-	-	-	**16**
23LA259	71.43	24.68	-	-	-	3.90	-	-	-	-	-	**79**
23MD43	81.42	16.94	-	-	-	1.64	-	-	-	-	-	**188**
23MD147	94.01	4.79	-	-	-	1.20	-	-	-	-	-	**177**
23MD148	90.57	3.77	-	-	-	3.77	1.89	-	-	-	-	**57**
3BE187	80.00	20.00	-	-	-	-	-	-	-	-	-	**107**
34HS9	92.98	0.31	0.21	0.21	-	4.13	2.07	-	-	-	0.10	**998**
34HS24	93.45	2.91	-	-	-	2.91	0.36	-	-	0.36	-	**276**
14CO1	87.15	5.36	-	0.19	0.10	6.23	0.78	-	0.10	0.10	-	**1035**
14CO3	93.92	3.42	-	-	-	2.66	-	-	-	-	-	**272**
23SA131	68.97	13.33	2.56	0.51	-	12.56	-	2.05	-	-	-	**393**
3CW11	66.32	28.42	1.05	-	-	-	4.21	-	-	-	-	**97**

Table 6.15. Interior Surface Treatment by Culture (% of Total), Important Observations Highlighted

Phase	Plain	Burnished	Decorated	Brushed	Polished	Scraped	Slipped	Burnished, Decorated	Burnished, Scraped	Burnished, Slipped	Slipped, Scraped
Neosho	91.02	6.69	0.12	-	-	2.01	0.15	-	-	-	-
Fort Coffee	93.08	0.88	0.16	0.16	-	3.86	1.69	-	-	0.08	0.08
Lower Walnut	88.53	4.96	-	0.16	0.08	5.50	0.62	-	0.08	0.08	-
Oneota	68.97	13.33	2.56	0.51	-	12.56	-	2.05	-	-	-
Unaffiliated	66.32	28.42	1.05	-	-	-	4.21	-	-	-	-

executing. Within each of these three main categories, there is a suite of attributes recorded to investigate regional variation. Better understanding the use of punctations and incised decorations was particularly crucial, as the main points of contention and confusion among regional scholars. In the end, these analyses provided the author a better understanding of regional variation and potential locally versus non-locally produced vessels in each area in question. The decorative analyses are discussed below. This section begins by discussing each attribute separately, and then discusses interrelationships and commonalities.

Decoration Location

For any decorative analysis, it is essential to understand if there is patterning in the locations in which potters apply those designs. It has already been briefly discussed above that Oneota potters applied punctates more often to the interior lips of their vessels than the other communities. This is consistent with observations made by Henning (1970) in his investigations of Oneota assemblages and shows up in the data represented at the Guthrey site (23SA131). Decoration location was recorded by vessel portion (e.g., rim, body, lip, base, shoulder, handle) and is presented in Table 6.16 as counts by site and then in Table 6.17 as percentages by culture or phase that has been previously assigned those sites.

In some of these instances, potters chose to apply decoration to more than one of these vessel portions, but for ease of data presentation I have separated these for discussion. In other words, the data presented are not mutually exclusive, and a sherd, for example, with decoration on the lip and shoulder will show up twice in the data presented above. A few interesting patterns emerge. Firstly, I noted that Lower Walnut ceramics seemed to be decorated more often on the lips of the vessels than the other sites I examined in the sample. These data show that over half of the decorated vessels (57.63%) in the sites assigned to Lower Walnut communities are decorated

Table 6.16. Decoration Location by Site (counts). Data not mutually exclusive.

Site	**Culture**	Rim	Body	Lip	Base	Shoulder	Handle
34DL20	Neosho	1	-	-	-	1	-
34DL27	Neosho	3	7	5	-	1	-
34DL28	Neosho	5	13	8	-	7	-
34DL29	Neosho	13	29	34	-	24	1
34DL30	Neosho	3	10	9	-	9	-
34DL31	Neosho	-	-	-	-	-	-
34DL32	Neosho	1	8	1	-	1	-
34DL39	Neosho	4	29	10	-	14	4
34DL96	Neosho	-	-	2	-	1	-
34MY18	Neosho	7	15	1	-	1	-
34MY54	Neosho	1	9	5	-	5	-
34MY66	Neosho	-	-	-	-	-	-
23LA259	Neosho	2	3	3	-	9	1
23MD43	Neosho	6	1	9	-	7	-
23MD147	Neosho	3	1	8	1	2	-
23MD148	Neosho	-	-	1	-	-	-
3BE187	Neosho	1	-	-	-	1	-
34HS9	Fort Coffee	13	15	6	-	9	-
34HS24	Fort Coffee	9	13	1	-	9	-
14CO1	Lower Walnut	1	-	29	-	5	43
14CO3	Lower Walnut	-	3	5	-	-	11
23SA131	Oneota	-	48	20	-	60	2
3CW11	Unaffiliated	4	2	1		5	1

Table 6.17. Decoration Location by Culture (% of Total), Important Values Highlighted

Culture	Rim	Body	Lip	Base	Shoulder	Handle
Neosho	13.81	34.53	26.52	0.55	22.93	1.66
Fort Coffee	28.95	38.16	9.21	-	23.68	-
Lower Walnut	1.69	10.17	57.63	-	8.47	22.03
Oneota	-	36.92	15.38	-	46.15	1.54
Unaffiliated	28.57	14.29	7.14	-	42.86	7.14

on the lips of the vessels. Neosho potters also had a relatively high proportion of decoration on the lip, but they also seemed to utilize the shoulder and body of the vessel in similar proportions. This observation is consistent with Freeman and Buck's (1960) typological description of Neosho Punctate. Basal decoration is only present in one instance and includes basket impressions on the base of a vessel at 23MD147, a Neosho community. These impressions are likely markers of vessel manufacture, the beginnings of the actual formation of the vessel itself. At most sites these impressions have been smoothed or obliterated in some fashion, but for some reason the potter who manufactured this vessel kept the impressions.

Fort Coffee communities heavily utilize decoration on the rims (28.95%) and bodies (38.16%) of their vessels. Body decoration is seemingly consistent in proportion of use between Fort Coffee, Neosho, and Oneota peoples. Additionally, decorations are often classified as "body" decoration when no diagnostic vessel identifiers are present. This may explain the high proportions of these represented in the sample overall. The heavy use of decoration by Fort Coffee communities on the rims (and shoulders at 23.68%) is consistent with Rohrbaugh's (1984) definition of their diagnostic wares, Braden Punctate and Braden Incised, with decorations being present from shoulder to rim. The low proportion of lip decoration at Fort Coffee communities is also consistent with these definitions. Oneota and unaffiliated communities most commonly apply decoration to the shoulders of their vessels. This is consistent with my observations during data collection and with type descriptions for Oneota.

Unfortunately, decoration location is often difficult to classify without large portions of sherds or diagnostic inflection points and rims. As such, the majority of decoration in the sample is noted to be on a catch-all category (i.e., body). If I eliminate those categorized as "body decoration", we can see the patterns discussed above a bit more clearly (Figure 6.2). Oneota and

Unaffiliated communities are utilizing shoulder decorations more commonly, while Lower Walnut and Neosho communities are using lip decoration more commonly than the others. The Fort Coffee patterns hold as well, with decoration most utilized on the rims and shoulders of vessels.

While these patterns are interesting, they do not diverge from the typological descriptions as discussed above and these data do not alone inform us or solve the confusion around the

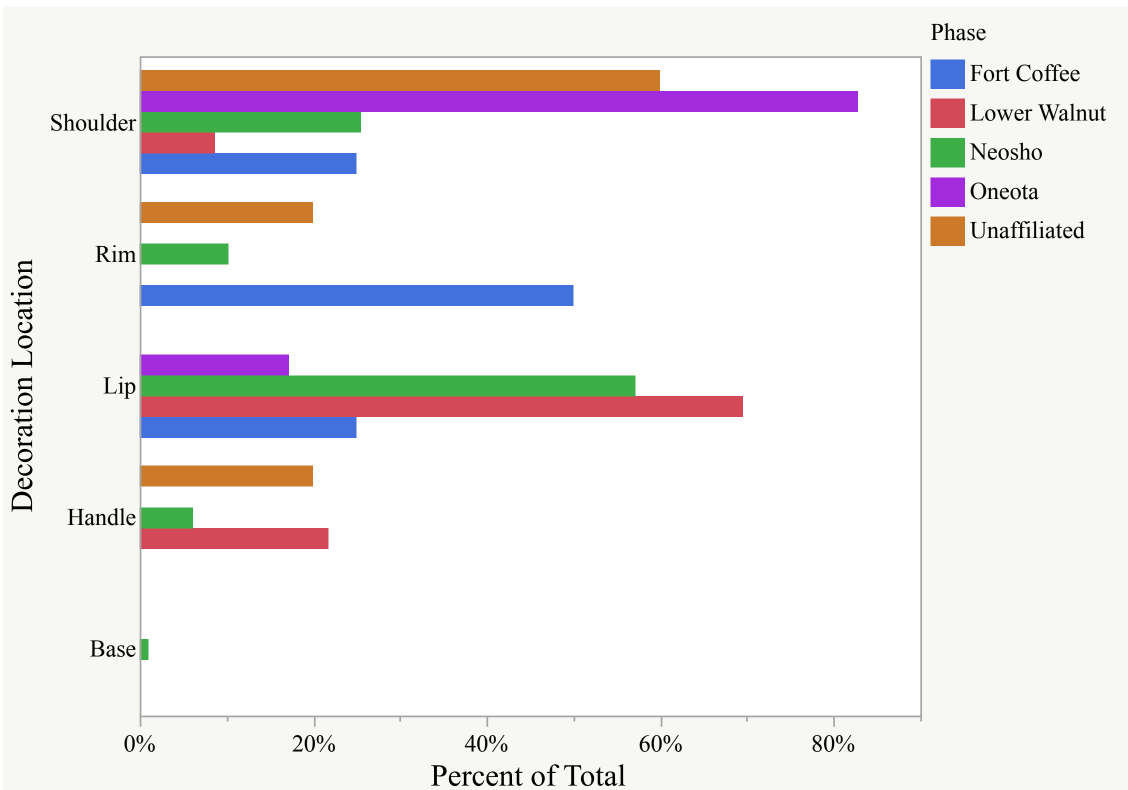


Figure 6.2. Decoration Location, Excluding Body Decoration

identification of these wares or those that are typical of any one given community. But the purpose of these analyses was not necessarily to reform these typologies but to create a better understanding of potential variation in the regional sample. As these discussions on decoration progress, I will hopefully be able to weave these data together to inform future researchers on potential meaningful data points upon which they can focus, but also to contextualize and inform the use of network analysis in Chapter 6. Using SNA to understand interrelationships between ceramic manufacture and design in a regional study is unlike a typological analysis in many ways, a point that will be expounded upon in the subsequent chapter. Nonetheless, these attributes are important to describe and investigate, as potential informants for future research designs.

Decoration Type

The next part of my analyses focused on understanding the types of decorations utilized at each site and the phase assigned to that site. Obviously from the typological descriptions there is a fair amount of overlap, so I wanted to investigate if any one given community was utilizing a certain type of decoration more often than the others. Tables 6.18 and 6.19 describe decoration type by site and then by phase, respectively.

While each of these communities are using similar techniques to decorate their pots, it seems they are using them in varying concentrations and combinations. Perforations were only observed at Neosho sites in the sample, while combinations of punctation and appliqué were found at Neosho and Lower Walnut sites. Table 6.19, which presents these data by phase, collapses some of the categories with combined decorations with small proportions to identify patterns more readily. Figure 6.3 graphs these proportions for visualization of tabulated proportions.

It seems that the vast majority of Neosho and Lower Walnut pots were decorated with only punctations (48.94% and 62.50%, respectively), while most Fort Coffee and Unaffiliated

Table 6.18. Decoration Type by Site (counts)

Site Number	Incised	Incised, Appliqué	Incised, Molded	Incised, Punctated, Molded	Incised, Punctated, Perforated	Incised, Punctated	Punctated	Punctated, Appliqué	Punctated, Molded	Appliqué	Basket Impressed	Molded
34DL20	-	-	-	-	-	1	-	-	-	-	-	-
34DL27	1	-	-	-	-	9	3	-	-	-	-	-
34DL28	5	-	-	-	-	2	15	-	-	-	-	-
34DL29	5	-	1	-	-	15	45	1	1	7	-	1
34DL30	3	-	-	-	-	7	8	-	1	-	-	-
34DL31	-	-	-	-	-	-	-	-	-	-	-	-
34DL32	3	-	1	-	-	4	1	-	-	-	-	-
34DL39	15	-	-	-	-	5	29	1	-	-	-	-
34DL96	-	-	-	-	-	1	1	-	-	-	-	-
34MY18	15	-	-	-	-	1	4	-	2	-	-	-
34MY54	9	-	-	-	-	2	2	-	-	3	-	1
34MY66	-	-	-	-	-	-	-	-	-	-	-	-
23LA25 9	7	-	-	-	-	2	9	-	-	-	-	-
23MD43	-	-	-	-	2	3	4	1	-	-	-	-
23MD14 7	2	-	-	-	-	-	9	-	-	-	1	-
23MD14 8	-	-	-	-	-	-	1	-	-	-	-	-
3BE187	-	-	-	-	-	-	1	-	-	-	-	-
34HS9	19	1	-	-	-	1	9	-	-	3	-	2
34HS24	20	-	-	-	-	-	3	-	-	3	-	-
14CO1	7	-	-	-	-	-	29	-	-	8	-	-
14CO3	-	-	-	-	-	1	4	-	-	3	-	-
23SA13 1	36	-	-	1	-	61	23	-	-	-	-	-
3CW11	6	-	-	-	-	1	1	-	-	2	-	-

Table 6.19. Decoration Type by Phase (# of Total), some categories collapsed and Important Observations Highlighted

Phase	Punctated	Incised	Incised, Punctated	Appliqué	Molded	Basket Impressed	Perforated
Neosho	48.94	23.59	19.01	4.58	2.82	0.35	0.70
Fort Coffee	19.35	64.52	1.61	11.29	3.23	-	-
Lower Walnut	62.50	12.50	1.79	23.21	-	-	-
Oneota	18.85	29.51	50.82	-	0.82	-	-
Unaffiliated	10.00	60.00	10.00	20.00	-	-	-

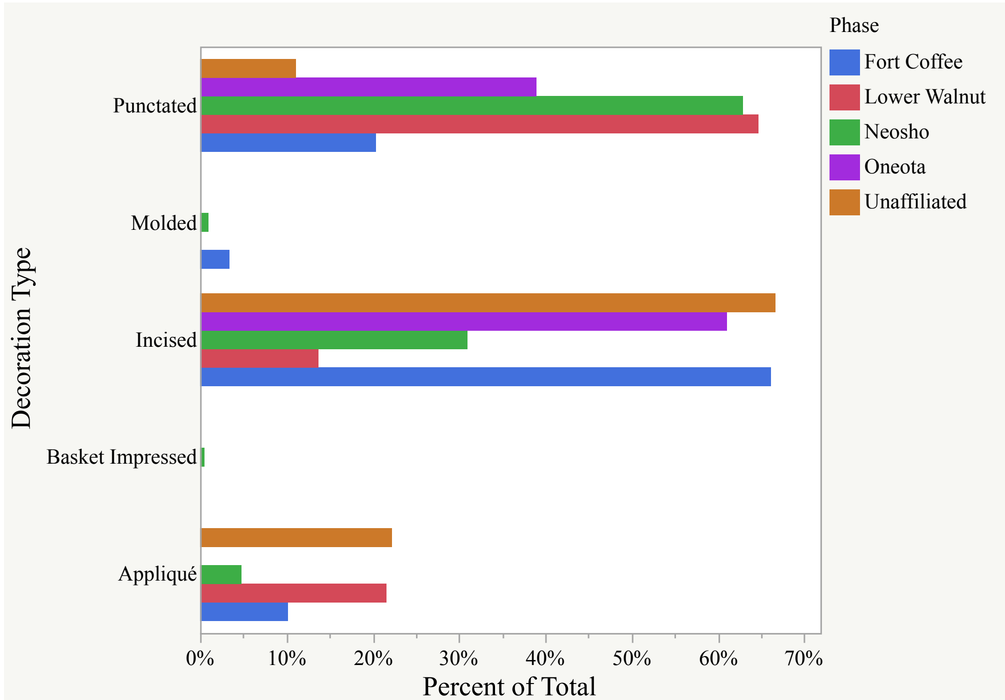


Figure 6.3. Decoration Type by Phase (% of Total), some categories collapsed

decorated vessels were incised (64.52% and 60%, respectively). For Lower Walnut communities, as discussed briefly above, punctations were quite common on the lips of vessels and were more common than any other type of decoration. Therefore, the high proportion of punctations on their vessels was expected and is confirmed by these analyses. Neosho communities also were noted to have a high proportion of punctations, which Freeman and Buck (1960) noted in their original descriptions of Neosho Punctate. Many of these sherds in Neosho assemblages are small, and may not include the entire design, but nonetheless Neosho potters were utilizing punctation heavily on their vessels.

Fort Coffee potters used incised/trailed lines as decoration more often than any other community. As will hopefully be shown by the discussion of incised decorations below, Fort Coffee designs are distinguished in many ways from the incised designs present on Neosho, Oneota, Lower Walnut, and Unaffiliated wares. Some of these incised designs likely represent Caddo finewares typical in the region, including Avery Engraved and more. While Fort Coffee communities also used punctates on their vessels, they used them in much fewer instances than surrounding communities. Neosho potters also used incised lines and combinations of incised and punctated decorations, but in varying configurations and less often than Fort Coffee and Unaffiliated communities. The similarities and differences in these design configurations in relation to each community in question will be more fully described below.

Oneota potters were combining incised and punctated designs in the highest proportions (50.82%) based on these analyses. The combination of these designs is particularly crucial, especially in understanding an attribute discussed below, design configuration. These configurations on Oneota vessels as discussed below will likely show a more diverse set of designs utilized than the other communities in question. This conclusion is unsurprising, as their combination of decorative techniques allows for a more diverse range of combinatory design configurations to occur.

Appliqué appendages were also common in varying proportions throughout the region. They were most common on Lower Walnut vessels, most in the form of pinched appendages located on vessel handles. Many of these handle designs were noted in the Lower Walnut samples at 14CO1 and 14CO3, and Stein (2012) discusses their inclusion in Lower Walnut assemblages overall as common attachments to Cowley Plain vessels. These pinched appendages were discovered solely in the Lower Walnut dataset. Triangular lip tab appendages were also present in the current sample, found at Fort Coffee (N=2) and Neosho (N=7) sites. These appendages are not discussed in the overall typological descriptions for Fort Coffee or Neosho ceramics, but were present in the site assemblages in small amounts. Though not represented by the Lower Walnut samples discussed in this dissertation, triangular lip tabs are present in Lower Walnut assemblages in the Arkansas City area (Stein 2012:275). It is possible these lip tabs represent direct interactions between Lower Walnut, Fort Coffee, and Neosho peoples. This will be discussed more fully in subsequent sections.

Appliqué nodes were also utilized by potters in the region (Figure 6.4). Though they are found in small proportions in the sample (N=16), their use is widespread. Nodes were noted in the assemblages for Fort Coffee (N=6), Neosho (N=5), Lower Walnut (N=3), and Unaffiliated (N=2) communities. There were no nodes present in the Oneota sample from the Guthrey site (23SA131). Nodes are noted in Freeman and Buck's (1960) original description of Neosho Punctate as well as in Stein's (2012:289) and Wedel's (1959) original description of decorated varieties of Cowley Plain, and though not noted by Rohrbaugh (1984) in his definitions of Braden Punctate and Braden incised, were likely present on variants of Woodward Plain used throughout the region.

Finally, molded decorations while present are not very common. Neosho and Fort Coffee potters utilized molded decorations very occasionally, and connections between these are difficult to define. In one instance, a molded decoration at the Neosho site 34DL29 (Figure 6.5) applied to the rim and body of the vessel resembles one found at 34LF1624, a Fort Coffee community whose ceramics are not described in this sample. The connection between these vessels and types of decoration is unclear, but they are not common in the sample and not representative of ceramic production and design in the region overall.

Figure 6.4. Appliqué node decoration (34HS24 on the right, 34DL29 on left).

Figure 6.5. Unique Molded Design on Neosho Sherd from 34DL29.

Punctations: Shape, Decorative Intent, Width and Depth

The variation in punctated decorations was particularly important to understand because this is what most researchers have used to build their theories and hypotheses about Neosho's identity and affiliation. In order to intensively investigate these decorative techniques and configurations, particular attention was paid to the interior and exterior shape of these designs, width and depth, as well as decorative intent and configuration.

The following attributes were recorded for punctated sherds: punctation shape (interior and exterior), punctation width and depth, as well as decorative intent (i.e., the specific configuration of punctations on the sherd). Shape was recorded for the exterior and interior of these punctations. Figure 6.6 illustrates the shapes described in this sample. Exterior shape of punctations is particularly crucial, as this is the element that tells us the most about how potters in each community wanted the decoration to look as well as what tools they were using. Their choice of tool and punctation shape affected the overall design and look of the decorated vessel. Tables 6.20 and 6.21 outline the exterior punctation shape by site and culture, respectively.

Looking at the exterior shapes overall, we begin to see robust patterns emerge. Based on these data, it seems that the different communities represented in the region preferred certain shapes of punctations. Neosho potters preferred to use wedge punctates (69.74%), Fort Coffee people used fingernail punctates exclusively at 34HS9 and 34HS24, Lower Walnut people preferred to use slit punctates (77.78%) on the lips of their vessels, and Oneota people preferred to use elliptical or lenticular punctates (74.42%). The Unaffiliated community represented by the ceramics at Beaver Pond (3CW11) only used punctates on 2 of the vessels in the sample, and as such I am unable to determine their preference.

Punctation Shape (Exterior)	Punctation Shape (Interior)
Wedge	Raised
Fingernail	Flat
Round	Parabolic
Slit (notched lips)	V-Shaped
Elliptical	
Square/Grass	

Figure 6.6. Exterior Punctation Shape Categories

Table 6.20. Exterior Punctation Shape by Site (counts)

Site	Phase	Wedge	Fingernail	Elliptical	Round	Slit	Square/Grass
34DL20	Neosho	-	-	1	-	-	-
34DL27	Neosho	11	-	1	-	-	-
34DL28	Neosho	13	1	2	1	-	-
34DL29	Neosho	45	2	7	1	7	-
34DL30	Neosho	14	-	2	-	-	-
34DL31	Neosho	-	-	-	-	-	-
34DL32	Neosho	5	-	-	-	-	-
34DL39	Neosho	27	1	5	1	1	-
34DL96	Neosho	1	1	-	-	-	-
34MY18	Neosho	-	2	4	1	-	-
34MY54	Neosho	2	-	-	-	2	-
34MY66	Neosho	-	-	-	-	-	-
23LA259	Neosho	4	3	4	-	-	-
23MD43	Neosho	7	-	-	1	1	-
23MD147	Neosho	4	2	1	-	2	1
23MD148	Neosho	1	-	-	-	-	-
3BE187	Neosho	-	1	-	-	-	-
34HS9	Fort Coffee	-	10	-	-	-	-
34HS24	Fort Coffee	-	3	-	-	-	-
14CO1	Lower Walnut	-	3	-	3	25	-
14CO3	Lower Walnut	-	2	-	-	3	-
23SA131	Oneota	6	-	64	16	-	-
3CW11	Unaffiliated	1	1	-	-	-	-

Table 6.21. Exterior Punctation Shape by Culture (% of Total), Important Observations Highlighted

Culture	Wedge	Fingernail	Elliptical	Round	Slit	Square/Grass
Neosho	69.74	5.64	13.85	2.56	7.69	0.51
Fort Coffee	-	100.00	-	-	-	-
Lower Walnut	-	13.89	-	8.33	77.78	-
Oneota	6.98	-	74.42	18.60	-	-
Unaffiliated	50.00	50.00	-	-	-	-

The interior shapes of these punctates do not show preferential patterning. The likely reason are the types of tools used by these communities result in similar interiors. Tables 6.22 and 6.23 present the data for interior punctation shape by site and culture, respectively. The interior shape of punctates applied by Fort Coffee potters are all exclusively v-shaped. This is unsurprising, as they were using their fingernails to apply these decorations, resulting in that interior shape. The other communities were likely using tools such as reeds or animal bones and in some cases their fingertips. I will discuss tool preference below.

Figure 6.7 shows the relationship between a punctation's interior and exterior shape. Overwhelmingly we can see that fingernail punctates have v-shaped interiors whereas the other exterior shapes that make up the majority in the sample (i.e., elliptical, slit, and wedge) mostly have parabolic interiors. Round punctations are interesting, in that they have nearly equal cases for parabolic and v-shaped interiors. This may be due to the type of tool utilized, whether it be a sharpened tool or bone. Round punctates also have raised interiors, likely from the use of a reed to punctate, with the hollow end leaving that raised impression.

Variation in punctation shape is incredibly important to note in this sample, as the typological descriptions mention use of a wide range of shapes throughout the region, but never preferred shapes. We can potentially infer potters' preferences in punctating tool from these trends, illuminating community preferences in the practice of decorating pottery vessels. The wedge punctates that Neosho communities preferred were likely applied by a reed or cane inserted at an oblique angle. In many instances, I noted plant fiber striations on the interior of these punctates, as well as a hollow impression on one side of the punctate itself, indicating that the tool itself was hollow, much like a reed. Obviously, Fort Coffee communities preferred to punctate their vessels without a tool, but instead chose to use their fingernails to create these

Table 6.22. Interior Punctation Shape by Site (counts)

Site	Phase	Flat	Parabolic	Raised	V-Shaped
34DL20	Neosho	-	1	-	-
34DL27	Neosho	-	11	-	1
34DL28	Neosho	-	13	1	3
34DL29	Neosho	-	55	-	8
34DL30	Neosho	-	16	-	-
34DL31	Neosho	-	-	-	-
34DL32	Neosho	1	3	-	1
34DL39	Neosho	-	32	-	3
34DL96	Neosho	-	1	-	1
34MY18	Neosho	-	3	1	3
34MY54	Neosho	-	4	-	-
34MY66	Neosho	-	-	-	-
23LA259	Neosho	-	5	-	6
23MD43	Neosho	-	9	-	1
23MD147	Neosho	-	6	-	3
23MD148	Neosho	-	1	-	-
3BE187	Neosho	-	1	-	-
34HS9	Fort Coffee	-	-	-	10
34HS24	Fort Coffee	-	-	-	3
14CO1	Lower Walnut	1	21	1	8
14CO3	Lower Walnut	-	3	-	2
23SA131	Oneota	1	65	-	20
3CW11	Unaffiliated	-	1	-	1

Table 6.23. Interior Punctation Shape by Culture (% of Total)

Culture	Flat	Parabolic	Raised	V-Shaped
Neosho	0.52	82.99	1.03	15.46
Fort Coffee	-	-	-	100.00
Lower Walnut	2.78	66.67	2.78	27.78
Oneota	1.16	75.58	-	23.26
Unaffiliated	-	50.00	-	50.00

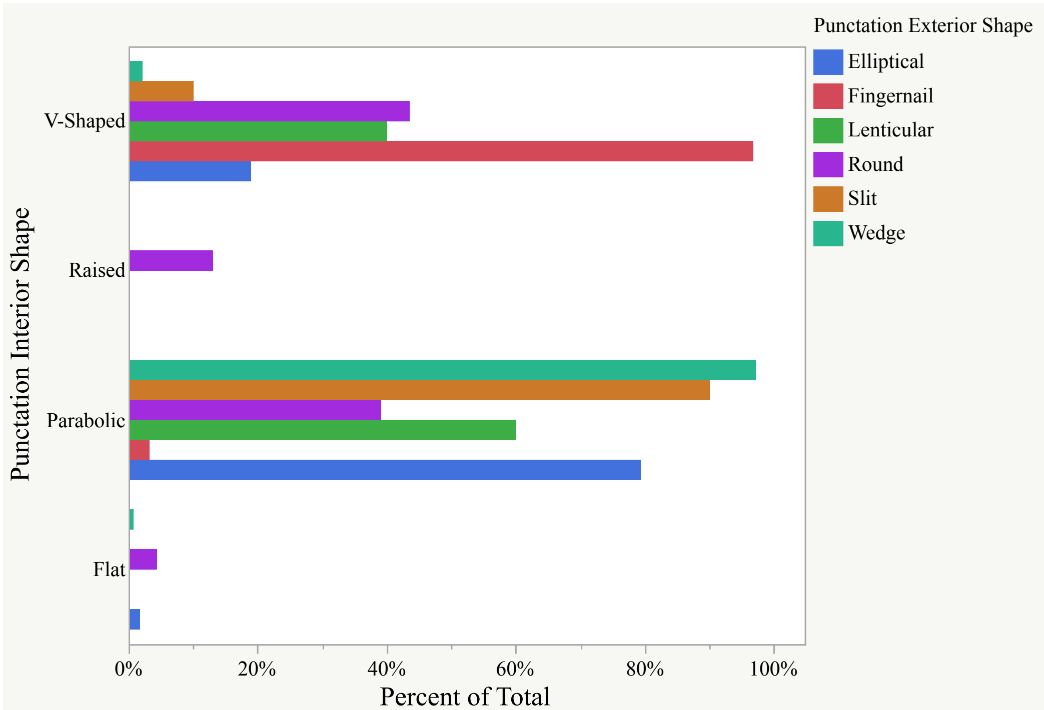


Figure 6.7. Interior versus Exterior Punctation Shape (% of Total)

designs. Though none are described in the sample presented here, Stein (2012:282) notes the use of fingernail punctates in Lower Walnut communities as well. Lower Walnut communities, preferring to incorporate slit shaped punctates along the lips of their vessels, were likely using reed or cane to impress the clay, resulting in the slit-like appearance and parabolic interior of these punctates. And finally, I noted as I was conducting the analyses on the ceramics from the Oneota community at Guthrey (23SA131) that these potters were utilizing their fingertips (not fingernails) to impress the clay, again resulting in a parabolic interior. Thus, it is clear that each community preferred various shapes and also preferred the use of certain tools to achieve those shapes.

The relationship between punctation width (mm) and depth (mm) was also measured. Figure 6.8 maps this relationship by culture. Punctation width was measured at the widest point of the mark with digital calipers, while punctation depth was measured at the deepest point of the mark using a tire tread depth gauge. Expectedly, it seems that as punctation width increases, so does punctation depth. It also seems that punctations on Neosho vessels in many cases are wider and deeper than those found at other communities. I expect this is due to the shape of the punctation itself along with the tool utilized to execute those punctations. There is wide variation

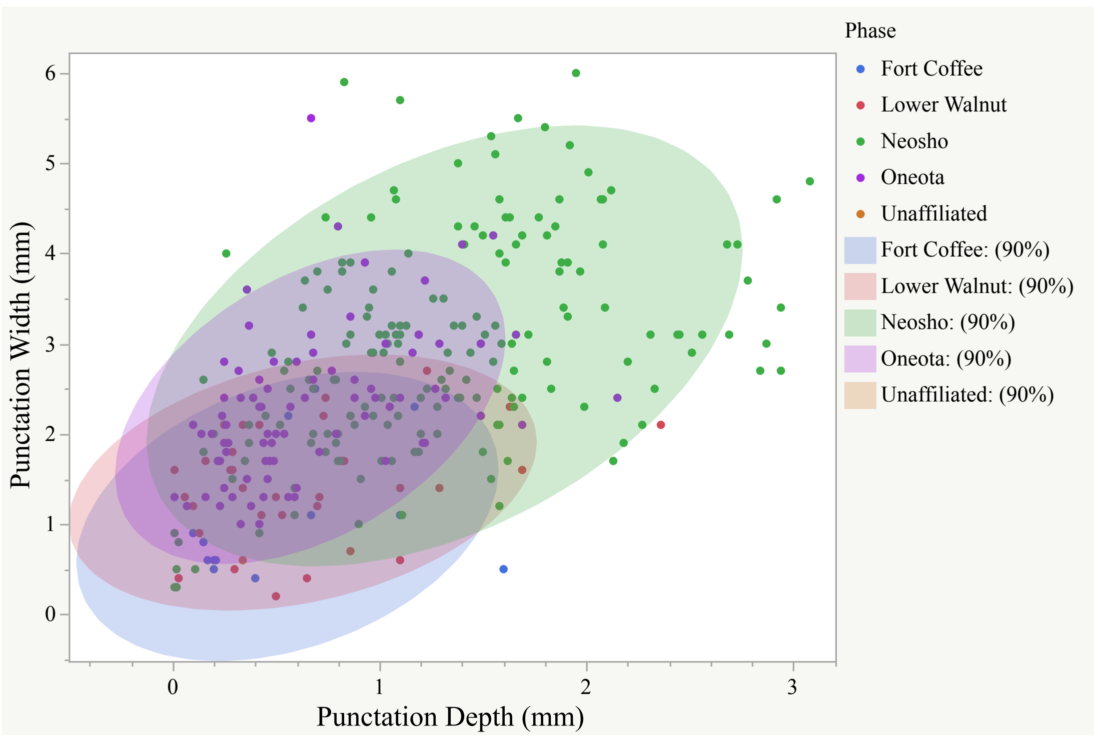


Figure 6.8. Punctation Width versus Punctation Height (5 outliers excluded). Shaded area represents 90% of the variation in the sample.

in the application of the wedge punctates on the vessels in the sample overall, and as a result it is unsurprising that these constitute the widest and deepest punctations in these data. As Neosho potters utilized wedge punctates more than the other communities, I expect therefore they are more represented on the right extent of the graph in Figure 6.8.

Finally, decorative intent of punctations was assessed. This simply means I made note of the configuration of punctates on the vessel itself (i.e., if they were placed in horizontal or vertical parallel lines, zoned, or diagonally opposed). Decorative intent investigated the overall look that the potters in these communities were trying to achieve. Based on the typological descriptions outlined above and borrowing terminologies from scholars like Freeman and Buck (1960) in their description of design configurations, I developed a coding sheet that would help investigate differences and similarities in design configurations for vessels that were punctated and/or incised. Figure 6.9 outlines the decorative intent and configurations categorized in these analyses for punctated and incised decorations.

Decorative intent for punctations shows several interesting patterns (Tables 6.24 and 6.25). Once again, I will not discuss the patterns for the Unaffiliated community as they are represented only by 2 cases. Nearly all (88.89%) of Lower Walnut punctations were placed such that they are diagonally opposed. As these potters were using slit punctations along the lips of vessels applied most likely with a reed or other rounded tool, they were also placed in varying diagonal positions. Stein (2012) discusses directionality of these slit decorations, and there is variation on their placement from left to right or right to left. For the purposes of the analyses presented here, punctation direction was not collected. Oneota communities also heavily utilized diagonally opposed punctations, but more often as ellipses.

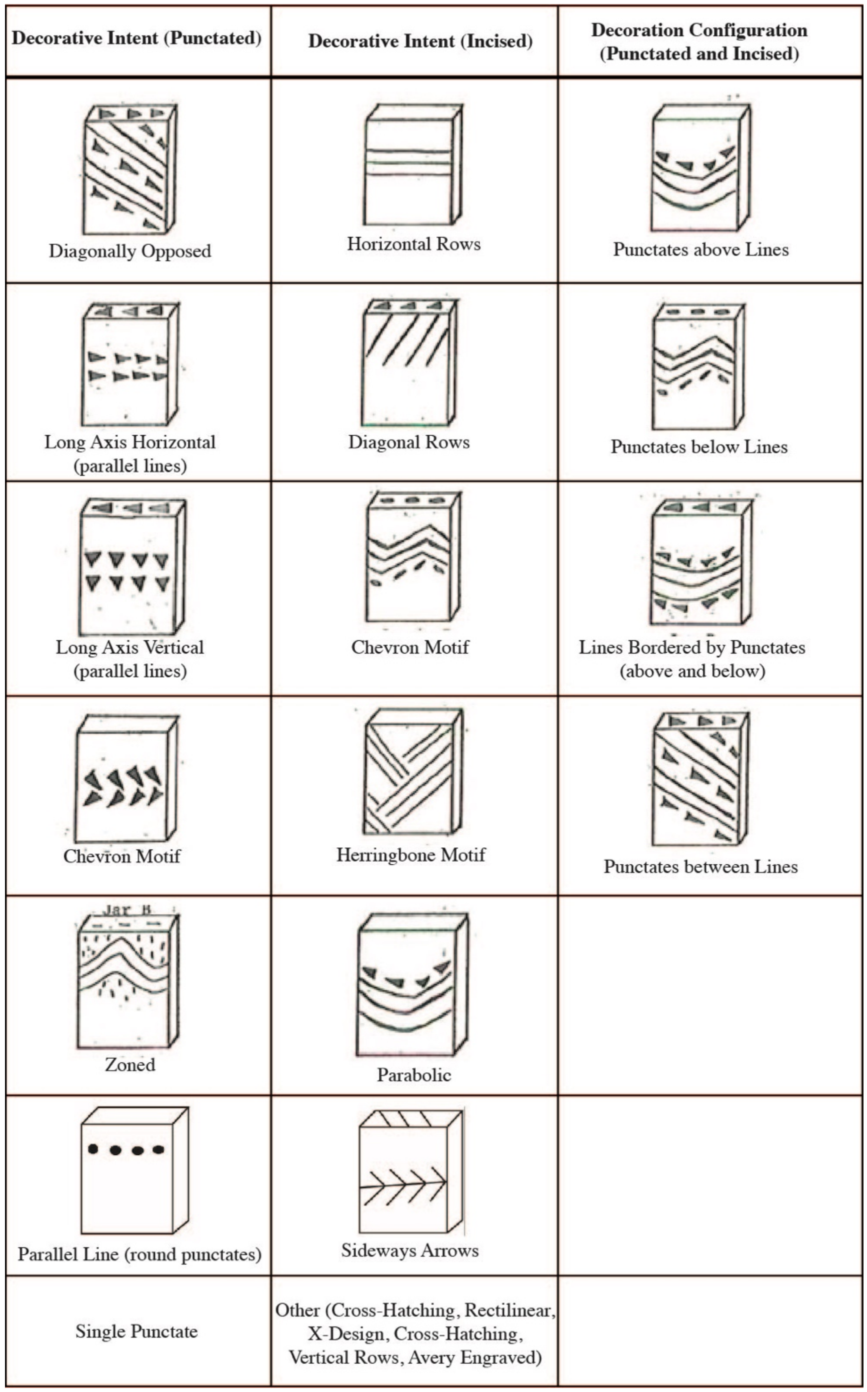


Figure 6.9. Decorative Intent and Design Configurations for Punctated and Incised Wares, adapted from Freeman and Buck (1960)

Table 6.24. Punctated Decorative Intent by Site (counts)

Site	Phase	Chevron Motif	Diagonally Opposed	Long Axis Horizontal (Parallel Lines)	Long Axis Vertical (Parallel Lines)	Parallel Lines (non-Wedge)	Zoned	Single Punctate
34DL20	Neosho	-	1	-	-	-	-	-
34DL27	Neosho	-	10	2	1	-	-	-
34DL28	Neosho	2	5	5	2	1	1	-
34DL29	Neosho	4	24	18	8	5	1	-
34DL30	Neosho	3	5	8	2	-	-	-
34DL31	Neosho	-	-	-	-	-	-	-
34DL32	Neosho	-	2	4	-	-	-	-
34DL39	Neosho	2	10	10	5	2	-	-
34DL96	Neosho	-	1	1	-	-	-	-
34MY18	Neosho	-	2	2	-	1	1	-
34MY54	Neosho	-	2	1	1	-	-	1
34MY66	Neosho	-	-	-	-	-	-	-
23LA259	Neosho	-	7	1	2	-	1	-
23MD43	Neosho	-	6	1	2	1	-	-
23MD147	Neosho	-	3	3	1	-	-	2
23MD148	Neosho	-	-	1	-	-	-	-
3BE187	Neosho	-	-	-	-	-	1	-
34HS9	Fort Coffee	-	3	2	2	1	3	-
34HS24	Fort Coffee	-	1	-	-	-	2	-
14CO1	Lower Walnut	-	27	-	-	4	-	-
14CO3	Lower Walnut	-	5	-	-	-	-	-
23SA131	Oneota	1	49	6	15	19	-	-
3CW11	Unaffiliated	-	-	-	1	-	-	-

Table 6.25. Punctated Decorative Intent by Culture (% of Total), Important Observations Highlighted

Culture	Chevron Motif	Diagonally Opposed	Long Axis Horizontal (Parallel Lines)	Long Axis Vertical (Parallel Lines)	Parallel Lines (Round)	Zoned
Neosho	5.95	42.16	30.81	12.97	5.41	2.70
Fort Coffee	-	28.57	21.43	14.29	-	35.71
Lower Walnut	-	88.89	-	-	11.11	-
Oneota	1.11	54.44	6.67	16.67	21.11	-
Unaffiliated	-	-	-	100.00	-	-

Fort Coffee potters were exclusively utilizing fingernail punctations, it seems in a wider range of design configurations. Mostly, they were placing these punctations in a zoned configuration, with large portions of the rim (or the entire rim) being covered in punctations (35.71%). This community also utilized diagonally opposed fingernail punctations and fingernail punctations placed in parallel lines. The parallel line punctations are more ordered than the zoned punctations, with clear decorative intent to create rows.

Neosho communities are mostly using diagonally opposed wedge punctations (42.16%), as well as long axis horizontal parallel line punctations. This attribute was often difficult to collect because sherd orientation was impossible for those without diagnostic vessel inflection points. Some of those classified as horizontal punctations may also be classified as diagonally opposed. However, I believe Neosho people showed a clear preference towards using diagonally opposed wedge punctations along the lips, rims, and shoulders of their vessels based on these data and those presented above.

Figure 6.10 visualizes punctation decorative intent data. These data illustrate that Fort Coffee potters held a preference towards the use of zoned designs. Combined with their preference towards the use of fingernail punctates, we can see that they were distinctive in their ceramic practice. Wedge punctations, predominately used by Neosho potters, are intended to be configured such that they are configured as chevrons, diagonally opposed, or in varying configurations of parallel lines. The elliptical punctates preferred by Oneota potters are similar, in that they are mostly configured as parallel lines, diagonally opposed, or as chevrons. And finally, the slit punctates preferred by Lower Walnut communities are mostly configured as diagonally opposed.

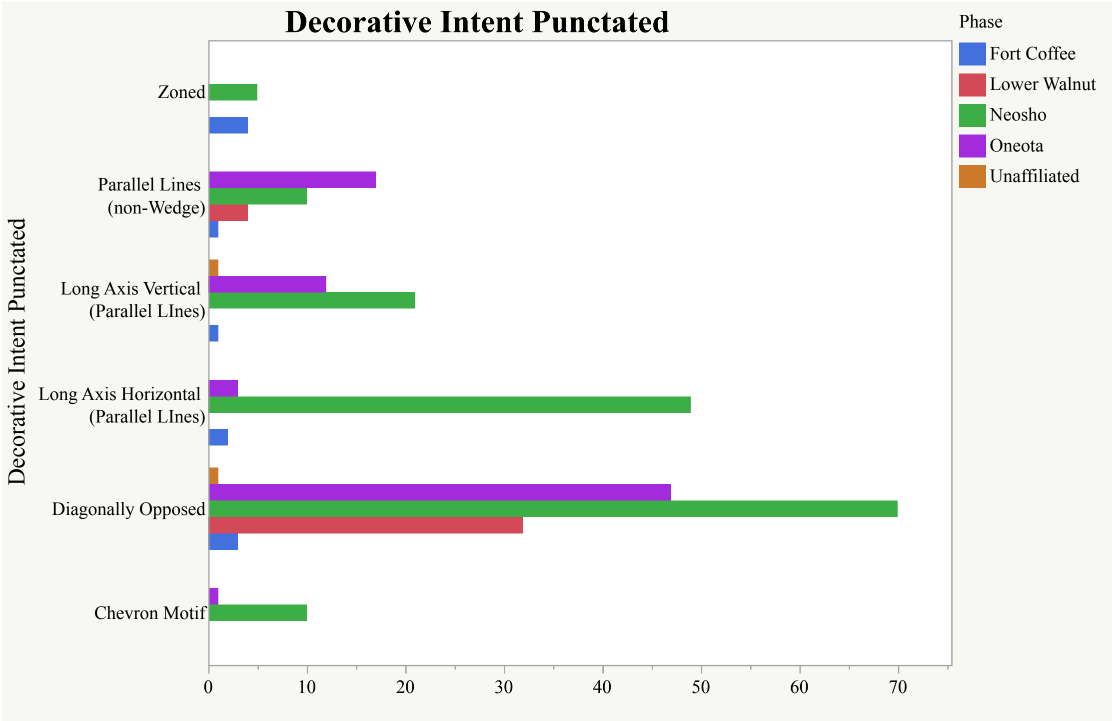


Figure 6.10. Punctated Decorative Intent

In examining the data on punctated vessels we can see that many communities are using similar design configurations. In particular, Neosho, Lower Walnut, and Oneota communities each incorporate a heavy use of diagonally opposed punctations as well as differentially oriented parallel lines. When examined in combination with the other attributes like interior and exterior shape, it becomes clear that these communities preferred certain implements (including their hands) to execute these designs and some preferred certain areas of the vessels to decorate. These newly discovered preferences and interrelationships demonstrated by attribute data illustrate that meaningful decorative variation does exist amongst these communities.

Incised/Trailed Lines

Many of these communities also utilized incised lines in varying forms and configurations. As discussed above, much like the punctations, there is confusion amongst scholars based on the typological descriptions given for the decorated varieties associated with these communities. The most distinctive description is given for Braden Incised by Rohrbaugh (1982:456-460), who describes this ware as having “lines arranged in triangular areas” and notes it as being like Canton Incised, which was defined by Suhm and Jelks (1962:23-24). This description still does not clarify how these incised lines differ from the others in the region, or how the configuration differs from some of those shown in Figure 3.2. Confusion still exists, in part due to the diversity of designs attributed to each community and an overall lack of understanding of similarities and differences in the region.

I chose to examine incised/trailed lines such that I could understand how people were applying these to the vessels (i.e., what tools they were using) and also overall decorative intent in the region. Some researchers choose to distinguish between trailed and incised, with trailed lines being wider than those that are classified as incised. Instead of making that distinction when classifying design type, because it can sometimes be quite arbitrary, I chose to classify them all as incised/trailed and then record width, depth, spacing (when possible), decorative intent, and interior shape to investigate variation amongst these communities. Figure 6.11 outlines the interior shapes investigated and discussed for incised and trailed lines. These shapes capture the range of interior shapes utilized in the region, giving researchers information about the potential types of tools that are utilized in creating these incisions on the vessels. Tables 6.26 and 6.27 present these data for the sites analyzed in this study and then by the culture assigned those sites, respectively.

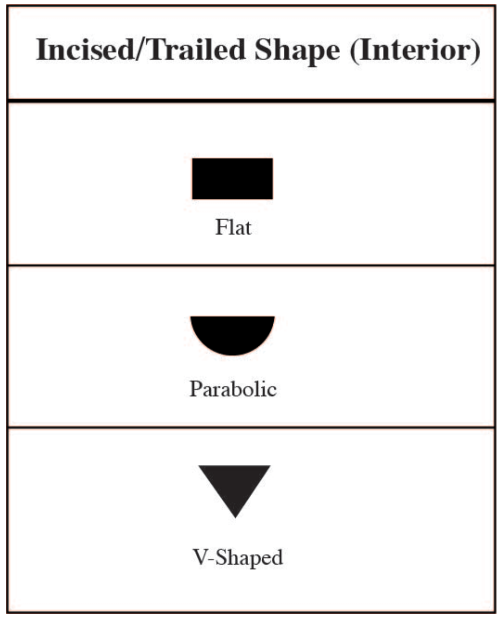


Figure 6.11. Incised/Trailed Interior Shapes

In looking at these data overall we can see that most communities in the region were utilizing tools that resulted in parabolic line interiors. The Lower Walnut sample is represented only by 8 cases and shows an even spread between parabolic and v-shaped interiors. The Lower Walnut sherds tended to be punctated more than incised. The sample size for the Unaffiliated community was also quite small (N=7), but overall, there were not many decorated wares in that assemblage. Oneota and Neosho incised/trailed designs had parabolic interiors most of the time (96.94% and 78.33%, respectively).

Fort Coffee potters were clearly using different strategies in executing the incised lines on their ceramics. Most of their incised decorations had V-shaped interiors (80.49%). I find it likely that they were using a different tool to execute these designs, showing a preference towards the look of the lines that this strategy created. Neosho potters also used incised lines with V-shaped interiors (20.83%) but seemed to prefer to use tools that created parabolic interiors much like the Oneota community at Guthrey (23SA131). It is likely that parabolic interiors created wider incised decorations, but the relationship between interior shape, line width and depth will be discussed more fully below.

Once again, we can see a potential preference for some communities to use certain tools, though the differences between these communities are not so clear as what was seen with the punctated designs. Though flat interiors were not common, plant fiber striations were once again noted in these cases, especially in the sample at Beaver Pond (3CW11), the Unaffiliated community. It is unknown what tools created the V-shaped and parabolic interiors, but variation in the sample once again shows that some communities preferred to utilize certain tools over others.

In examining line width, depth, and spacing, I used the same tools as when measuring punctation width and depth. For width and spacing of line decorations I utilized digital calipers and for depth I used a digital tire tread depth gauge. First, I wanted to examine these measurements on their own and then investigate any potential interrelationships. Figure 6.12 plots line width by phase and Figure 6.13 separates these measurements by interior shape to investigate interrelationships between these continuous measurements and interior shape.

In examining the above figures, patterns immediately emerge. As we saw above in examining interior shape, Fort Coffee communities were overwhelmingly utilizing tools that created V-shaped interiors. This resulted in the line width of their designs being overall much smaller than those of their neighbors. And overall, we can see that lines with V-shaped interiors are smaller in width than those with parabolic interiors. The lines potters applied in Oneota and Neosho communities are on average wider than those of Fort Coffee communities, which in

Table 6.26. Line Interior Shape by Site (counts)

Site Number	Flat	Parabolic	V-Shaped
3BE187	-	-	-
3CW11	1	4	2
14CO1	-	3	4
14CO3	-	1	-
23LA259	-	7	2
23MD43	-	5	-
23MD147	-	-	2
23MD148	-	-	-
23SA131	-	95	3
DL20	-	1	-
DL27	-	9	1
DL28	-	2	4
DL29	1	17	3
DL30	-	10	-
DL32	-	8	-
DL39	-	16	4
DL96	-	1	-
HS9	-	3	18
HS24	-	5	15
MY18	-	9	7
MY54	-	9	2

Table 6.27. Line Interior Shape by Culture (% of Total), Important Observations Highlighted

Phase	Flat	Parabolic	V-Shaped
Neosho	0.83	78.33	20.83
Fort Coffee	-	19.51	80.49
Lower Walnut	-	50.00	50.00
Oneota	-	96.94	3.06
Unaffiliated	14.29	57.14	28.57

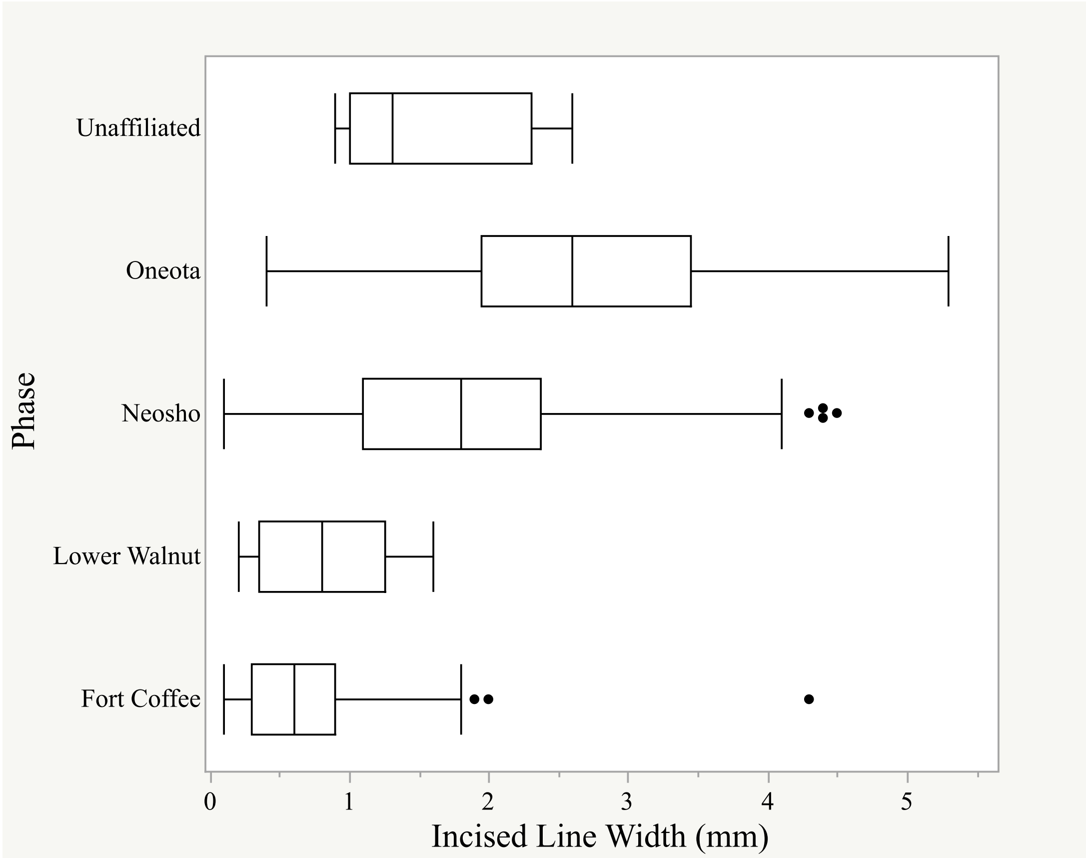


Figure 6.12. Line Width (mm) by Phase. Minimum, Maximum, and Medians represented.

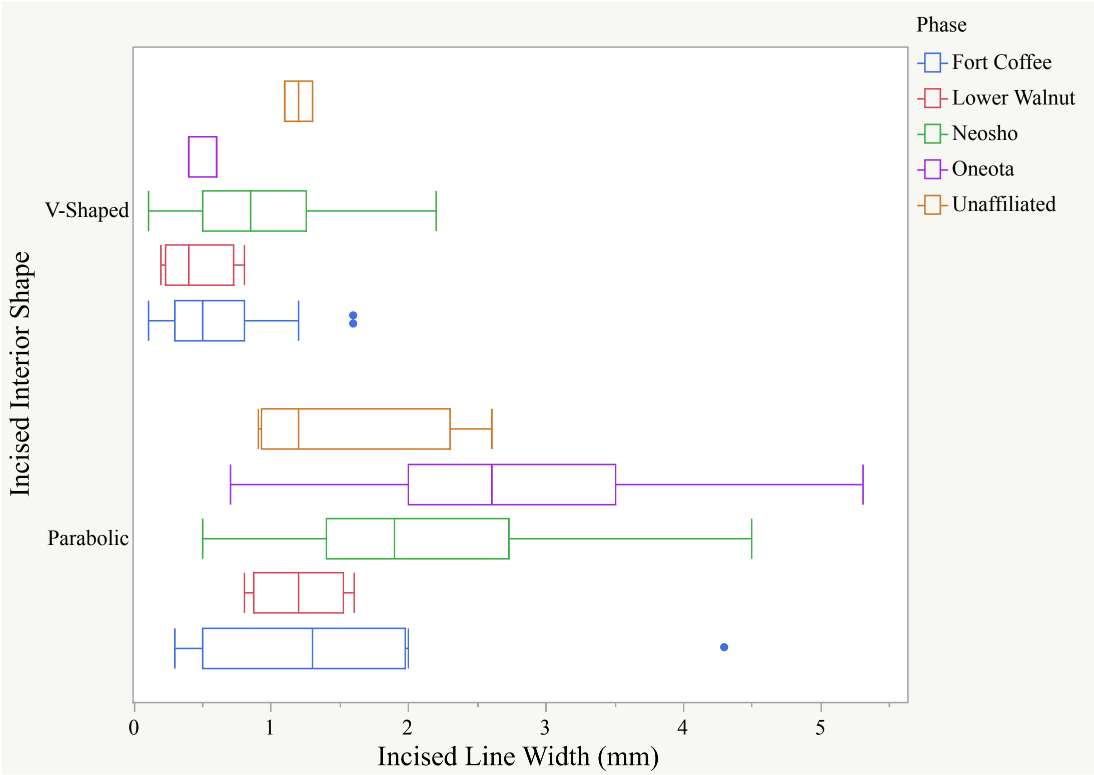


Figure 6.13. Line Width (mm) by Phase and Interior Shape. Minimum, Maximum, and Medians represented.

some instances may be explained by the tools utilized in creating the dominant parabolic interior shape.

Figure 6.14 presents the data for line depth by phase and Figure 6.15 separates these measurements by interior line shape. The relationships here are not as strong as those observed above when examining line width. Neosho pots had a greater range of depths recorded overall. It does seem that the lines that Fort Coffee potters applied as decoration are overall shallower than their neighbors. And, when we examine depth by interior shape, this is likely because lines with V-shaped interiors are overall shallower than those with parabolic interiors.

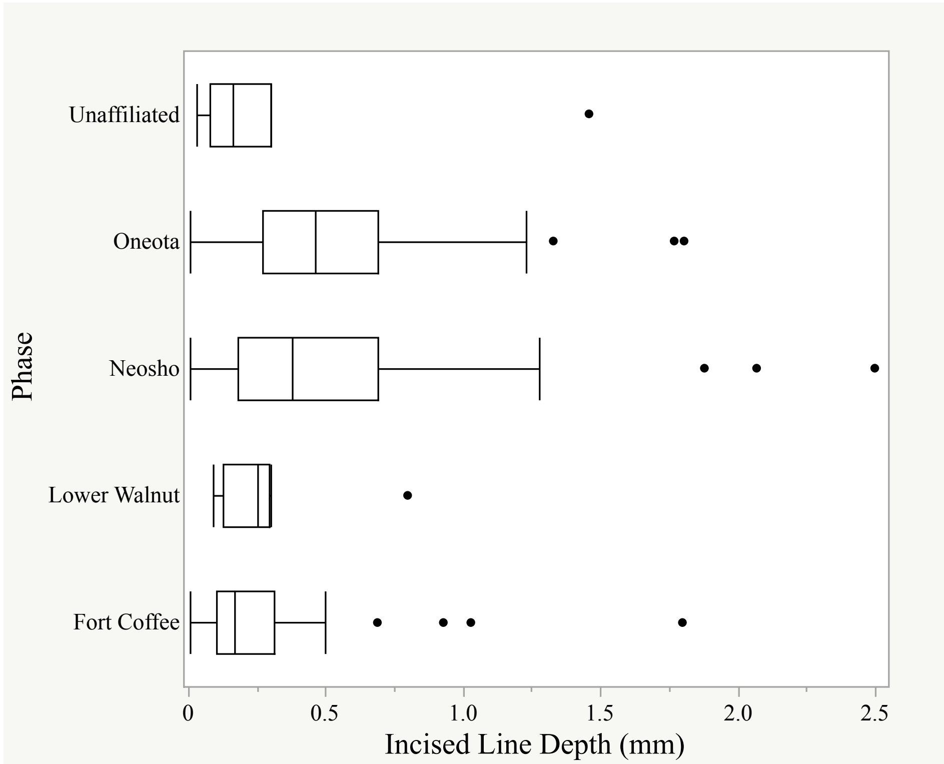


Figure 6.14. Line Depth (mm) by Phase, some outliers excluded. Minimum, Maximum, and Medians represented.

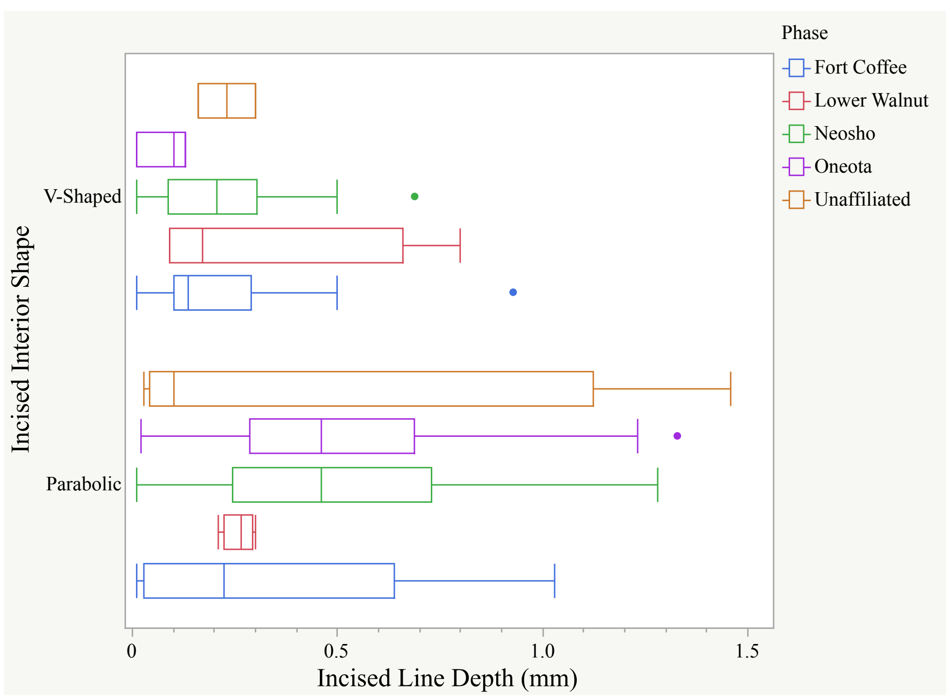


Figure 6.15. Line Depth (mm) by Phase and Interior Shape, some outliers excluded. Minimum, Maximum, and Medians represented.

Finally, Figure 6.16 presents the data for line spacing (when available) by culture and Figure 6.17 separates these measurements by the line's interior shape. Patterns in this attribute once again are not readily observable unless separated by the line's interior shape. Overall, it seems that the lines with parabolic interiors are overall spaced wider than those with V-shaped interiors. This means that Fort Coffee potters—in addition to the other points of variation mentioned above—are spacing their v-shaped line decorations closer to one another than communities who prefer to use tools that create parabolic interiors.

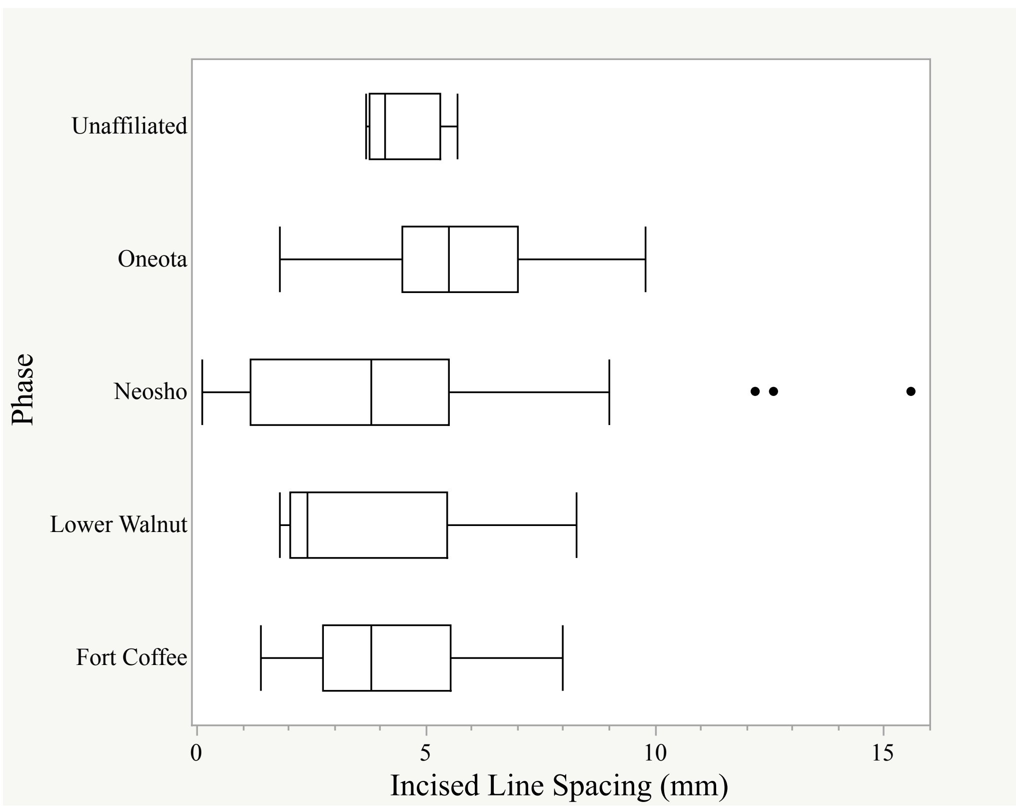


Figure 6.16. Line Spacing (mm) by Phase. Minimum, Maximum, and Medians represented.

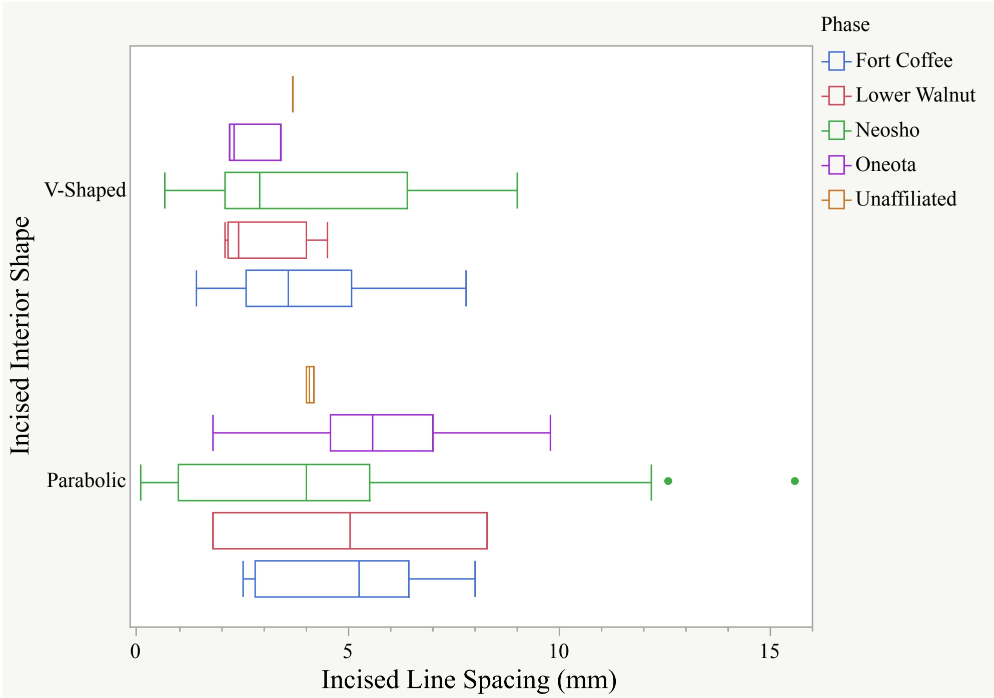


Figure 6.17. Line Spacing (mm) by Phase and Interior Shape. Minimum, Maximum, and Medians represented.

Now that I have described potential relationships between these continuous metrics and the interior shape of these incised or trailed lines, I wanted to examine if there was a relationship between how wide a line was versus how deep it was incised on the pot. Figure 6.18 plots these data by community. Clearly there is a positive correlation between line depth and width, though the spread is less obvious than for punctated designs. The Fort Coffee communities again cluster along the lower end of the spectrum, with their line decorations overall having smaller width and being shallower than others.

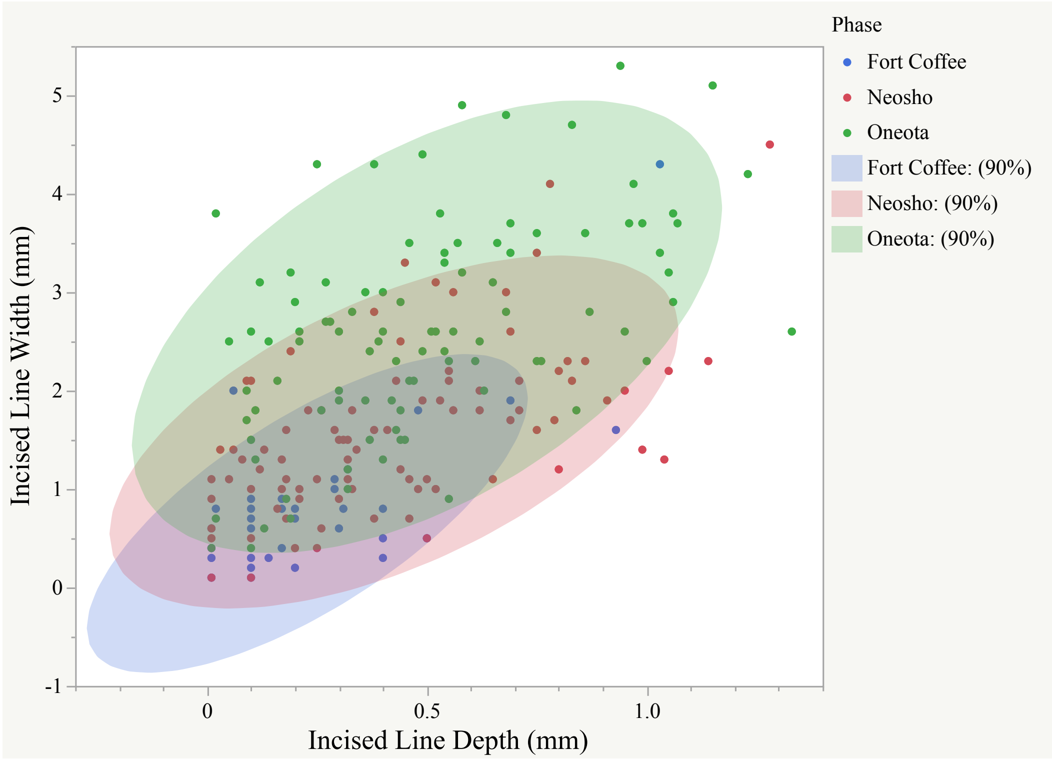


Figure 6.18. Relationship between Line Depth (mm) and Width (mm) by Culture. Lower Walnut and Unaffiliated Excluded due to low sample sizes (N<10).

Figure 6.19 presents the relationship between line depth and with as it relates to interior shape to confirm the relationships noted above for Fort Coffee communities. Again, we can see that the lines with V-shaped interiors are overall shallower and are not as wide as those with parabolic interiors. This explains why Fort Coffee line decorations are clustered towards the lower extent of the graph presented above. Obviously, these communities have wares represented that do not use tools that create V-shaped or parabolic interiors (whatever their preference might be), but some of this variation may be due to direct down-the-line exchange, instances of which will be presented below.

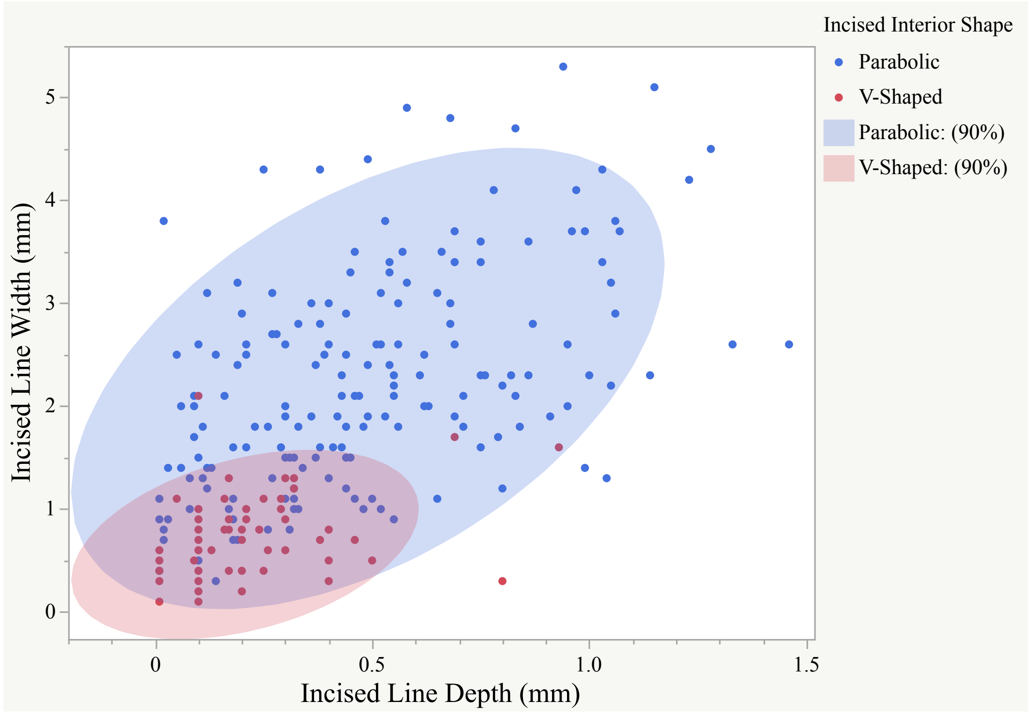


Figure 6.19. Relationship between Line Depth (mm) and Width (mm) by Interior Shape. Flat interior shape excluded due to low sample size (N<5).

The relationships shown above in line width, depth, spacing, and shape all illustrate that some regional differences do occur. I believe this discussion illuminates why the typologies refer to both incised and trailed decorations, which ultimately led to a lack of clarity in understanding decorative techniques in the region. Neosho and Oneota communities are predominately using line decorations that are deeper and wider than Fort Coffee communities, with parabolic interiors. It could be argued that these represent "trailed" decorations rather than "incised", but clearly there are instances in these communities where these decorations would be classified as "incised" (i.e., shallower, and thinner with V-shaped interiors). I believe the above investigations do more for understanding the decorative variation in the region rather than utilizing somewhat arbitrary cutoffs in line thickness to classify something as incised or trailed. It would be perhaps better, based on my own observations during data collection, to use interior shape to classify these designs and better understand relationships within and between communities in pottery making.

Lastly, the investigations on incised decorations evaluated decorative intent. Once again, the designs referred to in these analyses focus on those outlined in Figure 6.9 in the above discussions of punctations in the sample. Tables 6.28 and 6.29 present these data by site and by community, respectively. First, I want to briefly discuss the decorations that indicate interactions with surrounding communities including Caddo peoples in the Red River Valley and Arkansas River Valley. There were several instances in which Caddo finewares were present, here classified as having designs with cross-hatching, curvilinear, and rectilinear designs. These designs were present at Fort Coffee communities, continuing some of the earlier Caddoan Mississippian traditions and interacting with their neighbors in the Red River region. There were also Caddo finewares present in small quantities at Neosho sites, illustrating a relationship with Caddo peoples (and Fort Coffee communities) to the south. Typologies for these finewares are well-established by archaeologists studying the Caddo region (McKinnon et al. 2021). There was one Taylor Engraved sherd discovered in the assemblage for 34DL29, a Neosho community (Figure 6.20). This type has also been in investigations in Lower Walnut communities around Arkansas City in Kansas (Stein 2012:299), though none were discovered in the samples examined in this study. Avery Engraved has also been noted to be present in at Lower Walnut communities, at 14CO385 (Stein 2012:320). Perttula et al. (2001) discusses the provenance of these wares as coming from the Red River region during the Late Pre-Contact McCurtain and Titus phases associated with Caddo people. The x-design, curvilinear, cross-hatching, and

Table 6.28. Incised Decorative Intent by Site (counts)

Site Number	Chevron Motif	Herringbone Motif	Diagonal Rows	Vertical Rows	Horizontal Rows	Parabolic	Sideways Arrows	Teardrop (Zoned)	X-Design	Taylor Engraved	Cross-Hatching	Curvilinear	Rectilinear
3BE187	-	-	-	-	-	-	-	-	-	-	-	-	-
3CW11	2	-	1	1	1	-	-	1	-	-	-	1	-
14CO1	3	1	1	1	2	1	-	-	-	-	-	-	-
14CO3	-	-	-	-	1	-	-	-	-	-	-	-	-
23LA259	2	-	5	-	3	-	-	-	-	-	-	-	-
23MD43	4	-	1	-	-	-	-	-	-	-	-	-	-
23MD147	-	-	1	-	-	-	-	-	-	-	1	-	-
23MD148	-	-	-	-	-	-	-	-	-	-	-	-	-
23SA131	21	29	20	7	24	4	-	-	-	-	-	-	-
DL20	-	-	-	-	-	-	-	-	-	-	-	-	-
DL27	5	-	1	-	3	1	-	-	-	-	-	-	-
DL28	3	-	1	-	-	2	-	-	1	-	-	-	-
DL29	4	2	11	-	1	1	1	-	-	-	-	-	-
DL30	2	1	3	-	3	1	-	-	-	-	-	-	-
DL32	-	-	6	-	3	-	-	-	-	-	-	-	-
DL39	7	3	5	-	3	1	1	-	-	-	-	-	-
DL96	1	-	-	-	-	-	-	-	-	-	-	-	-
HS9	2	2	10	1	4	-	-	-	-	-	2	-	1
HS24	-	4	10	-	7	-	-	-	-	1	-	-	-
MY18	1	-	8	-	4	1	-	-	-	-	-	-	-
MY54	2	-	6	1	3	-	-	-	-	-	-	-	-

Table 6.29. Incised Decorative Intent by Culture (% of Total), Important Observations Highlighted

Phase	Chevron Motif	Herringbone Motif	Diagonal Rows	Vertical Rows	Horizontal Rows	Parabolic	Sideways Arrows	Teardrop (Zoned)	X-Design	Taylor Engraved	Cross-Hatching	Curvilinear	Rectilinear
Neosho	25.62	4.96	40.50	0.83	19.01	5.79	1.65	-	0.83	-	0.83	-	-
Fort Coffee	4.55	13.64	45.45	2.27	25.00	-	-	-	-	2.27	4.55	-	2.27
Lower Walnut	30.00	10.00	10.00	10.00	30.00	10.00	-	-	-	-	-	-	-
Oneota	20.00	27.62	19.05	6.67	22.86	3.81	-	-	-	-	-	-	-
Unaffiliated	28.57	-	14.29	14.29	14.29	-	-	14.29	-	-	-	14.29	-

rectilinear designs also represent Caddo finewares though types were difficult to assign. Thus, it is already clear that these communities are connected through interactions with their Caddo neighbors. Also, as discussed in Chapter 3, we know that communities in the Ozarks and the Arkansas Valley were interacting prior to the Late Pre-Contact, so relationships to Caddo communities in the Red River are ultimately unsurprising. The teardrop (zoned) decoration found solely at Beaver Pond (3CW11), the Unaffiliated community, is a decorative outlier and the relationships that are indicated by these sherds are unclear.

Most line decorations used by these communities involve one or more of the following: chevrons, herringbone motifs, diagonal rows, vertical rows, horizontal rows, or parabolic rows. This attribute does show some patterning, not only based on these data presented above, but based on my own observations when collecting these data. Due to the fragmented nature of these sherds, especially in Fort Coffee and Neosho collections, some designs were partial and were categorized diagonal, vertical, or horizontal rows in many cases. However, it is likely that if these designs continued, they would be representative of chevrons or herringbones. Taking that into account, and knowing the sample, it is clear to me that Neosho potters were mostly executing chevron designs on their pots. And knowing what we do about the nature of the lines themselves, these chevrons were made mostly of lines with parabolic interiors that were overall wider and deeper than those used by Fort Coffee communities. Lower Walnut communities also showed a preference towards chevron designs, though in the sample examined most of the wares represented were punctated rather than incised/trailed.

Figure 6.20. Taylor Engraved Sherd from 34DL29.

Fort Coffee communities, on the other hand, were mostly implementing herringbone patterns with thinner and shallower V-shaped lines than those used by Neosho potters. I find it likely that the herringbone design is what Rohrbaugh (1982) was referring to when describing "alternating triangles" in his description of Braden Incised (Figure 6.21). It is therefore possible to distinguish what Rohrbaugh (1982) classified as Braden to the chevron designs that are more typical of Neosho (and other community's) pottery assemblages.

Figure 6.21. Juxtaposition of Alternating Triangle (Herringbone) and Chevron Patterns (34DL39 on left and 34HS24 on right).

In making those distinctions between designs we can once again illuminate potential interactions between the communities in this study. While herringbone patterns are not necessarily distinctive to Fort Coffee pottery alone, it seems that there is a prevalence of these decorations being zoned and restricted to the upper shoulder and large rims of their vessels. Additionally, taking the above discussions on preference for zoned fingernail punctations on the shoulders and rims made by Fort Coffee groups, we can potentially distinguish Fort Coffee punctated wares from others in the region. Combining these points with an understanding of the preferred method of incising these lines on the pots, and in my understandings of the sample overall, we can identify these "typical" Fort Coffee wares as defined by Rohrbaugh in a just a couple cases at other communities in the region, one at the Dalhman site (23LA259), a Neosho community in the Missouri Ozarks, and one at 14CO1, a Lower Walnut community in Kansas.

As only two of these sherds were discovered outside the Fort Coffee community area, I find it safe to conclude that these represent local Fort Coffee wares that ended up in these communities because of direct exchange.

Oneota communities incorporated several configurations on any one given pot, whereas Fort Coffee, Lower Walnut, Neosho, and Unaffiliated communities incorporated only one. Oneota decorations were overall more complex in terms of decorative intent, often combining chevrons or herringbone patterns alongside punctates and vertical lines in most cases. The herringbone designs differ from those found at the Fort Coffee communities in that the lines were wider and deeper with parabolic interiors. These herringbone designs were also not as intensive or closely spaced as those found in the Fort Coffee sample and were mostly present on the upper shoulders and lower rims of vessels rather than covering the full extent of the rim.

Given the similarities between Oneota and Neosho decorations, we begin to see why scholars once proposed a relationship between these groups. The ceramic data from this study demonstrate that Oneota decorations were very different from Neosho decorations in multiple ways. Both preferred to use wider line decorations executed with a tool that created a parabolic interior, but Oneota potters consistently chose to incorporate more than one decorative intent for these lines consistently on their pots. There were numerous examples in the sample at 23SA131 where Oneota potters executed chevron as well as vertical incised/trailed designs on the same sherd, whereas Neosho potters in the sample only incorporated one of these configurations on each vessel. Additionally, as discussed above, Neosho and Oneota potters utilized different tools for punctations. These are important distinctions to note, though it does not eliminate the potential for a relationship of some kind between these two groups. It does show that in some ways these communities were part of different communities of practice in terms of decorative techniques.

Decoration Configuration of Incised and Punctated Pottery

In this final discussion of ceramic manufacture and design, I will cover the decoration configuration of vessels that had both line and punctated decorations. There were very few of these in the sample, and Neosho and Oneota communities dominated the sample overall. Lower Walnut and Fort Coffee communities only had one sherd each in their assemblages that combined these decorative techniques and the Unaffiliated community had none. Accordingly, these discussions will focus mainly upon Neosho and Oneota decorations.

Tables 6.30 and 6.31 present these data by site and assigned community, respectively. Once again, in many cases this attribute was difficult to record due to the partial nature of the sherds themselves. Some of these were categorized generally as punctates above or below. If we examine the samples in which a determination could be made about the design configuration, we can see differences emerge between Oneota and Neosho communities. In the sample, Neosho communities were mostly utilizing wedge punctates placed above and below the line decorations. There are cases in which these are placed between the line decorations, but the trend seems to be towards placing them above and below. Oneota potters, on the other hand, are incorporating mostly elliptical punctates between their line decorations. This, in part, is related to the fact that their line decorations overall incorporate more design configurations than Neosho potters, with vertical, chevron, and herringbone present in various combinations. This finding is consistent with Freeman and Buck's (1960) original drawing of Neosho punctate design configurations, where punctates were present between the lines in only one instance. Most of

Table 6.30. Decoration Configuration for Incised and Punctated Pottery by Site

Site Number	Phase	Lines Bordered by Punctates (Above and Below)	Punctates Above Lines	Punctates Below Lines	Punctates Between Lines
DL20	Neosho	1	-	-	-
DL27	Neosho	2	4	-	-
DL28	Neosho	2	-	-	-
DL29	Neosho	5	6	2	-
DL30	Neosho	-	3	3	-
DL31	Neosho	-	-	-	-
DL32	Neosho	2	2	-	-
DL39	Neosho	3	1	-	1
DL96	Neosho	-	1	-	-
MY18	Neosho	-	1	-	-
MY54	Neosho	-	-	1	-
MY66	Neosho	-	-	-	-
23LA259	Neosho	-	2	-	-
23MD43	Neosho	2	2	1	-
23MD147	Neosho	-	-	-	-
23MD148	Neosho	-	-	-	-
HS9	Fort Coffee	-	1	-	-
HS24	Fort Coffee	-	-	-	-
14CO1	Lower Walnut	-	-	-	-
14CO3	Lower Walnut	-	1	-	-
23SA131	Oneota	2	11	19	26
3CW11	Unaffiliated	-	-	-	-

Table 6.31. Decoration Configuration for Incised and Punctated Pottery by Culture, Important Observations Highlighted

Phase	Lines Bordered by Punctates (Above and Below)	Punctates Above Lines	Punctates Below Lines	Punctates Between Lines
Neosho	36.17	46.81	14.89	2.13
Fort Coffee	0.00	100.00	0.00	0.00
Lower Walnut	0.00	100.00	0.00	0.00
Oneota	3.45	18.97	32.76	44.83
Unaffiliated	0.00	0.00	0.00	0.00

these configurations show the punctates either above, below, or bordering the lines themselves.

Relationships Between Variables: Goodman-Kruskal's

Before moving to the network analyses, it is important to discuss potential relationships between these variables. I utilize *Goodman-Kruskal's* λ to evaluate potential relationships between the non-continuous variables in the sample. This is a measure of association among nominal variables that is based on the proportions of the reduction of error calculated by using the value of the independent variable to estimate the value of the dependent variable (Goodman and Kruskal 1954, 1959, 1963). This correlative measure is calculated based on a two-way table of potential cases of the independent variable against the potential cases of the dependent variable. *Goodman-Kruskal's* λ ranges from 0.0 to 1.0 and is interpreted much the same as Pearson's r, which will be discussed below. As an example, if $\lambda = 0.75$, this indicates that knowing the independent variable will increase the chance that a predictor would give the correct value to the dependent variable by 75%. Thus, this measure helps us better understand the relationships between all non-continuous variables in the current sample.

Table 6.32 presents the *Goodman-Kruskal's* λ values for the pairs of each of the non-continuous variables recorded on plain ceramics by site. According to these analyses, all but one of the non-continuous variables recorded on plain ceramics in the sample warrant inclusion into the network analyses presented in Chapter 7. Both the upper and lower portions of this matrix must be interpreted in order to fully understand the relationships between these variables. For example, knowing the additional temper included in any given clay body increases the chances of correctly assigning the additional temper amount by 55%, and knowing the additional temper amount increases the chances of correctly assigning the type of additional temper by 31%. There is also a strong association between additional temper amount and the site itself. To eliminate these high associations, the attribute "additional temper amount" will be eliminated from the network analysis of plain ceramics as presented in Chapter 7.

Table 6.32. Goodman-Kruskal's λ values for all non-continuous variables recorded on plain sherds.

	Site Number	Main Temper	Main Temper Amount	Additional Temper	Additional Temper Amount	Surface Treatment (Exterior)	Surface Treatment (Interior)
Site Number	K=23	0.2	0.04	0.14	0.47	0.1	0.05
Main Temper	0.02	K=6	0.02	0.07	0.03	0	0
Main Temper Amount	0.02	0.06	K=20	0.03	0.03	0	0.01
Additional Temper	0.03	0.36	0.01	K=12	0.31	0	0
Additional Temper Amount	0.1	0.08	0.01	0.55	K=16	0	0
Surface Treatment (Exterior)	0.02	0	0	0	0	K=16	0.09
Surface Treatment (Interior)	0.01	0	0	0	0.01	0.09	K=14

Table 6.33 presents the *Goodman-Kruskal's* λ values for the pairs of each of the non-continuous variables recorded on decorated ceramics by site. In looking at these relationships, we can see that there are correlations between things like punctation interior and exterior shape, especially. Knowing the punctation's exterior shape increases the chance of correctly assigning the punctation's interior shape by 48%, while knowing the punctations interior shape increases the chances of predicting the exterior shape by 79%. To eliminate the effect of this correlation, I will not use interior punctate shape in the networks presented in Chapter 7. Other high

associations include the relationship between decorative intent for incised/trailed designs and the interior shape of those lines. Knowing the interior shape of the line itself increases the chances of predicting the decorative intent of those lines by 69%, whereas vice versa the chance of predicting interior shape increases by 40%. While this relationship is asymmetrical, the high association between these variables is noteworthy. The rest of the associations are fairly weak, and thus warrant inclusion into the analyses presented in Chapter 7.

Table 6.33. Goodman-Kruskal's λ values for all non-continuous variables recorded on decorated sherds

	Site Number	Decorative Intent (Punctated)	Decorative Intent (Incised)	Decoration Configuration (Incised and Punctated)	Punctation Exterior Shape	Punctation Interior Shape	Incised Interior Shape
Site Number	K=21	0.14	0.14	0.16	0.28	0.2	0.27
Decorative Intent (Punctated)	0.06	K=16	0.1	0.16	0.45	0.59	0.14
Decorative Intent (Incised)	0.1	0.09	K=22	0.23	0.14	0.17	0.69
Decoration Configuration (Incised and Punctated)	0.07	0.1	0.12	K=7	0.1	0.1	0.23
Punctation Exterior Shape	0.15	0.46	0.13	0.19	K=11	0.79	0.21
Punctation Interior Shape	0.03	0.38	0.09	0.1	0.48	K=6	0.13
Incised Interior Shape	0.07	0.1	0.4	0.2	0.13	0.18	K=5

Summarizing the Ceramic Data: Similarities, Differences, Relationships, and more

The above discussions and descriptions have been useful in describing the variation of ceramic attributes in the region. Based on the observations above, we can make more sense of the difficulties that previous researchers have had in building their arguments and interpretations about regional interactions as well as about Neosho identity and affiliation. Archaeologists have consistently had issues in differentiating between plain shell-tempered ceramics, mostly because they are so geographically widespread and there are only a few ways to manufacture a shell-tempered pot. Therefore, instead of the type designations we see with decorated wares that are based on differences in designs, we get localized plainware type names like Woodward Plain and Cowley Plain that are only differentiated using spatial and temporal boundaries like phases. In terms of the measurement of attributes like those discussed above, this means that there are not many data points to collect on plain sherds other than those that relate to temper. And since most of the sherds in this sample were tempered with shell in varying sizes and concentrations, the meaningful differences really needed to come from attributes such as surface treatment, thickness, and method of manufacture. As noted above, variation in those attributes was not readily apparent, though Oneota plain ceramics did stand out from the rest in terms of the thickness of various portions of the vessel as well as them having rounded bases. These observations are not new, as the Oneota plainwares were already noted to be different in the above comparison of the regional typologies.

I did observe one meaningful difference in the plainware sample that is not captured by the typologies. Additional tempers or inclusions noted in the clay bodies of these sherds did vary by geographic location and also by community. Neosho sherds had more instances of grit while Lower Walnut had more sand. The intentionality of these materials is not assessed here, but these differences may reflect these communities' reliance on local clays. An assessment of regional clay sources and their differences may help to assess this hypothesis. I will note that though these additional materials may be natural and existent in the local clays, for whatever reason these communities chose not to sift them out during the processing stage of their ceramic practice. It would be important to juxtapose an investigation of regional clay differences alongside these analyses of additional tempers to see if some communities are processing their clays in different ways than others. For instance, if the local clays in the Arkansas River Valley and in the Ozarks have high inclusions of grit, but the vessels manufactured by Fort Coffee potters do not have grit inclusions, but Neosho communities do, this may mean there are different practices in clay processing. Whatever the case, there are regional differences in the secondary tempers recorded in this study.

In examining the decorated sherds in the region, some interesting observations can be made that are often obscured when using the pre-existing typologies. These communities seemed to have a preference in the shape and consequently the tool that they used to mark their pots. Neosho potters preferred wedge-shaped punctates, Lower Walnut more often marked the lips of their vessels with slit punctates, Oneota used elliptical, and Fort Coffee used fingernail punctates. These of course naturally correspond to various tools, but even if these communities were using the same tool, they held different intents for the shape. For instance, it could be that both Neosho and Lower Walnut potters were using a reed or other hollow tubular plant or animal bone to punctate their vessels, but Neosho people desired a wedge shape whereas Lower Walnut wanted a slit design on the lips of their pots.

Decorative intent, or configuration, of punctations on sherds varied widely, and there were no readily apparent patterns that can help us distinguish between these different communities. I was able to make note of one meaningful difference, in that Fort Coffee potters were using zoned punctations more often than the other communities in this sample. Combining this with the fact that Fort Coffee exclusively used fingernail punctates, we can distinguish what Rohrbaugh (1984) termed "Braden Punctate" from the other punctated wares in the region. This type he defined as having "punctations from shoulder to rim…fingernail punctations dominate", and we can see that manifest in these collections. (Rohrbaugh 1982:460-464). One instance of Braden Punctate was noted in the collection at 23LA259, that had been previously categorized as Neosho Punctate (Figure 6.22). This configuration of fingernail punctates is distinctive in Fort Coffee communities. These differences are incredibly important to note, as previous researchers heavily relied upon punctated ceramics to build conclusions about Neosho identity and affiliations. Just based on these observations, we can already see, before the construction of any networks, that Neosho and other communities distinguished themselves from surrounding groups in their use of these designs.

Figure 6.22. Braden Punctate Sherd from Dahlman (23LA259), previously categorized as Neosho Punctate

Additionally, we can see that there is a bit of variation in terms of line decorations. Fort Coffee potters were using a tool that resulted in a shallower and thinner line with a v-shaped interior, whereas Oneota and Neosho were using a tool that made a thicker line with parabolic interiors. Fort Coffee folks also more often executed a herringbone or alternating triangular design than the other groups, that is incredibly identifiable in these collections. One instance of this “Braden Incised” ware, as defined by Rohrbaugh (1982:456-460), was noted in a Lower Walnut collection (14CO1) included in this study, that had been previously categorized as Neosho Punctate (Figure 6.23). Though we can make note of less variation in line decorations than in punctated decorations, this is unsurprising, simply because potters are more often using punctated designs.

Figure 6.23. Braden Incised Sherd from 14CO1, previously categorized as Neosho Punctate..

Just based on the above discussions of the attributes collected in this sample, we can begin to build a narrative that helps us better understand the ceramic practices of communities in this region. Even though I was unable to make note of differences in the plainwares, I was able to describe a couple points of difference between these communities in their use of decoration on their vessels. This is not to say that previous researchers did not note these differences and preferences in design and decoration, but that at some point these important points of variation got lost in the translation of the typologies in the region. And because differences like those discussed above were lost, it was difficult for researchers studying Neosho to truly understand how these communities related to one another and to make robust conclusions about their affiliations and identity. Even in noting the differences that I have, it is still difficult to fully describe the relationships between these groups based on ceramic practice, because there is still immense overlap in the techniques and tools used by these potters.

Before constructing the networks, I can make some assessments based on the examination and characterization of the ceramic data. The Braden Punctate sherd found in the collections at Dahlman (23LA259) in Missouri shows that interaction was at least taking place between Fort Coffee communities in the Arkansas River Valley and Neosho in the Ozarks. Additionally, though these communities held preferences towards certain decorative elements, they also overlapped in many respects, illustrating that there may be connections in terms of ceramic practice. It is apparent that they were not peripheral to regional social interactions, and this will hopefully become clearer in the construction of the social networks in the subsequent chapter.

Based on the above discussions I can say that the decorative techniques that Neosho potters use are quite distinct from Fort Coffee, at least suggesting that Neosho is not an extension of the Caddo-affiliated Fort Coffee phase in the Arkansas River Valley. Similarly, Neosho and Lower Walnut ceramic decorative practices are also distinctive from one another, though we have no direct examples of trade and exchange, as these differences are murkier than those between Fort Coffee and Neosho. Though they maintained these differences from the surrounding groups, Neosho potters still sustained relationships with those communities, relationships that may have persisted from earlier time periods. Chapter 7 will take these data and translate them into a network analysis that will better illuminate these regional connections and answer the remaining research questions.

Chapter 7

Discovering Past Social Relationships: Constructing the Regional Social Networks of Ceramic Practice

In Chapter 5, I argued that evaluating technological and decorative aspects of ceramic style allows archaeologists to investigate relational connections between people in the past more fully. From a communities of practice perspective, investigating low-visibility attributes that are invisible on the final pots (e.g., temper, temper concentration) together with the high-visibility attributes (e.g., decoration type, decoration configuration), lets us map more restrictive relationships among potters who share similar manufacturing techniques as well as broad social affiliations resulting from identification and emulation, simultaneously (Carr 1995; Dietler and Herbich 1998; Gosselain 1998, 2000; Stark et al. 1998). In contexts like those in the current study, with limited datasets, incorporating an understanding of connections and similarities in all of these attributes provides the mechanics through which we can utilize techniques such as social network analysis (SNA) to better understand regional relationships in a more detailed manner than ever before. By combining high- and low-visibility attributes of ceramic style along with these relational techniques, tools, and theories, we integrate a perspective that does not only map "cultures," in the traditional culture-historic sense, but that maps shared practices between communities at various scales.

The last chapter took time to describe regional ceramic typologies and the issues surrounding their use in answering persistent questions about Neosho as well as to describe the ceramic sample and investigate trends in the data based on the various attributes recorded for plain and decorated sherds. Having investigated those trends and illustrated that there are several previously undiscussed points of variation in the sample, I have illustrated the need for a more intensive look at regional ceramic practice within and between communities. Using these data, centered around Neosho potters and communities, I will use network analysis to evaluate not only the dynamics within the Ozark Plateau, but also investigate the Ozarks as a meaningful cultural borderland. This chapter will describe the network protocols followed based on the trends in the ceramic data as presented in Chapter 5, discuss the similarities and differences between these protocols and a traditional typological analysis, as well as present, interpret, and evaluate the networks using various network characterization methods. These discussions will show that regional patterns of interaction are complex and multifaceted, showing varying connections based on ceramic design and techniques of application, and that the Ozark Plateau is not a cultural borderland as made meaningful by Neosho peoples.

Building a Network: Attributes, Samples, and Protocols

This section briefly summarizes the steps of the analyses and framework as described in Chapter 4. The data points collected in this study represent various attributes of ceramic design and style. These attributes were chosen not only to fully understand the variation present in the sample in the traditional sense, but also were tailored towards better understanding certain elements of ceramic practice among and between communities in the region. In other words, I chose to record certain attributes on all sherds (e.g., temper, concentration, surface treatment, thickness) to gain an overall understanding of practices in ceramic manufacture in the region, and then conducted an intensive analysis of decorative techniques specific to this region and that have led to long-standing and unresolved debates. By separating these attribute analyses, I can identify potentially meaningful points of variation between communities in this study (see Chapter 5) as well as map relative similarities in these practices in multiple ways that will show various regional relationships. There were a couple obvious correlations between variables, some with relatively high *Goodman-Kruskal's* λ values (Figures 6.23 and 6.24). Some of those variables were eliminated from this study while others were included. The rationale for this is presented in Chapter 6.

The various attributes recorded in this study each provide information on specific steps in the pottery manufacturing process in the region in question. The methods described in Chapter 4 and reiterated here are based upon the work of Peeples (2018b:185-193), which are designed to measure technologic similarity across all variables simultaneously in order to characterize variation and make inferences about the degree of social interaction among potters. All analyses were performed and all networks were generated using the R statistical package. Code was developed by Peeples (2018a) and modified for the purposes of this study.

These analyses follow four basic steps that will be more fully described in their implementation below. These steps are as follows:

1. Coded variables are converted into a distance matrix between individual sherds/samples.
2. That distance matrix is run through a Principal Coordinates Analysis (PCoA) to investigate strong relationships among the cases (in this case between sherds in the sample).
3. Clusters of similar sherds are defined based on the PCoA scores that reflect pottery produced with similar techniques.
4. A scale of similarity for each site's assemblage is defined based on the proportions of sherds in the clusters created in the previous step.

Having investigated the ceramic data and relationships between recorded attributes and having briefly described the protocol to be followed in this research, the decision was made to separate plain and decorated sherds for the generation of the networks in this chapter. The small decorated ceramic sample meant that a network generated from all collected data would be dominated by plainwares—which were shown in Chapter 6 to have little identifiable variation—and the important and multifaceted decisions made by potters in terms of decorative techniques and tools would be lost. A comparison between networks built from these two separated datasets allows me to more fully investigate relationships in the region, especially reflecting those smaller world communities of practice relationships versus relationships signaling broader affiliations and emulation. The decorative networks are also separated into punctated and incised ceramics, to control for missing data points that could affect the network structure. Most of the decorated ceramics in this sample are punctated or incised (rather than both), and these are the wares that have spurred most of the regional debates. In separating them I will more fully describe and investigate regional ceramic connections, that were hypothesized in previous chapters to be multifaceted.

Network Analysis and Typologies: Complementary Tools in the Analyses of Communities

As discussed in the previous chapter, analyses of the Late Pre-Contact Ozarks and surrounding areas have to date been based upon generalized typologies that often mask meaningful variations that can be investigated to understand relationships as it pertains to ceramic production and design. I have illustrated that the typologies described in Tables 6.3 and 6.4 have proven difficult for scholars to apply in the region, leading to an overall lack of understanding of what potentially distinguishes these communities' ceramics from one another.

In a regional study, it is much easier to see these inconsistencies in the application of typologies because the scope of work is much wider and encompasses a broader range of ceramic practice.

Thus, this study was designed to investigate technological aspects of ceramic practice as well as decorative techniques, to investigate how communities in this region not only made their vessels, but also how these communities may be connected through pottery manufacture. As such, I chose to conduct an attributes analysis to investigate the various modalities of human behavior more thoroughly in the region, rather than conducting a typological analysis that relies instead upon broad and often overlapping characterizations. Chapter 6 has already described the attribute analyses and how these data diverge from previously established typologies.

This chapter focuses on the construction and interpretation of social networks as developed from the data presented in Chapter 6. In choosing to conduct an attribute analysis on the regional ceramic data, I have been able to incorporate an intensive investigation of technological aspects of ceramic style that provide a means of making interpretations that represent localized and regional relationships between communities. These analyses are meant to be complimentary and to investigate variation and relationships using new methodologies like social network analysis (SNA) rather than disregarding the established typologies and interpretations. As such, this section will discuss the similarities and differences between the approach described above and traditional typological analyses that have to date been inconsistently applied in the region.

Above, in step 3 of the network protocols, I discuss the creation of ceramic technological clusters based on the attribute data collected and presented in Chapter 6. As defined by the statistical analyses, these clusters do not represent "types" as traditionally applied to ceramic data. Types, as applied by most archaeologists, are defined using a set of distinctive, analytically important, and easily recognizable characteristics on a certain material type, such as ceramic decoration. The meaning of these types is debated in extant literature, in how they are applied to the interpretation of human activity and behavior, through most would agree that types have some degree of significance for archaeological analyses (Ford 1954; Spaulding 1953). For ceramic analyses, there is a set of common variables utilized in type definitions, many of which were discussed in the previous chapter in the descriptions of typologies in the region and were presented as attributes measured and recorded in the current investigations (e.g., temper and concentration, surface treatment, decoration type).

Superficially, it could be argued that the definition of clusters from these data essentially recreate these types. These analyses do essentially construct something analogous to a type, just using a different scale of analysis than previous researchers in this region and using different statistical methodologies. The methods used here, while they do share many similarities to methods traditionally used to create and confirm typologies (Spaulding 1953), have more nuanced theoretical and methodological goals that should complement and clarify these traditional analyses. Rather than focusing most intently on the creation of reproducible types to be consistently reapplied in the region, the network methods and cluster definitions in these analyses aim to divide variation among all pottery presented in this regional study in terms of their relative similarities. As such, the goal of this study is to arrive at more a more nuanced understanding of regional interactions as illuminated through similarities in pottery manufacture and design. Whereas previous researchers tended to work at much smaller scales, this regional approach distinguishes the current study from traditional typological analyses. It is this regional variation that creates the categories in the SNA, with the overall interest being not in the definition of those categories like a traditional typological analysis, but instead in the illuminating the differing proportions of those categories found within various communities to make relational inferences.

These clusters are also defined in such a way that would be deemed inappropriate in a traditional typological analysis. For a typology, the main aim is to describe or identify a set of objects (in this case ceramics) that share an important characteristic like design or decoration. Such an approach has been shown to be unproductive in the region in question, mostly because there is a lot of overlap in these characteristics or attributes, such as the kinds of decorations used and also in the various design configurations that potters used in this region. However, in the current study, any one cluster may include pottery that has many attributes in common but differ in other respects. For instance, a cluster could include sherds with the same temper, decoration type, and design configuration but differ substantially in the actual application of those decorations (i.e., punctation shape, width, and depth). In these ways, the approach used here differs from a traditional typology in that it suggests that pottery within any one given cluster could have shared some production steps, but not others. As such, the primary goal is not to define reproducible groups—this is a secondary outcome resulting from the analysis overall—but rather to evaluate how specific attributes of pottery manufacture influence regional patterns of ceramic similarity and arrive at a more nuanced understanding of regional connections.

The discussions below will more readily demonstrate these points, in separating the various techniques and attributes for network and cluster construction. In the current study, the main concern is illuminating relationships between communities in terms of relative similarity of aspects of ceramic practice and design, rather than in terms of broad categorizations. In a traditional typological analysis, like those defined and presented by previous scholars such as Freeman and Buck (1960), their aim was to create a set of readily reproducible characteristics that archaeologists could utilize in identifying Neosho Punctate pottery and then use the existence and proportions of that type to make inferences about human behavior and relationships. As already illustrated, these typological definitions often become muddy and difficult to apply in regional studies, and as a result archaeologists have been unable to answer their burning questions about relationships between communities in this region. The patterns discussed in this chapter do not simply represent proportions of ceramic types found at these communities, but also show relational connections through similarities and differences in overall technological aspects of pottery manufacture as well as overall decorative design. In these ways the methods used here capture patterns of ceramic similarity that would not be readily apparent if using typological analyses on their own.

The beauty of a network analysis like the one to be presented here is that it does not exist in isolation from the typologies as defined by previous scholars but intends to complement and expand upon their work to investigate and evaluate relationships in the region overall. The traditional typologies, while inconsistently applied, have informed the attributes investigated in this study and the overall research design. The difference between my analyses and those undertaken by previous researchers is that I use these relational tools not to necessarily distinguish communities from one another, but instead to map and understand connections between these people as seen through ceramic practice. The networks presented in this chapter will show that communities like Neosho are internally connected, as one would expect by those previously established typologies, but also that that they are connected to surrounding groups by relative similarities in ceramic manufacture and design. These connections, as defined by relative proportions of ceramic clusters as discussed above, could be masked by a traditional typological analysis, whose aim is to differentiate communities from one another.

As has been discussed at multiple points in this dissertation, research questions about Neosho communities have to date been driven by traditional typological analyses, leading to an overall lack of understanding of how these communities interacted with one another. Importantly, the network connections described and interpreted here do not simply represent similarity in various ceramic attributes, but rather model community relationships as informed by an overall understanding and representation of technological and stylistic aspects of ceramic design. These connections, based on extant literature, represent such things as broad political and cultural affiliations in some ways, but also represent interpersonal connections within communities of potters who share techniques and tools. The network analyses discussed here do not move away from answering previous questions about the "origins" and identities of Neosho people that overemphasize problematic concepts as discussed in Chapters 2 and 3, but instead move the discussion towards relational questions geared towards better understanding people and their connections to one another in the past. In these ways the conversation shifts from differentiating peoples from one another to more fully describing the ways in which these groups built and maintained relationships. It is this shift in narrative that will lead to more productive and interesting discussions not only about the contemporaneous relationships between Neosho communities and surrounding groups, but eventually could lead to an understanding of diachronic movement and connections between peoples in the region overall.

Creating a Scale of Relative Similarity

The procedures described here and in previous chapters resulted in the creation of various matrices describing similarities between pairs of sites that can be seen as a proxy mapping the degree of social interaction among potters in the region. These connections can then be interpreted using the established theoretical frameworks to investigate relationships between Neosho and surrounding communities and to evaluate borderland dynamics based on ceramic practice. This section presents the cumulative results of the analyses completed in this dissertation on ceramics in the region. First, I will describe the tools and procedures as completed for the creation of datasets suitable for network generation on plainwares, punctated, and incised wares, and then will present, compare, and interpret the networks resulting from these datasets.

Plainwares

In this section I will not only present the networks generated from data on plain ceramics in the region, but I will also expound upon the network protocols described above and in Chapter 5. Step by step, these procedures as followed for these undecorated wares result in the generation of networks based on relative similarity of lower-visibility aspects ceramic production, investigating any unknown variation and relationships in regional ceramic practices. The steps described below are also followed for the generation of the networks for decorated ceramics. Again, these mirror the work of Peeples (2018a, 2018b), and all were completed using R statistical software. The R libraries utilized in these analyses are as follows: ade4, calibrate, cluster, fpc, igraph, network, parallelDist, psych, sna, statnet, and tnet. The R code is presented in Appendix C.

First, using the data collected on plain ceramic attributes, a similarity matrix that compares every sherd against every other sherd in the sample is generated. For these analyses, Gower's general coefficient of similarity was utilized because it more readily incorporates cases with missing data and is calculated using multiple classes of data including presence/absence, nominal/ordinal, and continuous variables (Gower 1971). Gower's coefficient (G_{ij}) for the continuous variables in the study (i.e., thickness) between two cases (*i* and *j*) is defined as follows:

$$G_{ijk} = 1 - \frac{\left|x_{ik} - x_{jk}\right|}{r_k}$$

where r_k represents the range of values for the *k*th variable. For nominal variables (i.e., temper, temper concentration, surface treatment) included in the study, the value of Gower's is the total number of included variables where two sherds have the same value. Upon these calculations, the variables are all combined by summing the similarity contributions for each continuous variable with the number of co-occurrences for the nominal variables. The final Gower's values between any two sherds is calculated by dividing this sum of similarity contributions by the total number of variables. These calculations result in the generation of a large symmetrical matrix with values ranging from 0, representing no similarity, to 1, perfect similarity for each pair of sherds in the analysis. Thus, we get a score of relative similarity between each pair of sherds included in the study. This similarity matrix was converted to a Euclidian distance matrix (distance = 1-similarity).

Secondly, the distance matrix generated from the Gower's similarity scores is then subject to Principal Coordinates Analysis (PCoA). This method is much like principal components analysis, in that it examines the pairwise interrelationships of correlated effects to investigate variation in the entire sample (Shennan 1997). Unlike principal components, PCoA operates instead on distance matrices. This analytic tool models patterning in the distance matrix and highlights the strongest associations. Figure 7.1 displays the scatterplots for the PCoA for all recorded variables on plainwares for these analyses. Each point represents a single sherd in the sample and the distance between points represents relative similarity between those various pairs of sherds. This plot suggests overall that the plainware sample is highly modal, but this makes sense considering there are relatively few variables for the plainwares as discussed in the previous chapter.

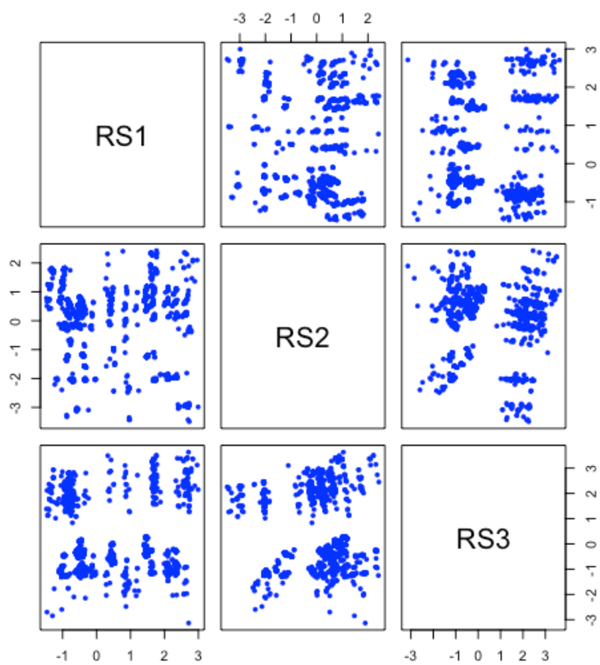


Figure 7.1. Principal Coordinates Plot for Plainwares.

In the next step (step 3 as designated above), groups of sherds that are relatively similar in terms of the measured attributes are defined using cluster analysis on the above PCoA scores between each case. Much like Peeples (2018b:188), this is accomplished using K-medoids cluster analysis on the first three PCoA axes. The first three axes of the PCoA were selected for this representation as the total percentage of variance explained by the remaining dimensions is less than 5 percent. This type of cluster analysis defines clusters based on Euclidean distances in a non-hierarchical manner that reduces the distance between individual cases and their cluster center while maximizing distances between the clusters themselves. This analysis is different than others in that it better accounts for datasets like the one in this analysis with potential outliers.

The K-medoids analysis step is tricky, in that the number of clusters is defined by the analyst. In utilizing the code and methods developed by Peeples (2018b), I used two methods of cluster evaluation involving assessing the sum of squared error (SSE). SSE is the sum of all squared distances between the samples in each cluster, serving as a measure of error that can be calculated across any number of clusters. Clustering in these datasets is evaluated by comparing SSE for the actual data to a number of randomized matrices based on these original data (Kintigh 1990; Kintigh and Ammerman 1982). SSE was calculated in this analysis for the first 15 cluster solutions on the PCoA coordinates and on the 250 randomized versions of those coordinates. When clustering is present, as the number of clusters increases (x-axis), the SSE for the actual data should decrease quicker than the SSE for the random data (y-axis). Strong "elbows" in the SSE values indicate potentially significant cluster solutions (Baxter 2003). Figure 7.2 shows not

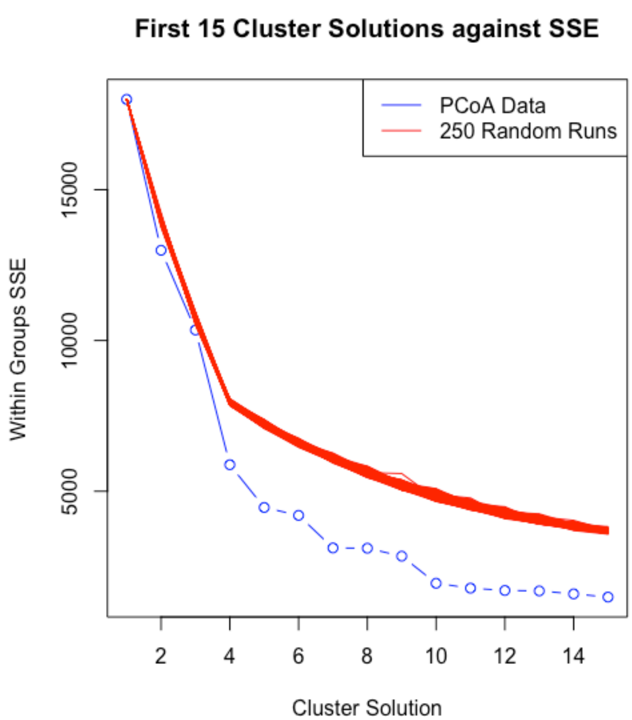


Figure 7.2. SSE for Actual and Randomized Data Plotted Against first 15 Cluster Solutions for Plainwares.

only that the rate of decrease in SSE is greater for the actual data than it is for the randomized data, but that there are multiple clustering solutions, most significantly at 5, 7, and 10.

A second method for choosing a cluster solution was also implemented in these analyses, one that involves comparing absolute differences between actual and random SSE values. Appropriate cluster solutions using this method are defined as one where there is a large difference between the actual SSE and the mean SSE of the random datasets. Figure 7.3 plots these absolute differences against the first 15 cluster solutions. In examining the peaks in the distributions, there are many peaks in the graph, and there is relatively little change in the peaks past the 10-cluster solution. Based on this conclusion, I chose the 10-cluster solution to represent these data and construct the networks. Figure 7.4 displays the 10-cluster assignment for each sherd on the dimensions of the PCoA. The clusters represented there represent groups of sherds

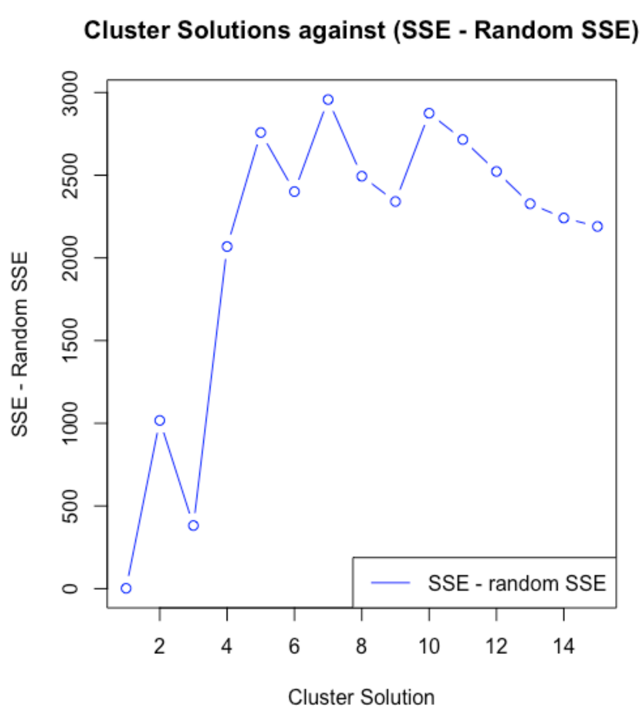


Figure 7.3. Absolute Difference in Sum of Squared Error between Actual and Randomized Data plotted Against the first 15 Cluster Solutions for Plainwares.

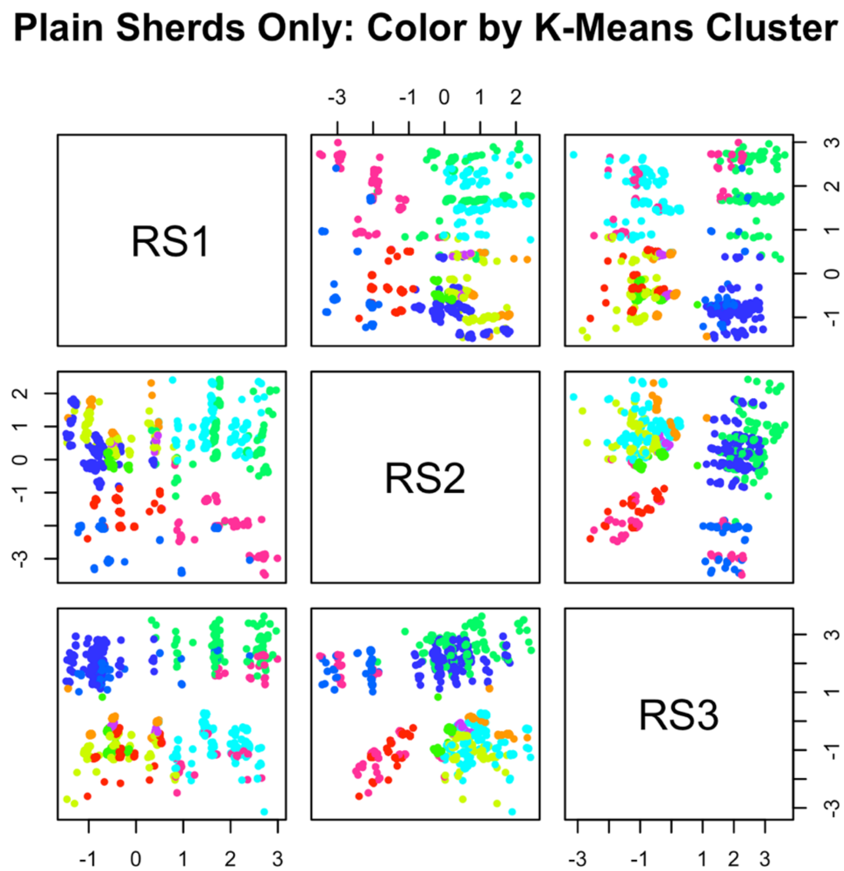


Figure 7.4. PCoA Plot for Plainwares showing 10-Cluster assignments.

that overlap substantially in terms of their interrelationships to the other sherds in the sample. Each attribute's contribution to these ceramic clusters, or what the clusters look like using the original variables are presented and described in Appendix B.

Upon examining the cluster assignments, we can make some initial considerations about the similarities of pottery-making techniques in the region. Figure 7.5 presents a bar chart of proportions of clusters present by community, so we can examine if any community-level or spatial patterns exist. It seems that most communities are dominated by a single cluster, and then proportions of the others vary by community. For instance, ceramic cluster 6 has more common with Lower Walnut, Oneota, and Unaffiliated communities than in Fort Coffee and Neosho.

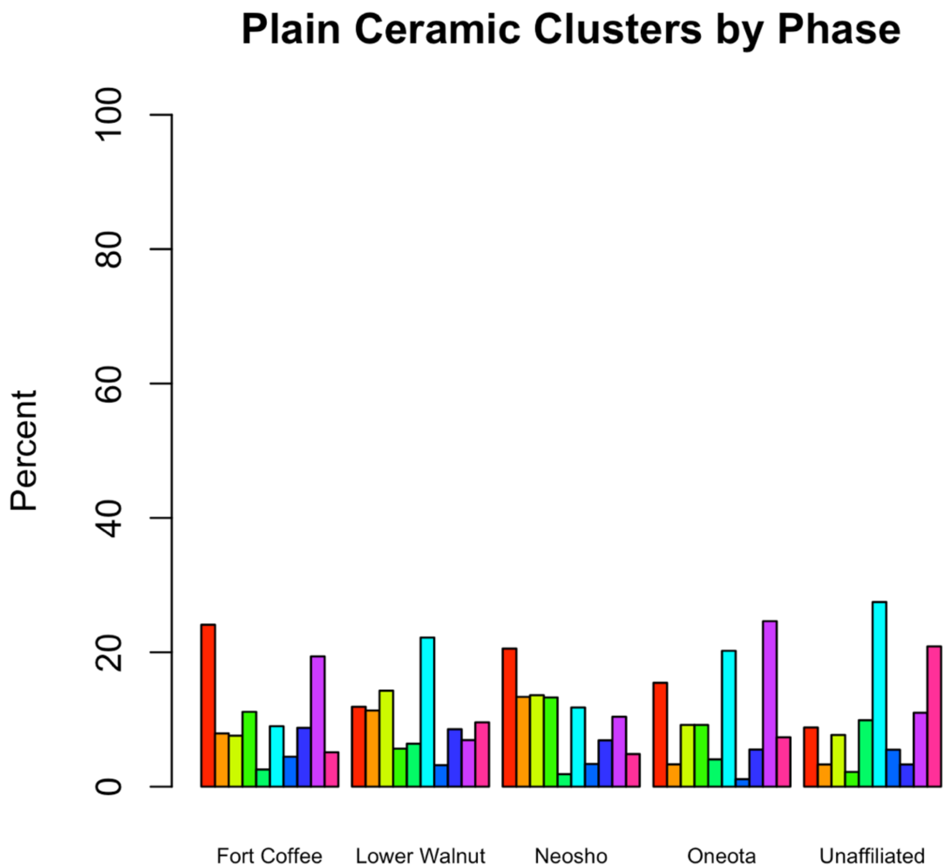


Figure 7.5. Relative Proportions of the 10 Ceramic Clusters by Community.

The last step in these analyses serve to create a scale of similarity among the assemblages in this study based on the clusters defined above. This is accomplished using the Brainerd-Robinson (BR) coefficient, which is a metric of similarity based on the sum of proportional representation of these categories. The measure ranges from 0 to 200, with 0 being no similarity and 200 being perfect similarity. The assumption of this final calculation is that sites that make and/or consume similar proportions of ceramics in each cluster represent sites inhabited by potters that share similar practices of ceramic production. This is especially true for the current dataset, as the plainware attributes described and accounted for in this section incorporate the relatively low-visibility aspects of pottery-making that illuminate these similar production techniques including clay processing.

The above procedure ultimately resulted in the production of a series of matrices describing relative similarities in the sample for plain and decorated ceramics. These similarities between pairs of sites and then communities can be utilized to understand the degree of social interaction among potters at various scales. Higher BR coefficients suggest more intensive and frequent interactions, representing stronger relationships among those communities. Strong similarities in the technological variables outlined above and in previous chapters suggest that these potters may share similar practices of pottery production and may indicate a widespread network of similar pottery production techniques in this region.

For plain ceramics, I present the BR coefficients summarized by community in Table 7.1. I have highlighted strong associations among these communities (i.e., greater than or equal to a BR value of 150, which is 75% of all possible similarity). There are relatively strong associations throughout this region in terms of the technologic similarity of pottery production. I find these strong associations unsurprising due to the low dimensionality of data overall, a point I presented also in Chapter 5. The highest value emerges between Neosho and Fort Coffee communities (167.19), commonly associated with the established plainware types Woodward and Poteau Plain. The Oneota community at Guthrey also has high BR values when compared to Fort Coffee and Lower Walnut sites, indicating a strong technologic similarity between these communities. As presented in Chapter 5, these strong associations were expected, not only due to the low dimensionality of the attributes collected, but also because most of these communities were using similar techniques of pottery manufacture overall including the heavy use of shell temper. These similar techniques were noted by previous scholars studying the region in their typological classifications, and they also had difficulties parsing out technologic variation between plainwares in the region (Freeman and Buck 1960). The investigations below of decorated ceramics and technological similarities will illuminate more variation with increased dimensionality.

Table 7.1. Brainerd-Robinson Coefficients for Comparisons among Communities

	Fort Coffee	Lower Walnut	Neosho	Oneota
Lower Walnut	136.82			
Neosho	167.19	156.11		
Oneota	156.41	150.47	145.32	
Unaffiliated	114.57	147.12	115.11	137.97

Decorated Ceramics

As briefly discussed above, to understand and map relational connections between communities based on decorated pottery it was necessary to separate the dominant decorative techniques for examination using the above protocols. As such, I separated punctated ceramics from incised ceramics in order to more fully examine relationships signifying shared technological ceramic practices alongside broader affiliations. Missing data occurred in this sample on decorated wares as many attributes corresponded directly to the type of decoration. For instance, if a sherd was punctated but not incised, there were attributes relating to incisions that were not recorded. This strategy of separating these sherds for analysis better accounts for the missing data in the sample and allows me to ensure that the techniques implemented on plainwares are not dominating these assemblages and masking meaningful nuances. In this sample, the decorated wares were mostly punctated or incised (not both), resulting in a large amount of missing data points that could affect the above statistical analyses if lumped together. Their separation ultimately ensures that I can fully describe the network relationships signifying affiliation and technologic similarity in design techniques. As the steps and methods were fully described above in the analysis of plainwares, this section will simply present the results of the analyses up to the generation of BR coefficients for punctated and incised wares.

Punctated Ceramics

While the plain ceramics did not result in illuminating new points of variation in the ceramic sample examined in this study, the decorated ceramics show particular promise in that these analyses combine the use of high- and low-visibility attributes in creating these measures of similarity. The high-visibility aspects of ceramic decoration obviously include decoration configuration and decoration type but can also include such things as punctation shape. Low-visibility aspects of pottery design for punctated ceramics in this sample include the continuous metrics of punctation width and depth. Thus, this increased dimensionality will allow this research to investigate relationships among and between sites and communities in this region.

Once the Gower coefficents were calculated, PCoA measurements were completed. Figure 7.6 plots the PCoA scores on the first three axes. Next, the K-medoids analyses were completed and cluster solutions were assessed using the two methodologies involving SSE. Figures 7.7 and 7.8 present the SSE evaluations for the first 15 cluster assignments. Once again, we can see that the rate of decrease in SSE is greater for the actual data than it is for the randomized data, but that there are multiple clustering solutions, most significantly at 4, 7, and 13 (Figure 7.7). Based on the absolute differences between the SSE and randomized SSE datasets (Figure #), we can see that there is relatively little change in these differences after the 7-cluster solution. For the purposes of these analyses on punctated sherds, I chose to use the 7-cluster solution.

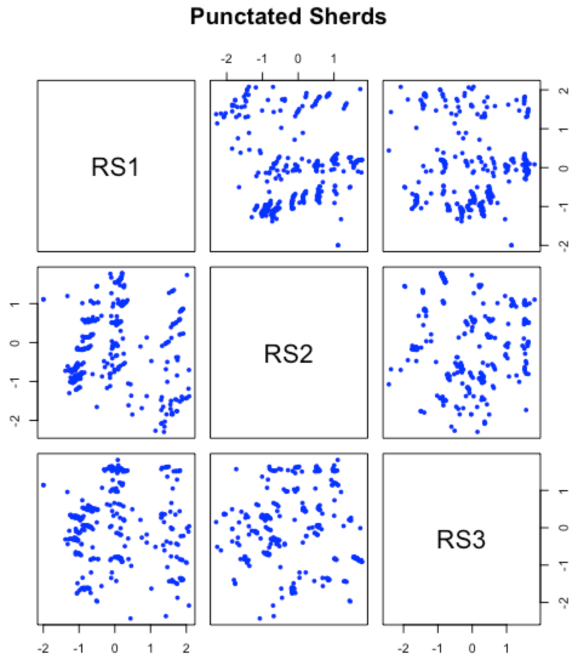


Figure 7.6. Principal Coordinates Plot for Punctated Ceramics

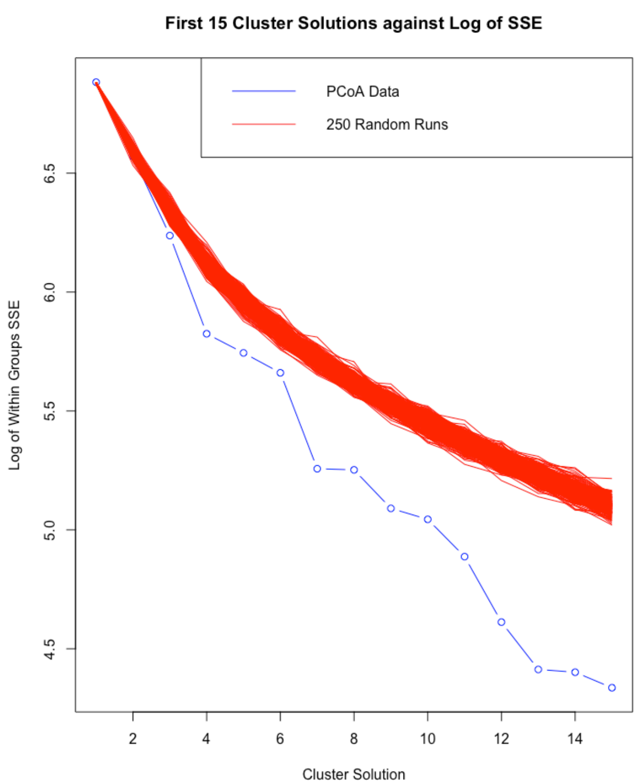


Figure 7.7. SSE for Actual and Randomized Data Plotted Against first 15 Cluster Solutions for Punctated Ceramics.

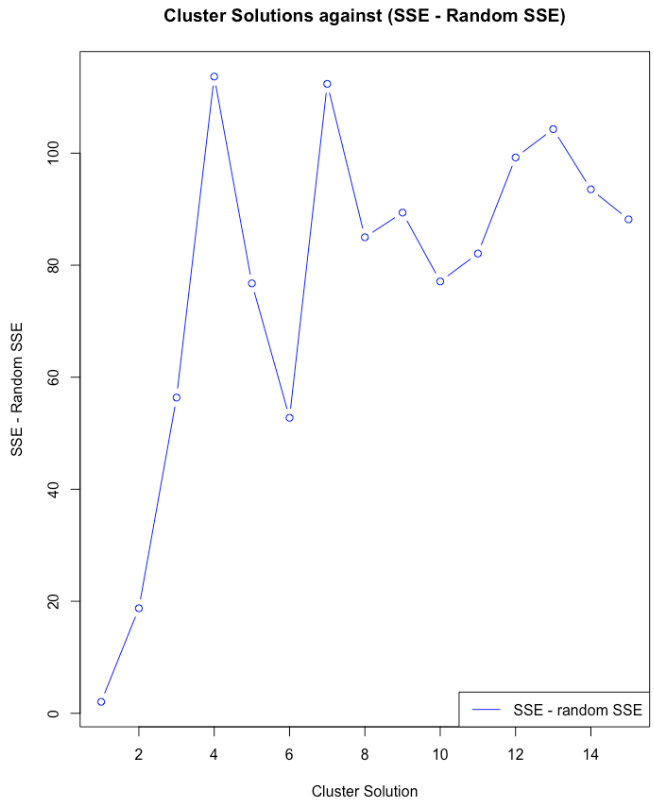


Figure 7.8. Absolute Difference in Sum of Squared Error between Actual and Randomized Data plotted Against the first 15 Cluster Solutions for Punctated Ceramics.

Figure 7.9 displays the 7-cluster assignment for each sherd on the dimensions of the PCoA for punctated sherds. The clusters represented there represent groups of sherds that overlap substantially in terms of their interrelationships to the other sherds in the sample. Once again, each attribute's contribution to these ceramic clusters is described in Appendix B. Finally, Figure 7.10 presents the 7-cluster assignments by community included in this study. It is clear from this bar chart that there is incredible variation in technological clusters represented at each community, and that the proportions of these clusters vary considerably by community. This suggests that each community investigated here is somewhat distinctive in the techniques and tools that they utilize in manufacturing punctated ceramics, though there are overlaps and connections in these clusters as well. Neosho communities have the most diverse range of cluster representation, interesting to note as they are more spatially centralized. Though, of course, Neosho sites are overrepresented in the sample and this is an expected outcome. Fort Coffee communities are dominated by two different clusters. This is unsurprising as the analyses presented in Chapter 5 illustrated that the punctated wares of Fort Coffee communities were the most distinctive in terms of all available attributes.

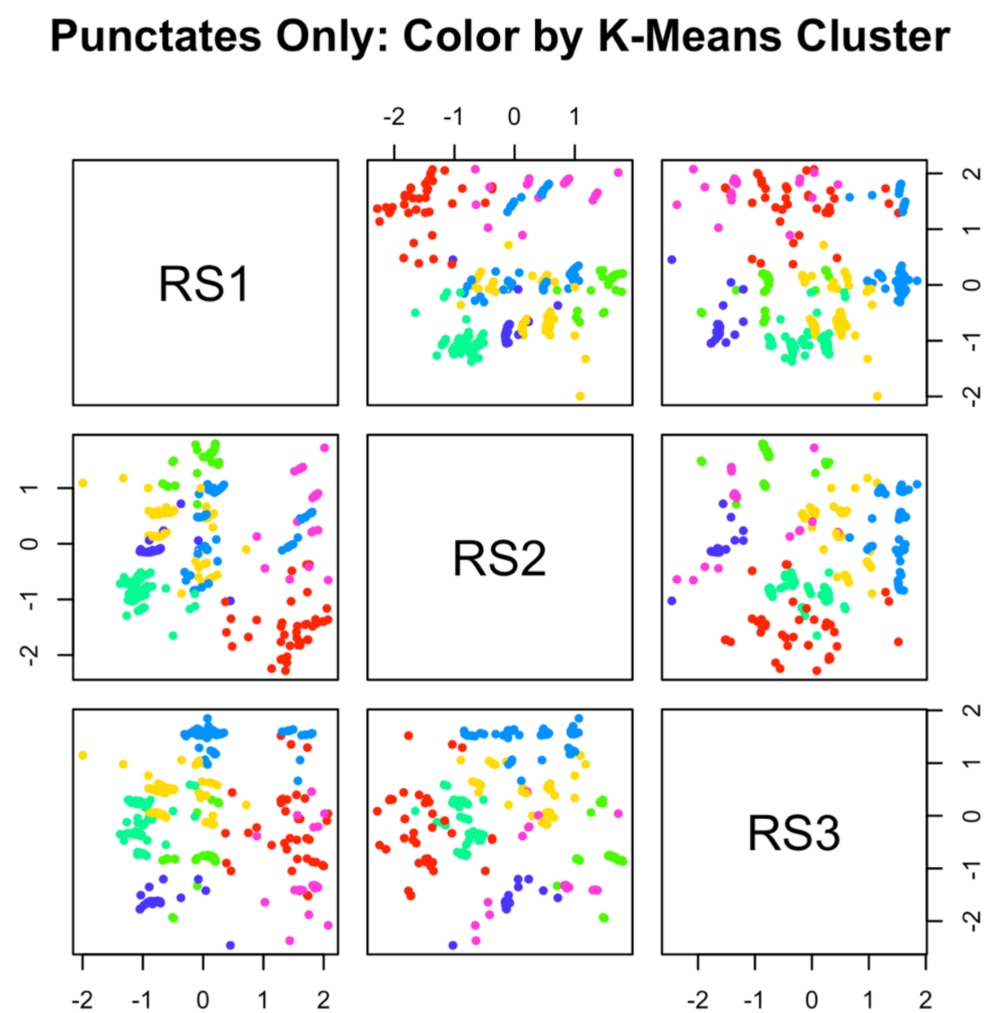


Figure 7.9. PCoA Plot for Punctated Ceramics showing 7-Cluster assignments.

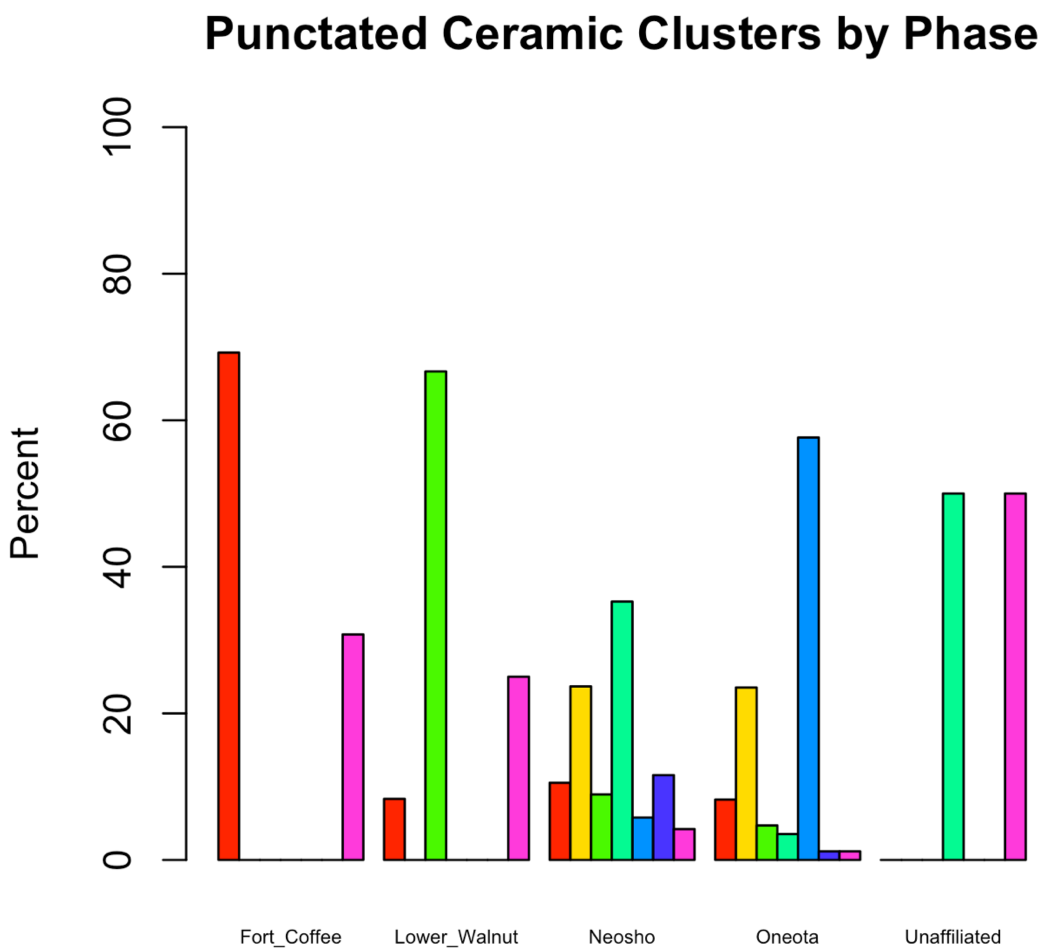


Figure 7.10. Relative Proportions of the 7 Punctated Ceramic Clusters by Community

BR coefficients for the punctated ceramic sample are presented by community in Table 7.2. These similarity values are all quite low, the highest being between Oneota and Neosho communities. These low values are expected based on community level interactions, given the cluster proportions presented in Figure 7.10. This suggests that each of these communities has a relatively distinct set of techniques for designing and implementing punctated designs. If we examine the BR scores by site, we can see that the highest similarity scores (highlighted here as greater than or equal to 120, accounting for 60% of all similarity) are mostly associated with sites associated within the same community. In other words, similarity scores between Neosho sites are higher than those between Neosho and other communities. This shows, expectedly, that these communities (especially Neosho) are more interrelated within their own groups and share more similar technological practices of pottery making than they do with those outside of their community. This is not to say that ties do not exist between communities, but to say that the ties within these communities are stronger than those between them, which makes logical sense if they are indeed separate cultural entities as defined by previous researchers.

Table 7.2. Punctated Ceramics Brainerd-Robinson Coefficients Comparisons among Communities, Highest Value Highlighted

	Fort Coffee	Lower Walnut	Neosho	Oneota
Lower Walnut	66.67			
Neosho	29.47	42.99		
Oneota	18.82	28.24	96.28	
Unaffiliated	61.54	50	78.95	9.41

Incised Ceramics

The incised ceramics, much like the punctated, were recorded such that the increased dimensionality should allow for a more in depth investigation of the low and high visibility ceramic practices among communities in this region. The same protocols were again followed for these ceramics and are presented below. The PCoA plot is presented in Figure 7.11, showing the pairwise distances between all incised sherds. SSE was once again used to evaluate and investigate clustering solutions calculated by the K-medoids method. Figures 7.12 and 7.13 present these results. It is apparent, in examining inflection points and peaks in these data, that one viable solution exists at the 8-cluster solution, with the absolute differences between the SSE

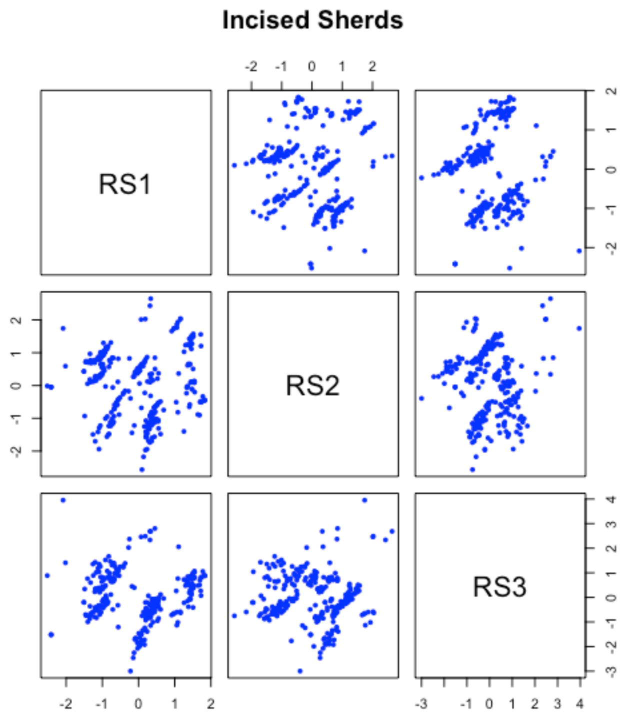


Figure 7.11. Principal Coordinates Plot for Incised Ceramics

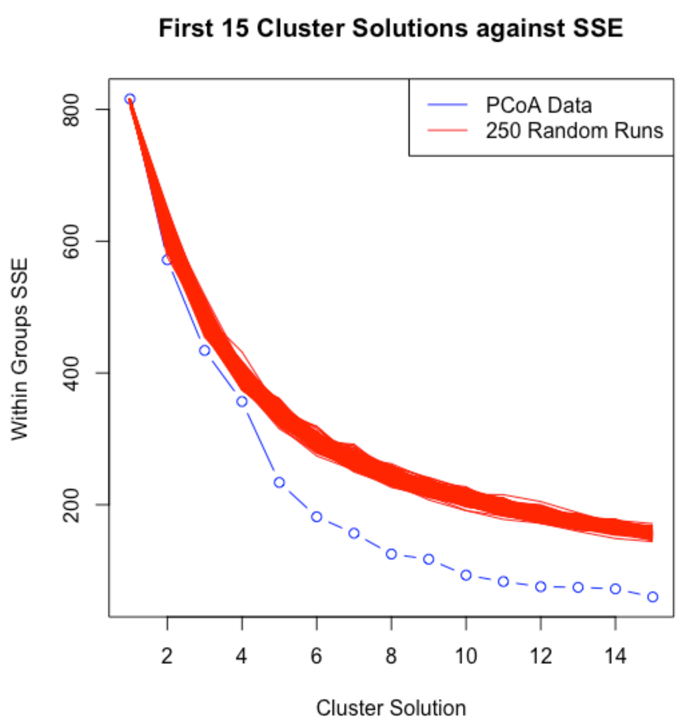


Figure 7.12. SSE for Actual and Randomized Data Plotted Against first 15 Cluster Solutions for Incised Ceramics.

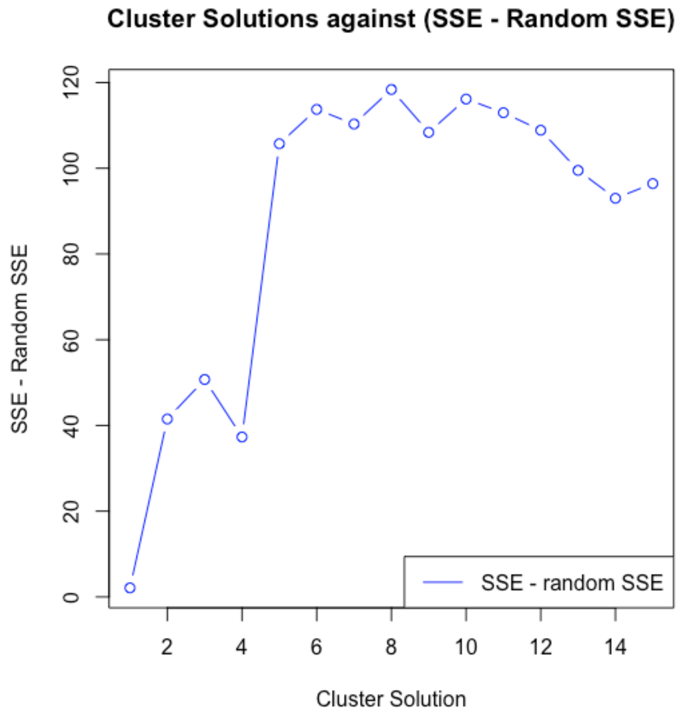


Figure 7.13. Absolute Difference in Sum of Squared Error between Actual and Randomized Data plotted Against the first 15 Cluster Solutions for Incised Ceramics.

for the actual data and that for the randomized data having little change past that solution. I chose to use the 8-cluster solution for the resulting analyses on incised ceramic wares.

Figure 7.14 displays the 8-cluster assignment for each sherd on the dimensions of the PCoA for incised sherds. The clusters represented there represent groups of sherds that overlap substantially in terms of their interrelationships to the other sherds in the sample. Each attribute's contribution to these ceramic clusters is presented in Appendix B. For the final part of the presentation of these analyses prior to network construction, Figure 7.15 presents the 8-cluster assignments by community included in this study. Once again, we see some variation in terms of the clusters that dominate each community. Fort Coffee communities stand out, confirming what the data presented in Chapter 5 suggested, that their incised ceramics were in many ways

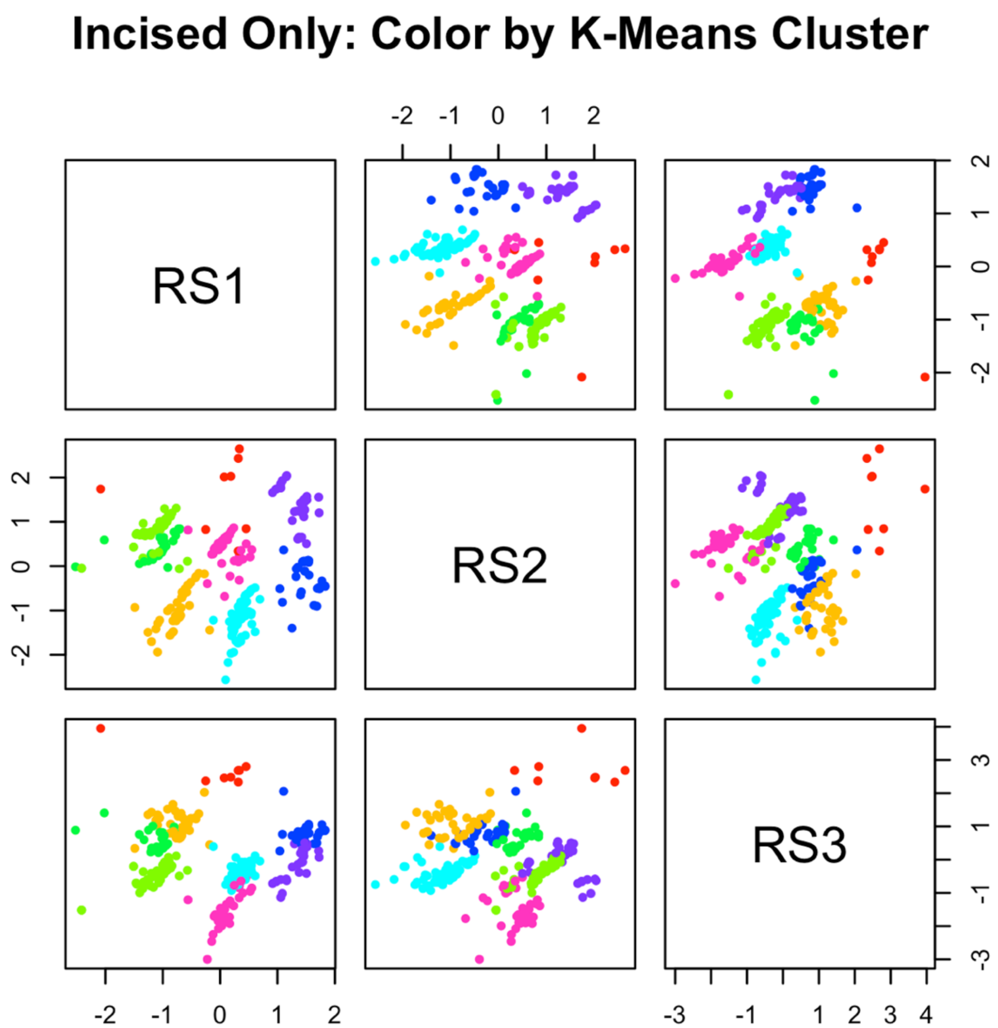


Figure 7.14. PCoA Plot for Incised Ceramics showing 8-Cluster assignments.

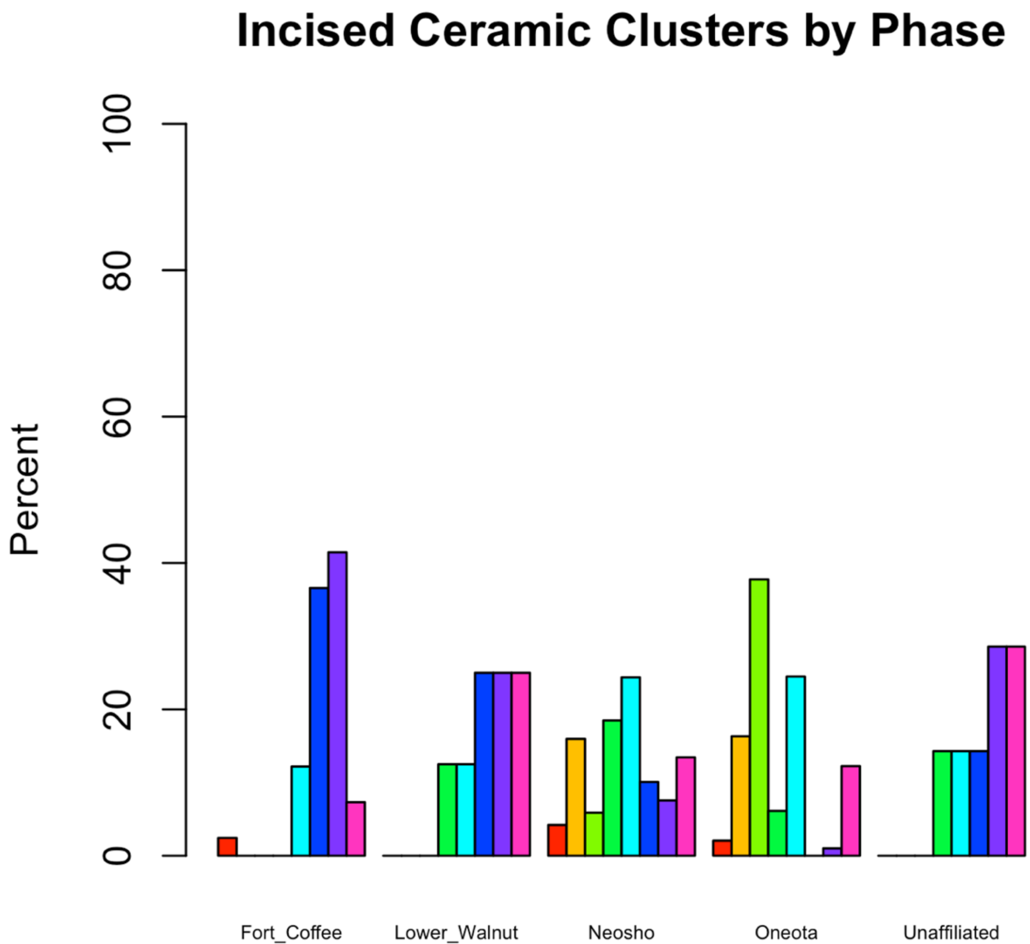


Figure 7.15. Relative Proportions of the 8 Incised Ceramic Clusters by Community

significantly different than the other communities. Oneota communities also stand out as proportionally different than the other communities.

BR coefficients for the incised ceramics are presented by community in Table 7.3. These values are overall higher than those for the punctated ceramics, showing a more complex system of relational connections when examining incised decorations. Importantly, it is not my intent to suggest that incised and punctated ceramics signify different processes of interaction that are isolated from one another. Instead, I intend to compare and make conclusions concerning relationships in the region using the combined knowledge gained from understanding the technological connections between these communities as illuminated through an examination of these decorative techniques using the above methods. The BR coefficients for incised wares are highest between Unaffiliated and Lower Walnut communities, though relative similarities between Lower Walnut and Fort Coffee communities as well as between Neosho and Oneota are also relatively high. If we recall the data presented in Chapter 6 concerning incised decorations, the variation in the sample between communities was not as apparent as with the punctated wares, so these similarity scores are somewhat expected.

If we examine the BR coefficients by site, unlike the punctated wares, we can see stronger connections occurring between different communities. For instance, the Fort Coffee communities at 34HS9 and 34HS24 share high coefficients with the Lower Walnut community at 14CO1. There is evidence of direct exchange between these two communities, as I discovered a Braden Incised sherd (i.e., shell temper, zoned herringbone incised, v-shaped line interior) in the collection at 14CO1. I have investigated how the above calculations change by eliminating this particular sherd from the sample. Clustering solutions change from the SSE calculations, and the most viable solution seems to be at 6 clusters. The overall patterns discussed above in terms of relative proportions of those clusters within each community do not change. Fort Coffee and Oneota communities still diverge in their proportions of the various technological clusters in the sample. Upon calculation of the BR coefficients without this Braden sherd present in the sample, there is a slight decrease in the values between the communities at 34HS9, 34HS24 and 14CO1, but this decrease is less than 5%. Thus, the relative similarities between these assemblages do not drastically change by eliminating the tradewares. This is not surprising, as there were only a couple instances of these in the sample and should not affect the overall similarity scores to a high degree, but still worth investigating.

Table 7.3. Incised Ceramics Brainerd-Robinson Coefficients Comparisons among Communities, Highest Value Highlighted

	Fort Coffee	Lower Walnut	Neosho	Oneota
Lower Walnut	139.02			
Neosho	79.20	112.18		
Oneota	45.15	63.78	135.29	
Unaffiliated	124.74	178.57	119.33	67.35

Conclusions for Calculating Relative Similarity for Regional Ceramics

The above analyses comprise the foundation upon which the networks discussed below will be constructed and interpreted. The plain ceramic similarity patterns are less clear than those presented in the punctated and incised data, but this is expected in examining lower visibility attributes of ceramic manufacture, especially in a dataset such as this with low dimensionality and few points of variation. Nonetheless, I will investigate the strength of the ties in these networks as well as the centrality of the sites and communities represented to better understand relationships between communities based on shared techniques of pottery manufacture.

As briefly discussed above, I do not aim to suggest that in separating these ceramics (especially in separating punctated and incised wares) and examining them on their own that they represent distinctive relational connections. The only distinctions I make here are with relatively low visibility attributes (present in the plain ceramic data) versus higher visibility attributes that are more present in the data for the decorated ceramics. These data were separated not only to compare the relationships as illuminated by more technological aspects of ceramic style (low-visibility) from more decorative aspects (high-visibility), but also to ensure that missing data are not affecting the overall calculations and networks. The discussions and networks presented below will be examined together to make interpretations and conclusions concerning the relational connections between communities in this region, as well as to evaluate the research questions posed earlier in this dissertation concerning borderlands.

Regional Networks of Ceramic Practice

Below I will present the networks for the above datasets, presenting the rationale for the various decisions made in their construction. For these data, I chose to binarize network ties in order to reduce the noise in these networks and to highlight the strongest associations. Centrality measures are utilized to investigate relational dynamics between sites and communities in the region. Here, I will present the networks separately, discuss them each on their own, and then present a comparison and interpretation of interregional relationships based on all of these networks together. For clarity and to implement the research design as described in Chapter 5, I separated the plan and decorated networks, then further separated the decorated networks into punctated and incised. This helps not only to investigate the two different kinds of interactions we are after (i.e., restrictive learning communities versus broad affiliative relationships), but also ensures that missing data does not affect the networks themselves. There were very few ceramics that were both punctated and incised, and as such I did not construct a network on these few sherds.

Plain Ceramics

To create a network, one must define what represents a node and what represents a tie. In these networks, a node represents an individual site. To highlight the strongest associations, I chose to binarize the network ties (or relationships) based on a threshold BR value. Weighted ties often introduce unwanted noise in the network visualization of datasets constructed from BR coefficients, as each node (in this case, sites) would be connected in some way to every other node. In terms of visualization, binarization allows me to highlight the strongest associations between sites and communities, to better investigate relationships across this region. The BR values utilized in network construction were all presented above in the relevant sections for these datasets.

Threshold values were chosen using a Monte Carlo simulation of expected BR value range. This process generated one thousand columned matrices of the actual proportions for each of the clusters at each site and BR values were then calculated for each randomized matrix. The distribution for the BR values for the random data sets gives an estimate of the range of BR values that we might expect by chance, given the number and frequency of each cluster. We can then compare the random distribution to the distribution of values present in the actual data. Figure 7.16 presents this comparison, and we can see, expectedly, that the distributions for the randomized and actual BR values are different. Using this information, we can then choose a threshold value (which is somewhat arbitrary but informed by the mean and standard deviation of these datasets). For these analyses on plain ceramics, I chose to define a tie between sites as having a BR value greater than 1.5 standard deviations above the mean BR values for the randomized datasets (BR=125). This threshold, while somewhat arbitrary, falls just above the mean for BR values of the original dataset and allows me to highlight the stronger ties. I investigated how changing this threshold would change the overall structure of the network, and my experimentations suggest that the general structure of relationships is not affected by the selection of this threshold, other than the density of the network varying.

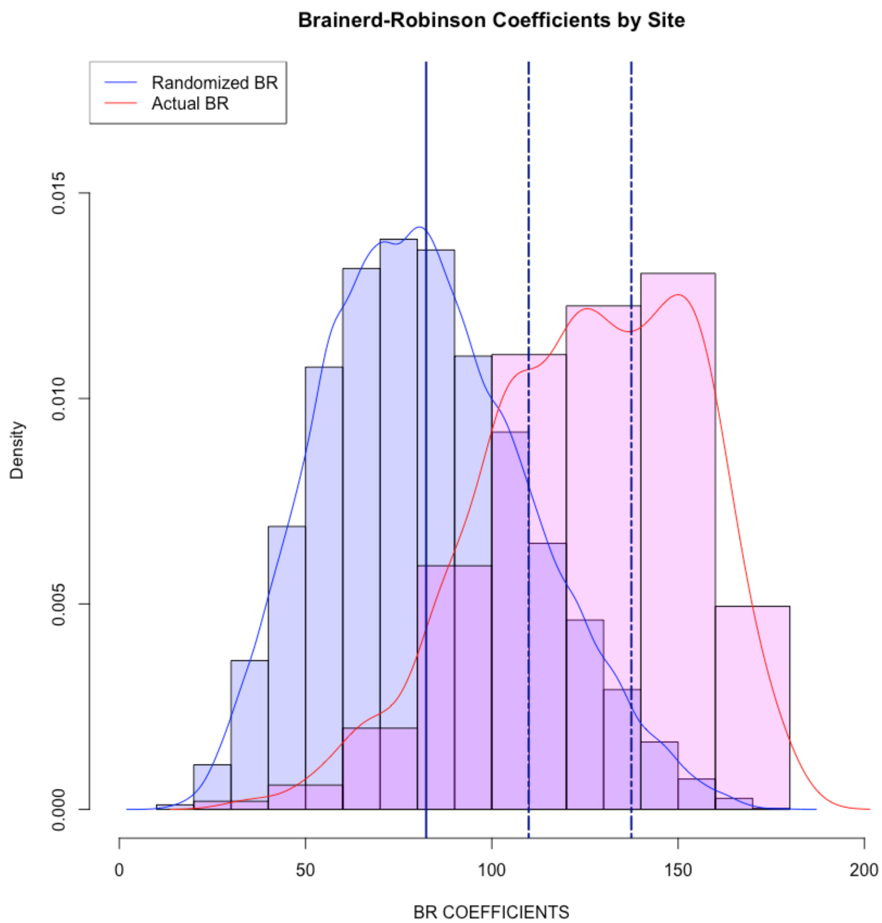


Figure 7.16. BR Distribution for Actual (red) and Randomized (blue) Data for Plain Ceramics Solid vertical line represents the mean while the two dotted lines represent 1 and 2 standard deviations above the mean.

The network presented below simply visualizes the complex relationships as examined in this study. The power of network analysis is that it allows archaeologists to visualize these complex relationships and illustrate ties between and among communities. The selection of a BR threshold does not suggest that the people inhabiting these sites did not have a meaningful social relationship. Rather, in using these criteria to visualize the network itself, I am able to present these networks such that they highlight the strongest associations between sites and communities in the region.

Figure 7.17 presents two network graphs for sites in the region based on the plain ceramic data. Node size is determined by relative degree centrality, which essentially tells us about node connectivity. In other words, the more interconnected a site is (i.e., how many direct connections/relationships each node has in the network), the higher the centrality score and the larger the node size. Betweenness scores were not utilized in the visualization of these networks because, while they do potentially show which sites are "bridges" in the network, the method seemed naturally biased towards Neosho sites as they represent most of the datasets in this research. While the high betweenness centrality scores of Neosho sites give a potential line for future research, to examine if Neosho peoples acted as potential "brokers" between communities in this region, more data is needed to make a reliable assessment of these hypotheses.

The difference between the two networks presented below is that one of these presents the nodes in their geographic location, while the other presents the location determined using an algorithm that essentially clusters highly connected groups of nodes together in the network (Peeples 2018b:205). The network graphs illustrate that many of these sites, regardless of phase or community, are highly interconnected when examining the attributes for plain ceramics. There is no clear clustering between sites to suggest separate or differentiated groups of sites with intensely similar ceramic technological practices. Rather, and I assume again this is due to the lack of dimensionality in these data on plainwares, it seems that there is a widespread network of similar technologic practices in this region.

Interestingly, not all sites are connected to one another in this region. Not even all Neosho sites are connected to one another. If we look geographically, several of the sites lying on the "edge" of the Neosho culture area as past researchers originally defined it (e.g.,

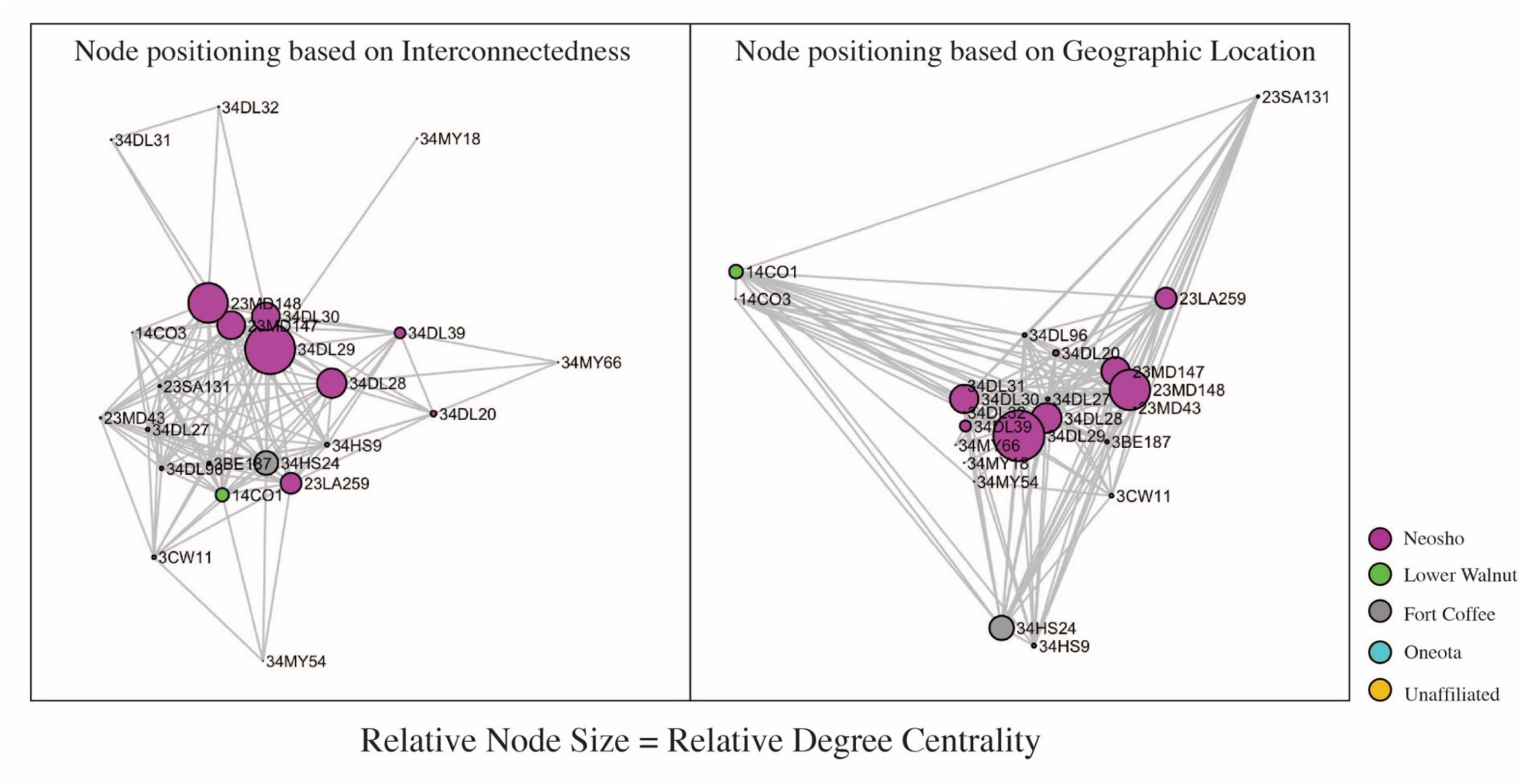


Figure 7.17. Network Graph for Plainwares for All Sites.

34MY18, 34MY54, 34MY66) lie also on the periphery of the network graph on the left of Figure 7.17. This suggests they are not as strongly tied to the "core" Neosho area in terms of their ceramic practices. However, these sites do not simultaneously represent what researchers would call "brokers" between groups, as their centrality scores are relatively low, and they are not directly connected to the surrounding groups like Fort Coffee and Lower Walnut. Degree centrality refers to the number of edges a given node has, or in this case, the number of connections a site has in the network. In examining the geographic network graph, we can see that the sites with the highest centrality scores lie at the center, amongst the Neosho sites. This means the most connected sites are the Neosho communities. I find this unsurprising, as the data input into these analyses are biased towards Neosho assemblages and sites, and any other centrality scores would likely show Neosho sites to be more central than the others.

Based on these network ties between sites, we can make some initial assessments concerning our original research questions. First, it is clear that Neosho potters did share similar technological practices with surrounding communities like Lower Walnut and Fort Coffee, as they cluster towards the center of the graph on the left of Figure 7.17. This suggests that Neosho is not necessarily any more or less related to communities on the Plains or the Eastern Woodlands in terms of relative similarities in ceramic manufacturing practices. Additionally, many of the Neosho sites show strong ties to one another, suggesting a strong network of ceramic practice among their communities overall. Therefore, we can hypothesize, based on these networks that highlight the more restrictive learning community relationships, that Neosho was not necessarily peripheral to regional interactions as seen through ceramic practice. They were an inward facing community, much like any other cohesive cultural group, but they maintained several active ties to surrounding peoples. We can also make a preliminary judgement stating that this part of the Ozarks does not constitute a cultural borderland, as there are these strong internal ties between Neosho communities rather than the weak ties we would expect of a cultural borderland. Though these ties seem to be diverse, in that there are strong relationships between Neosho, Fort Coffee, and Lower Walnut communities, I believe this is due once again to the low dimensionality of these data rather than the existence of a diverse range of plainware types. I will continue to evaluate these conclusions as I construct the decorative networks that will investigate broad affiliative relationships.

The networks constructed based on these data, which incorporates relatively low-visibility attributes such as temper and temper concentration, do suggest that Neosho potters did share very similar technological ceramic practices, but that they also shared these practices with many of the surrounding peoples. As noted above, there is not much differentiation in plain shell-tempered wares across the United States, and this is likely what the murkiness of the connections in this SNA on plainwares reflect. More data is needed to add dimensionality to these networks and better understand relative similarities in technological practices throughout the region. This means not only the addition of similar types of data from more sites in the region, but also other data points such as clay characterization that could result in more robust conclusions. At the very least, these networks suggest that Neosho communities residing on the Ozark Plateau were not separated from surrounding communities of practice, but that there are complex interrelationships throughout the region.

Decorated Ceramics

The networks built from data on decorated ceramics were constructed the same way as the above networks on plain ceramics. I chose to focus upon punctated and incised wares separately, as they comprise most decorated ceramics in this region and have remained an important element utilized by previous scholars in investigating Neosho's relationships to surrounding groups. Below I present the networks for punctated and incised wares separately, interpreting them each in turn.

Punctated Ceramics

The networks below once again are represented by a series of nodes that represent sites. Ties between these nodes were again defined using a threshold similarity score, derived from the Monte Carlo analyses. Figure 7.18 presents the relationship between those randomized datasets and the actual BR coefficients. In examining the distribution of the BR scores overall, we can see

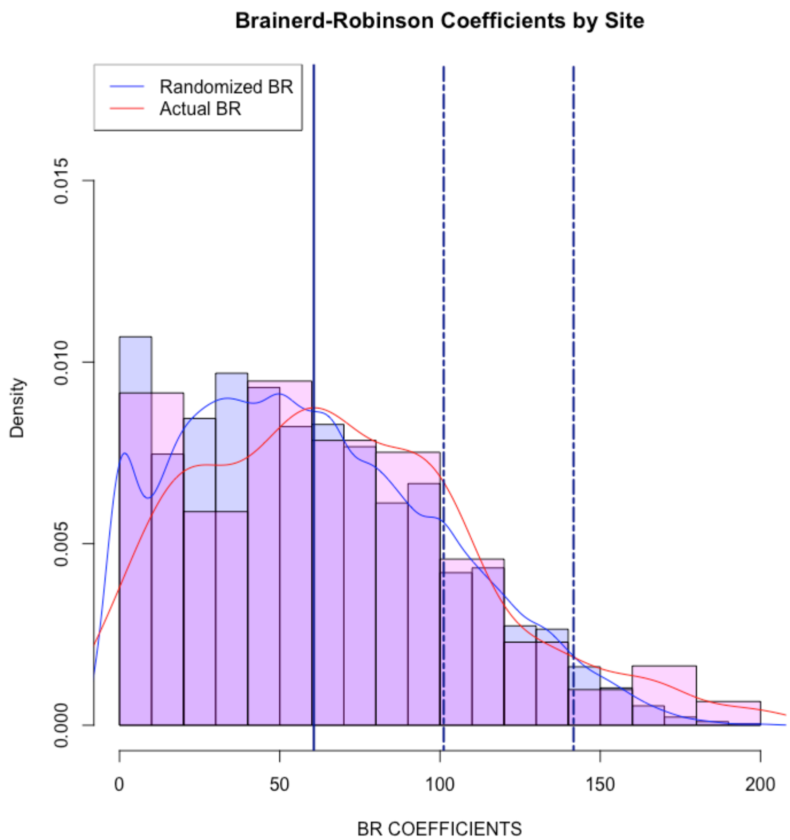


Figure 7.18. BR Distribution for Actual (red) and Randomized (blue) Data for Punctated Ceramics. Solid vertical line represents the mean while the two dotted lines represent 1 and 2 standard deviations above the mean.

that these scores mostly represent weak ties between nodes (BR<100). The threshold value chosen was 1 standard deviations above the mean of the randomized BR (BR=100). Again, this threshold value is arbitrary and does not suggest that relationships do not exist between sites that do not have ties. I chose this value in order to highlight the stronger associations in this network.

Figure 7.19 presents these networks using the same metrics as the above networks on plainwares. Node size represents relative degree centrality on both of these. Again, betweenness scores were also investigated but once again were affected by the sample of Neosho sites. The difference in node position reflects geographic position and then interconnectedness. These network graphs illustrate and confirm some of the points made above about ceramic practice in the region in terms of higher-visibility (i.e., broader affiliative) ceramic techniques. Neosho sites overall have a higher degree centrality, most likely attributed to their heavy use of punctations in their ceramics overall, but also that these punctates were distinct from the surrounding communities (see Chapter 6).

In examining the network graph where the nodes are positioned according to interconnectedness, we can see that the Neosho sites in this network are more highly interconnected than the other communities. The Oneota, Fort Coffee, Lower Walnut, and Unaffiliated communities all lie on the periphery of this network, with only a couple BR scores high enough to warrant a connection to Neosho sites on the Ozark Plateau. Much like was discussed above, this makes intuitive sense. If we are examining higher visibility attributes in this network, we would expect that sites affiliated culturally with one another (in this case, those that share similar decorative techniques, tools, and configurations) would be more interconnected with one another than with sites that affiliate with a different cultural tradition of ceramic practice. The other communities in this sample are only connected to Neosho communities by

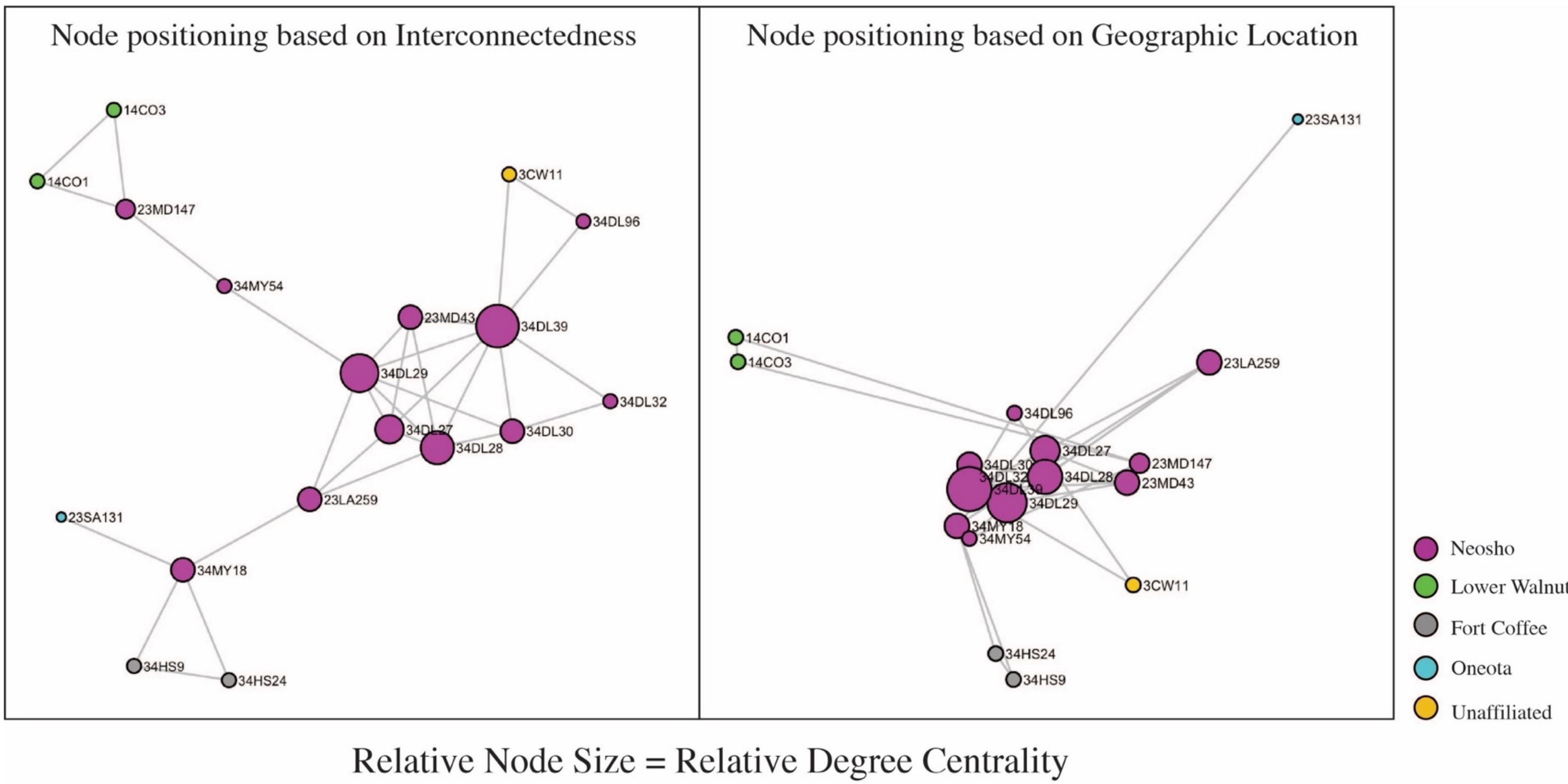


Figure 7.19. Network Graph for Punctated Ceramics for All Sites.

one or two ties to Neosho sites on the Ozark Plateau, illustrating potters in these communities use decorative techniques that are mostly differentiated from those of Neosho communities. There does seem also to be a spatial element represented, in that the Neosho sites connected with surrounding groups are located at what some have defined to be the "edges" of the Neosho culture area. More data is needed to confirm these observations.

Interestingly, one case of direct exchange does not result in a tie in this network given the threshold value set above. A Braden Punctate sherd (zoned fingernail impressions) was in the collections at the Dahlman site (23LA259). This type, as differentiated by Rohrbaugh (1982) and discussed in Chapter 5, is associated with Fort Coffee communities, here represented by 34HS9 and 34HS24. Though neither of these Fort Coffee sites are connected to Dahlman on this graph, we do know that a relationship exists between those sites resulting from direct trade and exchange. This serves as an example to illustrate that threshold values do not necessarily capture the full extent of relationships present in a network, but here I have chosen to only represent the strongest associations based on higher relative similarities in ceramic techniques and designs to better examine regional connections in the actual practice of pottery making and to evaluate borderland concepts. Additionally, the networks generated in this dissertation are more interested in examining shared manufacturing practices as opposed to exchange. In other words, these networks only indicate similarities in ceramic assemblages, but don't document all available connections that are observable in the archaeological record.

SNA can be used in many ways to examine ceramic assemblages and can highlight different kinds of relationships. Similarities between ceramic assemblages can signify overlapping ideas of ceramic production or they can signify exchange. The SNA techniques alone do not make that distinction, but where possible the analyst should be able to differentiate between these two types of relationships. In this dissertation, I am not examining similarities that investigate direct exchange (though I do make note of it where it is present), I am highlighting the similarities that indicate overlapping practices of ceramic production and design.

Again, these data presented above show that Neosho is not isolated from surrounding communities outside of the Ozark Plateau. There are few connections between Neosho and surrounding groups when examining punctated decorations, illustrating that those techniques used by Neosho potters signaling broader affiliations are indeed differentiated from those of other communities. The strong ties in the network between Neosho sites confirms that the Ozark Plateau does not represent a cultural borderland, as traditionally defined by scholars as discussed in previous chapters. Instead, the interconnectedness of Neosho sites seen in these punctated networks illustrate that Neosho intensively resided in the Ozarks, building a distinctive ceramic design tradition that was distinctive of their communities, while also maintaining some connections to surrounding groups outside of this ecological zone.

In these ways, because Neosho sites have a network of strong ties with one another, but have weak ties to surrounding groups, it could be argued that Neosho peoples made the Ozark Plateau a meaningful cultural area for themselves while establishing their own cultural boundaries differentiating themselves from surrounding communities. Thus, the Ozark Plateau itself, in the sense that borderland and network scholars have defined (i.e., high proportions of weak ties internally, higher diversity of ceramic wares represented) does not represent a cultural borderland as made meaningful by Neosho communities (Peeples and Mills 2018:38). Rather, through their practices, Neosho peoples (as other communities do), established their own boundaries and frontiers, that we can see partially through examining their ceramic design.

Finally, we can begin to answer more definitively one of the original research questions as set forth by preceding Neosho scholars, but in a way that abandons the dichotomous view that Neosho must represent the Plains or the Eastern Woodlands. Based on the network connections illuminated by relative similarities in punctated decorative attributes, Neosho is not any more or less connected to communities on the Plains relative to the Eastern Woodlands. As we would expect, Neosho is its own unique cultural group that maintained several active relational ties to these surrounding areas. This is particularly important, as the subset of the regional ceramic data investigated above (i.e., the punctated sherds) is what past scholars used to investigate and assess regional relationships and most decorated sherds were punctated in some fashion. Clearly, past researchers defined Neosho to be a separate community distinct from Lower Walnut and Fort Coffee for a reason and based on these networks, we can confirm their suspicions to be true. What these networks allow us to do is take that one step forward to dispel some of the arguments in the extant literature and to definitively state that based on the data and networks presented above that Neosho is not necessarily more connected to either the Plains or Eastern Woodlands. Not only are these broad classifications essentially meaningless in the frameworks presented in this dissertation, but they are also unfounded—as they would be in the investigation of any borderland community. While Neosho may share many trait similarities with their neighbors, these networks illustrate that they also separated themselves as a cultural community from those surrounding groups. As such, these networks give us a more nuanced understanding of relationships between groups in this region, without presuppositions that emphasize dichotomous and categorical perspectives.

As they are shown above to be a distinctive community, the networks presented above may mean that scholars who suggested that Neosho was an in-situ development are indeed correct, but a diachronic study is now needed to investigate the relationships between preceding cultures on the Ozark Plateau and Neosho. We do know that connections between communities in the Ozarks and Arkansas River Valley were present during preceding time periods—as evidenced at sites like Spiro, Reed, and Lillie Creek. Some of the relationships between Fort Coffee and Neosho communities may represent enduring connections between these groups, even after the dissolution of the Mississippian ceremonial systems of preceding time periods. It is interesting that I was able to differentiate Neosho ceramic practices from Fort Coffee, suggesting more research is needed to understand how the relationships between these communities changed from the earlier Mississippian periods into the Late Pre-Contact.

The conclusions derived from the punctated networks dovetail well with the faunal and subsistence data presented in Chapter 4, which showed that Neosho is not really "Plains-like" (in the traditional sense) in their procurement of faunal resources. Though they did utilize some bison, but not in quantities suggesting that bison dominated their subsistence, as has commonly been attributed to Plains groups throughout history. A characterization of "Plains-like" is ultimately an over-generalization, as there is no idealized or stagnant list of traits associated with communities living on the Plains through time. The incredible movement of people and ideas through time precludes the creation of any one list of traits that would represent either side of this dichotomy between the Eastern Woodlands and the Plains as we see in extant Neosho literature. Though of course we cannot confirm or deny if a Plains group moved eastward into the Ozarks at some point, we can at least say that during the Late Pre-Contact period in this part of the Ozarks, there is no indication that Neosho represents a "Plains-like" or Eastern Woodlands like lifeway as defined by problematic categorical perspectives, both in terms of subsistence as traditionally defined and when examining decorative (i.e., broader affiliative) ceramic practices.

I will further expand on these ideas in the conclusion of this chapter as well as the subsequent chapter that will more fully summarize the investigations that have taken place in this dissertation.

Incised Ceramics

The networks for incised ceramics were constructed using the established protocols described above. The threshold value chosen was based upon the Monte Carlo analyses, summarized in Figure 7.20. Based on the data presented, I chose to set the threshold value for network connections at 1 standard deviation above the mean of the randomized BR scores (BR=100). This threshold should highlight the strongest associations among sites in the region based on incised decorative techniques and tools. Once again, this does not suggest that relationships do not exist between sites that are not tied to one another as presented below. As discussed above, there are instances of direct trade and exchange between these groups, including a Braden Incised sherd, commonly associated with Fort Coffee communities, being in the collections at a Lower Walnut community (14CO1). As such, these network graphs do not necessarily depict the totality of relationships between groups in this region.

Figure 7.21 presents the network graphs for the incised ceramics. Once again, the nodes are sized based on relative degree centrality, with those sites that have more connections being larger. The graphs presented are again arranged by geographic location and also using an algorithm to highlight regional interconnectedness. This network is much more interconnected between communities than the previously presented networks derived from punctated ceramics. There are far fewer incised/trailed ceramics in this sample, and I suspect therefore the relationships are a bit murkier than seen with the punctated decorations. Additionally, there are fewer design configurations present in the sample for the incised/trailed sherds than the

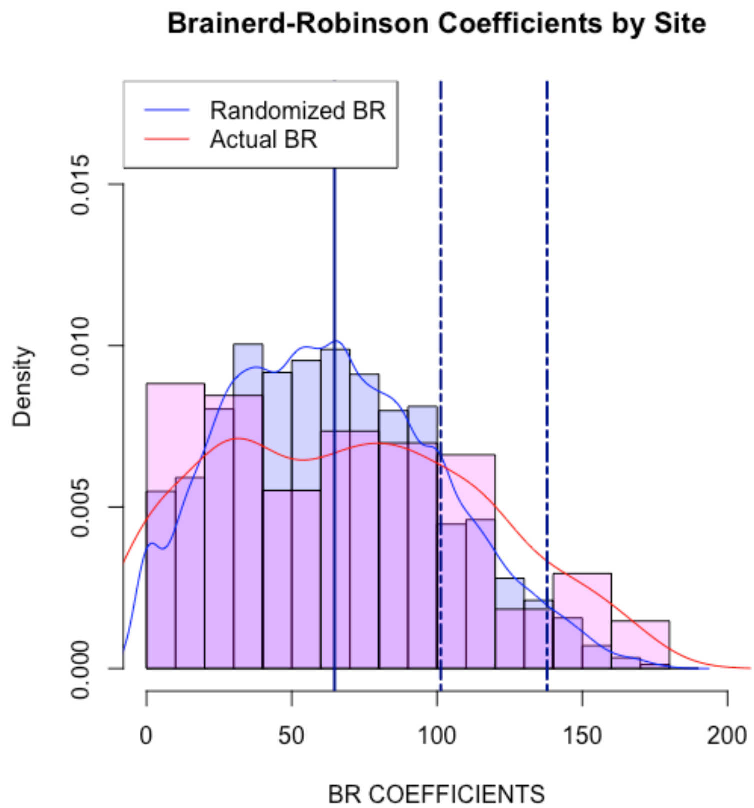


Figure 7.20. BR Distribution for Actual and Randomized Data for Incised Ceramics. Solid vertical line represents the mean while the two dotted lines represent 1 and 2 standard deviations above the mean.

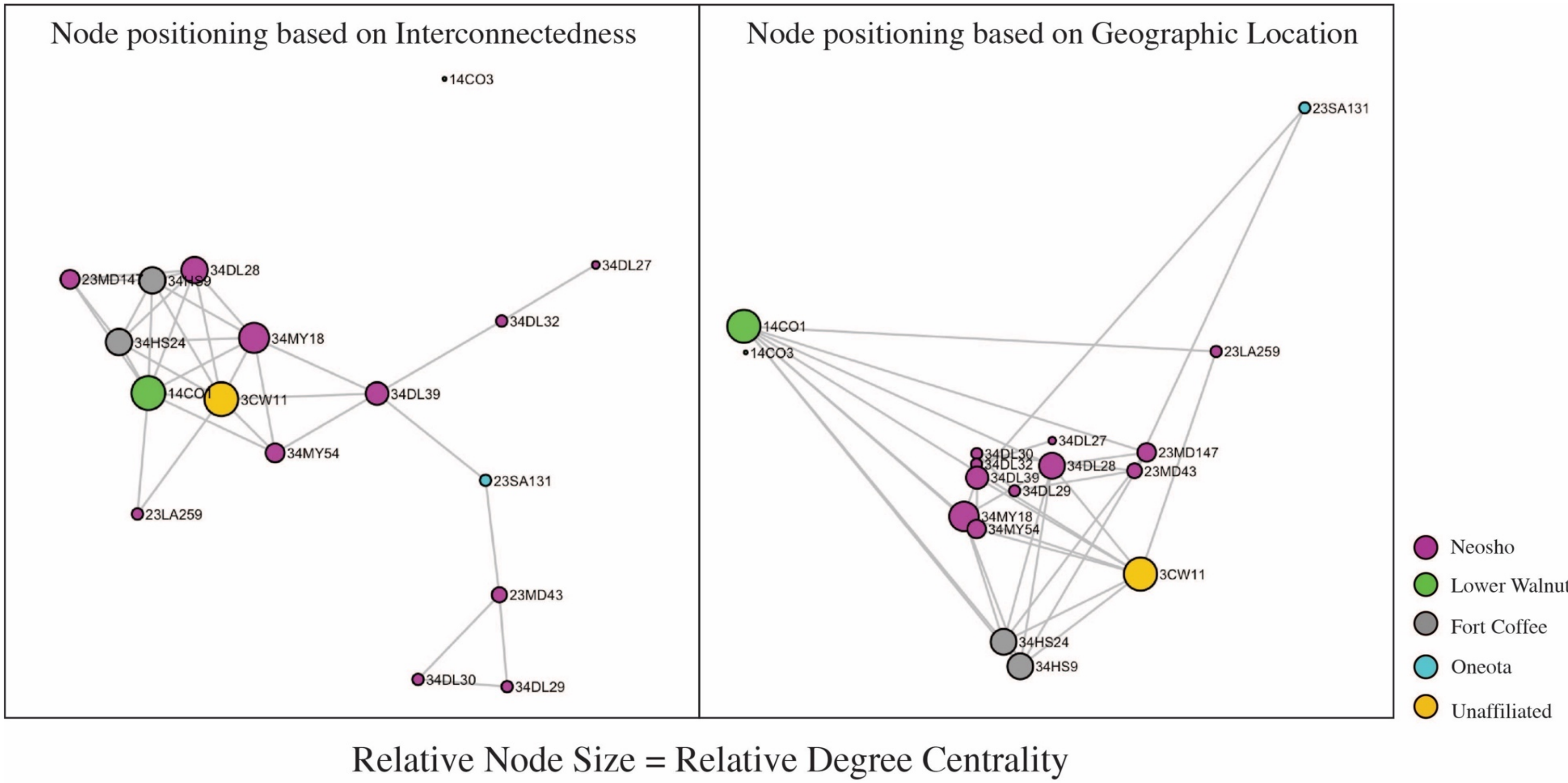


Figure 7.21. Network Graph for Incised Ceramics for All Sites.

punctated, and as a result these communities are more interconnected because of their heavy use of chevron and parallel line designs. As the graphs illustrate, there are many connections not only between Neosho sites themselves, but also between Neosho sites and those of surrounding communities. In fact, there are many Neosho sites that are peripherally connected to one another when examining this decoration type.

One could interpret these networks as being opposite of the punctated networks, but upon further inspection, it is clear the relationships signified by the incised ceramics are very similar to those illuminated by the punctated decorations. The strongly internally connected Neosho sites as seen in the punctated network graph (Figure 7.19) did not use incised or trailed lines as often as the other groups in the sample. The sites exhibiting the characteristics of borderlands (i.e., weak and diverse ties) in the punctated network (e.g., 34MY18, 34DL96, 23MD147) are all more strongly connected to the surrounding groups in this incised network. To me, this illustrates that these sites, which were shown to be more peripheral in the punctated networks to the Neosho cultural community, are utilizing a more diverse range of decorations than other Neosho sites in the sample. This results in them using more incised or trailed lines, and being more interconnected with surrounding groups than with the strongly internally connected Neosho cultural community. These few Neosho sites could have acted as bridges or brokers between Neosho and surrounding groups. Rather than interpreting the incised network as being completely opposite of the punctated graphs, I therefore interpet these networks as being complementary to one another and further illustrating the points made above about punctated ceramics in the region.

Direct affiliative relationships between Lower Walnut and Fort Coffee communities do emerge. It it is unlikely that these ties are representative of direct exchange, as it was demonstrated above that the BR scores do not shift dramatically if we eliminate known tradewares (i.e., a Braden Incised sherd discovered at one of the Lower Walnut sites). As a result, we can confidently say that these ties are indicative of some degree of affiliative similarities in their incised ceramics. There are strong internal ties between Neosho communities in this sample, confirming some of what was discussed above in terms of punctated ceramics. There are also strong ties between Fort Coffee communities in the sample as well.

In examining these networks based solely upon the highly visible attributes of incised decoration and application, we can see that these communities are connected by complex networks signaling relatively high similarities of ceramic practice. Sample size may affect these networks, as Neosho communities more often punctated their ceramics rather than incising them. Nonetheless, much like the data presented above and in Chapter 6 suggest, the ceramic practices in the region are more interrelated when examining incised decorative techniques than when examining punctated techniques.

Combining what we learn from these incised affiliative networks with what was previously discussed concerning punctated wares, we can confirm several important points with regards to the original research questions. It was not my intent to suggest that relative similarities in punctated and incised decorations signal different kinds of interaction or relationships. I merely separated these to minimize the impact of missing data. In interpreting these two networks simultaneously, as they both result in ties that signal broad social affiliations, it is clear Neosho communities were not necessarily isolated on the Ozark Plateau, but they did establish clear boundaries between themselves and other communities while also maintaining active ties to those same neighbors. Additionally, the Ozark Plateau as inhabited by the Neosho communities as a cohesive cultural unit does not exhibit the characteristics of a cultural borderland, as the ties between Neosho sites are quite strong, making them a distinctive and separate community. There are, however, several Neosho sites that do exhibit the characteristics of a borderland community. Sites like 34DL96, 23MD147, and 34MY18 all exhibit these characteristics as seen on the punctated network graph (Figure 7.19). The people living at these sites built their ties to surrounding groups such that they held weaker ties to the central Neosho community, as well as diverse ties to the surrounding communities. They could very well represent "brokers" between the centralized Neosho communities and neighboring groups, but more data from those surrounding groups is needed to evaluate this hypothesis. Therefore, these network graphs all illustrate that Neosho communities defined themselves as culturally distinct from surrounding communities and as a result have also defined their own boundaries and borders.

Evaluating the Concept of Borderlands through Relational Ties

The network analyses presented above do much to complement and clarify the research of previous scholars who studied Neosho communities, while also shifting our focus towards questions that align with contemporary relational theories and methodologies. These investigations for Neosho communities especially aid in our understandings of traditionally understudied regions and illustrate that these new methods are tailorable to circumstances and datasets often seen as "less than ideal". A study such as this would do well with the addition of more data to confirm the hypotheses and conclusions discussed in this chapter, as well as the addition of other data to potentially create two-mode networks that will more robustly investigate relationships in the region. The networks discussed above, taken together, map not only the complex and multifaceted relationships between regional communities but also illustrate that the relationships between sites on the Ozark Plateau do not all represent a cultural borderland as traditionally defined (i.e., isolated, peripheral, with weak internal connections). Rather, here I present a more nuanced perspective illustrating that Neosho communities living on the Ozarks are much like any other cultural complex we see in the archaeological record. They are more internally connected with one another—strongly tied—than they are with surrounding groups. The borders they maintained are manifest by several Neosho sites having weaker ties to the centralized Neosho cultural complex and a diverse range of ties to surrounding communities.

Neosho communities were not isolated from their neighbors and importantly seem to represent a distinctive and internally structured community in terms of affiliative (i.e., highly visible) elements of ceramic practice and design. They also shared many similarities with surrounding groups when examining the lower visibility elements of ceramic manufacture, illustrating that people in this region were actively building and maintaining relationships with one another through ceramic practice. This reiterates the above points that assert the Ozark Plateau does not represent a backwoods cultural zone with ephemeral populations, but rather represents an important space as made culturally meaningful by Neosho peoples on their own and in their interactions with surrounding communities. This confirms Brown's (1984) assertions that communities living on the Ozark Plateau were not isolated, marginal, or uninfluential—assumptions that were purely based on the Ozark's assumed impassable environmental conditions and its status as an ecotone. These conclusions are unsurprising, as Brown (1984) and others have illustrated that the Ozarks were in not marginal, but maintained active relationships to surrounding groups in preceding time periods. Thus, in line with his conclusions that are confirmed by the data presented in this dissertation up to this point, it is my assertion that the Late Pre-Contact Ozark Plateau does not represent a cultural borderland, but instead represents an ecologically diverse environment made culturally meaningful by Neosho communities internally and externally with their interactions with surrounding groups.

If we are to reexamine the characteristics presented in previous chapters concerning what constitutes a borderland or frontier, these networks (taken together) confirm that the Ozark Plateau should not be defined as such without nuance. Network scholars who have examined borderland and frontier contexts using SNA have outlined how researchers can identify potential borderlands when examining relational data (Hart 2017; Peeples and Mills 2018). Based on their conclusions, we know that borderlands are commonly located between major political formations, have low population densities, and increased social diversity (Herr and Harry 2018). In network terms, this means that a cultural borderland should be characterized by diverse and weak ties, in relation to the strong and homogenous ties that comprise centralized areas (Peeples and Mills 2018:34). If we reexamine the above relational ties between sites and communities as illuminated by various aspects of ceramic practice, we can see that the relationships between sites on the Ozark Plateau overall (i.e., between Neosho sites) should not be characterized as weak or diverse. Instead, Neosho communities have strong ties to one another, building a network of affiliative relationships, while also maintaining some relationships to surrounding groups like Fort Coffee and Lower Walnut. There are Neosho sites within these networks that do exhibit the characteristics of borderland communities (i.e., 34DL96, 34MY18, 23MD147), illustrating that Neosho people did define their own boundaries. But as a whole, the Neosho cultural complex should not be defined as a borderland group.

It is my assertion that SNA represents a useful tool, as discussed here, in identifying potential borderlands and frontiers from relational data. While this part of the Ozarks does not represent a cultural borderland as inhabited by Neosho people, it is clear that groups in the Late

Pre-Contact period in this region did in many ways build and maintain permeable borders. These borders can be seen in this research when examining the relational data concerning relative similarities of ceramic manufacture and design. It was never the intent of this research to argue that borders did not exist for past populations, but rather to illustrate that these borders are not readily identifiable unless we are examining and evaluating data that represents the relationships (and resulting spatial organization) built by those past communities. In these ways, using these data that signal different scales of interaction, we can map the ways that these communities organized their own social worlds, without relying solely upon pre-existing and unevaluated taxonomic classifications that often can mask these relationships.

Additionally, we can use these tools to help evaluate our categories and typologies. If we reexamine the networks based on the highly visible decorative elements of ceramic design, we can see that scholars were right to distinguish Neosho ceramics from those of surrounding communities. In mapping the relative similarities of these elements throughout the region, Neosho potters maintained a relatively distinctive practice of decorating their ceramics (e.g., shape of punctates), resulting in their communities being more internally connected than externally with surrounding groups. This does not preclude the existence of a couple affiliative relationships to Lower Walnut and Fort Coffee but does highlight that in examining the highly visible elements of ceramic practice that past scholars utilized in building the original typologies, we can see these communities as distinctive, in congruence with those original categorizations. It is important to utilize tools like this to evaluate our preconceptions and to also ask new and exciting questions like those tackled in this dissertation. In doing so, we ensure that our discussions fully investigate the relational dimensions we are after in examining the materials made and used by past communities. In interrogating the data and juxtaposing previous scholarship, we can confirm some of their original ideas but dispel others. We know now that Neosho is distinctive in terms of ceramic design, which is what past researchers suspected, but we also know now that they are not necessarily any more or less culturally interactive with the Plains or Eastern Woodlands. It is possible that Neosho pottery has more similarities to the Plains than did previous peoples in the Ozarks, but more work is needed to rigorously evaluate that hypothesis. A categorization as “Plains-like” is unwarranted at this stage, without further investigation into diachronic relationships between preceding and succeeding communities in this region. This categorization is also unneeded, as it is too general to be a meaningful classificatory term. As such, this dissertation has tried to do away with these kinds of categorizations and instead fully interrogate the relationships between these contemporaneous communities.

Finally, I want to emphasize that these data and networks rely solely upon one element of cultural practice: that relating to ceramic design and manufacture that signal two types of relationships (i.e., restrictive learning networks and broad social affiliations). In line with the theories outlined in Chapters 2 and 5, it is likely that if we examined a different material practice that the borders and boundaries that we see in these ceramic networks between groups would shift. Boundaries are inherently multidimensional and fluid (Parker 2002, 2006), so if we examined data on something like lithic technology, which signals a different kind of practice and activity, we should not expect that the network ties would signify the same relationship as seen with ceramics, nor that these ties would mirror those of the ceramic networks. This is an important point, in that it calls attention to the permeability and ambiguity of borders and boundaries and highlights the importance of understanding what kinds of activities and interactions our data signals.

The framework used here, in combination with the techniques and methodologies developed by many other network scholars, helps in understanding how groups built their relationships to one another as well as how they organized their cultural worlds and interactions through ceramic practice. The Ozark Plateau and the peoples residing in that space consequently become reintegrated within a complex network of regional interactions enacted by many different communities. The borders or frontiers that are potentially signaled in these data are between groups like Fort Coffee and Neosho (rather than broadly being the Ozarks themselves), but these borders are not strict and impassable. Rather, there are important and strong connections between communities in this region, indicating a complex network of relationships maintained by these communities. The final chapter of this dissertation will take an in-depth look at the original research questions outlined in previous chapters, using the data presented in Chapters 4, 6, and 7 to provide answers and to propose future research in this region.

Chapter 8

From Categories to Relationships: Borderlands and Boundaries in the Late Pre-Contact Ozark Plateau

This chapter will draw together the various lines of evidence presented throughout this dissertation to evaluate the research questions posed in earlier chapters. In doing so, this discussion will fully investigate the relationships and connections of communities in this region to resolve some of the burning questions that past researchers have asked about Neosho, but also to scrutinize this space in the Ozarks as a meaningful cultural borderland. At the beginning of this study, I set forth a framework of anthropological and archaeological theories on borderlands and boundaries, communities of practice, and social networks that provided some general expectations on how relationships would look if these communities occupied an area that spanned a cultural borderland. Here, in this final chapter, I will revisit these principals and theories in order to fully describe the complex relationships between communities in this region.

Evaluating Assumed Borderlands by Examining Relationships

In Chapters 3 and 5, I set forth a series of research questions that were designed to evaluate the Ozark Plateau as a cultural borderland as inhabited and made meaningful by Neosho people. This section will tackle the first two of these:

- Were Neosho communities, in fact, peripheral to regional social networks (i.e., disconnected and isolated)?
- Does this part of the Ozark Plateau exhibit the characteristics of a cultural borderland (i.e., weak and diverse ties)? If not, where did these communities construct their boundaries?

As discussed in Chapter 2, anthropology's and archaeology's overreliance upon spatial frameworks sometimes is a hindrance to our interpretations. These spatial schemas do help us organize cultural variability in comparable terms and allow us to interpret social processes at a certain level, but in many respects, an overreliance on these unevaluated taxonomies of communities, cultures, and regions can mask the relational patterns that archaeologists seek to illuminate and interpret. For example, we sometimes get trapped in a narrative that overemphasizes the importance of environment on shaping the lives and practices of past people. This is especially true as we approach the boundaries of these units, or when we get to the "borderlands."

Borderlands—as indirect and artificial constructions resulting from the construction of environmental, political, and cultural boundaries—have been historically deemed as problematic or murky because they do not fit neatly within the categories that are used in archaeology to organize cultural worlds in the past. Because they do not naturally fit, the cultural practices of people residing in these areas often go understudied. Simultaneously, archaeologists often assume that these cultural boundaries and borders are factual, when in reality they are often based upon relatively limited datasets and do not reflect the ways in which these past communities built and maintained their relationships to surrounding groups. As such, many borderlands are unevaluated, meaning mostly that the people and communities residing in those areas are assumed to embody the social characteristics of borderland groups—maintaining weak and diverse ties to surrounding cultural complexes.

The above issues were all present in Neosho research up to the point of this dissertation, and the two main research questions above were designed to investigate relationships in this region to evaluate if the portion of the Ozark Plateau where Neosho communities resided had the characteristics of a cultural borderland. Secondarily, those questions aimed to emphasize that the methods and theories utilized in this research can help archaeologists investigate where past communities built and maintained social, cultural, political, or economic boundaries. The foundations of the protocol followed in this study followed the work of Peeples and Mills (2018) as well as Hart et al. (2018), who each examined borderland and frontier contexts using social network analysis (SNA) and provide explicit methodologies for identifying and investigating these spaces using archaeological data. Along with these scholars, many other archaeologists (e.g., Anschuetz et. al. 2001; Fowles 2018; Gupta and Ferguson 1992; Herr and Harry 2018; Kohl 1987; Lightfoot and Martinez 1995; Rodseth and Parker 2005; Rösler and Wendl 1999; Stein 1998) have discussed the characteristics of borderland communities that ultimately allowed this research to evaluate the Ozarks as such.

Based on this previous scholarship, we know that there are three basic characteristics of a borderland region: location between major political and social formations, low population density, and increased social diversity (Herr and Harry 2018). Borderland communities are also often seen as a natural bridge or broker for exchange from one region to the next, simply because of their geographic location between various entities. I will discuss each of these in turn and evaluate these characteristics for Neosho and the Ozarks to answer the above research questions. The first characteristic illustrates borderlands are most often associated as areas beyond or between some kind of boundary. And, unfortunately, borderlands are often most directly associated or identified based on geographic and ecological differences (Peeples and Mills 2018:28). Topography that is seen as a natural break or barrier to travel are commonly associated with these boundaries and borders, as I discussed in Chapter 2. The original definitions of culture areas as set forth by early scholars like Wissler (1914, 1917) and Holmes (1914) corresponded to divisions set forth by geologists, geographers, and biologists that ultimately described the natural environment (Binford and Sabloff 1982; Wissler 1914). Thus, in early interpretations of cultural practice and activities of communities living in these borderlands, archaeologists assumed that cultural influence and change came to these groups from the outside in, from more “developed” cultures in “centralized” areas. These legacies persisted through the development of culture history as a distinct paradigm, and for Neosho especially, we can see that these assumptions still exist, and this is the main reason why researchers have been unable to answer their questions concerning Neosho’s identity and affiliations.

There is no indication given the extant literature that past researchers thought Neosho to be between political or social formations, only that they were between two major ecological zones. In fact, these researchers defined Neosho to be a separate political and social group for a reason: they were distinctive enough in their material practices to distinguish them from surrounding cultural groups. It is curious that the main research questions and interpretations that persisted throughout their work on Neosho relied upon the assumptions that cultural influence must have come from somewhere outside the Ozarks, or that Ozark communities were culturally “conservative” and relied upon these outside influences. These conclusions are, in my opinion, mostly associated with the idea that the Ozarks were a marginal environment, that they were a natural break on the landscape, and as a result must represent social or political boundary between groups as well. Those assumptions about the Ozarks persisted until Brown (1984) asserted that communities living on the Plateau were not isolated, marginal, or uninfluential. More contemporary work on the Ozarks has confirmed his assertions, but until this point no new research had been conducted on Neosho to confirm his statements.

While the Ozarks as an environment are a natural break, a mountainous zone between two other large environmental areas, the networks presented in the previous chapter offer a more nuanced perspective illustrating that groups like Neosho manifest their social relationships such that they were a distinct cultural community while also maintaining ties to surrounding groups. This does suggest that the Ozarks are at this time are distinctive socially and politically, as assumed by previous perspectives, but hopefully also illustrates that this does not necessarily mean that this environment represents a natural boundary or borderland between groups on the Plains and the Eastern Woodlands. Instead, this research shows that most Neosho sites do not exhibit the characteristics of borderland communities, eliminating the simplistic view of the Ozarks as one large boundary and offering a more detailed perspective on relational ties in this region overall. This research is thus complementary to the earlier culture historic paradigms, using techniques and theories embedded within relational archaeology and network analysis to capture the complexities of interactions between peoples in the past.

In this research, I have illustrated that Neosho is a unified social community, especially with respect to ceramic practice. Figure 8.1 represents the networks constructed from punctated ceramics in this region, as this is the cultural element that past researchers were using to build hypotheses about Neosho's relationships to surrounding groups as well as their identities and affiliations. This network was also the most robust, based on the existing data. Recalling the theories outlined in Chapter 5, the ceramic attributes (i.e., highly visible decorative elements) and resultant network connections presented in this graph signal broad social affiliations that help archaeologists identify communities that are unified socially. In examining the interconnectedness of these graphs that highlight the strongest associations and relationships, we can see that Neosho communities are more internally connected than they are externally with the

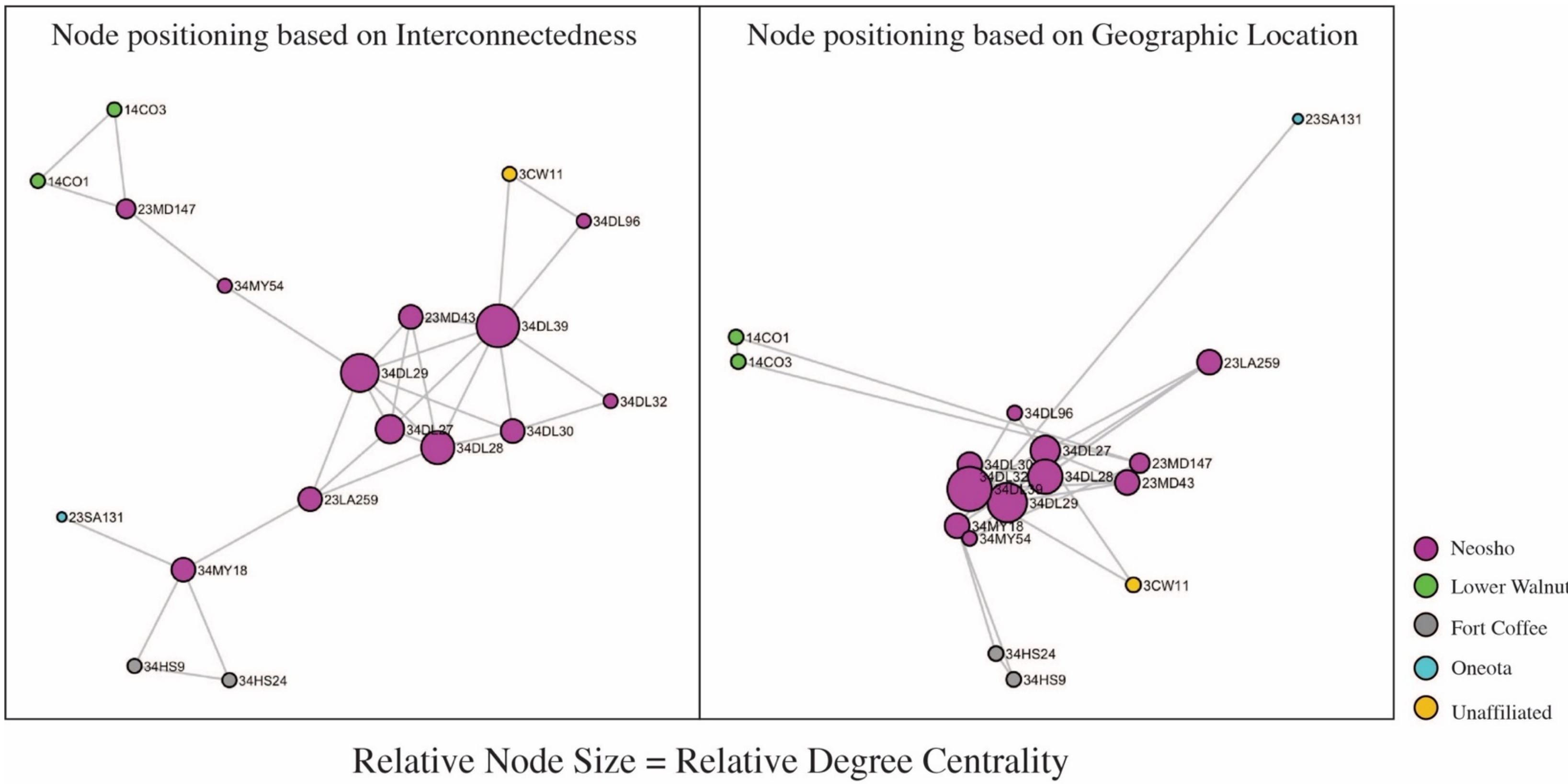


Figure 8.1. Social Networks based on Punctated Ceramics

surrounding groups. This confirms what previous researchers knew, that Neosho is quite distinctive in their decorative ceramic practices, which is why they were defined as a separate cultural group in the first place. What it also tells us is that Neosho is a socially unified entity, as are the surrounding groups like Lower Walnut and Fort Coffee. Therefore Neosho (and by proxy this part of the Ozarks) does not lie between major political or social boundaries, as borderlands are defined. Instead, the boundaries that Neosho maintained between themselves and surrounding groups (based on decorative ceramic practices) lie at sites like 34MY18 and 23MD147, where they built strong ties to Fort Coffee and Lower Walnut groups, respectively. So, this portion of the Ozarks does not represent a cultural borderland as defined by the first characteristic discussed above. It is only "between" in the sense that it is situated geographically between two major ecological zones. In the future I would like to increase the sample from surrounding communities in order to interrogate the connectivity of these other groups.

The second of these characteristics relates directly to the idea that borderlands have more ephemeral populations than more politically or socially centralized areas. This element is difficult to characterize using archaeological data on understudied areas like the Ozarks, as sampling biases can often simulate the idea that these areas were not as intensively occupied as others. I believe this sampling bias to be present for Neosho, in that most of the data stems from rockshelter occupations that were excavated as part of inundation projects in Oklahoma. The extant literature mostly reexamines these data in various iterations, with just a few excavations taking place from the 1970s to today. Little is known about the open-air sites in this area, and very few have been discovered, I hypothesize because there is a lack of understanding of the geomorphology of the areas in which Neosho communities resided. Late Pre-Contact open-air sites may be more deeply buried than archaeologists realize, and much work is needed to try and identify these occupations throughout the Ozarks in northeastern Oklahoma. While the extant data and settlement patterns might suggest that the Ozarks are ephemerally occupied during this time, this is because of the lack of research on Neosho and the time period as a whole in this area and these data do not accurately reflect the population densities in the Ozarks in northeastern Oklahoma. And given the above networks in Figure 8.1 that illustrate Neosho is a centralized social group, I find it highly likely that these seeming population densities are much higher than are reflected in the archaeological data at this point.

If we translate the third characteristic into SNA terms, this means that a borderland can be characterized by diverse and weak ties, as opposed to the strong and homogeneous ties that occupy centralized areas (Peeples and Mills 2018:34). These terms also can be utilized to evaluate the second criteria, but one must be mindful of the difficulties discussed in the paragraph above. Basically, in characterizing the relational ties in borderlands as diverse and weak, this means that communities residing in these areas are not centralized and that their relationships span out in numerous directions. This is what is meant when researchers discuss borderlands as spaces of culture contact, where diverse groups of people interact with one another and are weakly tied to each other in the borderlands, but are more strongly tied to their associated centralized communities.

Figure 8.2 presents all of the networks constructed using ceramic data in this region, organizing the sites geographically. If we examine these networks, which signal two different kinds of relationships, we can make a couple assessments. Once again, when examining the robust punctated network signaling broad affiliative relationships, it is clear that Neosho is a strongly interconnected internalized community that is distinct from surrounding groups. Though a bit murkier, this conclusion follows through with the incised networks and also the networks

Figure 8.2. Social Networks with nodes positioned geographically.

constructed from low-visibility data on plain ceramics that signal more restrictive relationships like those of learning communities. As such, Neosho sites have more strong ties to one another than they do to the surrounding groups, and as such are not weakly tied as we would expect based on the above characteristics of a borderland area. Those connections are also not necessarily more diverse, in that Neosho only maintained a few strong connections to communities outside of their established social boundaries. It is my assessment once again that this area does not constitute a cultural borderland given the three characteristics above, though it may be ecologically diverse and situated geographically between two major environmental zones.

Finally, I'd like to briefly examine the idea that Neosho—as a hypothesized borderland community—acted as brokers or a bridge between groups on the Plains and the Eastern Woodlands. This has been hypothesized by many scholars in Neosho research, most explicitly by Thomas and Ray (2002). Given the networks presented in Figure 8.2, there is no indication that Neosho necessarily acted as a go between for communities like Lower Walnut and Fort Coffee, as there are direct relationships signified between those communities without Neosho acting as a broker. Bigger sample sizes are needed from surrounding groups to fully interrogate the hypothesis that Neosho acted as brokers for Lower Walnut and Fort Coffee communities. In network perspectives, this could be measured using betweenness centrality. The current investigations did not use betweenness as they naturally skewed to show Neosho with higher scores, since the data was highly biased towards Neosho assemblages.

Additionally, if we recall the presentation of ceramic data in Chapter 6, there was evidence of direct exchange between Lower Walnut and Fort Coffee groups, with Braden Incised and Avery Engraved sherds that were likely manufactured in the Arkansas River Valley or Red

River Valley being found in Lower Walnut assemblages. These sherds were also found in Neosho assemblages. Therefore, I cannot rule out the idea that these trade wares traveled through the Neosho geographic area onto the Plains, but given the networks presented above I suspect that these were more the result of direct interactions and relationships between these communities rather than going entirely through a third party. This does not preclude the idea that Neosho may have acted as a broker between Plains groups and other communities in the Eastern Woodlands, but given the data examined in this dissertation I do not believe they acted as brokers between Lower Walnut and Fort Coffee groups.

It is possible that Neosho did act as this go between for Plains groups supplying bison resources to folks in the Eastern Woodlands, as Thomas and Ray (2002) suggested, though I suspect that Neosho communities also had access to various resources in the Ozarks that these communities also desired. There are high quality chert materials in the Ozarks as well as various resources that are not readily available in surrounding areas, and many communities may have built and maintained relationships to Neosho to have access to these materials. Also, based on the subsistence data presented in Chapter 4, where I examined the proportions of bison remains in collections throughout the region, there was a much smaller proportion of bison in Neosho collections than in both Lower Walnut and Fort Coffee collections. If Neosho acted as a bridge between groups aimed in part at supplying bison materials to groups in the Eastern Woodlands, I would expect Neosho to have a heavier presence of these animal remains in their assemblages. Contrarily, Neosho faunal data is overwhelmed by white-tailed deer, with only a few bison elements represented at each site. The one Fort Coffee community investigated (34LF31) showed a higher proportion of bison remains and of course Lower Walnut assemblages were dominated by bison.

More work is of course needed to fully investigate the hypothesis that Neosho acted as brokers, but also to investigate the more economic relational connections that are not evaluated in this dissertation. Just because Neosho lived between the Plains and Eastern Woodlands does not mean they naturally served as brokers, nor that groups on either side would build and maintain relationships with Neosho communities just because of their relative access to various resources. These are also unevaluated assumptions that are associated with the presupposition that this part of the Ozarks is a meaningful borderland and given the above discussions that dispel these common ideas, it is clear that economic relationships must be assessed and investigated in the future as well. Ray (2020) has illustrated Neosho had ties with groups on the Plains such as Lower Walnut, trading Burlington Chert from the Ozarks and receiving small amounts of Florence A. Similar relationships should be examined for sites in the Eastern Woodlands. These regional economic relationships could result in different connections and networks than the ones above that examine social and cultural connections and will more readily investigate the hypotheses that Neosho communities built and maintained these bridging connections.

The connections shown in the network graphs presented in the preceding chapter also show that there are enduring relationships between groups in this region that were also present in preceding time periods. I have noted at several places in this dissertation that relationships between communities on the Ozarks, the Plains, and the Arkansas River Valley were present at least in the preceding Mississippian time periods, as discussed by scholars like Brown (1984) and Regnier et al. (2019). Ties between Neosho, Fort Coffee, and Lower Walnut likely represent a continuation of these relationships as established by preceding communities, and perhaps an intensification of these relationships as affected by things like the climatic and associated social changes occurring during this time. More research is needed to understand the shifts in these relationships through time.

From this research we have learned that Neosho is in not necessarily fully isolated from regional interactions—an expected conclusion. While most Neosho communities were separated relationally from surrounding communities, several Neosho sites showed active ties to neighboring groups. Secondly, this part of the Ozarks—as inhabited and made meaningful by Neosho communities and their relationships to surrounding groups—is not a cultural borderland. This of course is not meant to suggest that borders do not exist at all in this area, rather to illustrate that these boundaries are not readily identifiable without an evaluation of regional interactions as reconstructed from data like that presented in this research. And based on these data, we have confirmed that Neosho maintained distinctive practices with regards to ceramic decoration especially, that signals their own internalized affiliative relationships. We can also see potential sites or places within the Neosho community that did exhibit the network characteristics of borderlands (i.e., diverse and weak ties), where there were permeable boundaries built and maintained by groups in this region. Those sites that connect groups like Lower Walnut and Fort Coffee to Neosho communities signal potential boundary areas. Therefore, in utilizing the theories, methods, and case study data presented in this dissertation, I have been able to answer the first two questions with some degree of certainty. Additionally, I have illustrated that these tools and frameworks are tailorable to many contexts, most importantly in investigating understudied areas with "less than ideal" datasets. Network techniques are essential to reinvigorating research in these areas and providing answers to questions that emphasize the importance of evaluating our categorical taxonomies as well as placing our understanding of past relationships at the forefront of archaeological research.

Answering Enduring Questions about Neosho and Proposing Future Research

The data presented in this dissertation also proved useful in answering some of the enduring questions that researchers had in their original assessments of Neosho communities—albeit in a more nuanced way. In particular, I was able to investigate whether Neosho is more or less connected (not related) to groups on the Plains or Eastern Woodlands. Based on the networks presented above in Figures 8.1 and 8.2, Neosho is not more or less connected to either Lower Walnut or Fort Coffee communities. This does not preclude the idea that a Plains group moved eastward into the Ozarks or that climatic shifts resulted in Neosho communities adopting similar practices to groups on the Plains, but instead shows that when examining contemporaneous communities there is no indication that Neosho built or maintained more relationships to groups on the Plains than they did for groups on the Eastern Woodlands.

Especially when looking at the punctated networks, that show connections between communities based on highly visible attributes that signal social affiliations, it is apparent from these data that Neosho is not necessarily more or less tied to groups on either side. Given what we know from anthropological theories of communities, this is unsurprising. Neosho defined themselves and their own boundaries, differentiating themselves from surrounding groups in terms of their ceramic practices, but still maintained some active and strong ties to groups in other areas. The reasons for those active ties are unknown, but given the data examined in this research, these are not economically motivated but rather evaluating cultural and social connections. And since we can see no indication that Neosho connected themselves more to the Plains or Eastern Woodlands, we can eliminate the dichotomous idea presented by previous research that presupposed they were related to groups on either side.

Most of the arguments about Neosho origins and affiliations came from ideas surrounding subsistence practices and hypotheses associated with environmental determinism stating Neosho was “Plains-like” in many ways. This “Plains-like” distinction is an over-generalization perpetuating a dichotomous categorical perspective that problematically ignores the complex social histories of cultural groups like Lower Walnut. Lower Walnut communities as ancestral Wichita groups have social histories showing ties to the southeastern United States as well as to the west. Defining them as a Plains community is therefore somewhat inaccurate, and similarities between them and Neosho and/or Fort Coffee do not necessarily mean that those communities became more “Plains-like” Instead of emphasizing a dichotomy between the Plains and the Eastern Woodlands, in this dissertation I have chosen to eliminate such categorical narratives and focus on an understanding of the similarities and differences between these contemporaneous groups and what those mean in terms of interactions and relationships.

Chapter 4 presented subsistence data to directly investigate the similarities between Neosho and Lower Walnut subsistence, illustrating Neosho’s faunal subsistence was unlike that of Lower Walnut communities. The proportion of bison remains in Lower Walnut assemblages was much higher than that of Neosho communities, and Neosho communities’ proportion of white-tailed deer was much higher than Lower Walnut. In part, this may reflect the overall range and desired environments of these areas, with deer being more prevalent in the forested Ozark environments and bison being more available in the Plains grasslands. Even when examining plant remains, of which there are very few samples, there were some clear differences between Lower Walnut and Neosho.

Botanical remains are limited in Neosho assemblages but do show evidence of horticulture. Lower Walnut assemblages also have cultivated products. So, given this evidence, we know that groups living on the Plains and Neosho did also engage in horticultural activities, though the extent is unknown. If we compare Neosho and Fort Coffee faunal subsistence, both more intensively exploited deer than anything else, so there is a connection there. This similarity may be due to the overall environments and ranges of these animals rather than meaningful cultural or economic connections between these groups. Based on these assessments of subsistence, I would argue that Neosho is still not necessarily any more or less connected to the Plains or Eastern Woodlands, especially when combined with our new understanding of cultural relationships as signified by the ceramic data.

Other hypotheses about Neosho posited that they were very much related to Oneota groups in the Midwest, based on their use of punctations and trailed line decorations. These theories were mostly based on macroscopic comparisons rather than systematic investigations, and the data presented in this dissertation do highlight some similarities between the two groups, but also numerous differences. In examining the decorated affiliative networks above (i.e., incised and punctated), Neosho and Oneota groups are only ephemerally connected. And based on the ceramic characterizations presented in Chapter 6, it was clear that these communities were using different tools to implement these decorations and also using different decorative configurations. The vessel forms of Neosho and Oneota were also distinctive from one another, with Oneota vessels having very thick rims and rounded bases, whereas Neosho pots had flat bases and thinner rims. Based on these data, the idea that Neosho is related to Oneota groups can also be dispelled.

Using the data presented in this dissertation I have been able to make some preliminary assessments that answer a couple of the enduring questions surrounding Neosho communities. I believe that there is a lot of research still to be done to answer the remaining inquiries. The work presented here is one step forward in our understanding of regional interactions and community dynamics, in part designed to clarify our understandings of Late Pre-Contact groups in these areas, focusing most intently upon Neosho. To fully investigate the original questions that researchers posed about Neosho's origins and cultural affiliations, I believe diachronic studies are also needed. The arguments outlined in the current research do illustrate that Neosho shows no direct affiliation with contemporary groups on either side, but a diachronic study could more fully investigate the hypotheses that Neosho represents either an in-situ development of local Ozark communities, or that groups migrated from the Plains onto the Ozark Plateau. Similar network methodologies may be useful in completing these diachronic assessments, as scholars like Mills et al. (2016) have illustrated that social network analyses can be utilized to trace the movements of people. However, it will be necessary to assess and tailor such a study to the nuances of the datasets in this region, as was done in this study on Neosho and contemporaneous surrounding groups. Such work will also be necessary for researchers to get a better understanding of the overall cultural history of the communities in this portion of the Ozarks, as there are still many questions about cultural change through time.

Intensive surveys are also needed in this portion of the Ozark Plateau as well. The datasets utilized in this dissertation are incredibly limited in their scope, because of the bias in these collections towards Neosho's rockshelter occupations. Archaeologists need to get a better understanding of the geomorphology of the area to identify more open-air sites to eliminate these biases and get a better comparative sample from which to build conclusions about shared traditions in the broader region as presented here. Such surveys and any resultant excavations should incorporate a sampling strategy to investigate Neosho's day to day activities more intensively, including their faunal and botanical subsistence. Such work will allow researchers to further evaluate the conclusions as presented in this dissertation, as well as to move forward in our understandings of Neosho lifeways and how they related to surrounding communities.

To investigate the more restrictive learning community relationships more fully, as presented in the plainware networks above, I believe it will be necessary in the future to investigate various clay resources in this region. In Chapter 6 I presented data that suggested there may be differences in regional clay sources, as the additional tempers in the plainwares varied considerably based on the geographic location of various sherds. The clay in the Ozarks that Neosho communities were using may have more grit inclusions whereas the clay on the Plains in the vicinity of the Lower Walnut communities may be sandier, based on these data. An understanding of clay sources in these areas alongside the data presented in this dissertation may illuminate more patterns in the plainware data overall and in the relational connections based on that data.

The beauty of such a study as this is that it necessitates the addition of more data to continuously evaluate the conclusions as outlined in this and earlier chapters. In these ways, research on Neosho and their interactions with surrounding communities will not stay the same but will shift and move much like boundaries and borders do through time. The addition of more ceramic data may indeed shift these boundaries as illuminated in the networks presented above and in Chapter 7, but I have confidence that the overall conclusions will not change. Neosho communities clearly were not isolated from surrounding groups just because of their geographic location in a mountainous environment, and I was able to more definitively show that Neosho peoples were an internally cohesive social group who differentiated themselves from those surrounding communities but also maintained strong relationships to those other groups. These conclusions likely would not change with the addition of more data, but the addition of more ceramic attribute data may shift the roles that certain sites played in these networks, and it also may more readily identify which sites acted as those bridging connections between groups in this region.

Final Thoughts: Investigating Boundaries and Borders in Archaeological Contexts

This research aimed to illustrate the importance of evaluating the categories and taxonomies commonly utilized in archaeological research. When these various typologies remain unassessed and used as meaningful analytic units, they can inadvertently emphasize difference and mask important patterns concerning the relationships of past communities. Using network approaches and associated theories as discussed and used in this research, archaeologists can design inquiries that question these categorical schemas, illuminating lost points of connection and reevaluating our existing taxonomies.

Especially when examining cultures and communities like Neosho who lie in supposed borderlands, it is important to assess the assumptions that these categorizations entail. As we saw with Neosho, their interactive roles in this region in no way characterize them as a borderland society, though they had been consistently discussed and interpreted as such, with cultural development and influence stemming from other places. Assumed borderland areas are difficult to work within, because they are understudied, and the datasets are "less than ideal." I have shown above that network approaches are tailorable to these contextual nuances and allow us to build these inquiries and learn more about how past communities built their social worlds.

Boundaries and borders in the past are not all-encompassing. This is especially important to remember when examining archaeological materials that naturally correspond to different kinds of activities and therefore signify different social, economic, and political processes. The data in this dissertation correspond only to one set of these relationships and boundaries, though it is likely that other materials would show similar relationships and connections between these sites and communities. We should not assume, however, that these relationships have the same meanings or analyze the same processes. Often our typologies and culture area definitions in archaeology attempt to lump communities together and encompass a "totality of culture." in a similar sense to Clark Wissler (1914, 1917). Of course, most archaeologists recognize today that the boundaries we create based on these data are artificial, change with new data, and ultimately serve just as heuristic devices that allow us to compare and discuss cultural differences and variation. I think it is also important to emphasize that the materials we study signal these different processes. Ceramic attributes (especially decorative) may vary more considerably through space than lithic attributes. This certainly seems to be the case for Neosho. And this is because, those materials correspond to entirely different activities and processes. The boundaries between groups in the area in question were mostly built off ceramic attributes, mostly on the punctated wares, because those were the most variable through space. This is all to assert that we should be more explicit in our definitions of cultural variation through space and in our understandings of what those areas and differences truly mean.

Instead of asserting that the boundaries suggested by the networks above are factual and stagnant for Neosho, I instead encourage future researchers to assess these conclusions and to incorporate more and varying types of data to investigate the inherent multiplicity of boundaries and borders in the past. Much work is needed on Neosho communities and in the Late Pre-Contact in this region overall, but also on understudied borderland areas like the one scrutinized in this area. It is my hope that this research will contribute not only to our localized understandings of the communities in this area, but to the broader archaeological literature on borderlands and boundaries in the past.

References Cited

Adair, Mary J.

2012 Archaeobotanical Analysis. In *Archaeological Investigations at Arkansas City, Kansas,* edited by Robert J. Hoard. The Digital Archaeological Record (tDAR), doi:10.6067/XCV81Z43V0.

Adelman, Jeremy and Stephen Aron

1999 From Borderlands to Borders: Empires, Nation-States, and the Peoples in Between in North American History. *American Historical Review* 814-841.

Albert, Louis E.

1981 *Ferndale Bog and Natural Lake: Five Thousand Years of Environmental Change in Southeastern Oklahoma.* No. 7. Oklahoma Archeological Survey.

Alvarez Jr., Robert R.

1995 The Mexican-US border: The making of an anthropology of borderlands. *Annual Review of Anthropology* 24:447-470.

1999 Toward an Anthropology of Borderlands: The Mexican-U.S. Border and the Crossing of the 21st Century. In *Frontiers and Borderands: Anthropological Perspectives*, edited by Michael Rösler and Tobias Wendl, pp. 225-238. Peter Lang, Frankfurt.

Anschuetz, Kurt F., Richard H. Wilshusen, and Cherie L. Scheick

2001 An Archaeology of Landscapes: Perspectives and Directions. *Journal of Archaeological Research* 9(2):157-211.

Appadurai, Arjun

1990 Disjuncture and Difference in the Global Cultural Economy. In *Theory, Culture & Society 7*(2-3):295-310.

1996 *Modernity at Large: Cultural Dimensions of Globalization*. Minneapolis: University of Minnesota Press.

Baerreis, David A.

1940 The Neosho Focus. *Society for American Archaeology Notebook* 1:108-109.

1941 *Recent Developments in Oklahoma Archaeology*. Proceedings of the Oklahoma Academy of Science, pp. 125-126.

Baerreis, David A. and Joan E. Freeman

1959 A Report on a Bluff Shelter in Northeastern Oklahoma (DL-47). *Archives in Archaeology*, No. 1. University of Wisconsin Press, Madison.

Bahn, Paul
2014 *The History of Archaeology: An Introduction*. Routledge, London.

Barsh, Russell L. and Chantelle Marlor
2003 Driving Bison and Blackfoot Science. *Human Ecology* 31:571-593.

Baxter, Michael
2003 *Statistics in Archaeology.* Arnold, London.

Bell, Robert E., and David A. Baerreis
1951 A Survey of Oklahoma Archaeology. *Bulletin of the Texas Archeological and Paleontological Society* 22:7-100.

Bell, Robert E., Gayle S. Lacy Jr., Margaret T. Joscher, and Joe C. Allen
1969 *The Robinson-Solesbee Site, HS-9, A Fulton Aspect Occupation, Robert S. Kerr Reservoir, Eastern Oklahoma*. Archaeological Site Report No. 15, Oklahoma River Basin Survey. University of Oklahoma Research Institute, Norman.

Benedict, Ruth
1934 *Patterns of Culture.* Houghton Mifflin, Boston.

Benn, David W. and Neal H. Lopinot
1993 The Prehistoric Occupations at Cobb Cave in the Western Ozarks. *The Missouri Archaeologist* 54:55-78.

Bhabha, Homi
1994 *The Location of Culture*. Routledge, London.

Binford, Lewis R.
1965 Archaeological Systematics and the Study of Culture Process. *American Antiquity* 31(2):203-210.

Binford, Lewis R. and Jeremy A. Sabloff
1982 Paradigms, Systematics, and Archaeology. *Journal of Anthropological Research* 38(2):137-153.

Birch, Jennifer
2015 Current Research on the Historical Development of Northern Iroquoian Societies. *Journal of Archaeological Research* 23:263-323.

Birch, Jennifer and John P. Hart
2018 Social Networks and Northern Iroquoian Confederacy Dynamics. *American Antiquity* 83(1):13-33.

Blakeslee, Donald J. and Martin F. Hawley
2006 The Great Bend Aspect. In *Kansas Archaeology*, edited by Robert J. Hoard and William E. Banks, pp. 165-179. University of Kansas Press, Lawrence.

Boas, Franz
1930 Concept of Culture Areas. *Conference on Regional Phenomena.*

Borck, Lewis
2016 *Lost Voices Found: An Archaeology of Contentious Politics of the Greater Southwest, AD 1100-1450*. Unpublished PhD Dissertation, University of Arizona.

Borck, Lewis, Barbara J. Mills, Matthew A. Peeples, and Jeffrey J. Clark
2015 Are Social Networks Survival Networks? An Example from the Late Pre-Hispanic US Southwest. *Journal of Archaeological Method and Theory* 22(1):33-57.

Borgatti, Stephen P.
2006 Identifying Sets of Key Players in a Social Network. *Computational & Mathematical Organization Theory* 12(1):21-34.

Borgatti, Stephen P. and Martin G. Everett
2006 A Graph-Theoretic Perspective on Centrality. *Social Networks* 28(4):466-484.

Borgatti, Stephen P. and Daniel S. Halgin
2011 Analyzing Affiliation Networks. In *The SAGE Handbook of Social Network Analysis*, pp. 417-433. SAGE Publications.

Borgatti, Stephen P., Martin G. Everett, and Jeffrey C. Johnson
2013 *Analyzing Social Networks*. Sage, New York.

Borgatti, Stephen P., Ajay Mehra, Daniel J. Brass, and Giuseppe Labianca
2009 Network Analysis in the Social Sciences. *Science* 323(5916):892-895.

Bourdieu, Pierre
1977 *Outline of a Theory of Practice*. Cambridge University Press, Cambridge.

1990 *The Logic of Practice.* Translated by R. Nice. Stanford University Press.

Brooks, Robert L. and Peggy Flynn
1988 34TX-71: A Late Prehistoric Bison Processing Station in the Oklahoma Panhandle. *Plains Anthropologist* 33:467-487.

Brown, James A.
1971 *Spiro Studies, Volume 3, Pottery Vessels.* First Part of the Second Annual Report of Caddoan Archaeology—Spiro Focus Research. University of Oklahoma Research Institute.

Brown, James A.
1984 Prehistoric Southern Ozark Marginality: A Myth Exposed. *Missouri Archaeological Society* Special Publication 6

Brown, James A.
1996 *The Spiro Ceremonial Center: The Archaeology of Arkansas Valley Caddoan Culture in Eastern Oklahoma* Vol 29. Museum of Anthropology, University of Michigan.

2017 *The Spiro Hollow Chamber Reconsidered*. Unpublished manuscript on file at the Oklahoma Archeological Survey, University of Oklahoma, Norman.

Brück, J. and Fontijin, D.
2013 The Myth of the Chief: Prestige Goods, Power, and Personhood in the European Bronze Age. In *The Oxford Handbook of the European Bronze Age*, edited by A. Harding and H. Fokkens, pp. 197-215. Oxford University Press, Oxford.

Brughmans, Tom
2010 Connecting the Dots: Towards Archaeological Network Analysis. *Oxford Journal of Archaeology* 29:277-303.

Brughmans, Tom, Anna Collar, and Fiona Coward, editors
2016 *The Connected Past: Challenges to Network Studies in Archaeology and History*. Oxford University Press, Oxford.

Buehler, Kent J.
1997 Getting Over the Hump: Some Concluding Remarks on Southern Plains Bison Procurement/Utilization Studies. In *Southern Plains Bison Procurement and Utilization from Paleoindian to Historic*, edited by Leland C. Bement and Kent J. Buehler, pp. 173-182. *Plains Anthropologist* Memoir 42.

Card, Jeb J. (editor)
2013 *The Archaeology of Hybrid Material Culture*. Center for Archaeological Investigations, Occasional Paper 39. Southern Illinois University Press, Carbondale.

Carr, Christopher
1995 Building a Unified Middle-Range Theory of Artifact Design. In *Style, Society, and Person: Archaeological and Ethnological Perspectives*, edited by Christopher Carr and Jill E. Neitzel, pp. 151-170, Springer Science+Business Media, New York.

Cartledge, T. R.
1969 The Tyler-Rose Site and Late Prehistory in East Central Oklahoma, HS-24. *Archaeological Site Report* 19. Oklahoma River Basin Survey. University of Oklahoma Research Institute.

Chapman, C. H.

1959 *The Origin of the Osage Indian Tribe: An Ethnographic, Historical, and Archaeological Study.* Unpublished Ph.D. Dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

Clay, R. Berle

1976 Typological Classification, Attribute Analysis, and Lithic Variability. *Journal of Field Archaeology* 3(3):303-311.

Cobb, J.

1976 *The Functional Analysis of Late Prehistoric Remains from the Bontke Shelter.* Unpublished MA Thesis, Department of Anthropology, University of Arkansas, Fayetteville.

Conner, Michael D.

1999a *Neosho Tradition Occupation in Lawrence County, Missouri.* The Missouri Archaeologist 60:1-106.

1990b Conclusions. In *Neosho Tradition Occupation in Lawrence County, Missouri*, edited by Michael D. Conner. The Missouri Archaeologist 60:85-96.

Conner, Michael D.

2006 Ceramic Assemblage. In *Archaeological Investigations at Six Sheltered Sites in McDonald County, Missouri*, edited by Jack H. Ray and Michael D. Conner, pp. 137-145. Special Publication No. 5, Center for Archaeological Research, Missouri State University.

Cooper, Judith Rose

2008 *Bison Hunting and Late Prehistoric Human Subsistence Economies in the Great Plains.* Unpublished Doctoral Dissertation, Southern Methodist University.

Crabtree, S. A. and L. Borck

2019 Social Networks for Archaeological Research. In *Encyclopedia of Global Archaeology*, C. Smith (ed). Springer.

Crown, Patricia L.

2014 The Archaeology of Crafts Learning: Becoming a Potter in the Puebloan Southwest. *Annual Review of Anthropology* 43:71-88.

Deagan, Katherine

1990 Sixteenth-Century Spanish-American Colonization in the Southeastern United States and the Caribbean. In *Columbian Consequences: Archaeological and Historical Perspectives in the Spanish Borderlands East,* Vol. 2, Edited by David H. Thomas, pp. 225-250. Smithsonian Institution Press, Washington.

Dickson, Don R.
1991 *The Albertson Site: A Deeply and Clearly Stratified Ozark Bluff Shelter*. Research Series No. 41. Arkansas Archeological Survey, Fayetteville.

2002 *Prehistoric Native Americans in the Ozarks*. Ozark Resources and Historical Publications, Special Publication No. 1.

2003 Albertson Shelter (3BE174) Radiocarbon Dates. *Missouri Archaeological Society Quarterly* 20(1):12-13.

Dietler, Michael and Ingrid Herbich
1994 Ceramics and Ethnic Identity: Ethnoarchaeological Observations on the Distribution of Pottery Styles and the Relationship Between the Social Contexts of Production and Consumption. In *Terre Cuite et Société: La Céramique, Document Technique, Économique, Culturel*, edited by Didier Binder and Jean Courtin, pp. 459-472, XIVe Rencontre Internationale d'Archéologie et d'Histoire d'Antibes.

1998 Habitus, Techniques, Style: An Integrated Approach to the Social Understanding of Material Culture and Boundaries. In *The Archaeology of Social Boundaries*, edited by M. T. Stark, pp. 232-63. Smithsonian Institution Press, Washington.

Drass, Richard R.
1997 *Culture Change on the Eastern Margins of the Southern Plains.* Studies in Oklahoma's Past 19 and Oklahoma Anthropological Society Memoir 7. Oklahoma Archeological Survey, Norman.

1998 The Southern Plains Villagers. In *Archaeology of the Great Plains,* edited by Raymond Wood, pp. 415-455. University of Kansas Press, Lawrence.

Elton, Hugh
1996 *Frontiers of the Roman Empire*. Indiana University Press, Bloomington.

Emirbayer, M. and J. Goodwin
1994 Network Analysis, Culture, and the Problem of Agency. *American Journal of Sociology* 99:1411-1454.

Faust, Katherine
1997 Centrality in Affiliation Networks. *Social Networks* 19(2):157-191.

Feinman, Gary and J. Neitzel
1984 Too Many Types: An Overview of Sedentary Prestate Societies in the Americas. *Advances in Archaeological Method and Theory* 7:39-102.

2020 Excising Culture History from Contemporary Archaeology. *Journal of Anthropological Archaeology* 60:1-13.

Feinman, Gary and Linda M. Nicholas
2016 Framing the Rise and Variability of Past Complex Societies. In *Alternative Pathways to Complexity: A Collection of Essays on Architecture, Economics, Power, and Cross-Cultural Analysis*, edited by Lane F. Fargher and Verenice Y. Heredia Espinoza, pp. 271-289. University Press of Colorado.

Flannery, Kent V.
1967 Culture History vs. Cultural Process: A Debate in American Archaeology. *Scientific American* 217(2):119-127.

Fields, Barbara J.
2001 Whiteness, Racism, and Identity. *Int. Lab. Work.-Class History* 60:48-56.

Ford, James A.
1954 On the Concept of Types. *American Anthropologist* 56:47-54.

Ford, James A. and Gordon R. Willey
1941 An Interpretation of the Prehistory of the Eastern United States. *American Anthropologist* 43(3):325-363

Ford, Paige
2019a In Between Two Worlds: Past Perspectives on the Neosho Phase (AD 1400-1650). *Caddo Archaeology Journal* 29:205-217.

2019b The Spaces Between: A Pilot Study in the Application of Social Networks Analysis (SNA) to Borderland Contexts. *76th Annual Southeastern Archaeological Conference*, Poster Presentation.

Fowles, Severin
2018 The Evolution of Simple Society. *Asian Archaeology.*

Freeman, Joan E.
1959a *The Neosho Focus: A Late Prehistoric Culture in Northeastern Oklahoma*. Unpublished Ph.D. Dissertation, University of Wisconsin.

1959b *Site Dl-29, A Rockshelter in Northeastern Oklahoma.* Archives of Archaeology, No. 8, Oklahoma Archeological Survey.

1959c *An Archaeological Report on a Cave Deposit (Dl-30) in Northeastern Oklahoma.* Archives of Archaeology, No. 2, Oklahoma Archeological Survey.

1962 The Neosho Focus: A Late Prehistoric Culture in Northeastern Oklahoma. *Bulletin of the Oklahoma Anthropological Society* 10:1-26.

Freeman, Joan E. and A. Dewey Buck, Jr.
1960 Woodward Plain and Neosho Punctate: Two Shell Tempered Pottery Types of Northeastern Oklahoma. *Bulletin of the Oklahoma Anthropological Society* 8.

Fritz, Gayle J.
1984 Identification of Cultigen Amaranth and chenopod from Rochkshelter Sites in Northwest Arkansas. *American Antiquity* 49:558-572.

1986a Desiccated Botanical Remains from Three Bluffshelter Sites in the Pine Mountain Project Area, Crawford County, Arkansas. In *Contributions to Ozark Prehistory*, edited by George Sabo III, pp. 86-97. Research Series No. 27. Arkansas Archeological Survey, Fayetteville.

1986b *Prehistoric Ozark Agriculture: The University of Arkansas Rockshelter Collections.* Unpublished Ph.D. Dissertation, Department of Anthropology, University of North Carolina at Chapel Hill.

1990 Archeobotanical Remains from the Dirst Site, Buffalo National River, Arkansas. In *Archeological Investigations at 3MR80-Area D in the Rush Development Area, Buffalo National River, Arkansas, Vol. I*, edited by George Sabo III and Randall L. Guendling, pp. 153–175. Professional Papers No. 38. Southwest Cultural Resources Center, Santa Fe, New Mexico.

Fritz, Gayle J.
1997 A Three-Thousand-Year-Old Cache of Crop seeds from Marble Bluff, Arkansas. In *People, Plants, and Landscapes: Studies in Paleoethnobotany*, edited by Kristen J. Gremillion, pp. 42-62. University of Alabama Press, Tuscaloosa.

Giddens, Anthony
1984 *The Constitution of Society: Outline of the Theory of Structuration.* University of California Press, Berkeley.

1991 *Modernity and Self-Identity: Self and Society in the Late Modern Age*. Stanford University Press

Gilmore, Melvin R.
1931 Vegetal Remains of the Ozark Bluff-Dwellers Culture. *Michigan Academy of Science, Arts, and Letters* 14:83-102.

Golitko, Mark and Gary M. Feinman
2015 Procurement and distribution of pre-Hispanic Mesoamerican obsidian 900 BC-AD 1520: A social network analysis. *Journal of Archaeological Method and Theory* 22:206-247.

Golitko, Mark, James Meierhoff, Gary M. Feinman, and Patrick R. Williams
2012 Complexities of Collapse: The Evidence of Maya Obsidian as Revealed by Social Network Graphical Analysis. *Antiquity* 86(332):507-523.

Goodman, Leo A. and William H. Kruskal
1954 Measures of Association for Cross Classification, *Journal of the American Statistical Association,* 49:732-764.

1959 Measures of Association for Cross Classifications II: Further Discussion and References. *Journal of the American Statistical Association,* 54(285):123-163.

1963 Measures of Association for Cross Classifications III: Approximate Sampling Theory. *Journal of the American Statistical Association*, 58(302):310-364.

Gosden, Chris and Yvonne Marshall
1999 The Cultural Biography of Objects. *World Archaeology* 31(2):169-178.

Gosselain, Olivier P.
1995 *Identites Techniques: Le Travail de la Poterie au Cameroune Meridional.* Unpublished Doctoral Dissertation. University of Brussels, Brussels.

1998 Social and Technical Identity in a Clay Crystal Ball. In *The Archaeology of Social Boundaries*, edited by Miriam T. Stark, pp. 78-106. Smithsonian Institution Press, Washington.

Gosselain, Olivier P.
2000 Materializing Identities: An African Perspective. *Journal of Archaeological Method and Theory* 7(3):187-217.

2008 Thoughts and Adjustments in the Potter's Backyard. In *Breaking the Mould: Challenging the Past through Pottery*, pp. 67-79, ed. by Ina Berg. Archaeopress, Oxford.

2011 Fine if I Do, Fine if I Don't. Dynamics of Technical Knowledge in Subsaharan Africa. In *Investigating Archaeological Cultures*, pp. 211-227.

Gower, J. C.
1971 A General Coefficient of Similarity and Some of its Properties. *Biometrics* 27:857-871.

Gupta, Akhil and James Ferguson
1992 Beyond “Culture”: Space, Identity, and the Politics of Difference. *Current Anthropology* 7(1):6-23.

Habiba, Jan C. Athenstädt, Barbara J. Mills, Ulri Brandes
2018 Social Networks and Similarity of Site Assemblages. *Journal of Archaeological Science*, 92:63-72.

Hall, Robert L.
1951 *The Late Prehistoric Occupation of Northeastern Oklahoma as Seen from the Smith Site, Delaware County.* Unpublished MA Thesis, Anthropology. University of Oklahoma.

1962 *The Archaeology of Carajou Point*. 2 vols. University of Wisconsin Press, Madison.

Hammerstedt, Scott W., Patrick C. Livingood, and Amanda L. Regnier
2010 Geophysical and Archaeological Investigations at the Clement Site, McCurtain County, Oklahoma. *Southeastern Archaeology* 29(2):279-291.

Hammerstedt, Scott W. and Sheila Bobalik Savage
2021 Caddo Ceramics in the Arkansas River Basin in Eastern Oklahoma. In *Ancestral Caddo Ceramic Traditions*, edited by Duncan P. McKinnon, Jeffrey S. Girard, and Timothy K. Perttula, pp. 93-115. Louisiana State University Press, Baton Rouge.

Harrington, Mark R.
1960 *The Ozark Bluff-Dwellers*. Museum of the American Indian, Heye Foundation, Indian Notes and Monographs No. 12. Museum of the American Indian, New York.

Hart, John P.
1999 Another Look at Clemson's Island. *Northeast Anthropology* 57:19-26.

2012 The Effects of Geographical Distances on Pottery Assemblage Similarities: A Case Study from Northern Iroquoia. *Journal of Archaeological Science* 39:128-134.

Hart, John P. and H. J. Brumbach
2003 The Death of Owasco. *American Antiquity* 68:737-752.

Hart, John P., Jennifer Birch, Christian Gates St-Pierre
2017 Effects of Population Dispersal on Regional Signaling Networks: An Example from Northern Iroquoia. *Science Advances* 3:1-11.

Hart, John P. and William Engelbrecht
2012 Northern Iroquoian Ethnic Evolution: A Social Network Analysis. *Journal of Archaeological Method and Theory* 19(2):322-349.

2017 Revisiting Onondaga Iroquois Prehistory through Social Network Analysis. In *Process and Meaning in Spatial Archaeology: Investigations into Pre-Columbian Iroquoian Space and Time*, edited by Eric E. Jones and John L. Creese, pp. 189-214. University Press of Colorado, Boulder.

Hart, John P., Termeh Shafie, Jennifer Birch, Susan Dermarkar, Ronald F. Williamson
2016 Nation Building and Social Signaling in Southern Ontario: AD 1350-1650. *PLOS One*.

Hart, John P., Susan Winchell-Sweeny, Jennifer Birch
2019 An Analysis of Network Brokerage and Geographic Location in the Fifteenth-Century AD Northern Iroquoia. *PLoS ONE* 14(1).

Haury, Chérie E.
2012 Vertebrate Faunal Remains. In *Archaeological Investigations at Arkansas City, Kansas,* edited by Robert J. Hoard. The Digital Archaeological Record (tDAR), doi:10.6067/XCV81Z43V0.

Hawley, Marlin F., Martin Stein, Frederick W. Scott
2008 The Lower Walnut Settlement and its Ceramics. In *Land of Our Ancestors: Studies of Protohistoric and Historic Wichita Cultures*, edited by Timothy G. Baugh and Stephen M. Perkins, Memoir 40. *Plains Anthropologist* 208:445-470.

Hawley, Marlin F. and Susan C. Vehik
2012 Cultural and Historical Background. In *Archeological Investigations at Arkansas City, Kansas*. Kansas Historical Society, Contract Archeology Publication Number 26: 17-38.

Henning, Dale R.
1970 Development and Interrelationships of Oneota Culture in the Lower Missouri River Valley. *The Missouri Archaeologist*, Vol. 32.
Henning, Dale R.
1998 The Oneota Tradition. In *Archaeology of the Great Plains*, edited by Raymond Wood, pp. 345-414. University of Kansas Press, Lawrence.

Henry, E.R., B. Angelbeck, and U. Z. Rizvi
2017 Against Typology: A Critical Approach to Archaeological Order. *SAA Archaeological Record* 17:28-30.

Herr, Sarah A. and Karen G. Harry
2018 Life Beyond the Boundaries. In *Life beyond the Boundaries: Constructing Identity in Edge Regions of the North American Southwest*, edited by Karen G. Harry and Sarah A. Herr. University Press of Colorado

Hilliard, Jerry E.
1980 *Prehistoric Ozark Settlement-Subsistence and Nut Resource Utilization.* Unpublished MA Thesis, Department of Anthropology, University of Arkansas, Fayetteville.

Hilliard, Jerry E.
1986 Selection and Use of Acorn Species by Late Prehistoric Ozark Inhabitants. In *Contributions to Ozark Prehistory*, edited by George Sabo III, pp. 81-85. Research Series No. 27. Arkansas Archeological Survey, Fayetteville.

Hoard, Robert J.
2012a *Archeological Investigations at Arkansas City, Kansas*. Kansas Historical Society, Contract Archeology Publication Number 26.

2012b Radiocarbon and Archaeomagnetic Assays. In *Archaeological Investigations at Arkansas City, Kansas,* edited by Robert J. Hoard. The Digital Archaeological Record (tDAR), doi:10.6067/XCV81Z43V0.

2012c Conclusions. In *Archaeological Investigations at Arkansas City, Kansas,* edited by Robert J. Hoard. The Digital Archaeological Record (tDAR), doi:10.6067/XCV81Z43V0.

Hodder, Ian
1982 *Symbols in Action: Ethnoarchaeological Studies of Material Culture.* Cambridge University Press, Cambridge.

Holland-Lulewicz, Jacob
2020 From Categories to Connections in the Archaeology of Eastern North America. *Journal of Archaeological Research*. In Press.

Holmes, W. H.
1886 *Ancient Pottery of the Mississippi Valley*. Bureau of Ethnology Fourth Annual Report, pp. 361-436.

Holmes, W. H.
1914 Areas of American Culture Characterization Tentatively Outlined as an Aid in the Study of the Antiquities. *American Anthropologist* 16(3):413-446.

Hu, Di
2013 Approaches to the Archaeology of Ethnogenesis: Past and Emergent Perspectives. *Journal of Archaeological Research* 21:371-402.

Johnson, Matthew H.
2006 On the Nature of Theoretical Archaeology and Archaeological Theory. *Archaeol. Dial.* 13(2):117-132.

Jones, J. Knox, Jr., David Armstrong, and Jerry R. Choate
1985 *Guide to Mammals of the Plains States.* University of Nebraska Press, Lincoln.

Kassabaum, M. C.

2019 Early Platforms, Early Plazas: Exploring the Precursors to Mississippian Mound-and-Plaza Centers. *Journal of Archaeological Research* 27:187-247.

Kearney, Michael

1991 Borders and Boundaries of State and Self at the End of Empire. *Journal of Historical Sociology* 4(1):52-74.

Kelly, Lucretia S.

2006 Faunal Remains. In *Archaeological Investigations at Six Sheltered Sites in McDonald County, Missouri*, edited by Jack H. Ray and Michael D. Conner, pp. 165-200. Special Publication No. 5, Center for Archaeological Research, Missouri State University.

Kerr, Henry P. and Don G. Wyckoff

1964 Two Prehistoric Sites, My-72 and My-79, in the Markham Ferry Reservoir Area, Mayes County, Oklahoma. *Oklahoma Anthropological Society Bulletin* 12:55-85.

Kintigh, Keith W.

1990 Intrasite Spatial Analysis: A Commentary on Major Methods. In *Mathematics and Information Science in Archaeology: A Flexible Framework*, edited by A. Voorrips, pp. 165-200. Studies in Modern Archaeology. Holos, Bonn.

Kintigh, Keith W. and Albert J. Ammerman

1982 Heuristic Approaches to Spatial Analysis in Archaeology. *American Antiquity* 47:31-63.

Knappett, Carl

2011 *An Archaeology of Interaction: Network Perspectives on Material Culture and Society*. Oxford University Press.

Knappett, Carl

2013 (editor) *Network Analysis in Archaeology: New Approaches to Regional Interaction*. Oxford University Press.

2014 What are Social Network Perspectives in Archaeology? *Archaeological Review from Cambridge* 29(1):179-184.

2016 Networks in Archaeology: Between Scientific Method and Humanistic Metaphor. In *The Connected Past: Challenges to Network Studies in Archaeology and History*, edited by T. Brughmans, A. Collar, and F. Coward, pp.35-58. Oxford University Press, Oxford.

Kohl, Philip

1987 The Use and Abuse of World Systems Theory: The Case of the Pristine West Asian State. In *Advances in Archaeological Method and Theory*, Vol. II, edited by Michael B. Schiffer, pp. 1-35. Academic, New York.

Kosiba, Steve

2019 New Digs: Networks, Assemblages, and the Dissolution of Binary Categories in Anthropological Archaeology. *American Anthropologist* 121(2):447-463.

Kowalewski, S. A., R. E. Blanton, G. Feinman, and L. Finsten

1983 Boundaries, Scale, and Internal Organization. *Journal of Anthropological Archaeology* 2:32-56.

Krieger, Alfred D.

1944 The Typlogical Concept. *American Antiquity* 9(3):271-288.

Kroeber, A. L.

1931 The Culture-Area and Age-Area Concepts of Clark Wissler. In *Methods in Social Science, A Case Book*.

1939 *Cultural and Natural Areas of native North America*. University of California Press, Berkeley.

Krus, Anthony Michal

2013 *A Chronology for Warfare in the Mississippian Period (AD 1000-1500)*, Unpublished PhD Dissertation, Indiana University.

2016 The Timing of Precolumbian Militarization in the US Midwest and Southeast. *American Antiquity* 81(2):375-388.

Latour, Bruno

1993 Ethnography of a "High-Tech" Case. In *Technological Choices: Transformation of Material Cultures Since the Neolithic,* edited by P. Lemonnier, pp. 372-398. Routledge, London.

Lemonnier, Pierre, ed.

1993 *Technological Choices: Transformation of Material Cultures Since the Neolithic.* Routledge, London.

Liebmann, Matthew

2013 Parsing Hybridity: Archaeologies of Amalgamation in Seventeenth-Century New Mexico. In *The Archaeology of Hybrid Material Culture,* edited by Jeb J. Card, pp. 25-49. Center for Archaeological Investigations, Occasional Paper 39. Southern Illinois University, Carbondale.

Liebmann, Mathew and Melissa S. Murphy (eds)
2011 *Enduring Conquests: Rethinking the Archaeology of Resistance to Spanish Colonialism in the Americas*. School of American Research Press, Santa Fe.

Lightfoot, Kent G. and Antoinette Martinez
1995 Frontiers and Boundaries in Archaeological Perspective. *Annual Review of Anthropology* 24:471-492.

Lightfoot, Kent G., Antoinette Martinez, and Ann M. Schiff
1998 Daily Practice and Material Culture n Pluralistic Social Settings: An Archaeological Study of Culture Change and Persistence from Fort Ross, California. *American Antiquity* 63(2):199-222.

Lopinot, Neal H.
1992 Archaeobotany of the Will Shelter Complex. In *Phase II and III Investigations at the Will Shelter Complex (3WA876): A Series of Disturbed Bluff Shelters, Washington County, Arkansas*, by Kathleen H. Cande, John J. Mintz, Margaret J. Guccione, Neal H. Lopinot, Susan L. Scott, and James E. Barnes, pp. 152–162. AAS Project No. 732. Arkansas Archeological Survey.

1997 Plant Remains from 2WA539 and 3WA741. In *Cato Springs Archeology and Geomorphology, Archeological Data Recovery at 3WA539, 3WA577, and 3WA741, U.S. Highway 71 Relocation, Washington County, Arkansas*. Report 94–6. Mid-Continental Research Associates, Springdale, Arkansas.

1999 Archaeobotany. In *Neosho Tradition Occupation in Lawrence County, Missouri*, edited by Michael D. Conner. The Missouri Archaeologist 60:71-81.

Lopinot, Neal H. and Gina S. Powell
2006 Archaeobotany. In *Archaeological Investigations at Six Sheltered Sites in McDonald County, Missouri*, edited by Jack H. Ray and Michael D. Conner, pp. 146-164. Special Publication No. 5, Center for Archaeological Research, Missouri State University.

Lopinot, Neal H., Jack H. Ray, and Michael D. Conner, eds.
1998 *The 1997 Excavations at the Big Eddy Site (23CE426) in Southwest Missouri.* Special Publication No. 3. Center for Archaeological Research, Southwest Missouri State University, Springfield.

2005 *Regional Research and Archaic Record at the Big Eddy Site (23CE426), Southwest Missouri.* Special Publication No. 4. Center for Archaeological Research, Southwest Missouri State University, Springfield.

Lorrain, Dessamae
1967 The Glass Site. In *A Pilot Study of Wichita Indian Archeology and Ethnohistory*, assembled by Robert E. Bell, Edward B. Jelks, and W. W. Newcomb. Final Report for Grant GS-964, pp. 24-37. National Science Foundation, Washington D.C.

Luke, Douglas A.
2015 *A User's Guide to Network Analysis in R*. Springer International Publishing.

Lulewicz, Jacob
2017 Radiocarbon Data, Bayesian Modeling, and Alternative Historical Frameworks: A Case Study from the US Southeast. *Advances in Archaeological Practice* 6:58-71.

2018 *Network Histories of Southern Appalachia, AD 600-1600*. Unpublished Doctoral Dissertation, University of Georgia, Athens.

2019 A Bayesian Approach to Regional Ceramic Seriation and Political History in the Southern Appalachian Region (Northern Georgia) of the Southeastern United States. *Journal of Archaeological Science* 105:1-10.

Lyman, R. Lee and Michael J. O'Brien
2003 Cultural Traits: Units of Analysis in Early Twentieth-Century Anthropology. *Journal of Anthropological Research 59(2):225-250.*

Lyman, R. Lee, Michael J. O'Brien, and Robert C. Dunnell
1997 *The Rise and Fall of Culture History*. Springer Science & Business Media, New York.

Manning, Sturt W.
2020 Radiocarbon Dating, Bayesian Modeling, and American Archaeology. *SAA Archaeological Record* 20(4):40-46.

Manning, Sturt W., Jennifer Birch, Megan A. Conger, Michael W. Dee, Carol Griggs, Carla S. Hadden, Alan G. Hogg, Christopher Bronk Ramsey, Samantha Sanft, Peter Steier, Eva M. Wild
2018 Radiocarbon Re-Dating of Contact-Era Iroquoian History in Northeastern North America. *Science Advances* 4.

Mathew, A. J., A. J. Woods, and C. Oliver
1991 Spots before your Eyes: New Comparison Charts for Visual Percentage Estimation in Archaeological Material. In *Recent Developments in Ceramic Petrology*, edited by A. P. Middleton and I. C. Freestone, pp. 211-263. British Museum Occasional Paper 81. British Museum, London.

McKern, W. C.
1939 The Midwestern Taxonomic Method as an Aid to Archaeological Culture Study. *American Antiquity* 4(4):301-313.

McKinnon, Duncan P., Jeffrey S. Girard, and Timothy K. Perttula, eds.
2021 *Ancestral Caddo Ceramic Traditions*. Louisiana State University Press, Baton Rouge

McMillan, R. Bruce
2012 Bison in Missouri Archaeology. *The Missouri Archaeologist* 73:79-134.

McPherson, Miller, Lynn Smith-Lovin, and James M. Cook
2001 Birds of a Feather: Homophily in Social Networks. *Annual Review of Sociology* 27:415-444.

McPherson, Miller and Lynn Smith-Lovin
2002 Cohesion and Membership Duration: Linked Groups, Relations and Individuals in an Ecology of Affiliation. *Advances in Group Processes* 19:1-36.

Mead, Margaret
1928 *Coming of Age in Somoa: A Psychological Study of Primitive Youth for Western Civilization.* William Morrow, New York.

Mengoni, Luisa A.
2010 Identity Formation in a Border Area: the Cemeteries of Baoxing, Western Sichuan (Third Century BCE – Second Century BCE). *Journal of Social Archaeology* 10(2):198-229.

Mills, Barbara J.
2017 Social Network Analysis in Archaeology. *Annual Review of Anthropology* 46:379-397.

Mills, Barbara J. Jeffery J. Clark, and Matthew A. Peeples
2016 Migration, Skill, and the Transformation of Social Networks in the pre-Hispanic Southwest. *Economic Anthropology* 3:203-215.

Mills, Barbara J., Matthew A. Peeples, Randall W. Haas, Lewis Borck, Jeffrey J. Clark, and John M. Roberts
2015 Multiscalar Perspectives on Social Networks in the Late Pre-Hispanic Southwest. *American Antiquity* 80(1):3-24.

Mills, Barbara J., Jeffrey J. Clark, Matthew A. Peeples, Randall W. Haas, John M. Roberts, J. Brett Hill, Deborah L. Huntley, Lewis Borck, Ronald L. Breiger, A. Clauset, and Michael S. Shackley
2013 Transformation of Social Networks in the Late Pre-Hispanic US Southwest. *Proceedings of the National Academy of Sciences* 110(15):5785-5790.

Minar, Jill C. and Patricia L. Crown
2001 Learning and Craft Production: An Introduction. *Journal of Anthropological Research 57(4):369-380.*

Mintz, John Joseph
1985 *Prehistoric Ceramic Variability in the Arkansas Ozarks.* Unpublished MS Thesis, Appalachian State University.

Mische, Ann
2011 Relational Sociology, Culture, and Agency. In *The SAGE Handbook of Social Network Analysis*, pp. 80-97. SAGE Publications.

Morey, Darcy F. and Dan Bleam
2012 Molluscs. In *Archaeological Investigations at Arkansas City, Kansas,* edited by Robert J. Hoard. The Digital Archaeological Record (tDAR), doi:10.6067/XCV81Z43V0.

Nassaney, M. S. and K. E. Sassaman (eds)
1995 *Native American Interaction: Multiscalar Analyses and Interpretations in the Eastern Woodlands*. University of Tennessee Press, Knoxville.

Naum, Magdalena
2010 Re-emerging Frontiers: Postcolonial Theory and Historical Archaeology of the Borderlands. *Journal of Archaeological Method and Theory* 17:101-131.

O'Brien, Michael J. and W. Raymond Wood
1998 *The Prehistory of Missouri*. University of Missouri Press, Columbia.

Ogundiran, Akinwimi
2014 The Making of an Internal Frontier Settlement: Archaeology and Historical Process in Osun Gove (Nigeria), Seventeenth to Eighteenth Centuries. *African Archaeological Review* 31(1):1-24.

Ong, Aihwa
2005 (Re)Articulations of Citizenship. *PS: Political Science and Politics* 38(4):697-699.

Orr, Kenneth G.
1946 The Archeological Situation at Spiro, Oklahoma: A Preliminary Report. *American Antiquity* 11(1):228-256.

Orton, Clive, Paul Tyers, and Alan Vince
1993 *Pottery in Archaeology.* Cambridge University Press, Cambridge.

Östborn, Per and Henrik Gerding
2014 Network Analysis of Archaeological Data: A Systematic Approach. *Journal of Archaeological Science* 46:75-88.

Overstreet, David F.
1997 Oneota Prehistory and History. *The Wisconsin Archaeologist* 78(1-2):250-296.

Parker, Bradley J.
2002 At the Edge of Empire: Conceptualizing Assyria's Anatolian Frontier ca. 700 B.C. *Journal of Anthropological Archaeology* 21(3):371-395.

2006 Toward an Understanding of Borderland Processes. *American Antiquity* 71(1):77-100.

Parmalee, Paul W., R. Bruce McMillan, and Francis B. King
1976 Changing Subsistence Patterns at Rodgers Shelter. In *Prehistoric Man and His Environment,* edited by W. Raymond Wood and R. Bruce McMillan, pp. 141-161. Academic Press, New York.

Patterson, Thomas C.
1995 *Toward a Social History of Archaeology in the United States*. Harcourt Brace, Fort Worth.

Pauketat, Tim
2001 Practice and History in Archaeology: An Emerging Paradigm. *Anthropological Theory,* 1(1):73-98.

2007 *Chiefdoms and Other Archaeologial Delusions*, Rowman Altamira, New York.

2013 Bundles of/in/as time. In *Big Histories, Human Lives: Tackling Problems of Scale in Archaeology*, J. Robb and T. R. Pauketat (eds), pp. 45-56. Santa Fe Institute, Santa Fe.

Pauketat, T. R., and S. M. Alt
2005 Agency in a Postmold? Physicality and the Archaeology of Culture-Making. *Journal of Archaeological Method and Theory* 12:213-236.

Peeples, Matthew A.
2011 *Identity and Social Transformation in the Prehispanic Cibola World: AD 1150-1325*. Unpublished Doctoral Dissertation. Arizona State University, Tempe.

2017 Network Science and Statistical Techniques for Dealing with Uncertainties in Archaeological Datasets [online]. Available: http://www.mattpeeples.net/netstats.html
Peeples, Matthew A.
2018a R Code for Corrugated Ceramic Technological Analysis [online]. Available: https://core.tdar.org/document/439448/r-code-for-corrugated-ceramic-technological-analysis

2018b *Connected Communities: Networks, Identity, and Social Change in the Ancient Cibola World*. University of Arizona Press, Tucson.

2019 Finding a Place for Networks in Archaeology. *Journal of Archaeological Research* 27:451-499.

Peeples, Matthew A. and W. Randall Jr. Haas
2013 Brokerage and Social Capital in the Prehispanic U.S. Southwest. *American Anthropologist* 115:232-247.

Peeples, Matthew A. and Barbara J. Mills
2018 Frontiers of Marginality and Mediation in the North American Southwest: A Social Networks Perspective. In *Life Beyond the Boundaries: Constructing Identity in Edge Regions of the North American Southwest*, edited by K. G. a. S. A. H. Harry. University Press of Colorado.

Perttula, Timothy K, Marlin F. Hawley, and Frederick W. Scott
2001 Caddo Trade Ceramics. *Southeastern Archaeology* 20(2): 154-172.

Pettitt, P. B, W. Davies, C. S. Gamble, and M. B. Richards
2003 Paleolithic radiocarbon Chronology: Quantifying Our Confidence Beyond Two Half-Lives. *Journal of Archaeological Science* 30:1685-1693.

Pillaert, E. Elizabeth
n.d. Faunal Material from the Moore Site (LfMoI, LfMrIII, 34LF31). Unpublished Notes in Possession of the Author.

Pillaert, E. Elizabeth, William G. Reeder, Laura A. Monahan
2018 Faunal Remains from the Archaeological Sequence in Delaware County, Northeastern Oklahoma. *Oklahoma Anthropological Society Bulletin* 66.

Purrington, Burton Lewin
1971 *The Prehistory of Delaware County, Oklahoma: Cultural Continuity and Change on the Western Ozark Periphery*. Unpublished Ph.D. Dissertation, University of Wisconsin, Anthropology.

Rafferty, Milton D.
1980 *The Ozarks: Land and Life.* University of Oklahoma Press, Norman.

Raub, L. Mark, ed.
1976 *Pine Mountain: A Study of Prehistoric Human Ecology in the Arkansas Ozarks.* Research Report, No. 7. Arkansas Archeological Survey, Fayetteville.

Ray, Jack H.
2006a Chert Availability and Use. In *Archaeological Investigations at Six Sheltered Sites in Southern McDonald County, Missouri*, edited by Jack H. Ray and Michael D. Conner, pp. 119-136. Special Publication No. 5. Center for Archaeological Research, Missouri State University, Springfield.

Ray, Jack H.

2006b Henson Cave: Excavations and Lithics. In *Archaeological Investigations at Six Sheltered Sites in McDonald County, Missouri*, edited by Jack H. Ray and Michael D. Conner, pp. 56–87. Special Publication No. 5. Center for Archaeological Research, Missouri State University, Springfield.

2006c Henson Shelter: Excavations and Lithics. In *Archaeological Investigations at Six Sheltered Sites in McDonald County, Missouri*, edited by Jack H. Ray and Michael D. Conner, pp. 88-106. Special Publication No. 5. Center for Archaeological Research, Missouri State University, Springfield.

2007 *Ozarks Chipped-Stone Resources: A Guide to the Identification, Distribution, and Prehistoric Use of Cherts and Other Siliceous Raw Materials.* Missouri Archaeological Society.

2013 *An Archaeological Survey and Assessment of Chert Extraction Sites in the Vicinity of Peoria Quarry, Ottawa County, Oklahoma*. Research Report No. 1495. Center for Archaeological Research, Missouri State University, Springfield.

2020 The Dahlman Cache: Evidence for Late Prehistoric Trade of Burlington Chert to Affiliated Groups on the Eastern Plains. *The Missouri Archaeologist* 81:193-213.

Ray, Jack H. and Neal H. Lopinot

2006 Introduction. In *Archaeological Investigations at Six Sheltered Sites in McDonald County, Missouri*, edited by Jack H. Ray and Michael D. Conner, pp. 1-11. Special Publication No. 5, Center for Archaeological Research, Missouri State University.

2008 Late Prehistoric Culture History for Southwest Missouri. *The Missouri Archaeologist* 69:57–102.

Ray, M. A.

1965 A Report on the Excavations at the Pohly Site, My-54, in northeastern Oklahoma. *Oklahoma Anthropological Society, Bulletin 13*:1-68.

Regnier, Amanda L., Scott W. Hammerstedt, and Sheila Bobalik Savage

2019 *The Ritual Landscape of Late Precontact Eastern Oklahoma: Archaeology from the WPA Era Until Today*. University of Alabama Press, Tuscaloosa.

Rodseth, Lars and Bradley J. Parker

2005 Introduction: Theoretical Considerations in the Study of Frontiers. In *Untaming the Frontier in Anthropology, Archaeology and History*, edited by Bradley J. Parker and Lars Rodseth, pp. 3-21. University of Arizona Press, Tucson.

Rogers, J. Daniel

1978 *Federally Sponsored Archaeological Work in Oklahoma Before World War II*. Unpublished Course paper, ANTH 4983, University of Oklahoma.

Rogers, J. Daniel

2006 Chronology and the Demise of Chiefdoms: Eastern Oklahoma in the Sixteenth and Seventeenth Centuries. *Southeastern Archaeology* 25(1):20-28.

Rohrbaugh, Charles L.

1982 *Spiro and Fort Coffee Phases: Changing Cultural Complexes of the Caddoan Area*. Unpublished Ph.D. Dissertation, Department of Anthropology, University of Wisconsin-Madison.

1984 Arkansas Valley Caddoan: Fort Coffee and Neosho Foci. In *Prehistory of Oklahoma*, edited by R. Bell, pp. 265-285. Academic Press, Orlando.

Roper, Donna

2013 Evaluating the Reliability of AMS Dates on Food Residue on Pottery from the Late Prehistoric Central Plains of North America. *Radiocarbon* 55(1):151-162.

Roper, Donna C. and Mary J. Adair

2011 Interpreting AMS Radiocarbon Age Determinations from Selected Central Plains Tradition Sites. *Plains Anthropologist* 56(217):3-22.

2012 Additional AMS Radiocarbon Age Determinations for the Central Plains Tradition. *Plains Anthropologist* 57(221):31-38.

Rösler, Michael and Tobias Wendl (editors)

1999 *Frontiers and Borderlands: Anthropological Perspectives*. Peter Lang, Frankfurt.

Sabo, George and Ann M. Early

1990 Prehistoric Culture History. In *Human Adaptation in the Ozark-Ouachita Mountains*, by G. Sabo, A. M. Early, J. C. Rose, B. A. Burnett, L. Vogele, and J. P. Harcourt, pp. 34-120. Arkansas Archeological Survey, Fayetteville.

Sassaman, Kenneth E.

2001 Hunter-Gatherers and Traditions of Resistance. In *The Archaeology of Traditions: Agency and History Before and After Columbus*, T. R. Pauketat (ed), pp. 218-236. University of Florida, Gainesville.

2010 *The Eastern Archaic, Historicized*. AltaMira Press, Lanham.

Sassaman, Kenneth E., and D. H. Holly (eds)

2016 *Hunter-Gatherer Archaeology as Historical Process*. University of Arizona Press, Tucson.

Sassaman, Kenneth E. and Wictoria Rudolphi

2001 Communities of Practice in the Early Pottery Traditions of the American Southeast. *Journal of Anthropological Research*, 57(4):407-425.

Schoen, Christopher M. and Christine Garst
2012 Descriptions of Sampled Features. In *Archaeological Investigations at Arkansas City, Kansas,* edited by Robert J. Hoard. The Digital Archaeological Record (tDAR), doi:10.6067/XCV81Z43V0.

Schoen, Christopher M., Christine Garst, and Susan A. Holland
2012 Site Descriptions and Excavation Methods. In *Archaeological Investigations at Arkansas City, Kansas,* edited by Robert J. Hoard. The Digital Archaeological Record (tDAR), doi:10.6067/XCV81Z43V0.

Shennan, Stephen J., ed.
1997 *Quantifying Archaeology*. Edinburgh University Press, Edinburgh.

Silliman, Stephen
2001 Agency, Practical Politics and the Archaeology of Culture Contact. *Journal of Social Archaeology* 1(2):190-209.

Soil Survey Staff
2021 Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at the following link: http://websoilsurvey.sc.egov.usda.gov/.

Spaulding, Albert C.
1953 Statistical Techniques for the Discovery of Artifact Types. *American Antiquity* 18:305-313.

Spriggs, Matthew
1989 The Dating of the Island Southeast Asian eolithic: An Attempt at Chronometric Hygiene and Linguistic Correlation. *Antiquity* 63:587-613.

Stark, Miriam T., Mark D. Elson, and Jeffrey J. Clark
1998 Social Boundaries and Technical Choices in Tonto Basin Prehistory. In *The Archaeology of Social Boundaries,* edited by M. T. Stark, pp. 208-231. Smithsonian Institution Press, Washington, D.C.

Stein, Gil J.
1998 From Passive Periphery to Active Agents: Emerging Perspectives in the Archaeology of Interregional Interaction: Archaeology Division Distinguished Lecture AA Annual meeting, Philadelphia, December 5, 1998. *American Anthropologist* 104(3):903-916.

Stein, C. Martin
2012 Ceramic Artifacts. In *Archeological Investigations at Arkansas City, Kansas*. Kansas Historical Society, Contract Archeology Publication Number 26: 251-328.

Straus, Lawrence Guy
1999 Underground Archaeology: Perspectives on Caves and Rockshelters. *Archaeological Method and Theory* 2:255-304.

Strong, W. D.
1934 The Plains Culture Area in the Light of Archaeology. *American Anthropologist* 35(2):271-287.

Suhm, Dee Ann and Edward B. Jelks, eds.
1962 *Handbook of Texas Archeology: Type Descriptions*. The Texas Anthropological Society Special Publication No. 1 and Bulletin No. 4, The Texas Memorial Museum, Austin.

Taché, Karine and John P. Hart
2013 Chronometric Hygiene of Radiocarbon Databases for Early Durable Cooking Vessel Technologies in Northeastern North America. *American Antiquity* 78(2);359-372.

Terrell, John E.
2013 Social Network Analysis and the Practice of History. In *Network Analysis in Archaeology: New Regional Approaches to Interaction*, edited by Carl Knappett, pp. 17-41. Cambridge University Press, Cambridge.

Thomas, Larissa A. and Jack H. Ray
2002 Exchange at the Dahlman Site (23LA259), A Late Prehistoric Neosho Phase Settlement in Southwest Missouri. *Plains Anthropologist* 47(182):207-229.

Thompson, Victor D. and Anthony M. Krus
2018 Contemplating the History and Future of Radiocarbon Dating in the American Southeast. *Southeastern Archaeology* 37(1):1-11.

Thompson, Victor D., Thomas J. Pluckhahn, Matthew H. Colvin, Justin Cramb, Katherine G. Napora, Jacob Lulewicz, and Brandon T. Ritchison
2017 Plummets, Public Ceremonies, and Interaction Networks during the Woodland Period in Florida. *Journal of Anthropological Archaeology* 48:193-206.

Todd, Lawrence C., David C. Jones, Robert S. Walker, Paul C. Burnett, and Jeffrey Eighmy
2001 Late Archaic Bison Hunters in Northern Colorado 1997-1999 Excavations at the Kaplan-Hoover Bison Bonebed (5LR3953). *Plains Anthropologist* 46:125-147.

Trabert, Sarah and Kacy L. Hollenback
2021 *Archaeological Narratives of the North American Great Plains: From Ancient Pasts to Historic Resettlement*. Society for American Archaeology, Washington, DC. In Press

Trigger, Bruce G.
1984 Archaeology at the Crossroads: What's New? *Annual Review of Anthropology* 13:275-300.

2006 *A History of Archaeological Thought, Second Edition.* Cambridge University Press, Cambridge.

Tsing, Anna Lowenhaupt
1994 From the Margins. *Cultural Anthropology* 9:279-297.

2000 The Global Situation. *Cultural Anthropology* 15(3):327-360.

Vehik, Susan C.
1976 The Great Bend Aspect: A Multivariate Investigation of Its Origins and Southern Plains Relationships. *Plains Anthropologist,* 21(73):199-205.

1993 Dhegiha Origins and Plains Archaeology. *Plains Anthropologist* 38(146):231-252.

2012 Prehistory and Ethnohistory of the Wichita Indians. In *Archaeological Investigations at Arkansas City, Kansas,* edited by Robert J. Hoard. The Digital Archaeological Record (tDAR), doi:10.6067/XCV81Z43V0.

Vogele, Louis E. Jr.
1990 Environmental Setting. In *Human Adaptation in the Ozark and Ouachita Mountains*, edited by George Sabo III< Ann M. Early, Jerome C. Rose, Barbara A. Burnett, Louis Vogele, Jr., and James P. Harcourt. Arkansas Archeological Survey, Fayetteville.

Walker, Mike
2005 *Quaternary Dating Methods*. John Wiley and Sons, Chinchester, England.

Wasserman, S., and K. Faust
1994 *Social Network Analysis: Methods and Applications*, Cambridge University Press, Cambridge.

Waters, Michael R. and Tomas W. Stafford, Jr.
2007 Redefining the Age of Clovis: Implications for the Peopling of the Americas. *Science* 315:1122-1126.

Wedel, Mildred M.
1959 Oneota sites on the Upper Iowa River. *Missouri Archaeologist* 21(2-4).

Wedel, Waldo R.
1959 *An Introduction to Kansas Archaeology.* Bureau of American Ethnology Bulletin 174. Washington, D. C.

Wedel, Waldo R.
1986 *Central Plains Prehistory: Holocene Environments and Culture Change in the Republican River Basin.* Lincoln: University of Nebraska Press.

Wendrich, Willeke
2012 *Archaeology and Apprenticeship: Body Knowledge, Identity, and Communities of Practice*. University of Arizona Press, Tucson.

Wenger, Etienne
1998 *Communities of Practice: learning, Meaning, and Identity*. Cambridge University Press, Cambridge.

Whittaker, John C., Douglas Caulkins, and Kathryn A. Kamp
1998 Evaluating Consistency in Typology and Classification. *Journal of Archaeological Method and Theory*, 5(2):129-164.

Wilkerson, Isabel
2020 *Caste: The Origins of Our Discontents*. Random House, New York

Willey, Gordon R. and Philip Phillips
1958 *Method and Theory in American Archaeology.* Chicago University Press.

Willey, Gordon R. and Jeremy A. Sabloff
1993 *A History of American Archaeology, Third Edition.* Freeman, New York, W.H.

Wissler, Clark
1914 Material Cultures of the North American Indians. *American Anthropologist* 16(3):447-505.

1917 *The American Indian: An Introduction to the Anthropology of the New World.* Douglas C. McMurtrie, New York.

Wobst, Martin
1977 Stylistic Behavior and Information Exchange. In: *Papers for the Director: Research Essays in Honor of James* S. *Griffin,* edited by C. E. Cleland. University of Michigan, Museum of Anthropology, Anthropological Papers, 61. Ann Arbor. Pp. 317-342.

Wood, Raymond W. and R. Bruce McMillain, eds.
1976 *Prehistoric Man and His Environments: A Case Study from the Ozark Highland.* Academic Press, New York.

Worth, John E.
2017 What's in a Phase? Disentangling Communities of Practice from Communities of Identity in Southeastern North America. In *Forging Southeastern Identities: Social Archaeology and Ethnohistory of the Mississippian to Early Historic South,* edited by Gregory A. Waselkov and Marvin T. Smith. Unviersity of Alabama Press.

Wright, Alice P.
2017 Local and "Global" Perspectives on the Middle Woodland Southeast. *Journal of Archaeological Research* 25:37-83.

Wyckoff, Don G.
1963 *The Kerr Dam Site, A Stratified Site in the Markham Ferry Reservoir Area, Mayes County, Northeast Oklahoma.* Archaeological Site Report No. 1. Oklahoma River Basin Survey, Norman.

1964 The Jug Hill Site, My-18, Mayes County, Oklahoma. *Bulletin of the Oklahoma Anthropological Society* 12:1-54.

1967 Radiocarbon Dates from Oklahoma River Basin Survey Excavations. *Oklahoma Anthropological Society Newsletter* 15(2):6-8.

1980 *Caddoan Adaptive Strategies in the Arkansas Basin, Eastern Oklahoma*. Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman.

Wyckoff, Don G., Philip Robison, and Thomas B. Barr
1963 *Markham Ferry Reservoir Archaeological Resources, Mayes County, Oklahoma.* General Survey Report No. 1. Oklahoma River Basin Survey, Norman.

Yelton, Jeffry Keven
1991 *Protohistoric Oneota Pottery of the Lower Missouri River Valley: A Functional Perspective*. Unpublished Ph.D. Dissertation, University of Missouri-Columbia.

1999 Faunal Remains. In *Neosho Tradition Occupation in Lawrence County, Missouri*, edited by Michael D. Conner. The Missouri Archaeologist 60:82-85.

Ylimaunu, Timo, Sami Lakomäki, Titta Kallio-Seppä, Paul R. Mullins, Risto Nurmi, Markku Kuorilehto
2014 Borderlands as Spaces: Creating Third Spaces and Fractured Landscapes in Medieval Northern Finland. *Journal of Social Archaeology* 14(2):244-267.

APPENDIX A

CERAMIC ANALYSIS CODING SHEET

Dissertation Ceramic Recording Form Instructions

All Sherds

Attribute	Notes
Site Number	Site number of the sherd being recorded
Catalog Number	This will be derived from the Sam Noble Museum catalog. At other repositories, this will be recorded using their systems.
Old/Temporary Catalog Number	The SNMNH includes old catalog numbers. These numbers will be denoted on the sherd or on the bag from which the sherd was taken from.
Excavator	If provided by the database or through other means, the name of the excavator of this context.
Excavation Date	The date upon which these materials were excavated, if provided.
Unit	The unit number from which this material was excavated. Derive from database/catalog or from the bag.
Unit Section	If provided, the section of the unit (NW, NE, SW SE) from which these materials were excavated.
Northing	The Northing UTM coordinates of the site being excavated. Can be derived from site file information.
Easting	The Easting UTM coordinates of the site being excavated. Can be derived from site file information.
Depth	If provided, the depth of the artifact or context being examined.

Attribute	Notes
Level	The level from which these materials were derived. Provided in Museum database.
Sherd Type	Though may not be meaningful for these analyses, could be useful for later research if it is beneficial to examine all basal sherds versus all rim versus all body.
Thickness (mm)	Use calipers to measure a typical diameter of the vessel wall. Do not measure on top of a decorative element or a rim. Record to one decimal place.
Weight (g)	Record the weight of the sample in grams. Record to one decimal place.
Main Temper	The most prevalent temper in the sherd. Record only one.
Temper Amount	Use size and abundance categories to find the closest fit. Record zero NA if nothing is present.
Additional Temper	Can record multiple values. If any of these secondary tempers are present note it here.
Surface Treatment (Interior vs Exterior)	Can record multiple values. Record the treatment of the surface of the sherd. Most will be Plain.
Method of Manufacture	If present, record the presence of coil joints, coil breaks, slab joins which characterize the method of manufacture

****Also make note of any use wear in the "notes" section**

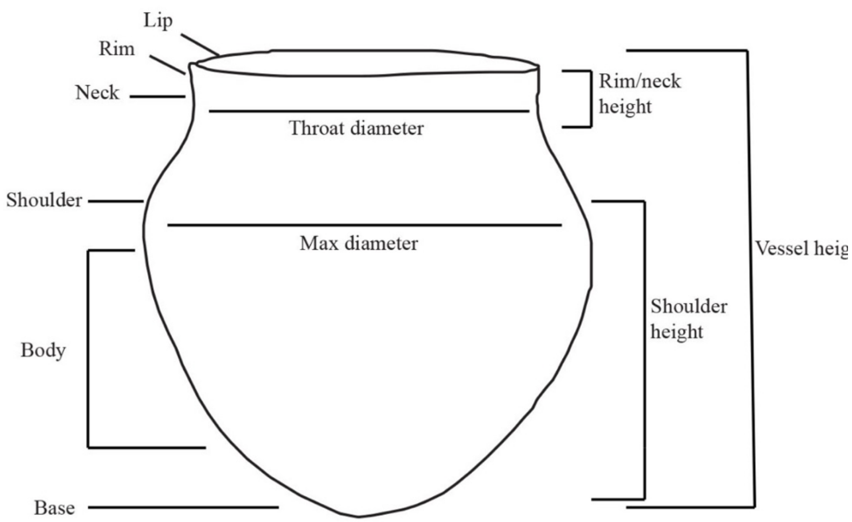
Diagnostic Sherds

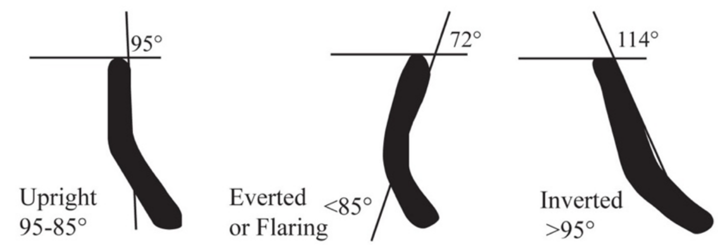
Diagnostic sherds get additional treatment in these analyses. These sherds illuminate more than plain sherds in terms of decorative intent and vessel form. The include any decorated sherds, any rim sherds, handles, or any other sherd that gives mor substantial information about vessel decoration or form. All the above attributes will be recorded for these sherds, and then the following attributes will also be recorded:

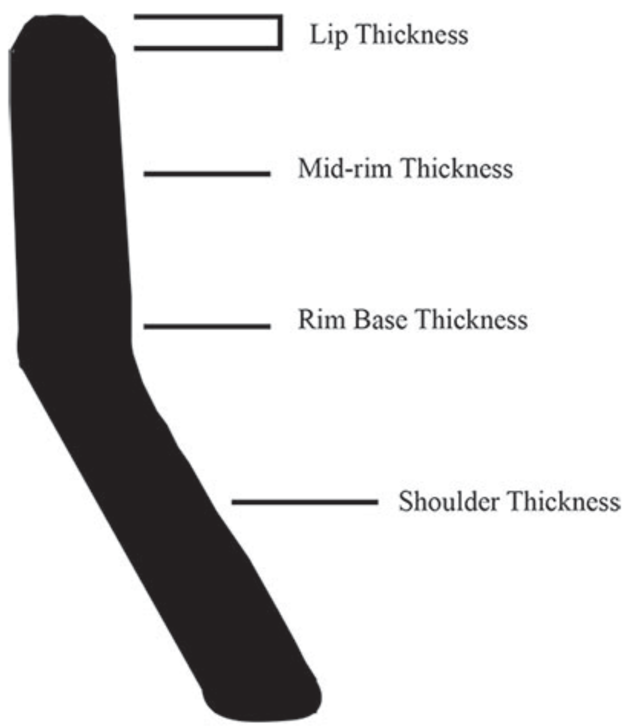
Attribute	Notes
Rim Profile	Is the rim shape standing, everted, or inverted. Record NA if unable to tell from this sherd.
Rim Curvature	Is the rim curvature straight, excurvate, or incurvate? Record NA if unable to tell from this sherd.
Rim Form	Which of the choices given best describes the shape and design of the rim. Choose only one option. Record NA if unable to tell from this sherd.
Lip Shape	Examine only the lip (the very edge of the rim of the sherd) and choose the shape that most closely resembles the lip. Record NA if unable to tell from this sherd.
Orifice Diameter	Use the orifice diameter chart to record the diameter of the rim. Record NA if unable to tell from this sherd.
Percent of Orifice	Use the orifice diameter chart to record the percent of the orifice that this sherd represents. Record NA if unable to tell from this sherd.
Mid Rim and Rim Base Thickness (mm)	Thickness of the rim measured using calipers.
Lip Thickness (mm)	Thickness of the lip measured using calipers.

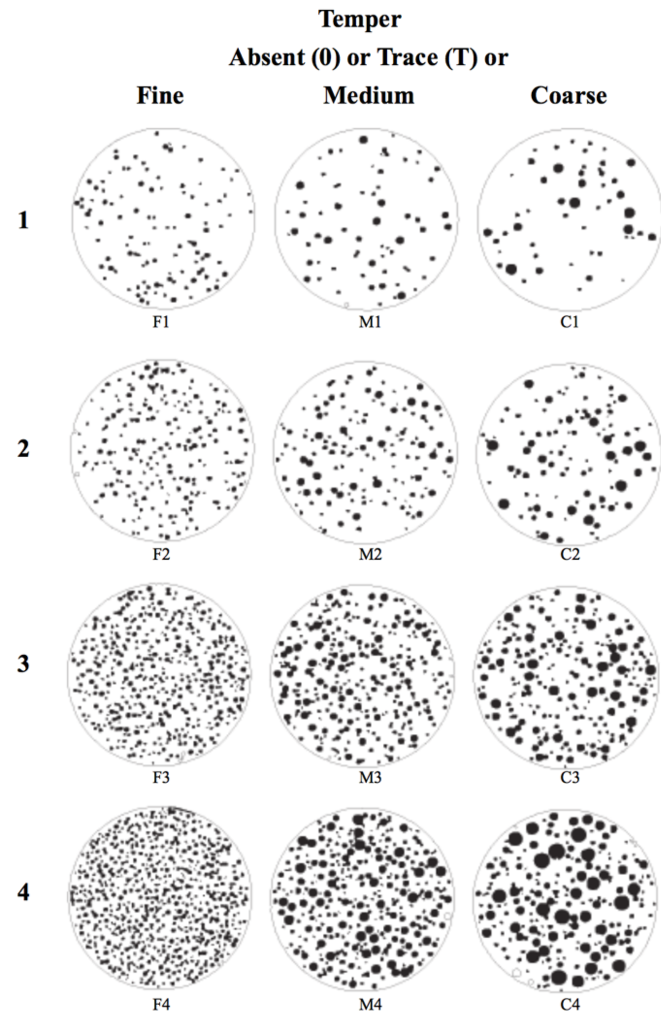
Attribute	Notes
Shoulder Thickness (mm)	Thickness of the shoulder measured using calipers.
Base Thickness	Thickness of the base measured using calipers.
Base Form	Is base flat or round?
Handle/Appendage Type	For sherds that have handles or appendages, record the type.
Location of Appendage	Location of handles or appendages. Record NA if you cannot tell.
Handle Thickness	Thickness of handle measured with calipers.
Handle Size	Length of handle measured using calipers.
Decoration Type	Record the type of decoration present. Can record multiple values.
Decoration Location	Location of decoration on vessel. Can record multiple values.
Decorative Intent (Punctated or Incised/Trailed)	Record the overall decorative intent. These were derived from Freeman and Buck (1960). If unable to tell, record NA.
Decoration Configuration	For those vessels that have incised/trailed AND punctates, record the configuration of the design.
Slip Color	The color of the slip. If no slip, record NA.

Attribute	Notes
Punctation Exterior Shape	The shape of the punctation exterior. If no punctation, record NA.
Punctation Interior Shape	Use putty to determine the interior shape of the punctation. If unable to tell or no punctation is present, record NA.
Punctation Depth (mm)	The depth of the punctation recorded using the tire tread gauge. If no punctation, record NA.
Punctation Width (mm)	The maximum width of the punctation's exterior measured using calipers. If no punctation, record NA
Incised Interior Shape	Use putty to determine the interior shape of the incised line. If no incised line, record NA.
Incised Line Width (mm)	Record the width of the incised line using calipers. If no incised line, record NA.
Incised Line Depth (mm)	If able, record the depth of the incised line using the tire tread gauge. If no incised line, record NA.
Incised Line Spacing (mm)	If regular, record the spacing between incised lines. If no incised lines, record NA.
Trailed Line Interior Shape	Using putty, record the shape of the interior of the trailed line. If no trailed line, record NA.
Trailed Line Width (mm)	Using calipers, record the width of the trailed line. If no trailed line, record NA.
Trailed Line Spacing (mm)	Using calipers, record the spacing between trailed lines. If no trailed lines, record NA.
Dentate Depth (mm)	With tire tread gauge, measure depth of dentates (if present).


Lip
Rim
Neck
Throat diameter
Rim/neck height
Shoulder
Max diameter
Vessel heig
Shoulder height
Body
Base


95°
Upright 95-85°
72°
Everted or Flaring
<85°
114°
Inverted >95°


Lip Thickness
Mid-rim Thickness
Rim Base Thickness
Shoulder Thickness


Temper
Absent (0) or Trace (T) or
Fine
Medium
Coarse
1
2
3
4
F1
M1
C1
F2
M2
C2
F3
M3
C3
F4
M4
C4

Main Temper

Temper	Code
Shell	1
Grog	2
Sand	3
Grit	4
Bone	5
Charcoal	6
Limestone	7

Additional Temper

Temper	Code
Shell	1
Grog	2
Sand	3
Grit	4
Bone	5
Charcoal	6
Limestone	7

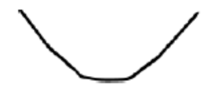
Surface Treatment Exterior/Interior

Treatment	Code
Plain	1
Smoothed	2
Burnished	3
Slipped/Filmed	4
Decorated	5
Brushed	6
Scraped	7
Perforation	8
Polished	9

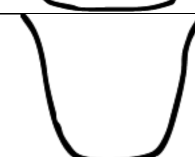
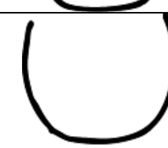
Method of Manufacture

Method	Code
Coil	1
Slab	2
Paddle and Anvil	3
Molded	4

Rim Profile

Profile	Code	Image
Standing	1	
Everted	2	
Inverted	3	

Rim Curvature

Curvature	Code	Image
Straight (no curvature)	1	
Excurvate	2	
Incurvate	3	

Rim Form

Form	Code	Image
Direct	1	
Thinned	2	
Expanding	3	
Collared	4	
Rolled	5	
Flanged	6	

Lip Shape

Form	Code
Flat	1
Round	2

Handle/Appendage Type

Type	Code
Loop	1
Strap	2
Node	3

Handle/Appendage Location

Location	Code
At lip	1
Body	2

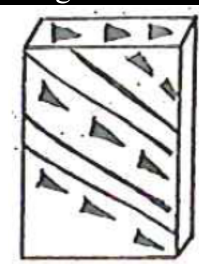
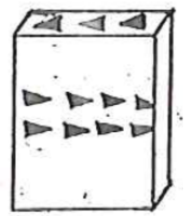
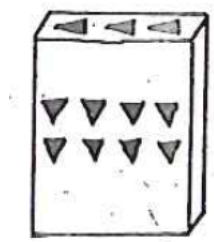
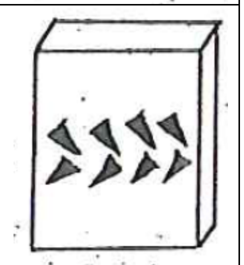
Decoration Type

Type	Code
Incised	1
Engraved	2
Trailed	3
Punctated	4
Pinched	5
Appliqué	6
Fabric Impressed	7
Cord Marked	8
Brushed	9
Dentate Stamped	10
Molded	11
BASKET IMPRESSED	12
Perforated	13

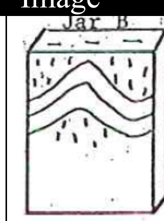
Decoration Location for Incised, Trailed, Punctated, and Appliqué

Location	Code
Rim	1
Body	2
Lip	3
Base	4
Shoulder	5
HANDLE	6
ALL	7

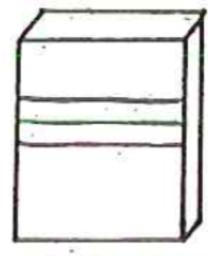
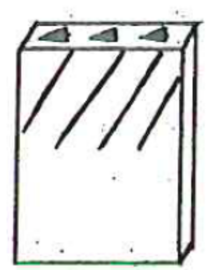
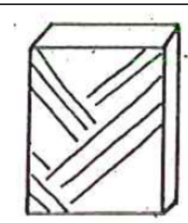
Decorative Intent for Punctated

Intent	Code	Image
Diagonally opposed	1	
Long Axis Horizontal (parallel lines)	2	
Long Axis Vertical (parallel lines)	3	
Chevron Motif	4	

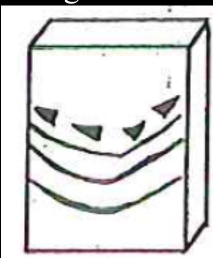
Decorative Intent for Punctated (continued)

Intent	Code	Image
Zoned	5	
Parallel Lines (non-wedge)	6	
SINGLE PUNCTATE	7	

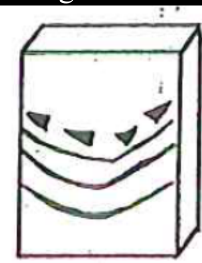
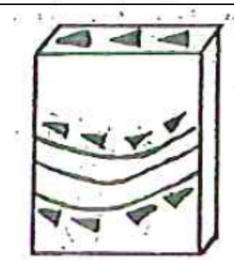
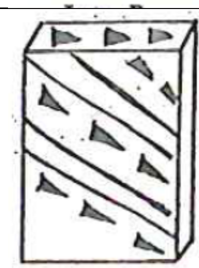
Decorative Intent for Incised/Trailed lines

Intent	Code	Image
Horizontal rows	1	
Diagonal Rows	2	
Chevron	3	
Herringbone	4	

Decorative Intent for Incised/Trailed lines (continued)

Intent	Code	Image
Parabolic	5	
SIDEWAYS ARROWS	6	>>>>>>>>>
X DESIGN	7	X
VERTICAL ROWS	8	
CROSS-HATCHING	9	
VERTICAL ROWS	11	
RECTILINEAR DESIGN (BOXES)	12	
AVERY/CADDO	13	
FESTOON	14	
TEARDROP (ZONED)	15	
CURVILINEAR	16	

Decoration Configuration for Incised AND Punctated Sherds

Intent	Code	Image
Punctates above lines	1	
Punctates below lines	2	
Lines bordered by punctates (above and below)	3	
Punctates between lines	4	

Slip Color

Color	Code
Red	1
Black	2
White	3

Punctation Exterior Shape

Shape	Code
Wedge	1
Fingernail	2
Elliptical	3
Round	4
Slit	5
Lenticular	6
SQUARE/GRASS	7

Punctation Interior Shape

Shape	Code
Raised	1
Flat	2
Parabolic	3
V-Shaped	4

Incised Interior Shape

Shape	Code
Flat	1
Parabolic	2
V-Shaped	3

Trailed Line Interior Shape

Shape	Code
Flat	1
Parabolic	2
V-Shaped	3

APPENDIX B

ADDITIONAL DOCUMENTATION OF CERAMIC CHARACTERIZATIONS

Summary Data for Ceramic Clusters

This appendix presents a series of figures that display the distribution of values for the attributes and variables described above within the clusters defined for each network discussed in Chapter 7. I separate these in the same ways I separated the data to generate those networks, as plain, punctated, and incised.

<u>*Cluster Summaries for Punctated Ceramics*</u>

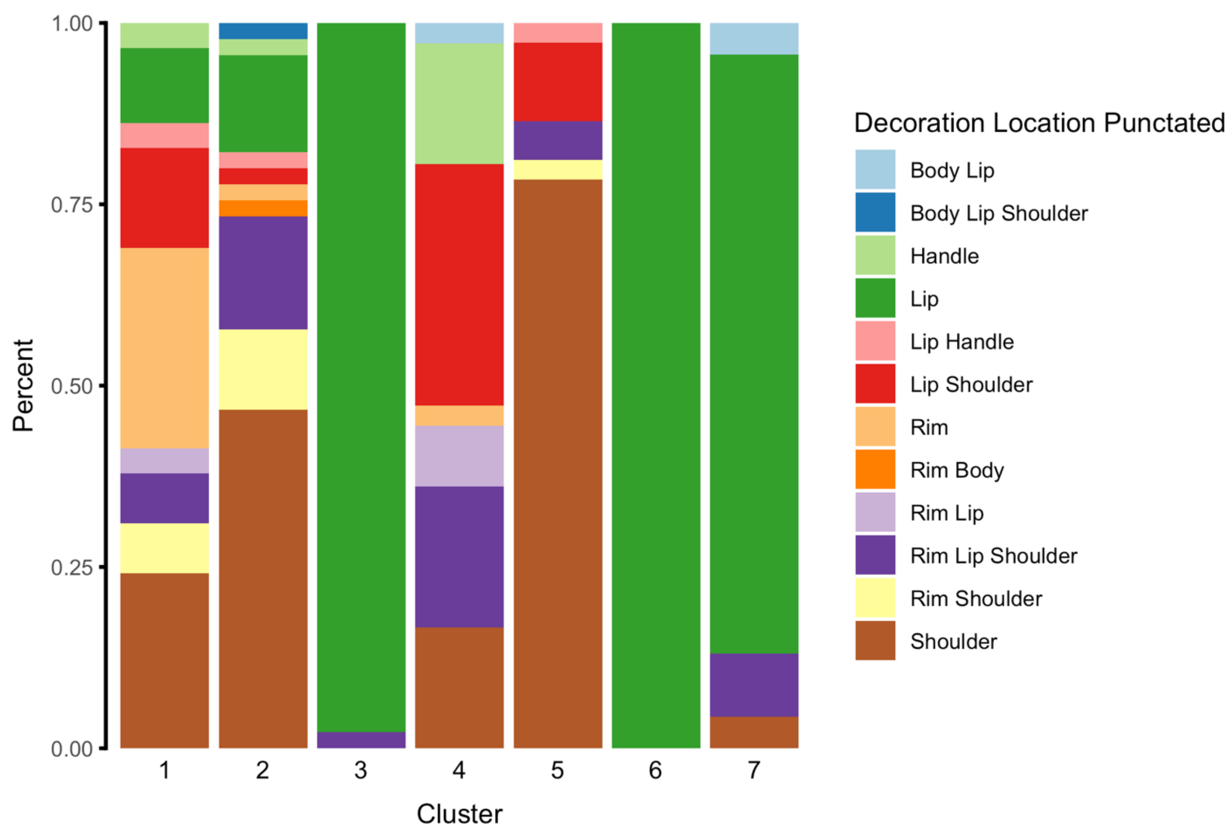


Figure B.1. Decoration Location (Punctated) by Cluster

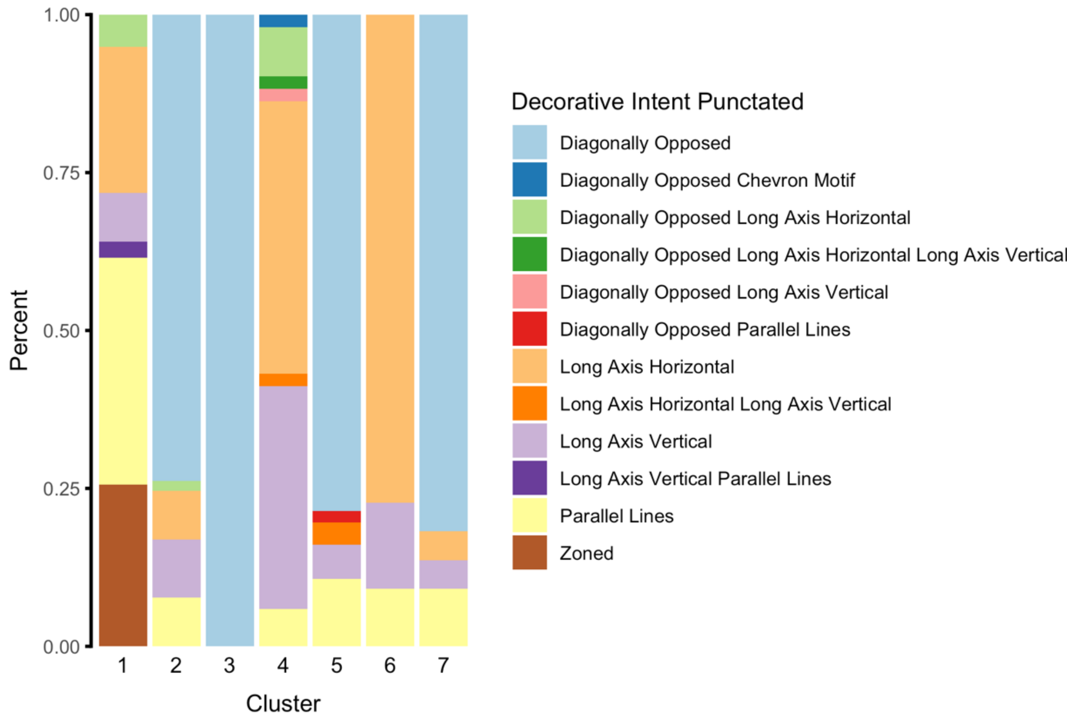


Figure B.2. Decorative Intent (Punctated) by Cluster

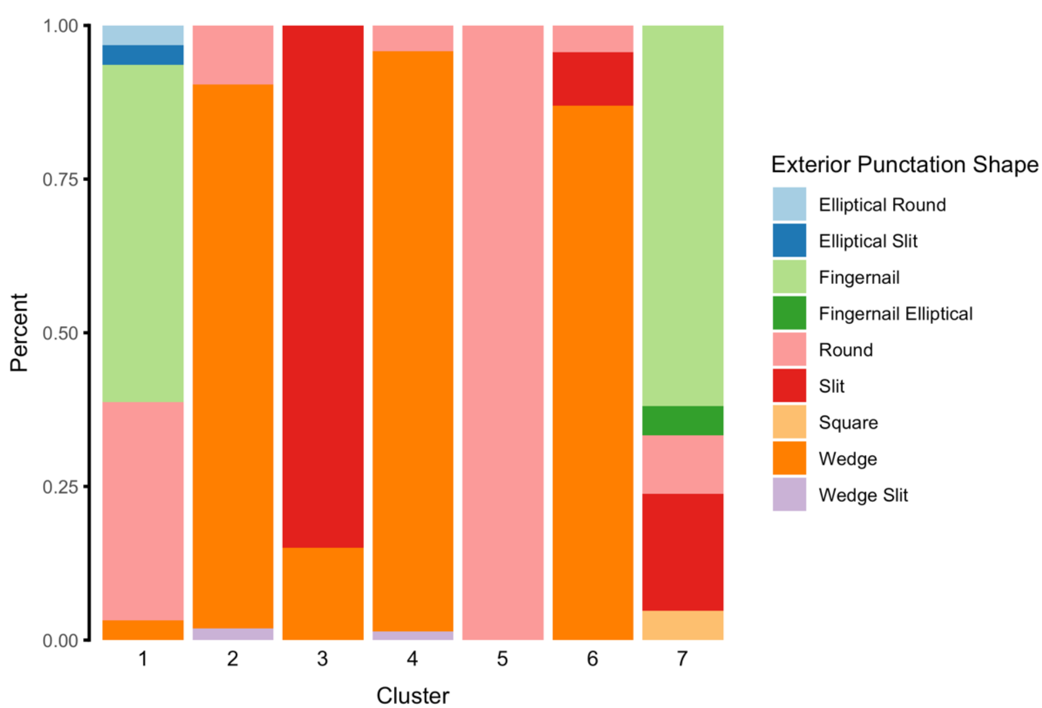


Figure B.3. Punctation Exterior Shape by Cluster

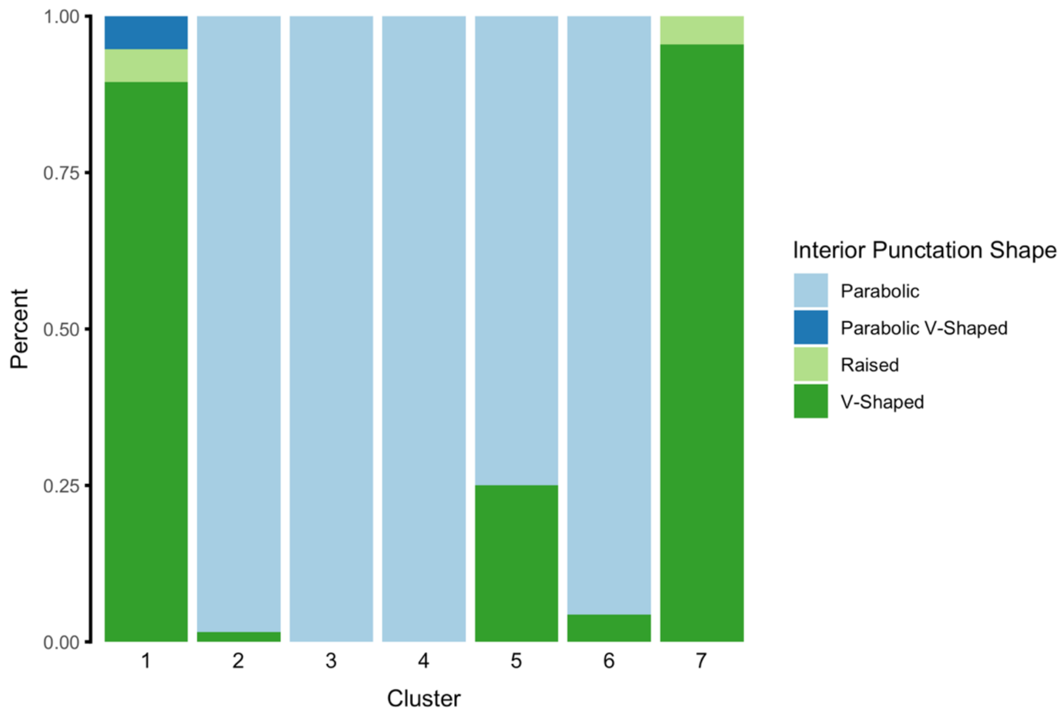


Figure B.4. Punctation Interior Shape by Cluster

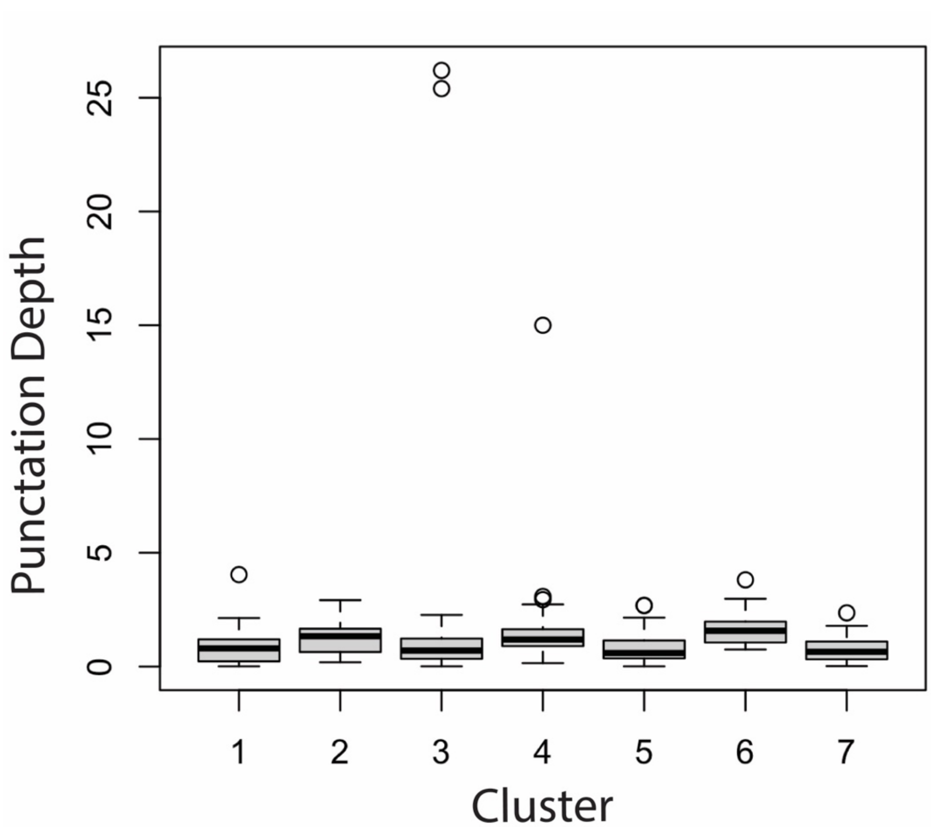


Figure B.5. Punctation Depth by Cluster

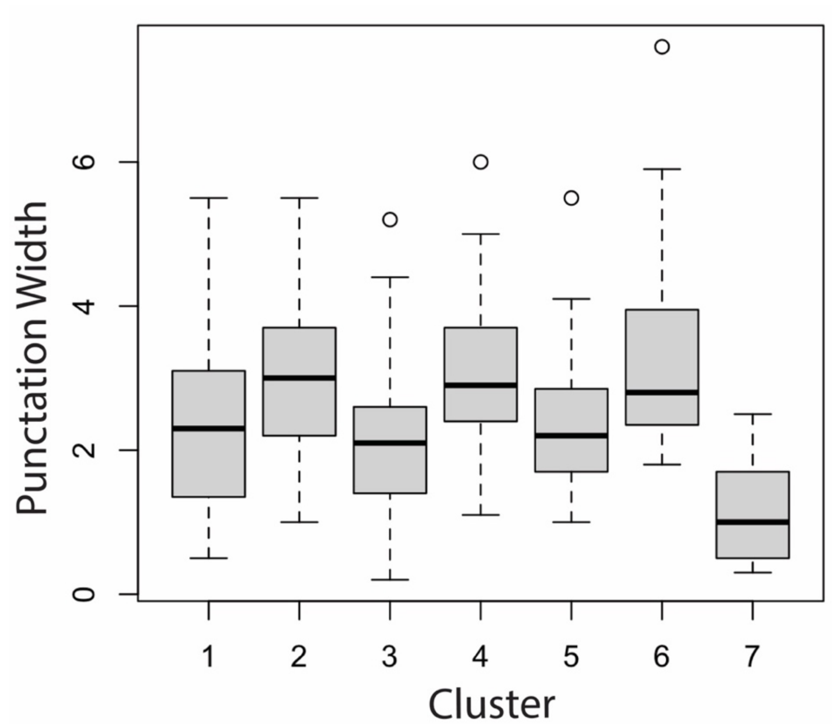


Figure B.6. Punctation Width by Cluster

<u>*Cluster Summaries for Incised Ceramics*</u>

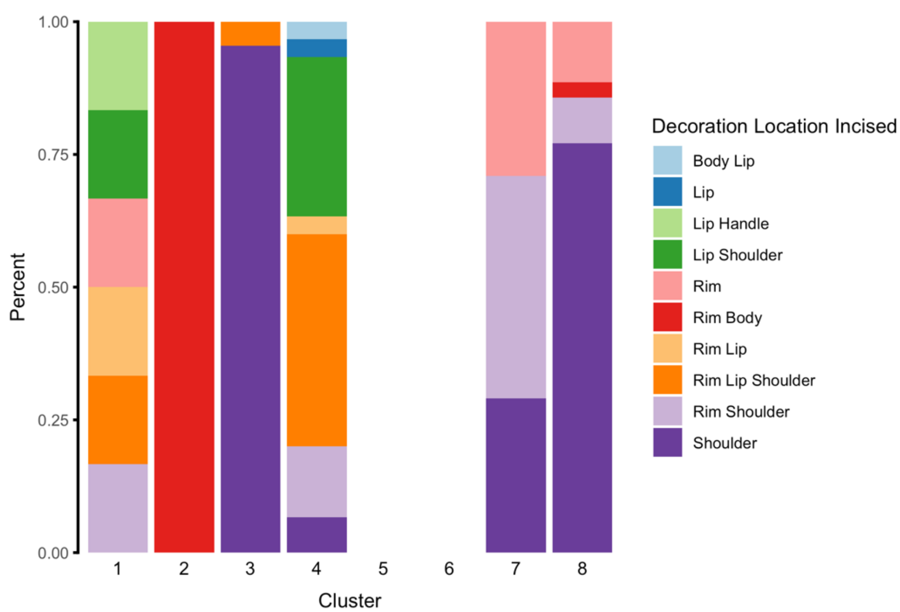


Figure B.7. Decoration Location (Incised) by Cluster

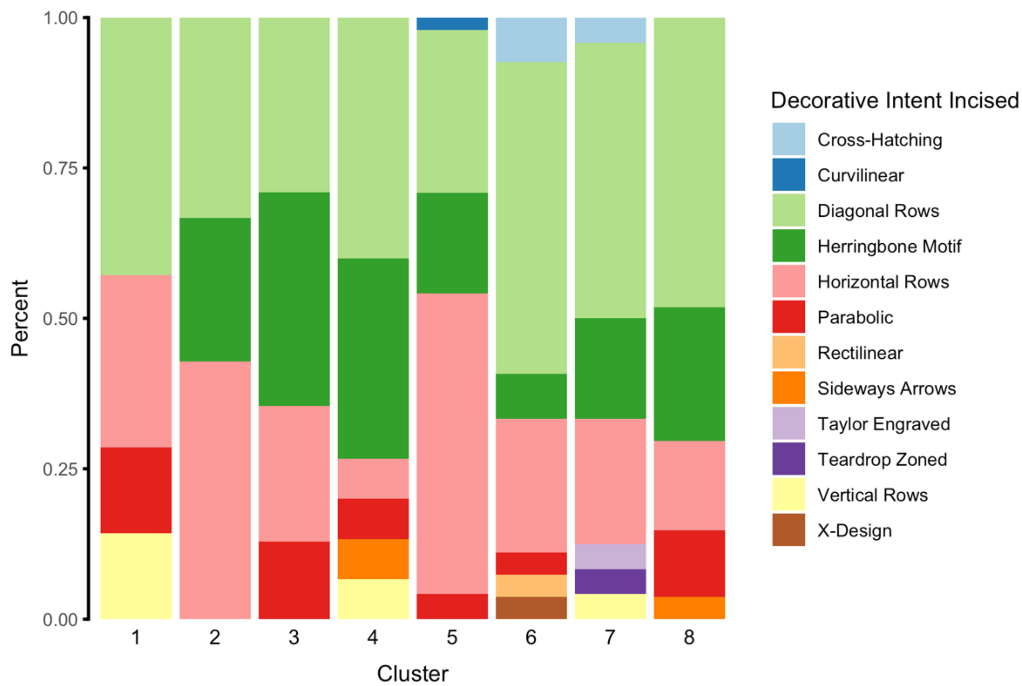


Figure B.8. Decorative Intent (Incised) by Cluster

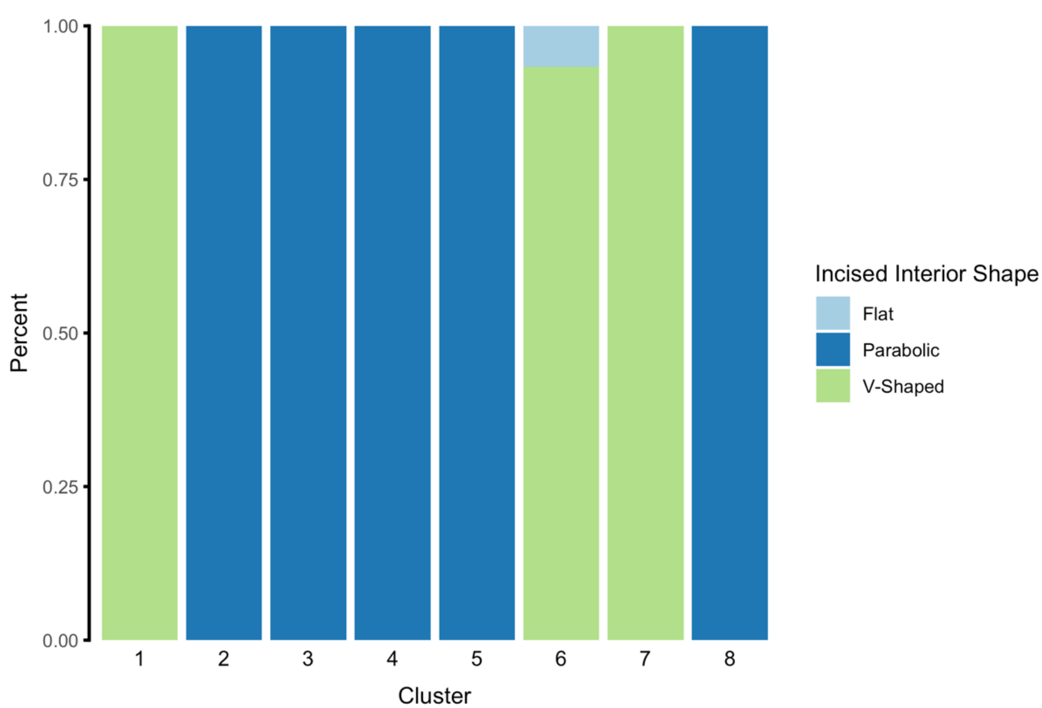


Figure B.9. Incised Interior Shape by Cluster

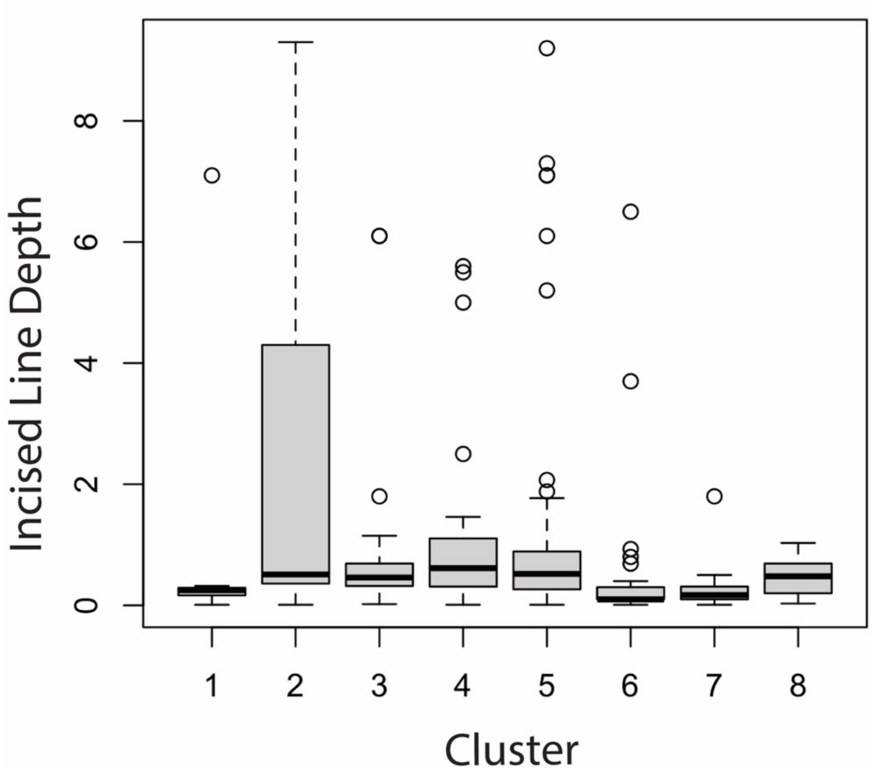


Figure B.10. Incised Line Depth by Cluster

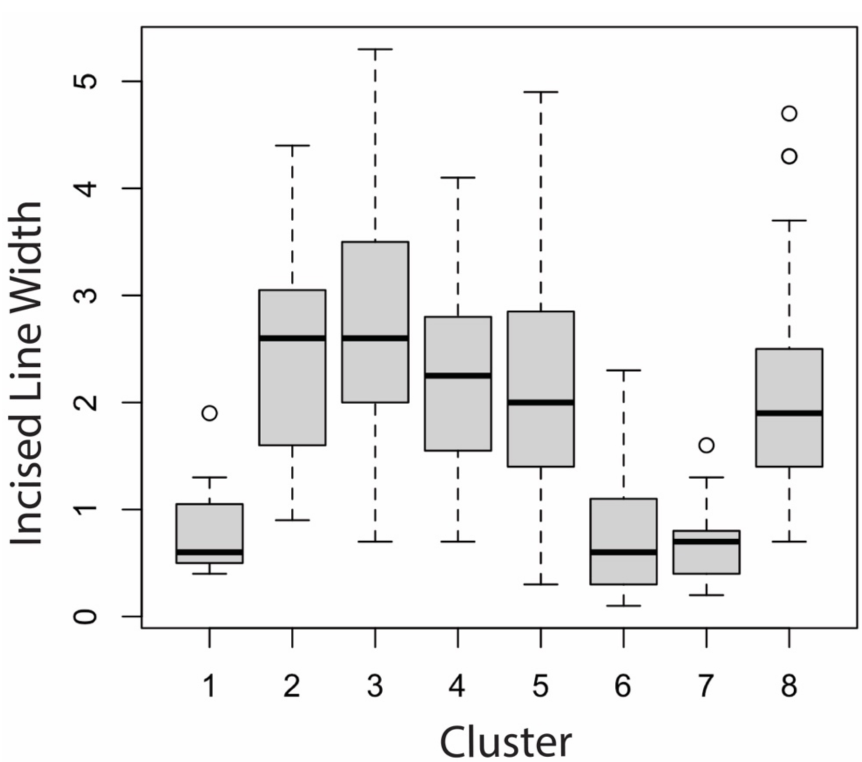


Figure B.11. Incised Line Width by Cluster

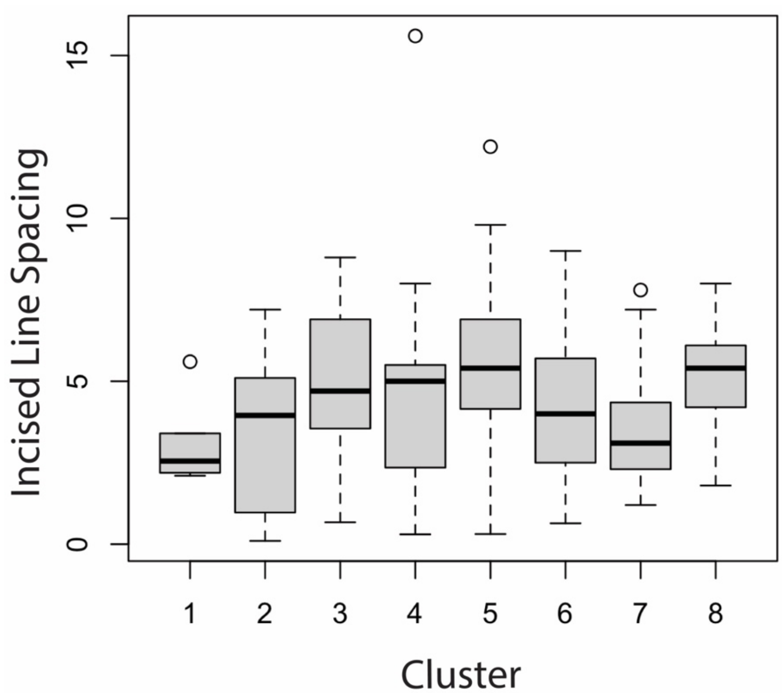


Figure B.12. Incised Line Spacing by Cluster

Cluster Summaries for Plain Ceramics

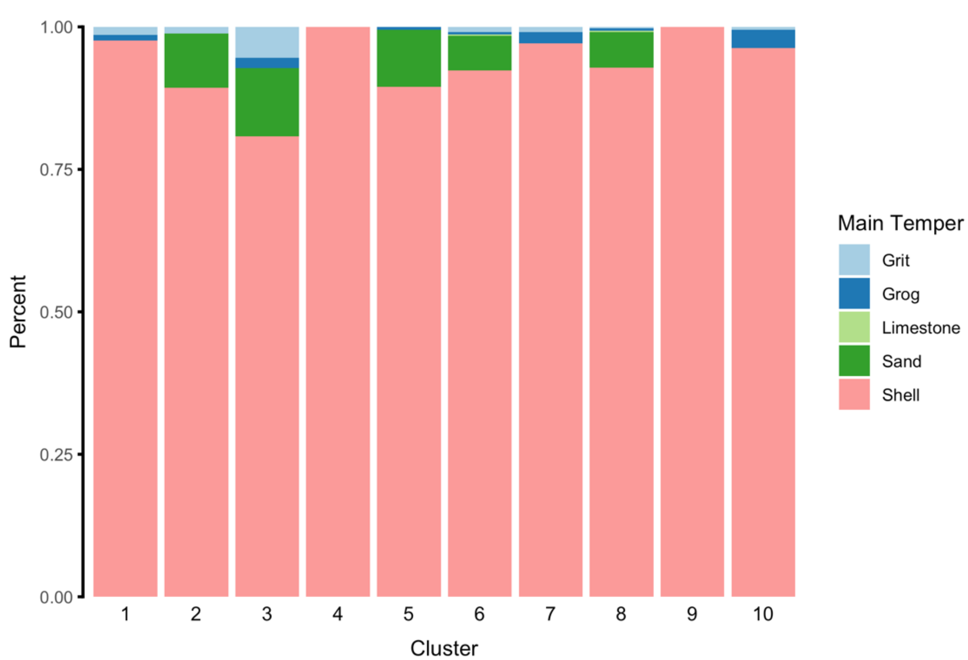


Figure B.13. Main Temper by Cluster

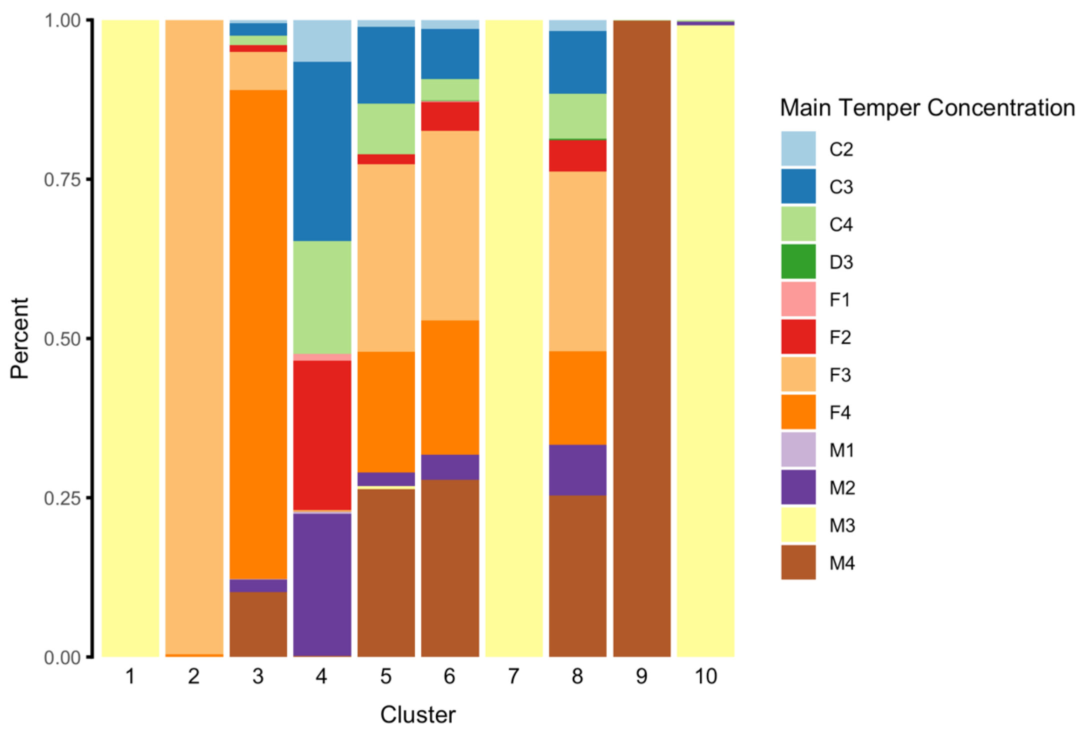


Figure B.14. Main Temper Concentration by Cluster

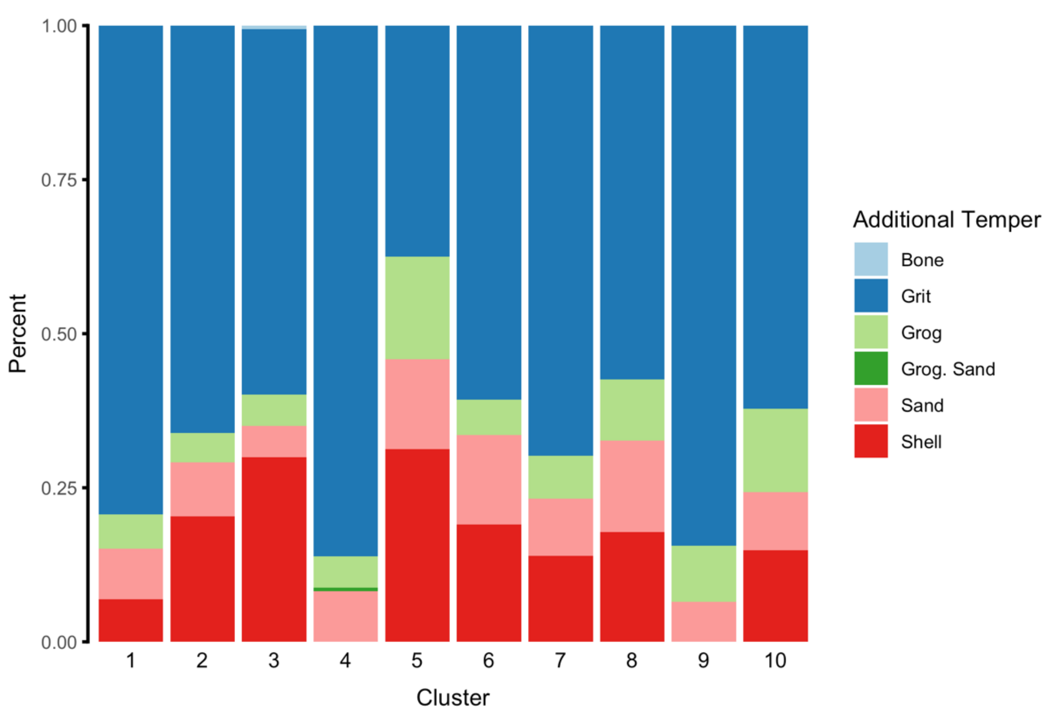


Figure B.15. Additional Temper by Cluster

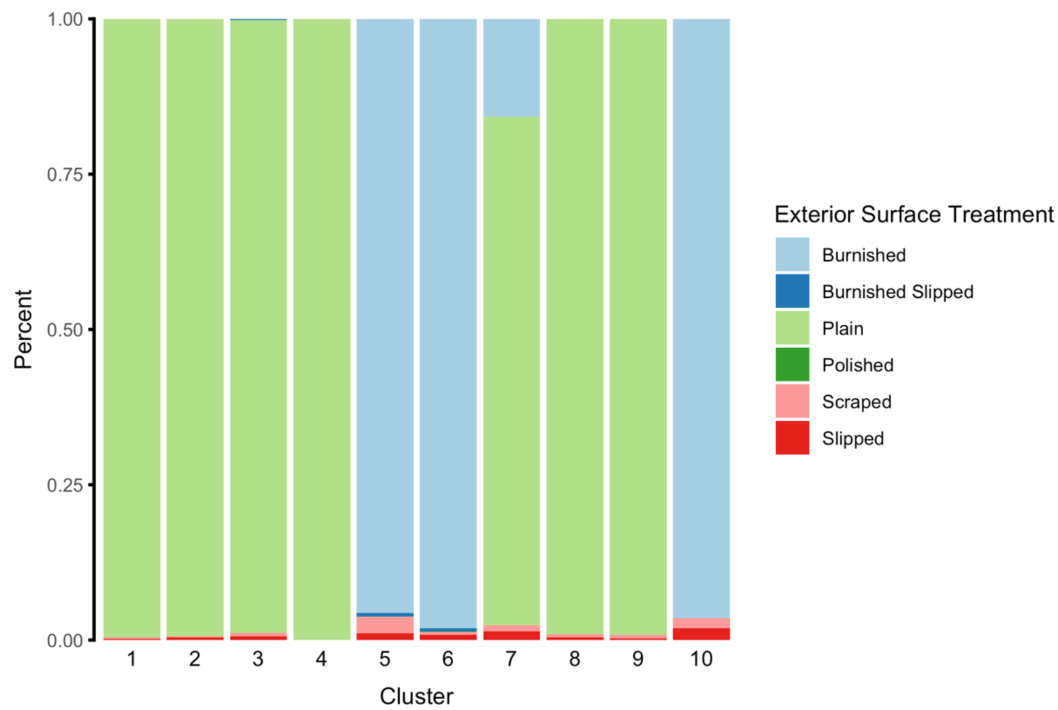


Figure B.16. Exterior Surface Treatment by Cluster

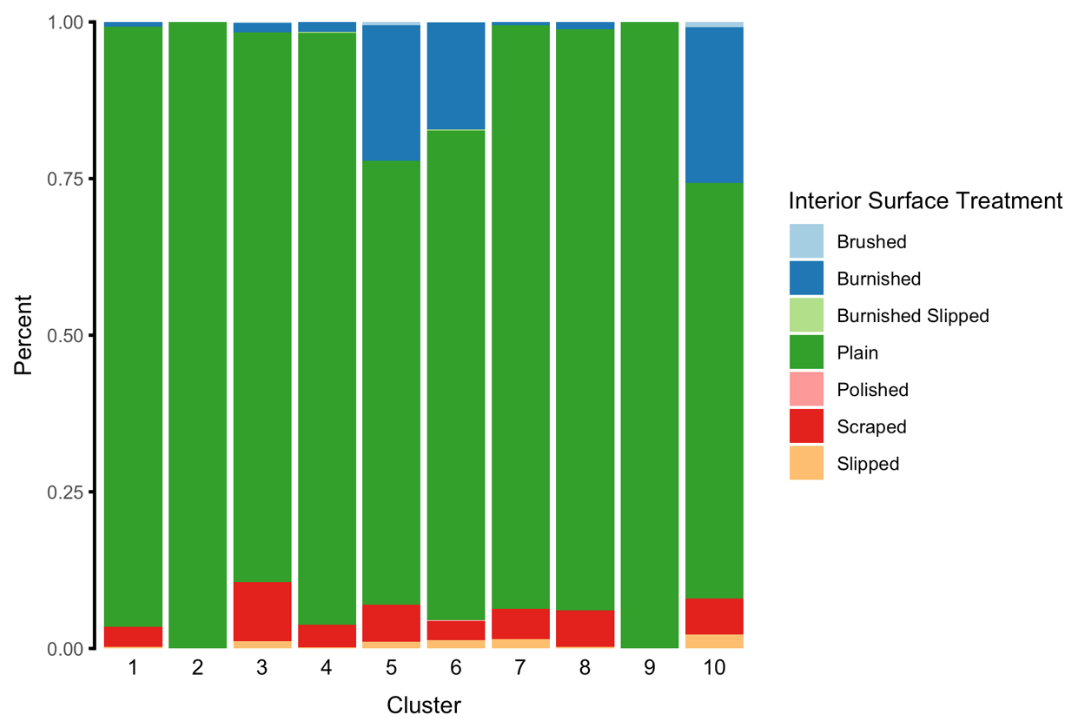


Figure B.17. Interior Surface Treatment by Cluster

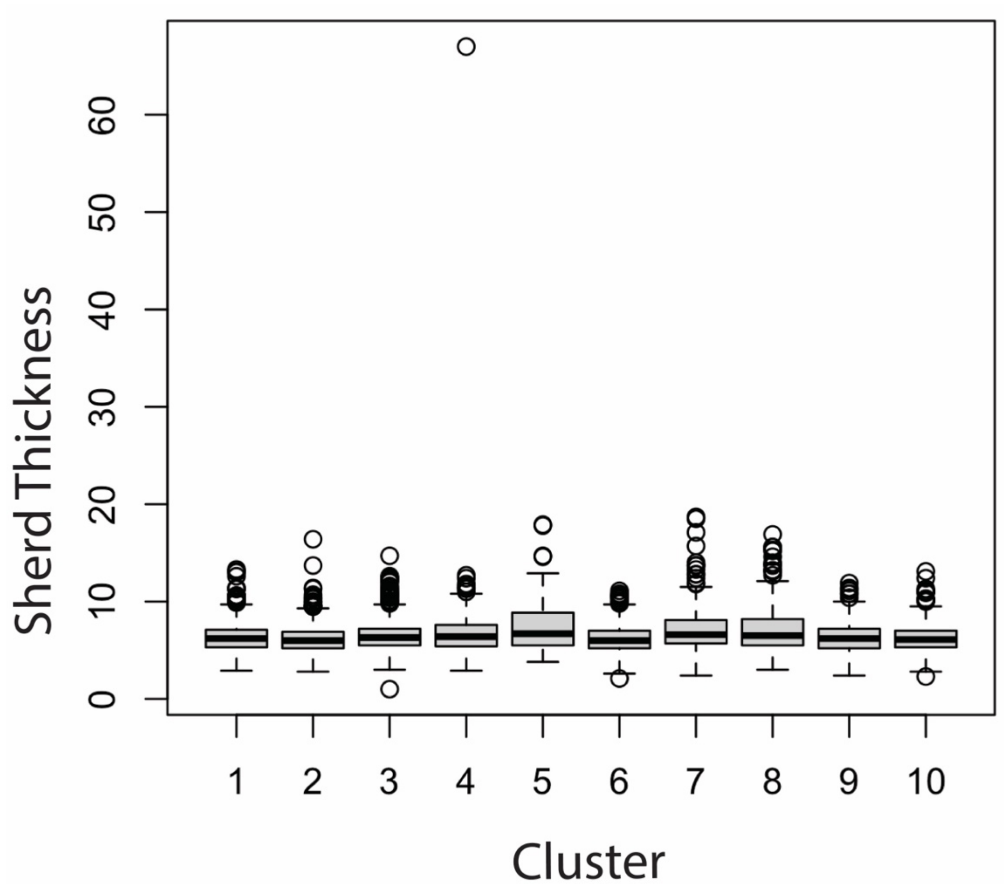


Figure B.18. Thickness by Cluster

APPENDIX C

R CODE FOR NETWORK ANALYSES AND CLUSTER CHARACTERIZATIONS

This appendix includes examples of the R code utilized in the network constructions in Chapter 7 and the cluster characterization analyses presented in Appendix B. The code provided focuses on the punctated examples of each of these operations. All code was run using R version 4.0.4.

R Code for Network Analysis

This code was adapted from code by Peeples (2018a). Modifications include the addition of the function "faster quasieuclid" to aid in the creation of the Euclidean distance matrix with large datasets (modification done by Dr. Patrick Livingood), the addition of a block of code to export BR calculations between phases and export to .csv files, and the addition of a line of code to generate network graphs based on geographic coordinates.

```
#change for relevant file locations
setwd("/Users/paigeford/Desktop/Testing_Decorated/Punctated/")

#This function takes a package name, installs it if not
installed and loads it if it is not loaded
"LoadPackageAndInstallIfNeeded"<-function(loadpackagename){
  if (!require(loadpackagename, character.only = TRUE)) {
    install.packages(loadpackagename, dependencies = TRUE)
    library(loadpackagename, character.only = TRUE)
  }
}

LoadPackageAndInstallIfNeeded("ade4")
LoadPackageAndInstallIfNeeded("cluster")
LoadPackageAndInstallIfNeeded("fpc")
LoadPackageAndInstallIfNeeded("psych")
LoadPackageAndInstallIfNeeded("network")
LoadPackageAndInstallIfNeeded("statnet")
LoadPackageAndInstallIfNeeded("calibrate")
LoadPackageAndInstallIfNeeded("parallelDist")
LoadPackageAndInstallIfNeeded("tnet")
LoadPackageAndInstallIfNeeded("sna")
LoadPackageAndInstallIfNeeded("igraph")
```

```
#Read Data Table of Ceramic Measurements/Attributes and Remove
Site, Phase, and Region Designations
data1<-read.table(file='Punctated_Sherds.csv', sep=',',
header=T)
Site<-as.matrix(data1$Site_Number)
Phase<-as.matrix(data1$Phase)
data1$Site_Number<-NULL
data1$Phase<-NULL

#Convert Characters to Factors
data1[sapply(data1, is.character)] <- lapply(data1[sapply(data1,
is.character)],as.factor)


#CODE TO MAKE FASTER EUCLIDEAN MATRIX
"Fasterquasieuclid" <- function (distmat) {
  #Based on the ade quasieuclid function
  #https://rdrr.io/rforge/ade4/src/R/quasieuclid.R

  #Replaces the use of base dist with parDist from parallelDist
library

  #Requires loading parallelDist library

  if (is.euclid(distmat)) {
    warning("Euclidean distance found : no correction need")
    return(distmat)
  }
  res <- as.matrix(distmat)
  n <- ncol(res)
  delta <- -0.5 * bicenter.wt(res * res)

  #This is still slow.
  eig <- eigen(delta, symmetric = TRUE)
  ncompo <- sum(eig$value > 0)
  tabnew <- eig$vectors[, 1:ncompo] *
rep(sqrt(eig$values[1:ncompo]), rep(n, ncompo))

  #This is the original command
  #res <- dist(tabnew)

  #Replacement command
  res<-parDist(tabnew)

  attributes(res) <- attributes(distmat)
  attr(res, "call") <- match.call()
  return(res)
```

```
}

# CALCULATE GOWER SIMILARITY COEFFICIENTS BETWEEN ALL SAMPLES
AND CONVERT TO DISTANCE MATRIX
ceramic.gow <- as.matrix(daisy(data1, metric="gower", stand=T))
#ceramic.gow.1 <- quasieuclid(as.dist(ceramic.gow))
ceramic.gow.1 <- Fasterquasieuclid(as.dist(ceramic.gow))

# CONDUCT PRINCIPAL COORDINATES ANALYSIS (PCoA) ON GOWER MATRIX
AND DISPLAY SCATTERPLOTS OF FIRST 3 PRINCIPAL AXES - OUTPUT
RESULTS TO CSV FILE
gow.out <- dudi.pco(ceramic.gow.1, scann=F, nf=3)
gow.plot <- gow.out$l1
m <- as.matrix(cbind(Site, Phase, gow.plot))
write.table(m, file="punctates_only.csv", sep=",")
pco.plot <- read.table(file="punctates_only.csv", sep=",",
header=T)
pairs(pco.plot[3:5], main = "Punctated Sherds", cex=0.8, pch =
16, col='blue')

# Z-SCORE STANDARDIZE PRINCIPAL COORDINATES FOR KMEANS ANALYSES
pco.clust <- gow.out$l1
pco.clust <- na.omit(pco.clust)
pco.clust <- scale(pco.clust)

# CALCULATE THE WITHIN GROUPS SUM OF SQUARED ERROR FOR FIRST 15
CLUSTER SOLUTIONS ON PCoA
set.seed(10)
wss <- rnorm(10)
while (prod(wss==sort(wss,decreasing=T))==0) {
  wss <- (nrow(pco.clust)-1)*sum(apply(pco.clust,2,var))
  for (i in 2:15) wss[i] <- sum(kmeans(pco.clust,
centers=i)$withinss)}

# CALCULATE THE WITHIN GROUPS SUM OF SQUARED ERROR FOR FIRST 15
CLUSTER SOLUTIONS ON 250 RANDOMIZED MATRICIES BASED ON PCoA
k.rand <- function(x){
  pco.rand <- matrix(sample(x),dim(x)[1],dim(x)[2])
  rand.wss <- rnorm(10)
  while (prod(rand.wss==sort(rand.wss,decreasing=T))==0) {
    rand.wss <- as.matrix(dim(x)[1]-
1)*sum(apply(pco.rand,2,var))
    for (i in 2:15) rand.wss[i] <- sum(kmeans(pco.rand,
centers=i)$withinss)}
  rand.wss <- as.matrix(rand.wss)
  return(rand.wss)}
rand.mat <- matrix(0,15,250)
for (i in 1:250) {
```

```
  r.mat <- as.matrix(suppressWarnings(k.rand(pco.clust)))
  rand.mat[,i] <- r.mat}

# CALCULATE THE MEAN AND STD DEV OF DIFFERENCE BETWEEN SSE OF
ACTUAL DATA AND 250 RANDOM RUNS
r.sse <- matrix(0,dim(rand.mat)[1],dim(rand.mat)[2])
wss.1 <- as.matrix(wss)
for (i in 1:dim(r.sse)[2]) {
  r.temp <- abs(rand.mat[,i]-wss.1[,1])
  r.sse[,i] <- r.temp}
r.sse.m <- apply(r.sse,1,mean)
r.sse.sd <- apply(r.sse,1,sd)

# PLOT WITHIN GROUPS SUM OF SQUARED ERROR AGAINST THE FIRST 15
CLUSTER SOLUTIONS FOR PCoA AND RANDOMIZED DATA, 1ST LOG SCALE,
2ND NORMAL SCALE
par(ask=TRUE)
plot(1:15, log(wss), type="b", col='blue', xlab="Cluster
Solution", ylab="Log of Within Groups SSE", main="First 15
Cluster Solutions against Log of SSE")
for (i in 1:250) lines(log(rand.mat[,i]),type='l',col='red')
legend('topright',c('PCoA Data', '250 Random Runs'),
col=c('blue', 'red'), lty=1)
par(ask=TRUE)
plot(1:15, wss, type="b", col='blue', xlab="Cluster Solution",
ylab="Within Groups SSE", main="First 15 Cluster Solutions
against SSE")
for (i in 1:250) lines(rand.mat[,i],type='l',col='red')
legend('topright',c('PCoA Data', '250 Random Runs'),
col=c('blue', 'red'), lty=1)

# PLOT DIFFERENCE BETWEEN ACTUAL AND RANDOM SSE AGAINST THE
FIRST 15 CLUSTER SOLUTIONS, 1ST LOG SCALE, 2ND NORMAL SCALE
par(ask=TRUE)
plot(log(r.sse.m), type='b', col='blue', xlab='Cluster
Solution', ylab='Log of SSE - Random SSE', main='Cluster
Solutions against (Log of SSE - Random SSE)')
legend('bottomright',c('SSE - random SSE'), col=c('blue'),
lty=1)
par(ask=TRUE)
plot(r.sse.m, type='b', col='blue', xlab='Cluster Solution',
ylab='SSE - Random SSE', main='Cluster Solutions against (SSE -
Random SSE)')
legend('bottomright',c('SSE - random SSE'), col=c('blue'),
lty=1)

# ASK FOR USER INPUT TO SELECT APPROPRIATE CLUSTER SOLUTION
```

```
choose.clust <- function(){readline("What clustering solution
would you like to use? ")}
clust.level <- as.integer(choose.clust())
# to match published results run the next line
clust.level <- 7

# APPLY K-MEANS CLUSTER SOLUTION - APPEND CLUSTERS TO CSV FILE
fit <- pam(pco.clust, clust.level)
aggregate(pco.clust, by=list(fit$cluster), FUN=mean)
clust.out <- fit$cluster
kclust <- as.matrix(cbind(clust.out, m))
write.table(kclust, file="punctates_only_ceramic_out.csv",
sep=",")

# DISPLAY SCATTERPLOTS OF PCoA COLOR CODED BY K-MEANS CLUSTER
pco.plot = read.table(file="punctates_only_ceramic_out.csv",
sep=",", header=T)
tiff("1_PunctatedSherdsClusterPCoA", units="in", width=5,
height=5, res=300)
pairs(pco.plot[4:6], main = "Punctates Only: Color by K-Means
Cluster", pch = 16, cex=0.8, col =
rainbow(clust.level)[unclass(pco.plot$clust.out)])
dev.off()

# DISPLAY BAR PLOT OF CLUSTERS BY SUB-REGION - OUTPUT TO CSV
FILE
par(ask=TRUE)
b.plot <- table(clust.out, Phase)
b.plot.mat <- as.matrix(b.plot)
b.plot.per <- prop.table(b.plot.mat, margin=2)*100
tiff("1_PunctatedClustersbyPhase", units="in", width=5,
height=5, res=300)
barplot(b.plot.per, main="Punctated Ceramic Clusters by Phase",
ylim=c(0,100), ylab="Percent", beside=TRUE, cex.names=0.5,
col=rainbow(clust.level))
write.table(b.plot.per, file="punctated_only_phase_per.csv",
sep=",")
dev.off()

# INITIALIZE FUNCTION FOR CALCULATING BRAINERD-ROBINSON (BR)
SIMILARITY COEFFICIENTS
BR <- function(x) {
  rd <- dim(x)[1]
  results <- matrix(0,rd,rd)
  for (s1 in 1:rd) {
    for (s2 in 1:rd) {
      x1Temp <- as.numeric(x[s1, ])
      x2Temp <- as.numeric(x[s2, ])
```

```
      br.temp <- 0
      results[s1,s2] <- 200 - (sum(abs(x1Temp - x2Temp)))}}
  row.names(results) <- row.names(x)
  colnames(results) <- row.names(x)
  return(results)}

# INITIALIZE FUNCTION FOR REMOVING THE DIAGONALS OF SIMILARITY
MATRIX
diag.rem <- function(x) {
  n <- dim(x)[1]
  as.numeric(x)[(1:n^2)%%(n+1)!=1]}

# INITIALIZE FUNCTION FOR CALCULATING BR COEFFICIENTS ON DATA
RANDOMIZED BY CLUSTER FREQUENCY
rand.BR <- function(x) {
  br.out <- NULL
  for (i in 1:100) {
    rand.br <- apply(x,2,sample)
    rand.per <- prop.table(rand.br,1)*100
    br.temp <- BR(rand.per)
    br.out <- c(br.out,diag.rem(br.temp))}
  return(br.out)}

# CONDUCT BR CALCULATIONS BETWEEN ALL SITES - OUTPUT TO CSV FILE
d.plot <- table(clust.out, Site)
d.plot.mat <- as.matrix(d.plot)
d.plot.per <- prop.table(d.plot.mat, margin=2)*100
st.br <- t(d.plot.per)
st.br.1 <- BR(st.br)
st.hist <- diag.rem(st.br.1)
st.ct.br <- t(d.plot)
st.ct.br.1 <- rand.BR(st.ct.br)
write.table(st.br.1, file="7_PunctatedOnly_BR_Values.csv",
sep=",")

#Conduct BR Calculations Between Phase - Output to CSV File
p.plot <- table(clust.out, Phase)
p.plot.mat <- as.matrix(p.plot)
p.plot.per <- prop.table(p.plot.mat, margin=2)*100
p.st.br <- t(p.plot.per)
p.st.br.1 <- BR(p.st.br)
p.st.hist <- diag.rem(p.st.br.1)
p.st.ct.br <- t(p.plot)
p.st.ct.br.1 <- rand.BR(p.st.ct.br)
write.table(p.st.br.1,
file="7_PunctatedOnly_BR_Values_byPhase.csv", sep=",")
```

```
# DISPLAY HISTOGRAMS OF BR COEFFICIENTS BETWEEN SITES AND FOR
RANDOMIZED DATA
par(ask=TRUE)
hist(st.ct.br.1, freq=F, ylim=c(0,0.0175), xlim=c(0,200),
main='Brainerd-Robinson Coefficients by Site', xlab='BR
COEFFICIENTS', col=rgb(0,0,1,0.2))
hist(st.hist, add=T, freq=F, xlim=c(0,200), col=rgb(1,0,1,0.2))
st.ct.br.1<-na.omit(st.ct.br.1)
lines(density(st.ct.br.1), col='blue')
lines(density(st.hist), col='red')
abline(v=(mean(st.ct.br.1)), col='darkblue', lwd=2)
abline(v=(mean(st.ct.br.1)+sd(st.ct.br.1)), col='darkblue',
lty=6, lwd=2)
abline(v=(mean(st.ct.br.1)+(2*sd(st.ct.br.1))), col='darkblue',
lty=6, lwd=2)
legend('topleft',c('Randomized BR', 'Actual BR'), col=c('blue',
'red'), lty=1)

# Below is Peeples Code for Constructing Networks
# ASK FOR USER INPUT TO SELECT CUTOFF FOR NETWORK CONNECTIONS
choose.cut <- function(){readline("How many SD above mean will
define cutoff? (between 0.1-2) : ")}
cutoff <- as.numeric(choose.cut())
# to replicate published results run the next line
cutoff <- 1

# SET UP NETWORKS BY SITE using SD cutoff established above
st.temp <-
event2dichot(st.br.1,method='absolute',thresh=(mean(st.ct.br.1)+
(cutoff*sd(st.ct.br.1))))
rownames(st.temp) <- rownames(st.br.1)
colnames(st.temp) <- colnames(st.br.1)
write.table(st.temp,file='PunctatesOnly_st_netw_4.csv', sep=',')
st.net <- network(st.temp,directed=F) #set up network to be
plotted below
col.st <- c(3,3,6,6,6,5,6,6,6,6,6,6,6,8,8,6,6,7) #node color
object

#below lines for centrality
Adjacency<-graph_from_adjacency_matrix(st.temp)
deg.st  <- degree(Adjacency)
bet.st <-betweenness(Adjacency)

#Import site coordinate data
sitecoords<-
read.csv('sitecoordspunctated_latlong.csv',row.names=1)

# PLOT NETWORK DIAGRAM BY SITE
```

```
par(ask=TRUE)
tiff("1_PunctatedSherdsNetworkClustered", units="in", width=5,
height=5, res=300)
plot(st.net,main='Punctated Ceramics by Site',xlab='relative
node size = relative degree centrality',
vertex.cex=deg.st*0.2,vertex.col=col.st,displaylabels=T,

label.cex=0.4,boxed.labels=F,edge.lwd=0.1,displayisolates=T,edge
.col='gray',label.pos=4)
dev.off()

# PLOT NETWORK DIAGRAM BY SITE WITH GEOGRAPHIC COORDINATES
par(ask=TRUE)
tiff("1_PunctatedSherdsNetworkCoordinates", units="in", width=5,
height=5, res=300)
plot(st.net,main='Punctated Ceramics by Site',xlab='relative
node size = relative degree centrality', vertex.cex=deg.st*0.2,
vertex.col=col.st,displaylabels=T,

label.cex=0.4,boxed.labels=F,edge.lwd=0.1,coord=sitecoords[,1:2]
,displayisolates=T,edge.col='gray',label.pos=4)
dev.off()
```

R Code for Cluster Characterization

This code was provided by Dr. Matthew Peeples to investigate the cluster solutions and their characterizations. Modifications include the use of ggplot functions to generate the graphics (modification done by Dr. Patrick Livingood).

```
#change for relevant file locations
setwd("/Users/paigeford/Desktop/Investigate_Clusters/Punctated_C
luster7/")

res <- read.csv('7_Punctated_Sherds.csv',row.names=1)

#This function takes a package name, installs it if not
installed and loads it if it is not loaded
"LoadPackageAndInstallIfNeeded"<-function(loadpackagename){
  if (!require(loadpackagename, character.only = TRUE)) {
    install.packages(loadpackagename, dependencies = TRUE)
    library(loadpackagename, character.only = TRUE)
  }
}
```

```
LoadPackageAndInstallIfNeeded("ggplot2")
LoadPackageAndInstallIfNeeded("ggthemes")
LoadPackageAndInstallIfNeeded("RColorBrewer")
LoadPackageAndInstallIfNeeded("ggprism")

#EXTERIOR PUNCTATE SHAPE
Punct.Ext.Shape <- as.matrix(table(res[,c(1,6)])) ## create a
table of cluster assignment by punctation exterior shape (column
6 in this case)
Punct.Ext.Shape <- Punct.Ext.Shape[,-1] ## remove the column for
NA or missing data if necessary
Punct.Ext.Shape.p <- prop.table(Punct.Ext.Shape,1)*100 ##
convert to percent

data<-data.frame(t(Punct.Ext.Shape.p))


my.theme <- theme_light() #Start with light theme
my.theme <- my.theme + theme(panel.border=element_blank(),
#remove unwanted elements
                             axis.line = element_line(),
                             axis.line.x=element_blank(),
                             axis.ticks.x=element_blank(),
                             panel.background=element_blank(),
                             panel.grid.major=element_blank(),
                             panel.grid.minor=element_blank(),
                             axis.ticks =
element_line(colour='black'),

axis.text.x=element_text(vjust=8,size=10,colour='black'), #vjust
here moves cluster numbers up, closer to bar. Might need to
adjust
                             axis.title.x=element_text(vjust=5),
#Moves x axis label closer
                             axis.title.y=element_text(vjust=2),
#Moves y axis label further
                             axis.ticks.y =
element_line(size=.75), #Sets size of axis line and ticks
                             axis.line.y =
element_line(size=.75,lineend="square"),
)
ggplot(data,aes(fill=Punctation_Exterior_Shape,y=Freq,x=clust.ou
t))+
  geom_bar(position="fill",stat="identity")+
  xlab("Cluster")+
  ylab("Percent")+
  labs(fill="Exterior Punctation Shape")+
```

```
  scale_fill_brewer(palette = "Paired") + #Uses ColorBrewer
palate, and chooses Paired colors
  my.theme +
  scale_y_continuous(guide = "prism_offset")
ggsave("PunctationExteriorShape.tif", device="tiff",scale=1,
units="in", width=7, height=5, dpi=300)

#INTERIOR PUNCTATE SHAPE
Punct.Int.Shape <- as.matrix(table(res[,c(1,7)])) ## create a
table of cluster assignment by punctation interior shape (column
7 in this case)
Punct.Int.Shape <- Punct.Int.Shape[,-1] ## remove the column for
NA or missing data if necessary
Punct.Int.Shape.p <- prop.table(Punct.Int.Shape,1)*100 ##
convert to percent

data<-data.frame(t(Punct.Int.Shape.p))

my.theme <- theme_light() #Start with light theme
my.theme <- my.theme + theme(panel.border=element_blank(),
#remove unwanted elements
                             axis.line = element_line(),
                             axis.line.x=element_blank(),
                             axis.ticks.x=element_blank(),
                             panel.background=element_blank(),
                             panel.grid.major=element_blank(),
                             panel.grid.minor=element_blank(),
                             axis.ticks =
element_line(colour='black'),

axis.text.x=element_text(vjust=8,size=10,colour='black'), #vjust
here moves cluster numbers up, closer to bar. Might need to
adjust
                             axis.title.x=element_text(vjust=5),
#Moves x axis label closer
                             axis.title.y=element_text(vjust=2),
#Moves y axis label further
                             axis.ticks.y =
element_line(size=.75), #Sets size of axis line and ticks
                             axis.line.y =
element_line(size=.75,lineend="square"),
)
ggplot(data,aes(fill=Punctation_Interior_Shape,y=Freq,x=clust.ou
t))+
  geom_bar(position="fill",stat="identity")+
  xlab("Cluster")+
  ylab("Percent")+
  labs(fill="Interior Punctation Shape")+
```

```
  scale_fill_brewer(palette = "Paired") + #Uses ColorBrewer
palate, and chooses Paired colors
  my.theme +
  scale_y_continuous(guide = "prism_offset")
ggsave("PunctationInteriorShape.tif", device="tiff",scale=1,
units="in", width=7, height=5, dpi=300)

#DECORATIVE INTENT
Deco.Intent <- as.matrix(table(res[,c(1,5)])) ## create a table
of cluster assignment by decorative intent (column 5 in this
case)
Deco.Intent <- Deco.Intent[,-1] ## remove the column for NA or
missing data if necessary
Deco.Intent.p <- prop.table(Deco.Intent,1)*100 ## convert to
percent

data<-data.frame(t(Deco.Intent.p))

my.theme <- theme_light() #Start with light theme
my.theme <- my.theme + theme(panel.border=element_blank(),
#remove unwanted elements
                             axis.line = element_line(),
                             axis.line.x=element_blank(),
                             axis.ticks.x=element_blank(),
                             panel.background=element_blank(),
                             panel.grid.major=element_blank(),
                             panel.grid.minor=element_blank(),
                             axis.ticks =
element_line(colour='black'),

axis.text.x=element_text(vjust=8,size=10,colour='black'), #vjust
here moves cluster numbers up, closer to bar. Might need to
adjust
                             axis.title.x=element_text(vjust=5),
#Moves x axis label closer
                             axis.title.y=element_text(vjust=2),
#Moves y axis label further
                             axis.ticks.y =
element_line(size=.75), #Sets size of axis line and ticks
                             axis.line.y =
element_line(size=.75,lineend="square"),
)
ggplot(data,aes(fill=Decorative_Intent_Punctated,y=Freq,x=clust.
out))+
  geom_bar(position="fill",stat="identity")+
  xlab("Cluster")+
  ylab("Percent")+
  labs(fill="Decorative Intent Punctated")+
```

```
  scale_fill_brewer(palette = "Paired") + #Uses ColorBrewer
palate, and chooses Paired colors
  my.theme +
  scale_y_continuous(guide = "prism_offset")
ggsave("DecorativeIntentPunctated.tif", device="tiff",scale=1,
units="in", width=7, height=5, dpi=300)

#DECORATION LOCATION
Deco.Location <- as.matrix(table(res[,c(1,4)])) ## create a
table of cluster assignment by decoration location (column 4 in
this case)
Deco.Location <- Deco.Location[,-1] ## remove the column for NA
or missing data if necessary
Deco.Location.p <- prop.table(Deco.Location,1)*100 ## convert to
percent

data<-data.frame(t(Deco.Location.p))

my.theme <- theme_light() #Start with light theme
my.theme <- my.theme + theme(panel.border=element_blank(),
#remove unwanted elements
                             axis.line = element_line(),
                             axis.line.x=element_blank(),
                             axis.ticks.x=element_blank(),
                             panel.background=element_blank(),
                             panel.grid.major=element_blank(),
                             panel.grid.minor=element_blank(),
                             axis.ticks =
element_line(colour='black'),

axis.text.x=element_text(vjust=8,size=10,colour='black'), #vjust
here moves cluster numbers up, closer to bar. Might need to
adjust
                             axis.title.x=element_text(vjust=5),
#Moves x axis label closer
                             axis.title.y=element_text(vjust=2),
#Moves y axis label further
                             axis.ticks.y =
element_line(size=.75), #Sets size of axis line and ticks
                             axis.line.y =
element_line(size=.75,lineend="square"),
)
ggplot(data,aes(fill=Decoration_Location,y=Freq,x=clust.out))+
  geom_bar(position="fill",stat="identity")+
  xlab("Cluster")+
  ylab("Percent")+
  labs(fill="Decoration Location Punctated")+
```

```
  scale_fill_brewer(palette = "Paired") + #Uses ColorBrewer
palate, and chooses Paired colors
  my.theme +
  scale_y_continuous(guide = "prism_offset")
ggsave("DecorationLocationPunctated.tif", device="tiff",scale=1,
units="in", width=7, height=5, dpi=300)

## For continuous variables

tiff("PunctationDepth", units="in", width=5, height=5, res=300)
boxplot(res$Punctation_Depth~res$clust.out) #by Punctation Depth
dev.off()

tiff("PunctationWidth", units="in", width=5, height=5, res=300)
boxplot(res$Punctation_Width~res$clust.out) #by Punctation Width
dev.off()
```