New Approaches to Understanding Cultural Continuity in the Great Plains

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Dissertation submitted in partial fulfillment of the requirements for the degree of MA in Archaeology

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INSTITUTE OF ARCHAEOLOGY

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Abstract

Cultural continuity has long been hypothesized to occur between many of the Great Plains tribes. As developed by culture-historians, this concept was primarily based upon ethnographic data from the early twentieth century. These ideas of continuity between Plains tribes have persisted in processual explanations, which typically view all Plains tribes as responding very similarly to ecological pressures, regardless of cultural differences. The reality of the Plains is that cultural and ecological similarities are not adequately represented by the ethnographic, ecological, and archaeological data. Identification of similarities and differences in the ethnographic and archaeological data will be done using evolutionary approaches, which examine culture as an inheritance system. Correspondence analysis and cladistic classification will form the base methods for these approaches, with the goal of specific conclusions concerning cultural similarity and historical lineages. In general, this dissertation will endorse broad notions of a distinct Plains villager cultural tradition as well as the development of the Middle Missouri from a separate cultural lineage.
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Acknowledgments

First and foremost, I would like to thank my parents for all the emotional and financial support they have provided for me to pursue my dreams, without their support none of my work would be possible, and words can’t express how much I thank them. Next, I would like to thank my advisor, Prof. Stephen Shennan for his patience and cooperation through the process of writing this dissertation. His comments and guidance throughout his project were greatly appreciated. In addition to Stephen, a thanks to the wonderful faculty at the Institute of Archaeology and elsewhere, such as Dr. Peter Jordan, Dr. Clare Holden, and Dr. Joseph Tiffany.

A very special thanks also needs to be extended to my wonderful friends and colleagues that have helped me with so many parts of this dissertation. In particular, Thomas Mace for his significant help, Sarah Leonard and Michelle Garceau for the corrections and comments, as well as Michael Charlton, Mads Rasmussen, Della Spiron, Jeremy Simon, and Mellina Hartnett. Last but certainly not least, a huge thanks to my research assistant Cortney Cain, as she has patiently stood by me through this process with unwavering support, as well as any others in which I may have forgotten.
Introduction

The Great Plains of North America is a geographic area of land consisting of roughly twenty-five percent of the United States, and represents the largest cultural area of any Native Americans. While the area is very geographically important in North America, archaeological research into the cultural areas of the Great Plains has been anything but prominent. Great Plains archaeology has rarely discussed overtly theoretical positions, and examples of research are often neglected in broader theoretical debates within American archaeology (Bamforth 1999). However, the research that has been done within the Plains, from cultural historians to modern processualists, has created a strict theoretical precedent by which archaeology in the Plains proceeds.

This precedent is characterized by the presumption of the long-term continuity of Plains tribes, both archaeologically, culturally, and ecologically. Many of the archaeological interpretations of the Great Plains have implicitly assumed the existence of a long-term continuity and homogeneity within the Great Plains. It should be noted here that this perception must be considered with great apprehension. While some cultural areas of the Plains demonstrate a certain degree of continuity, such notions of cultural continuity are quickly dispelled through analysis involving different theoretical models and analytical techniques. The purpose of this dissertation is the examination of the cultural similarities and differences of Plains groups, through the use of both ethnographic evidence and archaeological evidence, to understand cultural change through time. It will become apparent that notions of cultural continuity, as originally developed by cultural historical research, have proliferated throughout Plains archaeology and have constricted modern research of cultural change. New approaches that explicitly
look at cultural similarities and most notably, cultural differences are needed to adequately understand the cultural complexity and diversity present in the Great Plains.

Archaeological and anthropological research on the Great Plains has long promoted the notion of the Plains as a vast wasteland both in terms of people and landscape. Evidence of this thought dominates much of the early literature about the Plains Indians. Many authors (Lowie 1954; Wissler 1931, 1934; Kroeber 1947) often discuss the conception of a Plains Indian cultural complex, the idea that there exists a complex shared by Native Canadians and Americans living in areas from southern Manitoba and Alberta through to the panhandle of Texas, from the Rocky Mountains to the Mississippi. As described by Robert Lowie (1954), such a cultural complex involves many similar characteristics, including the importance of large game hunting, especially with regard to a heavy dependence on the buffalo for all levels of subsistence. These groups are typically classified as nomadic hunter-gatherers who followed the herds of buffalo, following a macro-band, micro-band pattern over the seasons. Characteristics also include a quick and vital reliance on the horse after its introduction to the Great Plains, an animal that was adopted successfully because it greatly increased the mobility of the groups across the entirety of the Plains. These inadequate generalizations of Plains Indians culture have led to the development of a cultural image of the Great Plains that still forms the basis of archaeological interpretations.

_Cultural Images of the Great Plains Indians_

The previously described image of the Great Plains Indian was implicitly developed and accepted within the early culture-history interpretations of the Great
Plains, as well as by the general public. The image of a Great Plains culture consisted of distinctive elements such as the use of the horse, the skin tipi, feather headdress, and bison hunting; an image that became the stereotype for North American Indians as a whole (Wood 1998). An examination of the anthropological and ethnographic evidence leads us to believe that such an image provides an almost accurate perception of life on the Great Plains, since this was the dominant way of life during the contact and post-contact periods with European settlers. Many of the Plains cultures during this period had already developed a reliance on the horse for bison hunting, and for many anthropologists it was very difficult to imagine a maintainable or culturally important life of the Plains without these distinctive elements (Kroeber 1947). While these elements and images were generally present in the historical period of the Plains Indians, they do not accurately represent the entirety of the Plains Indians. Differences in all aspects of Plains culture, including subsistence practices and transportation, can be seen in the archaeological record and must be acknowledged in interpretations.

These notions of cultural homogeneity were also widely mirrored by ideas concerning the physical landscape of the Plains. The ecological area of the Plains has generally been seen by archaeologists and anthropologists as a continuous area with similar vegetation, climate, and geography; a flat, barren area with little useful vegetation and a lack of significant resources. Some anthropologists, such as Wissler (1908), believed that the area known as the “Great American Desert” was virtually uninhabitable before the introduction of the horse (Wood 1998). The Plains were seen as an area in which small bands of hunter-gathering tribes were the only significant social system that could evolve. It was believed that the inhospitable landscape led to a way of life and
culture that remained constant from Clovis times of 11,500 years ago until the historic period and the introduction of the horse (Wood 1998). An overall description of the Plains Indians before the horse can be summed up in the words of Kroeber, “any good-sized group which lived permanently off the bison on the open Plains while they and their dogs were dragging their dwellings, furniture, provisions, and children… by the standards of the nineteenth century, the sixteenth century Plains Indian would have been miserably poor and almost chronically hungry.” (Kroeber 1947:77)

The effects of such an image developed by archaeological and anthropological research are still felt throughout Great Plains archaeology. While notions as extreme as the ones above are not discussed in the archaeological realm today, the implicit notion of cultural stability and continuity through time has remained. The idea that Plains Indians groups, especially historically documented nomadic groups, have remained culturally constant is still acknowledged and accepted. This view is, in some aspects, supported by the archaeological evidence, in that there is a remarkable monotony of pattern in most aspects of the material remains in the Plains (Wood 1998). It will be argued here that this monotony does not in fact exist within the Plains, but that research on the most studied artefacts, i.e. lithics and pottery, falsely provide this notion of continuity. Archaeological evidence such as house structures, while not represented as much as lithics and pottery, provide a much more diverse artefact pattern and therefore present the best archaeological evidence with which to understand cultural similarities and differences in the Plains.

This prevailing view of cultural stability within the Plains culture areas has led to a theoretical and methodological black box for explaining cultural change. Cultural
change has been widely accepted as a direct result of ecological pressures. While such interpretations may be accurate in some cases, notions of cultural continuity from earlier culture-historians have influenced interpretations that all Plains culture groups respond in the same way to these ecological pressures, resulting in a cultural continuity of responses to ecological pressure. These interpretations of Plains groups as continually culturally adapting in similar ways to ecological pressures has led to a rigid explanatory framework that disregards the historical contingency of particular cultures and differences in ecological pressures. Such issues are illustrated by explanations discussed of the Upper Republican phase, which notes that the abandonment of Upper Republican sites during the mid-1200’s coincided with a Plains-wide climatic shift towards a warmer and drier climate, with researchers theorizing a Plains-wide shift of cultural groups towards cooler and wetter climates. This interpretation shows the implicit notion that Plains cultures will respond to ecological pressure in the same way, in this case by abandonment and migration towards new areas. The archaeological evidence does not, however, support such a claim, since new horticultural communities began to develop during this time period in more arid regions, such as Oklahoma (Bamforth 1999).

These interpretations display an inherent failure properly accounting for historically based cultural differences between Plains groups as factors in cultural change. Most detrimentally, the interpretations have characteristically identified Plains Villagers and Plains Nomads as responding similarly to ecological pressure despite the presence of major cultural differences. Therefore, the first major goal of this research is to acknowledge the cultural differences of Plains Nomads and Plains Villagers, both culturally and ecologically. Acknowledgement of the cultural differences, as well as the
similarities, will prove to be a solid starting point for the move away from the cultural historical ideas of cultural continuity, towards the presentation of a more refined and realistic description of Plains cultures and ecology.

*The Reality of the Plains*

The reality of the Plains is such that the presumed cultural and ecological continuity of the Plains is, in fact, not adequately supported by multiple forms of evidence. Archaeological research has clearly shown that Plains Indians lived diverse lifestyles varying with the regions in which they lived. The most obvious differences in lifestyle are evident in a comparison of the Plains villagers of the Central Plains and the Middle Missouri, with nomadic/semi-nomadic cultures of the other major culture areas, the Northwestern, Northeastern, and Southern Plains, see figure 1.

![Figure 1. Spatial Divisions of the Plains Area (Wood 1998)](image)
The dichotomy between the nomads and horticulturalists should and does represent significant differences in culture, the processes of cultural change, and the transmission of culture. However, many authors still promote the notion of cultural similarity, claiming that Plains Village tribes are merely stationary versions of the nomadic groups, with minor differences in artefact types and use (Wood 1998). This dissertation will focus on the fact that the Plains Villagers represent a distinguishable break from their nomadic counterparts, with ethnographically distinguishable cultural differences, as well as recognized differences in population history.

Central to explanations of cultural stability throughout all Plains groups are the ecological explanations of cultural change. However, the diversity of ecological settings within the Plains is not always explicitly acknowledged, see ecoregions map figure 5. Covering such a vast area of North America, the Plains area should not be considered as a ‘natural monoculture’, but a complex mosaic of seasonally and geographically induced patches (Wood 1998). In dealing with such a complex mosaic, one would think the ecological differences throughout the Plains would be clearly recognized by all authors, but this has not been the case. The Plains area, while having similar flora such as tall-grass prairies and mixed grasses; has typically been environmentally defined by these vegetation standards, a definition that is inadequate. To be properly understood, the Plains region must be examined at a closer level than merely generalizing about grassland vegetation; one must take the variations in seasonal processes into account (Wedel 1961). The seasonal variation present throughout the Plains can be seen most directly by analysing the average mean temperature for January and July. Areas of the Northern Canadian Plains display an average January temperature 20-30 F degrees below that of
the Southern Plains and a nearly 20 F degree differentiation in July temperatures (See Figures 3 and 4). Combined with the wide ranging variations in temperature throughout the Plains, there is also a great deal of short-term ecological variation. The presence of extreme variables such as drought, floods, and high winds would have no doubt been a very real factor in the lives of Plains Indians.

A proper ecological description of the Plains must include these seasonal variations and extreme variables. The Plains environment can be described as a precipitation-based east-to-west zonal pattern of vegetation and wildlife. Moving from east to west, there is a gradual decline of annual precipitation and relative humidity, as well as an increasing frequency of prolonged droughts (Kay 1998). Such a pattern of ecology is primarily controlled by three factors: the air circulation system, the location of mountain ranges, and the positioning of the belt of westerly winds (Borchart 1950). Further studies into past climates within the Plains reveal the diverse effects these three primary patterns can have. First, the climatic changes in the Plains are variable, with changes being sudden or gradual, for either short or long periods of time (Wright 1983 in Kay 1998). Second, climate change is time-transgressive, meaning that climate change is not simultaneous throughout the Plains, and affects different cultures differently within the same time period.

The most significant effect of such ecological description is to show the incredible diversity of climatic change that can occur within the Plains. Both short-term and long-term ecological processes occur throughout the Plains with varying frequency and an adequate interpretation of the Plains climate must be done in regional spheres. Therefore, interpretations of Plains culture by ecological means can be extremely difficult to do
within an area of such ecological variation, and can easily provide inadequate explanations of cultural continuity.

**New Approaches to the study of Plains culture**

As discussed above, two main issues that plague Plains archaeology are the notions of cultural continuity throughout the region and the ecological adaptive explanations which discuss culture and ecology as homogenous throughout the Plains. In order to re-examine issues in the Plains, it is necessary to change the fundamental ideas at the core of these prior interpretations, and most importantly, to change the way culture is viewed. Throughout the history of Plains archaeology, culture has consistently been seen as an adaptive response to environmental conditions. This adaptive view has confined archaeological interpretations to the examination of external stimuli as reasons for change, resulting in a theoretical inability to adequately study the historical factors within a culture that can account for changes.

In order to develop a more refined explanation, culture must be examined within a different framework. For an approach towards looking at culture in a different way, one must move away from the explanatory framework developed by anthropology and borrow an alternate framework from the biological sciences. In such a framework, culture and artefacts are perceived to exist within a cultural inheritance system in much the same way genes act in a genetic inheritance system. The idea that cultural and genetic systems are linked at some level is not entirely new. Culture-historians, such as A.V. Kidder, understood the evaluation of culture through a genetic paradigm as an important development, and that “when cultural evolution is considered a natural
extension of organic evolution, our thinking about the total process of evolution will be greatly clarified” (Kidder 1932:8 in O’Brien and Lyman 2000:4). Within archaeological history, however, the concepts developed by cultural historians were quickly discarded for the explanatory theories of the processual approach. Instead, biologists such as Dawkins (1976) publicly explored ideas concerning cultural inheritance, and envisaged a system in which units of cultural information, or ‘memes’, were passed in ways similar to genes passing on genetic information.

A critical distinction in understanding culture from an archaeological perspective is that culture is not only an adaptive response to certain external stimuli, but is affected by the same type of processes that influence and alter genetic information: inheritance, mutation, selection and drift. The Darwinian notion of descent with modification is as central to understanding culture as it is to understanding biology. Descent with modification is the key aspect that archaeologists can develop on their own; archaeologists, in essence, are doing the same thing with culture as biologists have done with species, understanding its descent and modifications. The inclusion of descent with modification principles will help Plains archaeologists to adequately understand cultural stability and change, by recognizing the historical contingency of Plains cultures. This leads to the recognition that ecologically-based selection pressures may be important, but they still act upon inherited cultural information and behaviour. Plains research can offer interpretations of cultural change using ethnographic, ecological, anthropological, and archaeological data, based upon an explicit theoretical foundation that incorporates the processes of evolution. The inclusion of the evolutionary processes in interpretations can
help provide quality data which directly addresses the problems of cultural continuity within the Great Plains.

The inclusion of artefacts in a discussion concerning evolutionary processes is a crucial point for archaeologists to understand. Artefacts, like cultures, are part of an inheritance system, with a distinctive historical contingency. Being active within such a system means that descent with modification principles, such as mutation and drift, act upon artefacts as well. More importantly to Plains archaeology, it means that artefacts can firmly develop lineages in which ancestor relationships between artefact types can be established. Thus, ideas about cultural continuity or transmission, as well as about descent relationships within regions of the Plains, can be inferred through artefacts and their formal properties. This type of approach allows Plains archaeologists to directly examine ideas about cultural similarities and differences, as well as cultural continuity over time. Such explicit examination will inform Great Plains archaeologists as to their deficient knowledge and inadequate assumptions about the historical and evolutionary processes which affect Plains cultures.

**Analysis of Ethnographic Data**

In order to obtain the most accurate results concerning cultural similarities and differences throughout the Great Plains, it is necessary to analyse the ethnographic evidence, since it presents the most direct data concerning cultural groups. The ethnographic data chosen, the *Ethnographic Atlas* (Murdock 1967), was analysed using three different statistical and analytical procedures. First, Mantel Matrix tests were performed to give an understanding of the significant influences acting upon the cultural
traits of the entire Plains culture area. Next, correspondence analysis was done to identify specific similarities between cultural groups within the Plains. Finally, cladistic classification was used in order to identify possible descent relationships, or cultural lineages, among the tribes of the Plains. The use of all three techniques will provide a solid basis for understanding the interrelationships between cultural groups of the Plains within the fixed historic time period.

Choice of Ethnographic Data

While individual accounts of particular culture groups exist in the Plains literature, a large-scale data set in which all cultural groups of the Plains are acknowledged is difficult to obtain. The most reliable set of data that incorporates all the specific tribes is the Ethnographic Atlas compiled by Murdock (1967). The choice of the Ethnographic Atlas as the primary data set for analysis is based on two factors. First, as mentioned above, the atlas presents data for a majority of the Plains tribes, with a total of twenty-six chosen for analysis. Also, unlike written accounts from authors such as Lowie (1954), the atlas provides data in which can easily be transformed into quantitative data for use in statistical tests. While other ethnographic accounts will be drawn upon for interpretation, the analytical procedures rely solely on the data contained within the Ethnographic Atlas.

In transforming the Ethnographic Atlas into usable quantitative data, the use of presence/absence tables served as the basis for transforming the atlas data. The forty-seven traits that the atlas uses to classify all 862 societies were used as the starting point. Each of the forty-seven traits for the twenty-six Plains cultures contained a different
amount a variation. Each of the forty-seven traits were characterized by a varying amount of character states, such as the mode of marriage trait having four character states, bride-price, gift exchange, bride-service, and token bride-service. Each character state was then given a separate column within the presence/absence table, so that every cultural tribe was comprised of one character state within each trait; see Appendix A figure 1 for full list of traits and character states. A total of 123 character states were acknowledged within the 47 traits, and the presence/absence table of these 123 variables served as the data set to be used as the basis for analytical procedures. Furthermore, the 47 traits were divided into six major trait groups, similar to the procedure by Guglielmino et al (1995), with the following trait groups listed below, along with the corresponding amount of character states for each.

- **Family and Kinship**: 44 variables
- **House**: 14 variables
- **Subsistence**: 19 variables
- **Social Stratification**: 12 variables
- **Labor Division by Sex**: 20 variables
- **Various Others**: 14 variables

These 6 major trait groups then served as the primary categorical distinctions with which to analyse the cultural data, and an individual correspondence analysis scattergram was created for each of the trait groups analysed.

**Mantel Matrix Methods and Results**

The first analysis of data was performed in order to achieve a broad understanding of the significant influences acting upon the cultural data of the Plains, and a procedure called zero-order Mantel Matrix tests were used. The primary function of this procedure
is the calculation of overall similarities between units of analysis, without any attempt to
distinguish between similarities deriving from common descent, or from similar adaptive
or diffusionary patterns (Jordan and Shennan 2003). The units of analysis used within
these test were the six major trait groups listed above and four influences as chosen by
the author. The test is a method in which the matrices developed by the six major trait
groups are then correlated with the matrices of each particular influence. Each trait
group was transformed into a matrix using the Jaccard similarity function in the
Statistical Package for the Social Sciences software (SPSS). The Jaccard similarity
function is used in order to develop a matrix in which joint absences are excluded from
consideration and equal weight is given to matches and non-matches within the
presence/absence data (Jordan and Shennan 2003). The results of the zero-order
Mantel Matrix test are presented as a correlation value, with a high correlation value
representing an influence that most effectively accounts for the variation in the
ethnographic data.

As discussed above, the six major trait groups identified in the ethnographic data
serve as one base unit of analysis in Mantel Matrix tests. The other unit of analysis
consists of individual matrices of four particular influences—linguistics, ecology,
geographic distance, and adjacency. At some level, each of these influences can be seen
as potentially relevant to the cultural transmission and similarity between Plains tribes;
the purpose of the tests here, however, is the identification of the most significant
influence. It should be noted that results from the zero-order correlations should not be
taken at face value, as there are likely to be correlations between many of the influences.
For example, groups that share a common border or are geographically close to one
another may also occupy similar ecological areas, and speak closely related languages, so that the influences are not completely independent of one another (Jordan and Shennan 2003).

Linguistic Influence

The Great Plains area provides an opportunity to explore a high degree of linguistic diversity and variation in relation to cultural similarities. The Great Plains area is characterized by three major language groups, Algonquin, Siouan, and Caddoan, as can be seen in figure 2, and minor language groups include Shoshone, Athabaskan, and Kiowa.

Upon inspection of the map, several distinctions can be identified. Algonquin is primarily spoken in the north, Siouan in the central Plains, and a mixture of the others in the south. There are two apparent abnormalities in the general pattern: the position of the Caddoan speaking Arikara culture surrounded by Siouan and Algonquin speaking groups, and the large geographic distance between the Athabaskan speaking cultures of the Sarsi and the Kiowa Apache. The ethnographic literature, in particular the Handbook of North American Indians (Sturtevent 2001), demonstrates that the linguistic identity of each particular culture has remained relatively intact, with only a minor degree of linguistic borrowing between language groups.
Fig. 2. Language Families of the Great Plains (Sturtevant, W.C., and Demallie, R.J., (eds) 2001)

A language similarity matrix was created by assigning each of the twenty-six cultural groups a particular language, as determined through the use of Ruhlen’s Guide to World’s Languages (1987). Particular groups not listed in Ruhlen’s classification were placed in an approximate linguistic classification by the author, with the aid of alternative
sources such as *The Handbook of North American Indians: Plains Vol. 13 Part 2* (Sturtevent 2001). Studies concerning linguistics and their influence on culture are numerous; there is not enough space in this dissertation to adequately address the relationship between the two, and therefore the methods used are only valid at a broad and basic linguistic level. I will not attempt to place the languages within the historic context of ancestral languages and movement of language groups. Rather, the basic application of the language tree, as published in Ruhlen (1987), is used to draw similarities between the languages spoken and the cultural groups of the Plains. After this language tree is created, similarity percentages are given to each and every other language depending upon their proximity in the language tree, and subsequently a matrix of the relationships between the languages is developed. The language similarity percentages used are given by Jordan and Shennan (2003), and Welsch *et al.* (1992); the terminology of the groupings was given by Ruhlen (1987).

<table>
<thead>
<tr>
<th>Type of Grouping</th>
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<tr>
<td>Same Language</td>
<td>95%</td>
</tr>
<tr>
<td>Same Sub-branch</td>
<td>65%</td>
</tr>
<tr>
<td>Same Branch</td>
<td>50%</td>
</tr>
<tr>
<td>Same Subgroup</td>
<td>30%</td>
</tr>
<tr>
<td>Same Group</td>
<td>15%</td>
</tr>
<tr>
<td>Same Primary Branch</td>
<td>10%</td>
</tr>
<tr>
<td>Different Primary Branch</td>
<td>5%</td>
</tr>
</tbody>
</table>

This matrix of percentage of language similarity is the base unit, and is correlated with the matrices of the six major trait groups, with the results listed in figure 7, and the interpretations are discussed below.
Ecological Influence

Ecological influences have long been used as the primary explanatory framework in which to discuss cultural continuity and change throughout the Great Plains. Tests such as the Mantel Matrix can give statistical enhancement to the theories promoted by previous archaeologists, since the accuracy of these interpretations on a broad level means that correlation between cultural traits and ecological influence should be high. The most problematic assumption by Plains archaeologists, as mentioned earlier, is a lack of understanding about the ecological diversity present throughout the Plains. A significant reason for this problem is the classification of Plains areas with the use of vegetation as the ecological determinate. Therefore, in the creating of an ecological influence matrix, vegetation maps were not the only data used in classifying each particular culture group. Rather, data that also includes aspects of seasonal variation, such as temperature variation, are used as the primary set of data.

The ecological variables chosen consist of three main data sources: the average mean temperature for January, the average mean temperature for July, and the classification of ecoregions with ecological divisions, domains, and provinces given. The ecoregions of the Plains are based upon a combination of average yearly precipitation, as well as vegetation present. These data sources came from downloaded maps from the National Oceanographic and Atmospheric Agency as well as from the Forest Service of America (www.ngdc.noaa.gov 2003; www.fs.fed.us/institute/ecoregions/eco_download.html 2003).
Using ArcView software, cultural groups are then plotted onto the maps, figures 3-5, using the geographic locations as listed in the *Ethnographic Atlas* (Murdock 1967). Presence/absence tables were then created, with each cultural group classified by one zone on each temperature map, as well as one corresponding ecological domain, division, and province. Only the province, the most specific classification, is displayed in figure 5; the individual variables for each of the ecological traits can also be seen in figure 3, Appendix A.

After completing the presence/absence table, the data is transformed into a matrix through the use of the Jaccard similarity function within SPSS, as discussed earlier. The end result of this procedure was the creation of an ecological matrix that includes seasonal variation, as represented by temperature differences and classification by ecoregion, including precipitation and vegetation factors. This matrix was then
correlated with the six major trait groups to understand how well ecology correlates and influences the variation in the ethnographic data, which will be discussed below.

![Average Mean Temperature-July](www.ngdc.noaa.gov 2003)

Figure 4. Average Mean Temperature-July (www.ngdc.noaa.gov 2003)

**Geographic Distance and Adjacency Influence**

The geographic and proximate distances between Plains Indians cultures comprise the final two sets of influences. Two measures of distance are used: geographic distance and adjacency. High degrees of correlation between the ethnographic traits and the geographic and adjacency matrices lead to interpretations of high degrees of inter-mixing or blending between cultural groups in close proximity to each other.

While these methods are imperfect, refinements in GIS will hopefully lead to the addition of geographic boundary data, such as major rivers, water bodies, or mountain ranges that are not included in this analysis.
The methods used for measuring geographic distance involve the use of ArcView software. Geographic coordinates for each tribe, as listed in the *Ethnographic Atlas*, are plotted onto North American ecological maps. Using the distance function in ArcView, the distance between each point is measured so that a distance matrix can be formed. These distances do not take into account any geographic landscapes and are strictly Euclidean distances.

The adjacency measure consists of a map defining the cultural areas of the Great Plains, as found in the Handbook of North American Indians Vol. 12, see figure 6. Each group sharing a common border with another is given a presence mark within the presence/absence table, with some groups having multiple common borders, and others
only one. The adjacency table was then transformed into a matrix using the Jaccard similarity matrix functions found in SPSS.

![Key to Tribal Territories](image)

Figure 6. *Key To Tribal Territories* (Sturtevant, W.C., and Demallie, R.J., (eds) 2001)

The distance measurements calculated above do not provide a definitive answer as to their influence on the cultural similarity of Plains groups. Interpretations of this data should only be appropriately used on a broad level. As discussed by Shennan (2002), cultural information diffuses through and between cultures in ways more complex than simplistic geographic boundaries. An incredible array of historical, spatial, and
ideological influences are factors in the transmission of information and traits across groups.

Results of Mantel Matrix Tests

The results of the Mantel Matrix tests, which seek to identify the degree in which similarity between the ethnographic trait groups and influences, are shown in the table below.

Mantel Matrix Test Results

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Variables</td>
<td>Corr. Coeff.</td>
<td>-0.079</td>
<td>0.512</td>
<td>0.165</td>
<td>0.216</td>
</tr>
<tr>
<td></td>
<td>Y by X1%</td>
<td>0.006</td>
<td>0.262</td>
<td>0.027</td>
<td>0.046</td>
</tr>
<tr>
<td>Family and Kinship</td>
<td>Corr. Coeff.</td>
<td>-0.038</td>
<td>0.369</td>
<td>0.057</td>
<td>0.214</td>
</tr>
<tr>
<td></td>
<td>Y by X1%</td>
<td>0.001</td>
<td>0.136</td>
<td>0.003</td>
<td>0.045</td>
</tr>
<tr>
<td>House</td>
<td>Corr. Coeff.</td>
<td>0.003</td>
<td>0.405</td>
<td>0.124</td>
<td>0.102</td>
</tr>
<tr>
<td></td>
<td>Y by X1%</td>
<td>0.00001</td>
<td>0.164</td>
<td>0.015</td>
<td>0.011</td>
</tr>
<tr>
<td>Subsistence</td>
<td>Corr. Coeff.</td>
<td>-0.082</td>
<td>0.351</td>
<td>0.108</td>
<td>0.086</td>
</tr>
<tr>
<td></td>
<td>Y by X1%</td>
<td>0.006</td>
<td>0.123</td>
<td>0.011</td>
<td>0.008</td>
</tr>
<tr>
<td>Social Stratification</td>
<td>Corr. Coeff.</td>
<td>-0.139</td>
<td>0.262</td>
<td>0.004</td>
<td>0.081</td>
</tr>
<tr>
<td></td>
<td>Y by X1%</td>
<td>0.019</td>
<td>0.068</td>
<td>0.00002</td>
<td>0.002</td>
</tr>
<tr>
<td>Labor Division</td>
<td>Corr. Coeff.</td>
<td>0.022</td>
<td>0.362</td>
<td>0.058</td>
<td>0.096</td>
</tr>
<tr>
<td></td>
<td>Y by X1%</td>
<td>0.0005</td>
<td>0.131</td>
<td>0.003</td>
<td>0.009</td>
</tr>
<tr>
<td>Various Others</td>
<td>Corr. Coeff.</td>
<td>-0.185</td>
<td>0.177</td>
<td>0.396</td>
<td>0.261</td>
</tr>
<tr>
<td></td>
<td>Y by X1%</td>
<td>0.034</td>
<td>0.031</td>
<td>0.156</td>
<td>0.068</td>
</tr>
</tbody>
</table>

Figure 7. Mantel Matrix Test Results

The results in figure 7 show the correlation coefficient, as well as the percentage of correlation of the first matrix (Y) with the second (X1). The percentage correlation is
used as an indicator of the degree of similarity. Looking at figure 7, it becomes apparent that many of the values between the traits and influences are quite low. The influence of geographic distance on all variables provides the lowest correlation values of the group, 0.006; ecology and language follow close behind with values of 0.046 and 0.027. However, the adjacency measures stand out from the other influences with a high value of 0.262, with the all variables matrix that consistently correlates higher with a majority of the trait groups. While the overall percentage of correlation between the all the matrices is not considered very high, it is clear that adjacency has considerably higher values than other influences. Particular attention should be paid to the low correlation values between the ethnographic data and ecological influences. Many authors typically promote, a significant causal relationship is between the two. However, tests such as the zero-order Mantel Matrix can provide insight into such claims, with adjacency more clearly represented than ecology as the most significant influence. A broad understanding of the significant influence of adjacency throughout the entire Plains area supplies the starting point from which more specific interpretations about specific cultural groups can be made. It should be stated that the use of Mantel Matrix tests to infer highly specific trends is an inappropriate use of the methods, and results in inadequate interpretations.

**Correspondence Analysis**

The second analytical technique used with the ethnographic data is a procedure known as correspondence analysis. The main purpose of the technique, within this dissertation, is the closer identification of specific similarities between cultural groups of the Plains. This is done through the creation of individual scatter plots of the six major
trait groups. Each culture group is then plotted on the graph in accordance with how well it correlates with other surrounding groups; the more similar the overall cultures, the closer the groups will plot.

The data used to create such scatter plots comes directly from the presence/absence data tables used to transform the ethnographic data. Using the CANOCO 4.5 software, along with CanoDraw, the data is analysed and displayed in scatter plot form. Each scatter plot is then classified in terms of the linguistic affinity of each particular group. This classification is performed to give an understanding of the relationship between the ethnographic data and the population history of the cultural group. A good proxy indicator of population history is likely to be one that is not subject to selection processes, but is instead carried along by a population as a result of continuity (Shennan 2002). Therefore, language, which likely represents the most continuous cultural feature among groups, is used for classification. In essence, the correspondence analysis attempts to provide a basis for understanding why particular cultural groups are more similar to others; it is therefore important to understand if similar populations have similar histories, represented in correspondence analysis by strong linguistic grouping. However, with previous knowledge of the results of the zero-order Mantel Matrix, linguistic identity does not seem to play a major role. In conjunction with linguistic interpretations, therefore, correspondence analysis will be interpreted in terms of the influences of adjacency, with the major question being: do the positions of cultural groups compare well with their geographical positions?
All Variables

The all variables plot includes the 123 variables used, combining all six trait groups. The plot presents a good identification of the trends that can be seen in many of the subsequent plots. Trends include the close clustering of the Northern Plains tribes on the far left side of the graph, with various other tribes from both the Central Plains and Southern Plains scattered throughout; see figure for specific culture regions and figure 4 in appendix A for abbreviation codes.

Figure 8. Correspondence Analysis of All Ethnographic Variables

Groupings such as this appear to demonstrate no strong correlations between linguistic influence and cultural similarity, with five of the six, major language groups represented within the left side cluster. The Plains village cultures (Hd, Md, Ak, Om, Ot, Io) are represented far to the right of the nomadic grouping on the left side, and are placed in a rough geographic clustering. This tendency towards interaction in a regional sphere appears to best describe many of the correspondence analysis plots. The regional interaction appears to be significant within specific Plains Villager areas, with the
Omaha, Oto, and Iowa clustering together, the Ponca and Pawnee together, and the Hidatsa, Arikara, and Mandan together. It is important to understand the dichotomy between these Plains Villagers and their mainly nomadic counterparts over the last 1,000 years, as this scattergram display notions of significant cultural differences between the two, with Plains villager tribes showing a distinct tendency toward regional influence. Therefore, interpretations of many of the scattergrams would seem to claim that nomadic groups are culturally similar due to similar adaptation to lifestyle patterns and Plains Villagers have cultural similarity due to cultural transmission within a regional area.

Family and Kinship

Figure 9. Correspondence Analysis Plot of Family and Kinship Traits

Family and kinship traits display the largest variations within the six major trait groups, with forty-four total character states. The traits highlight some key issues in understanding the role of population history throughout Plains Cultures. It is evident in
this analysis of the particular plot, figure 9, that hunter gatherer groups are clustered closely together in the bottom left hand section of the graph, but village groups are widely displaced across the graph, ranging from the bottom left-hand side, through the top center, and down to the bottom right corner.

It should be realized that the plot demonstrates a close clustering of groups based on a combination of both lifestyles, either nomadic hunter-gatherer or Plains Villager horticulturalists. The Northern, Northwestern and Southern Plains cluster represents a similar hunter-gatherer lifestyle, and the Central Plains and Middle Missouri groups display horticulturalism. The horticultural groups also display a general regional tendency, as the Oto, Omaha, and Iowa of the Central Plains are located in the bottom corner, and the Middle Missouri region groups of the Arikara, Mandan, Hidatsa, and Pawnee are represented further up the graph.

Overall, two general interpretations are evident from the family and kinship scattergram. First, Algonquin-speaking groups of the Northern Plains share many common family and kinship characteristics, although the shared traits do not follow a strict linguistic line. The Algonquin speaking groups also share roughly similar traits with some Sioux, Shoshone, Kiowa, and Athabaskan speaking groups. The issue of whether the clustering of nomadic groups represents a shared population history or is mainly an influence of the nomadic lifestyle of particular regions will be discussed throughout his dissertation. Second, Siouan-speaking groups demonstrate a broad diversity of family and kinship traits, displaying a wide selection throughout the entire graph. While not corresponding with other Sioux groups, like the Algonquin speaking
groups, some basic trends can be seen in this and other plots, such as the regional correlations between the Sioux groups.

*House Styles*

The difference between the Northern Plains hunter and gatherer tribes and the Plains Villages tradition is most evident in the scatter plot representing house data. Two distinct groupings are present from the ethnographic data. The Northern Algonquin-speaking tribes are located on the left of the graph, and the majority of the Sioux-speaking tribes are on the opposite side. Only a few outliers are presented in this plot, with the Wichita tribe removed from the plot because it was an extreme outlier that caused displacement of many of the groups.

![Figure 10. Correspondence Analysis of House Styles Traits](chart)

The distinguishing features of each of the distinctive groups within the graph can be easily characterized. The Northern Plains tribes, on the left side of the graph, have the defining characteristics of hunter gatherer people. Their house style is comprised of
ground level tepees, made from hides or skins, with a fully migratory or semi-nomadic settlement pattern. The Plains Villagers, on the right side of the plot, have a definitive subterranean house style with dome-shaped houses made of wood, earth, or turf. The settlement pattern for the majority of these groups is classified as semi-sedentary, with only the Arikara, found at the bottom right of the graph, classified as having a compact and relatively permanent settlement pattern.

The general interpretation that can be drawn from the analysis of houses is the existence of two distinctive styles within the ethnographic data. The house styles are clearly representative of the dichotomy that exists within the Plains, with each side representing a distinct tradition of style, most distinctly based on lifestyle and geographic positioning. The key notion discussed here, as well as in the archaeological analysis section, is the idea that house styles represent the most significant remains through which major differences in culture and artefacts between Plains Villagers and Plains nomads can be observed.

**Subsistence Patterns**

Subsistence has been a focal point of many of the studies of the Plains Area, especially within the processual tradition. The plot presented is based on a classification of the relative importance of hunting, gathering, fishing, and agricultural pursuits. As in earlier graphs, the Northern Plains groups cluster closely together with the definitive characteristic being a 76-85 percent reliance on hunting and a 15-24 percent reliance on gathering.
The Plains Villagers and Southern Plains cultures are then displaced in a wide array, subject to percent dependence, with the Arikara and Mandan representing a 26-35 percent dependence upon hunting and roughly a 46-55 percent dependence upon agriculture. The extremes of either end are found in the bottom left-hand corner with the Hidatsa representing the highest percentage agricultural group, with a 55-65 percent dependence on agriculture and the Teton, Comanche, and Kiowa representing the other extreme, with an 86-100 percent dependence upon hunting. The possible reason for the placing of both of these groups in the bottom left corner is their common affinity of fishing and gathering shellfish in their subsistence practices.

Sioux-speaking groups once again represent a diverse grouping, with a varying degree of dependence upon agriculture. This dependence upon agricultural practices may
come as a surprise, since many early authors portrayed all Plains Indians groups as nomadic bison hunters. This plot clearly shows that this has not always been the case; many groups had a partial-to-heavy reliance on agricultural practices. The belief that Plains village tribes maintained subsistence practices based on hunting and gathering, with only a minor reliance on horticulture (Wood 1998), is not supported by this analysis. The scattergram displays the wide variety of subsistence patterns practiced by Plains tribes, and a simple dichotomy between horticulturalists and hunter-gatherers is not always adequate.

*Social Stratification, Labor Division by Sex*

The remaining three classification groups, social stratification, labor division by sex and various others, present a more complicated picture of the Plains area; many of the groups display only a general tendency towards trends, as seen in the first three plots.
The social stratification graph demonstrates a rough break between the Plains Village tribes, located in the bottom right, and the Northern Plains groups, represented in the upper left. However, a greater degree of inter-mixing occurs in this plot than in the previous ones, with a less developed core of Northern Plains or nomadic cultures. It should also be noted that within the Mantel Matrix test results there are very low correlations between the social stratification data and any of the four influences, so intermixed scattergrams should be expected.

Labor division by sex represents similar trends as in many of the previous graphs. Once again, the nomadic cultures of the Northern and Southern Plains are grouped closely together on the left-hand side of the graph, with a rough clustering of Central Plains tribes.
on the right-hand side. This graph would again promote the influence of an ecology-based lifestyle as a major factor in the cultural similarities of the nomadic tribes, with a lesser influence on Plains Villagers.

*Overall Interpretations of Correspondence Analysis*

As mentioned above, the main purpose of conducting correspondence analysis is the identification of particular cultures and the cultural similarities they share. Identification of groups with distinctive relationships with other groups provides the basis from which to conduct more specific sub-regional analysis. The general trend apparent in most of the scatter plots is that similar cultures do not share a linguistic similarity. Therefore, this analysis does not support the assumption that groups sharing a common language will share a common population history; the lack of support for this assumption leads to the interpretation that population histories do not adequately account for the cultural similarities between Plains groups. Rather, two major influences seem to account for the results. First, ecology-based lifestyle plays a significant role the cultural similarities of hunter-gatherer groups. Furthermore, Plains Village groups do not group as consistently close together as Plains Nomads, but do display a general tendency towards specific regional similarities.

Another major interpretation that can be drawn from the data is the existence of clear cultural distinctions between Plains Villager tribes and Plains Nomads. A majority of the graphs display a clear distinction between the groups. Significant differences in family and kinship traits, subsistence patterns, house styles, and labor division by sex are evident, with only a general similarity in social stratification and various other traits. It
should be apparent that correspondence analysis of the ethnographic data provides no basis for claims of cultural continuity of the entire plains area. At almost no point do the cultural groups of the Plains villagers and Plains nomads share similar cultural characteristics. There is, therefore, a clear basis for upholding the dichotomy between the two groups.

*Cladistic Classification*

Once cultural similarities and differences have been identified in the ethnographic record using the methods outlined above, a further step is necessary to identify descent relationships between Plains groups. These descent relationships are important in the identification of historical lineages of populations throughout the Plains. The purpose of cladistic classification here is to give an understanding of the influence of descent history on the cultural characteristics seen in the ethnographic record.

Cladistics, in its purest form, is a method of biological classification which seeks to group taxa, here the Plains culture groups, into sets and subsets based on the most parsimonious distribution of characteristics (Foyer 1990). These sets and subsets display the relationships of shared derived characteristics (synapomorphies) although inference about the origins of the latest common ancestor. The homologous features shared by cultures are used in order to groups the cultures in a cladogram. Cladograms, such as figure 14, identify relationships between groups based, on these derived characteristics, within an atemporal framework. The use of cladograms, or evolutionary trees, has provided a variety of benefits for archaeologists. Most importantly, it provides a basis for the comparative method (see Mace and Pagel 1994), an approach whose purpose is to
distinguish homologies or shared derived characteristics, from independent analogies, such as cultural attributes that arise out of independent innovation. This approach is critical to the goals outlined in this research, the task of understanding whether Plains groups of similar cultural attributes are this way because of shared descent, or whether similar cultural attributes are merely similar independent responses to particular stimuli.

Methods used in the cladistic classification of Great Plains tribes require the use of computer software known as PAUP 4.0 (Phylogenetic Analysis Using Parsimony). The presence/absence data of the ethnographic record that was developed earlier is transferred into the PAUP software, and a tree that developed out of the analysis can be seen in figure 14. Each cultural group in the Plains represents an individual branch on the tree diagram.

In addition to the visual representation given by the tree below, a statistical measure of the strength of the tree is given. The consistency index measures the degree to which the cultural attributes of the groups most adequately fit into a tree diagram. A high consistency index indicates strong descent patterns within the data. In contrast to the consistency measure, the homoplasy index represents the opposite, in essence, the degree to which the cultural groups lack a phylogenetic signal, or strong descent patterns. The measure of these indexes can provide inference about the validity of the tree pattern. In the tree presented above, a consistency index of 0.3934 and a homoplasy index of 0.6066 were calculated. Such a low consistency index, in combination with the visual representation of the evidence provides a combination of interesting interpretations.
Interpretations of Cladistic Analysis

The consistency index measure listed above most adequately provides interpretations that lean towards the idea that descent history does not sufficiently explain the variation within the ethnographic data. Rather, tendencies towards independent development of cultural traditions are favored, since there is a much higher homoplasy
index. Results such as these are expected, however, especially when compared with the results from prior analyses. The index measures and the shape of the tree both promote notions of adjacency and regionalization, similar to the results given by correspondence analysis and the Mantel Matrix tests. The shape of the tree projects a fairly adequate correlation with the branches of the tree representing distinct regions. This is most apparent within the Plains villager tribes of the Middle Missouri region, and the Central Plains. The tree reflects the close cultural similarity of the Hidatsa, Mandan, and Arikara by grouping them in similar branches. The same is apparent of the Omaha, Iowa, and Oto groups, representing close cultural ties on the tree as well as close geographic proximity to each other. The branching relationship from these two regions displays a geographic radiation as well, with close branches representing closer geographic distance, such as the inclusion of the Ponca and Pawnee only one tree branch length away. The more distinctive phylogenetic branching process represented in this section of the tree presents a pattern in which descent history may be an important influence in these regions. This notion however will be more closely examined through the archaeological record for material patterns of descent history.

The groupings and relationships presented by the rest of the Plains groups on the tree show similar interpretations to those developed in preceding analyses. There is a intermixing of groups regardless of geographic positioning. Examples of this are the branches represented by the Northern Plains groups, the Bungi, Plains Cree, Assissboine, and Santee. Such placement on the tree diagram promotes interpretations of similar culture adaptations not influenced by descent history, but rather by similar response to stimuli.
Overall Interpretations of Ethnographic Analyses

The combinations of the three analyses performed present us with a good starting point from which to begin an examination of culture change through time. First, Mantel Matrix tests provide notions of the significant influences acting upon Plains cultures, with adjacency seen to be primary influence. Second, correspondence analysis develops the idea that Plains village tribes represent distinctly different cultural traits from other Plains migratory tribes. These migratory tribes have strong cultural similarities to each other, although the correlation with language to identify similar population histories was not very strong. Third, cladistic analysis identifies the fact that Plains village cultures may have a strong descent history within the geographic regions in which they are located, as shown by the distinctive branches on the ethnographic cladogram. The migratory tribes, however, do not seem to share a strong descent history, and the variation within these groups can possibly be explained for by similar cultural adaptations.

Therefore, in analysing culture change through time and notions of cultural continuity in the Plains, a few key interpretations can be drawn from by the ethnographic evidence. Most importantly, the Plains area is not homogenous within its cultures and ecology and significant differences in culture are displayed by groups. This is most clearly evident in the dichotomy between the Plains villagers and the Plains nomads. Therefore, statements that claim the Plains villagers are merely stationary versions of Plains nomads are inadequate and misleading, and future studies should clearly acknowledge the distinction between the two lifestyles. Other important interpretations’ coming from the analyses is the view that the Plains village tradition represents a strong
degree of regionalization, with the most cultural similarities occurring between geographically close groups.

It should be obvious that the next step in understanding cultural continuity in the Plains is to take interpretations promoted by the ethnographic data and develop them in greater detail, with the help of the archaeological record. The archaeological record presents us with necessary evidence of change over time. Using these interpretations of the ethnographic record, archaeological evidence of the Plains village tradition between 900-1850 will be analysed, with an attempt to understand the cultural similarities and differences between Plains villager cultural similarities and differences at a more refined scale.

**Analysis of Archaeological Evidence**

The inclusion of archaeological evidence in the analysis of cultural continuity throughout the Plains region is necessary for understanding these processes. The inclusion of archaeological evidence helps to alleviate the limitations resulting from the use of ethnographic data. Ethnographic data allows for the identification of similarities between cultural groups, but is limited in understanding culture change through time. Ethnographic evidence merely presents a snapshot of life during a particular temporal period. Projecting interpretations from the ethnographic record in the Plains does not give an adequate image of previous Plains culture groups. Years of disease, war, and European interaction occurred in the Plains area before much of the ethnographic data was recorded. It is crucial therefore to rely on archaeological evidence as the basis of long-term continuity interpretations, since this is the most reliable data that is available to
measure changes through time. The goal of this research is the measurement the change
present in house structures in the Plains village period (900-1850 AD), using cladistic
techniques.

The Plains village tradition has been chosen due the unique position it represents
in the Great Plains cultural sequence. Plains Village groups are typically seen as a
geographical and cultural intermediate between the nomadic groups present in most of
the Plains, and the fixed settlement people of the Eastern Woodlands (Lehmer 1971); this
position is supported by the ethnographic data presented above. The measurement of
artefact change provides a starting point from which to base interpretations of cultural
continuity through time. The measurement of artefact change through time is achieved
by selecting sites which are the most representative of the temporal sequence widely
agreed upon by many authors (see Wood 1998). The primary methods used to identify
artefact patterns are the techniques such as correspondence analysis and cladistics, and
interpretations based upon the analysis of these sites will be formed in order to
understand the cultural and artefact variation present in the Plains villager tradition, and
the Great Plains as a whole. Particular emphasis will be placed upon identification of
historical lineages of culture through house structures, with interpretations of cultural and
artefact origins and descent patterns as a primary focus.

Cultural Sequence of Plains Villagers and Selection of Archaeological Evidence

The cultural sequence of the Plains Villager tradition, following Lehmer (1971),
consists of three major traditions: the Central Plains (900-1450), Middle Missouri (1000-
1500), and Coalescent (1400-1850). This division of traditions has been based primarily
on evidence of lithics, pottery, faunal remains, and house structures. Major characteristics of the Central Plains tradition have been identified as a lifeway based on the occupation of isolated, small clusters of earth lodges, with a diversified subsistence economy, spanning the period from roughly 900 AD to 1450 AD (Steinacher and Carlson 1998). The Middle Missouri tradition appeared in the Plains around 1000, characterized by the occupation of primary sedentary villages with primary reliance on horticultural subsistence (Winham and Calabrese 1998). Middle Missouri tradition houses, large rectangular buildings, represent a significant difference in structure from the Central Plains houses. The Coalescent tradition (1400-1850) represents the latest traditions, with primary focus on the prehistoric and historic villages of the Mandan, Arikara, Hidatsa, Pawnee and Ponca. (Johnson 1998). Coalescent sites represent a diversity of horticultural communities and typically include circular house patterns, although some square/rectangular houses are present. To consult a sample of diagrams used characteristic house sites of these periods consult Appendix B.

These three traditions, as well as the particular character states and phases, will form the major groupings in which house structures will be analysed. The choice of sites for analysis has been based upon this cultural sequence, with sites chosen that best represent the diversity of particular traditions and phases, as seen in figure 15.
Figure 15. Cultural Sequence of Great Plains Traditions (Lehmer 1971)

The phases represent geographic regions in which characteristic sites are found. These characteristic sites form the data set of house structures that have been analysed throughout the dissertation.

**Central Plains Tradition**
- **Upper Republican/Solomon River Phase**
  - Red Willow (Grange 1980)
  - Owens (Blakeslee 2002)
  - Holdredge (Blakeslee 2002)
  - Mowry Bluff (Wood 1967)
- **Nebraska**
  - Theodore Davis (Gradwohl 1969)
  - Patterson (Bozell and Ludwickson 1999)
  - Little Pawnee Creek (Bozell and Ludwickson 1994)
- **Loup River**
  - Sweetwater (Champe 1936)

**Middle Missouri**
- **Initial Middle Missouri Variant**
  - **Anderson Phase**
    - Dodd (Lehmer 1954)
Breeden (Brown 1974)
Swanson (Hurt 1951)
Grand Detour
Langdeau (Caldwell and Jensen 1969)
Pretty Head (Caldwell and Jensen 1969)
Jiggs Thompson (Caldwell and Jensen 1969)
Over/Mill Creek
Mitchell (Alex 1973)
Extended Middle Missouri Variant
Thomas Riggs (Hurt 1953)
Cannonball (Griffin 1984)
Bendish (Thiessen 1976)
Fire Heart Creek (Lehmer 1966)
Terminal Variant
Huff (Howard 1962)
Shermer (Sperry 1968)

Coalescent
Initial Variant
Black Partizan (Caldwell 1966)
Arzberger (Spaulding 1956)
Crow Creek (Kivett and Jensen 1976)
Talking Crow (Smith 1977)
Extended Variant
Demery (Woolworth and Wood 1964)
Over’s La Roche (Hoffman 1968)
Molstad (Hoffman 1967)
Post-Contact
Big Village (O’Shea and Ludwickson 1992)
Like A Fishhook (Smith 1972)

Figure 16. Sites of House Structure Data

Briefly looking at the primary definitions of the traditions represented in the Plains Villager period, it becomes evident the style of house structures is the primary characteristic differentiating the traditions. Middle Missouri houses represent a significantly different style from any house structure either before or after. This distinctive style has led to the question of the origins of the Middle Missouri with the
resulting development of two viewpoints. The first is that the Middle Missouri tradition represents a development of indigenous people of the area with local innovation of house structure and culture. The second viewpoint claims that the Middle Missouri tradition represents a migration of peoples from the east, who brought with them cultural attributes and house styles (see Toom 1992 in Johnson 1998). In light of these viewpoints, the analysis of historical lineages and descent patterns of house structures through correspondence analysis and cladistics can provide important data in this debate.

The choice of house structures as the primary data set in understanding cultural change through the Plains Village tradition was done for three major reasons. First, significant differences in house structures in Plains Village groups can easily be seen in the archaeological record and these houses are partly used as definitive features for each particular tradition. Second, the data concerning house structures exist in a relative ambiguity, since the primary focus within Plains archaeology has always been on pottery and lithics. This is evident in the lack of a coherent classification scheme for house structures in the Plains, with structures commonly discussed in only the broadest structural terms, as circular or rectangular. Third, house structures represent an artefact type in which the interaction of many cultural influences interact is visible. Pottery and lithics are commonly described as changing for functional reasons, typically due to environmental pressures, and often these interpretations are adequate. House structures, however, provide an artefact in which environmental pressures play a less significant role; rather, cultural influences such as social hierarchy, family and kinship values, and ideological factors make major contributions to house style. The combination of these
three factors demonstrates the necessity of using an analysis of house structures as the primary focus in any Plains Village study.

**Correspondence Analysis of House Structures**

A necessary first step in understanding the Plains Village tradition is gaining a general idea of the degree of similarity in the housing style of the Plains villagers. Correspondence analysis will demonstrate that the differences in housing styles between the Middle Missouri and Central Plains/Coalescent traditions are significant.

The techniques used in the analysis of housing structures follow methods similar to those used in the analysis of the ethnographic data. Using a paradigmatic classification scheme as outline by O’Brien and Lyman (2002), house structures were classified using seven character traits (see appendix A figure 2). Within each of these character trait classifications, a specific character state is assigned to each housing structure; for example, character trait I is the interior post-hole pattern, subdivided into individual character states such as circular, square/rectangular, linear, and double linear. Each of these character states is then represented by one column on the presence/absence table, for a total of thirty-nine individual characters states comprising the seven character traits. The presence/absence tables are then transformed into a scatter plot using the CANOCO and CanoDraw software, and the plot can be seen below, with corresponding site abbreviations found in figure 1 appendix B.

Two clear distinctions can be drawn from the interpretations of such a scatter plot, figure 17. First, the Middle Missouri houses represent a significantly different set of housing styles. Clustering on the left side of the graph, there is a clear division between
the Middle Missouri houses and the house styles of the Central Plains and Coalescent
traditions.

Figure 17. Correspondence Analysis of House Structures

This leads to the second key interpretation that Central Plains houses and Coalescent houses are structurally similar on many levels, despite the distinct geographic boundaries that exist between many of the sites. For instance, much of the site data concerning the Central Plains comes from areas within the state of Nebraska, such as the Upper Republican River Valley, see figure 19. The Coalescent period houses, however, are represented most typically in the villages of the Middle Missouri River Valley section of northern South Dakota and southern North Dakota, see figure 21. The scatter plot and interpretations drawn from the analysis provide the basis for understanding the Middle Missouri as a distinct cultural tradition within the Plains. It should be clear that cladistic
analysis can provide good insight into understanding the relationships between these three traditions.

Cladistic Classification of House Structures

As discussed above, cladistic classification provides a powerful tool with which to understand the descent relationships between cultures or artefacts. Here, the focus of analysis will be two-fold; first, descent relationships of house structures between all three traditions will be analysed, focusing especially on the descent patterns of the Middle Missouri, and the relationship between Central Plains and Coalescent houses, as identified through correspondence analysis. Second, house structures of individual periods will be analysed to given understanding of the branching processes involved in each, with particular importance placed upon Middle Missouri houses and the decent histories present within the data. The combination of these two foci will ultimately provide insight into the cultural continuity of Plains villager traditions. The initial tree seen in this analysis presents data concerning house styles of all three traditions. Similar to the process used in the cladistic analysis of the ethnographic data, presence/absence tables based upon the seven character states and thirty-nine characteristics are used in conjunction with PAUP software, with the corresponding cladogram presented below, figure 18.

The tree shown demonstrates a variety of features, most notably the distinct differences between the Middle Missouri house structures and the Central Plains and Coalescent houses. The clustering of Middle Missouri houses is represented in the middle of the tree by sites DoA (Dodd A) through JT (Jiggs Thompson). The distinct
cluster of Middle Missouri house structures once again shows the clear distinction present between these house styles and the other Plains Villager traditions, as a majority of the

middle Missouri houses are considerably far from a direct connection with Central Plains and Coalescent styles.

Middle Missouri houses also present a higher degree of branching than other sections of the graph. This distinctive branching process indicates a characteristically high degree of descent relationships between the house styles, since the evolutionary
lineage of house styles can be seen through the stages of the branching process. While this distinctive characteristic exists for Middle Missouri houses in this tree the extremely low consistency index measurement, .2966, should be noted. This consistency index value shows that while PAUP software is instructed to display the data in tree form, the data itself does not necessarily entail such a visual representation. Therefore, interpretations of the correlations between the house styles of all three traditions can only be properly inferred on a broad level of similarities and differences. Further examination of house styles on a smaller scale of individual traditions will be used for the bulk of the interpretations. Possible reasons for the low consistency index could be the great difference between the Middle Missouri houses and the Central Plains and Coalescent houses. Incorporating all three traditions emphasizes the differences of the Middle Missouri tradition and result in the development of an overall tree with such a low consistency index. Therefore, to present a clearer picture of descent history, individual traditions will be analysed by cladistic classification techniques.

*Central Plains House Structures*

As briefly discussed above, the Central Plains traditions represent the earliest phases of Plains Villager culture, roughly dating from 900 to 1450 AD. The tradition is characterized by the integration of horticulture into older hunter and gatherer societies (Steinacher and Carlson 1998). During this early period, horticulture was primarily dominated by maize cultivation, although the exact degree of its importance is still very poorly understood. The development of horticulture had significant effects on the material remains of the Central Plains, especially on housing styles. The development
away from mobile tepee structures to sedentary earth lodges is the most characteristic change throughout the Central Plains region, a geographic region that can be most adequately placed within Nebraska and the northern section of Kansas (see figure 19).

The majority of the site data presented here comes from each of the six principal taxonomic units as seen in figure 19.

Figure 19. Principal Taxonomic Units of the Central Plains Tradition (Steinacher and Carlson 1998)

The data from sites within the Central Plains displays the principal components of house structure: a square exterior post pattern, square internal post structure with four primary center posts, and with an area between 250 and 1000 square feet.
The cladogram shows the most distinguishing characteristics of the house structures of the Central Plains, is the relative similarity between all the house structures, and the structural continuity between sites from different geographic and temporal phases. This continuity can also be seen in the high consistency index of the Central Plains groups, measured at 0.7586 with a homoplasy index of 0.2414. It is evident that the consistency index of the Central Plains tradition alone is significantly higher then the index including all three traditions. A central understanding is the Central Plains tradition represents high continuity and descent patterns in the earliest temporal position of all three traditions. In relation to the other traditions, the Central Plains tradition represents a high continuity of the initial cultural and material changes that made up the Plains Villager traditions. The strong descent pattern and continuity of the Central Plains will be further analysed for its influence on later traditions, especially in the development of the initial Coalescent.
Middle Missouri House Structures

The Middle Missouri tradition, as discussed earlier, represents a significant difference in house structure from the other two traditions, a difference clearly demonstrated by correspondence analysis. The geographic region of the Middle Missouri was described by Lehmer (1971) as including the Missouri Valley, from just below the mouth of the White River in South Dakota to just above the mouth of the Yellowstone River in South Dakota, as seen in figure 21. Houses styles within this geographic region and between 1100-1500 AD are considerably different from the Central Plains and Coalescent houses in all character traits.

Figure 21. Middle Missouri Geographic Region and Location of Sites (Winham and Calabrese 1998)
They are characterized by four significant features: a rectangular exterior posthole pattern, a linear or double linear central post pattern, and a living area between 750-1250 square feet. Another interesting characteristic of Middle Missouri houses is a distinct pattern of house entrances facing towards the southwest, regardless of orientation of resources, such as rivers in the area. The descent relationships between these Middle Missouri houses can be seen in the tree, figure 22.

The cladogram shows that a different structure of relationships exists within the house styles of this tradition. Most significantly, there exists a more distinctive branching pattern between house structures, showing that a larger number of evolutionary events have taken place.

Figure 22. Cladogram of House Structures from the Middle Missouri Tradition
However, these events, represented by branches of the trees, do not coincide with the temporal scale of the sites. The Initial Variant houses located furthest down the tree branches in a descendent position with Extended and Terminal Variant houses, i.e. the Dodd C, Cannonball B, Huff, and Shermer sites displaying ancestral relationships.

An interesting idea develops from the use of this interpretation in correlation with the house tree of all three traditions. Within the tree containing all traditions, the closest relationship existing between the Middle Missouri houses and other houses is with a branch that displays Coalescent tradition houses. The broad interpretation of this trend seems to indicate that the initial development of the Middle Missouri represents the introduction of a lifestyle or house style not ancestral to the region, implying a migration of peoples into the area. Through the period of the Middle Missouri, a slow evolutionary change away from Middle Missouri housing styles towards a more definitive Central Plains or Coalescent is evident. The idea of such a population migration of population for explaining the variation present in the Middle Missouri will be discussed in greater detail below.

Coalescent House Structures

Coalescent tradition houses represent the most recent houses of the three traditions. Despite the presence of the Middle Missouri tradition, the Central Plains and
Coalescent cultures have typically been most strongly associated with a strong descent relationship with Central Plains groups, however, located geographically within the Middle Missouri region. Archaeological evidence from Coalescent houses does display some similarities to Central Plains artefacts, but there are also some large differences, most significantly the differences between the Initial and Extended Variants. House structures during the Initial Variant display strong tendencies towards external square structures, typically with rounded corners, square internal post structures usually with four center posts, and house sizes between 1000-1500 square feet. Extended Variant, houses on the other hand, are typically circular external structures, with a combination of circular and rectangular internal post structure, and a size that is either quite large, over 2,000 sq. ft., or quite small, under 750 sq. ft. The cladogram developed from this data shows this dichotomy between the variants quite well.
The structure of the tree places many of the later, extended sites together in the bottom section of the tree, with Initial Variant houses grouped together in the upper section. An investigation into specific archaeological differences between the variants of the Coalescent tradition, however, is deemed beyond the scope of this dissertation. Rather, the descent relationship between the Central Plains and the specific variants of the Coalescent tradition will be considered through cladistic analysis.

**Overall Interpretations of Descent Relationships in the Plains Village Traditions**

The analysis of archaeological evidence involves methods that explicitly use archaeological remains to infer the descent relationships between house styles, with are then used to understand the evolutionary changes of culture in the three major traditions. The use of archaeological evidence is crucial in understanding issues of cultural
continuity through time, since ethnographic evidence provides merely a snapshot of
culture. The two issues of cultural continuity that are most prevalent within the Plains
Villagers traditions, are the ancestor/descendent relationship between the three traditions
and the possibility of the Middle Missouri as representative of an area of individual
innovation, or of other cultural disruption such as the migration of a non-plains group. In
order to respond to such issues, it is necessary to integrate an evolutionary approach that
sees culture in terms of its descent relationships. The results and interpretations here
include only broad interpretations of the major issues involved, as surely much more
work is needed to clarify such issues, and future research will be discussed in detail later.

In light of the major issues concerning the Plains village tradition, and the
methods used to analyse archaeological evidence, a few major interpretations can be
supported. First, the Middle Missouri tradition represents a distinct material difference in
house structures that appears not to have any correlations with prior traditions throughout
the Plains area. The origins of the Middle Missouri appear to loosely establish the claim
of a migration of peoples into the region. However, a closer inspection of multiple
archaeological remains is required, and the local innovation of differential housing
structures should not be ruled out as a possibility.

Another concept in relation to the development of Middle Missouri origins is the
possibility of the gradual change of house styles as a result of the outside influence of
Central Plains and Coalescent traditions. However, the only basis for this claim lies in
the relationship between the branches present in the tree with all three traditions. The
tree shows that the closest relationship existing between Middle Missouri houses (DoA to
JT) and any others is between a combination of Initial and Extended Variant Coalescent
sites. It can only be tentatively hypothesized that this process of gradual acculturation represents a distinct non-Plains migration group settling within the Middle Missouri and slowly being influenced by surrounding groups. If local innovation is proposed as the cause of variation in the Middle Missouri, one would expect a life history pattern of increasing and decreasing artefact frequency, commonly called the ‘battleship curve’. A more in depth analysis is needed to identify such artefact patterns, however, before a definitive answer can be given.

The second key issue in discussions of cultural continuity in the Plains Village tradition is the question of continuity between the Central Plains and Coalescent periods. This issue, however, is not new to Plains Archaeology and was originally developed by Strong’s statement (1940 in Johnson 1998) that the Arzberger site represented an Upper Republican-like occupation, and the notion was again reinforced by authors such as Spaulding (1956). However, speculations about Coalescent origins have not always been supported by adequate material data. However, the individual analyses of traditions discussed above did not explicitly address this problem and therefore, a cladistic analysis of Central Plains and Coalescent sites together was performed in order to gain a better understanding of the possible continuity between the two. The resulting tree diagram, figure 25, is presented below.

The cladogram presents a complicated picture of descent relationships, between the two traditions. For the most part groupings of individual traditions and variants are present, such as the Arzberger, through Crow Creek sites representing the Initial Varient, Over’s La Roche and Like-A-Fishhook as Extended and Post-Contact Variants, and Holdredge through Patterson as Nebraska phases.
Figure 25. Cladogram of Central Plains and Coalescent House Sites

Similar to previous trees, the Central Plains sites maintain their small degree of branching, or minor evolutionary changes. This minor degree of evolutionary changes may indicate this as the ancestor tradition, whereas the more distinctive branching processes of the Coalescent possibly indicates a higher degree of evolutionary change, due to the possible descent relationship it might have with the Central Plains. The consistency index, however, proves to be relatively ambiguous in showing strong descent relationships, with a value of .4697, which is a relatively low index but clearly higher than the index obtained with the inclusion of the Middle Missouri. The comparison of
the consistency indexes of the tree of the Central Plains and Coalescent traditions, and the all traditions tree, gives insight into another particular debate within Plains Village tradition, namely, that the Coalescent tradition does not clearly represent a blending of the Central Plains and Middle Missouri traditions. The Middle Missouri is indicative of a distinct cultural entity that is possibly influenced by both the Central Plains and Coalescent traditions, although the blending of the Middle Missouri and Central Plains to create a hybrid cultural tradition, the Coalescent, does not seemed to be supported by any of the analyses done here. Either way, in future research a more definitive answer will be provided by the inclusion of a variety of artefacts, in addition to house styles, in cladistic analysis. It is hoped, however, that the analyses done here will spur others to examine this Central Plains and Coalescent descent issues.

**Final Conclusions and Aims of Future Research**

Presented throughout this dissertation has been approach which can develop new insight into cultural ideas that have long been insufficient for studying Great Plains cultural groups. To present an approach that allows archaeologists to explicitly use methods to identify cultural similarities and differences and measure cultural change through time. These methods and approaches are critical to interpret study areas such as the Plains, where lack of theoretical discourse had led to explanations limited to the confines of commonsensical and processual paradigms. Darwinian approaches present a new source of methods and theories that can provide archaeologists to understand cultural change through time. Theories that investigate culture as more then an adaptive response to ecological stimuli, and understand culture and its role in an inheritance system.
Understanding culture in an inheritance system advances research into the descent relationships of artefacts and culture, and can therefore adequately analyse cultural continuity, or lack of it, through time.

In the situation of the Great Plains, notions of cultural continuity have not effectively been analysed. Unsupported ideas developed from cultural historians have remained within the theoretical framework of Plains archaeology and have thus caused an implicit notion of cultural similarity. These notions can be mirrored in the statements describing the dichotomy between Plains Villagers and Plains Nomads, as a “deceptive practice that masks man deep-rooted and essential similarities that they shared. Plains horticulturalists practiced a lifeway as ancient as that of their nomadic neighbors, and one that drew on many of the same antecedents.” (Wood 1998:9). Using methods such as correspondence analysis and cladistics, which directly attempt to identify cultural similarities and descent relationships, it becomes clear that major differences between the cultures of the two groups are present. Through the ethnographic data, major differences are shown between the two groups in within multiple ethnographic traits, i.e. family and kinship, house, subsistence, social stratification, and labor division by sex. Through the archaeological data Plains Villager groups, especially those associated with the Middle Missouri tradition, can be seen through house structure data to have a distinct historical tradition that does not correlate well with and previous Plains tribes, thus not displaying the same antecedents trends discussed by Wood (1998).

The methods and approaches used throughout this research should, however, be seen as only a starting point for further analyses. Analyses that include the incorporation of different artefacts forms and styles that can also enhance ideas of cultural similarities
and cultural change through time, as well as the further analysis of the wide array of ethnographic evidence to understand the regional process of interaction present during the historic and post-contact periods. However most importantly further analysis involving spatial analysis and interpretations of cultural lineages between Middle Missouri cultures and Eastern Culture groups is needed. Spatial analysis is most needed to understand the geographic influences between Central Plains and Coalescent tradition sites, with focus questions on whether Initial Variant Coalescent sites are more closely representative of Central Plains sites. Second, cladistic analysis of Middle Missouri house structures as well as other artefacts, need to be correlated with houses and artefacts with cultural groups from the east. In response to the latter analysis, evidence of local innovation of cultural patterns should also be looked at by identification of frequency patterns of artefacts throughout Middle Missouri sites, looking for the ‘battleship curve’ which could possibly indicate the full life-histories of locally produced artefacts.

While these future analyses are important in providing depth to this research, it should be realized the important elements that can be provided through an evolutionary approach and methods. The Great Plains provides archaeology with an incredibly diverse study area in which plains archaeologists should not shy away from new approaches methods that can provide insight into problems that have long plagued our discipline. With open minds we can provide the quality interpretations in which the Great Plains is deserving of.
Appendix A
Traits and Character States of Ethnographic and Archaeological Data

Figure 1- *Ethnographic Atlas* (Murdock 1967) Traits and Character States

Presence/Absence Traits and Character States

*Family and Kinship*

Mode of Marriage
001-Bride-price/Bride Wealth
002-Gift Exchange
003-Bride-Service
004-Token Bride Service

Family Organization
005-Large Extended Families
006-Small Extended Families
007-Independent Nuclear Families
008-Independent Polygynous Families, polygyny is general, not preferentially sororal
009-Independent Polygynous Families, polygyny is common, preferentially sororal

Marital Organization
010-Ambilocal
011-Matrilocal
012-Patrilocal
013-Uxorilocal
014-Virilocal
015-differential rules for first year of marriage
016-presence of other subordinate system

Community Organization
017-Agamous Community
018-Demes
019-Exogamous
020-Segmented communities

Patrilineal Kin Groups
021-Moieties
022-Sibs

Matrilineal Kin Groups
023-Phratries
024-Moieties
025-Lineages of Modest size

Cognatic Kin Group
026-Bilateral descent, absence of ambi, matri, patri, kin groups kindreds
027-Bilateral descent with specifically reported kindreds

Cousin Marriage
028-Duolateral Cross Cousin Marriage
029-Matrilineal Cross Cousin Marriage
030-Nonlateral Marriage-first cousins
031-Nonlateral Marriage-no first cousins, second cousins

Kinship Terminology for Cousins
032-Crow
033-Hawaiian
034-Iroquis

Succession to the office of local headman
035-Nonhereditary through informal consensus
036-Nonhereditary through influence
037-Hereditary through son
038-Hereditary through patrilineal heir, with precedence over a son

Inheritance of Real Property
039-Patrilineal inheritance by a son/sons

Inheritance of Mobile Property
040-Inheritance by children of either sex or both
041-Inheritance by children, but daughters receiving less
042-Matrilineal inheritance by a sister’s son/sons
043-Inheritance by matrilineal heirs who take precedence over sisters’ sons
044-Patrilineal inheritance by son/sons

Subsistence Economy
Gathering of Wild Plants and small land fauna
045-6-15 percent dependence
046-16-25 percent dependence

Hunting
047-6-15 percent dependence
048-16-25 percent dependence
049-26-35 percent dependence
050-36-45 percent dependence
051-46-55 percent dependence
052-56-65 percent dependence
053-66-75 percent dependence
054-76-85 percent dependence
055-86-100 percent dependence

Fishing, including shellfish
056-6-15 percent dependence
057-16-25 percent dependence

Agriculture
058-6-15 percent dependence
059-16-25 percent dependence
060-26-35 percent dependence
061-36-45 percent dependence
062-46-55 percent dependence
063-56-65 percent dependence

House

Floor Level
064-Ground Level
065-Subterranean
Wall Material
066-Walls made from wood

Shape of Roof
067-Concical
068-Dome Shaped
069-Beehive shaped with pointed peak

Roofing Material
070-Hides or Skins
071-Earth or Turf
072-Grass Leaves
073-Bark

Settlement Pattern
074-Fully Migratory
075-SemiNomadic
076-Semisedentary
077-Compact Relatively Permanent

Social Stratification

Local Mean Size of Community
078-50-99 people
079-100-199
080-200-399
081-400-1000

Jurisdictional Hierarchy
082-2 levels of jurisdictional hierarchy-(nuclear family and extended)
083-3 levels of jurisdictional hierarchy-(nuclear, extended, and clans)
084-political complexity-petty political chiefdoms
085-more complex petty chiefdoms

Class Stratification
086-Wealth distinctions
087-Dual stratification

Slavery
088-Incipient non-hereditary Slavery at present time
089-Incipient non-hereditary slavery practiced at an earlier time

Labor Division By Sex

Leather
090-Females Alone Perform Activity
091-Activity Present by Sexual Differentiation not present

Pottery
092- Females Alone Perform Activity
093- Activity Present by Sexual Differentiation not present

Boat Building
094- Females Alone Perform Activity
095-Males Alone
096- Activity Present by Sexual Differentiation not present
House Construction
097-Equal Participation by both sexes
098- Females Alone Perform Activity
099-Both Sexes, but Female Dominate
100-Males Alone Participate
101-Both Sexes, but Males Dominate

Gathering
102-Females Alone Perform Activity
103-Both Sexes but females dominate

Fishing
104-Equal Participation
105-Males Alone

Animal Husbandry
106-Males Alone
107-Both Sexes, but Males dominate

Agriculture
108- Females Alone Perform Activity
109-Both Sexes, but males dominate

Various Others

High Gods
110-A high god present, but not concerned with human affairs
111-High god present, present, active, and supportive of human morality

Types of Games
112-Games of Physical Skill and Chance

Post-Partum Sex Taboos
113-Short, no more then one month
114-One Month to Six Months
115-Six Months to One Year
116-One Year to Two Years
117-More then Two Years

Segregation of Adolescent Boys
118-Complete Segregation, live with individuals outside nuclear family

Norms of Pre Marital Sex
119-Premarital sex allowed and not sanctioned
120-Premarital sex precluded by early age of marriage
121-Premarital sex freely permitted
122-Prohibited but weakly sanctioned
123-Insistence on virginity, prohibited, strongly sanctioned
Figure 2-Traits and Character States of House Data from Plains Village Traditions

I. Interior post hole pattern
   1. Circular (001)
   2. Square/Rectangular (002)
   3. Linear (003)
   4. Double Linear (004)

II. Number of central post holes
   1. 2 posts (005)
   2. 4 posts (006)
   3. more than 5 posts (007)

III. Exterior post hole pattern (Excluding Entryway)
   1. Circular (008)
   2. Square (009)
   3. Rectangular (010)

IV. Number of exterior post holes (Including Entryway)
   1. less than 10 (011)
   2. 11-20 (012)
   3. 21-30 (013)
   4. 31-40 (014)
   5. 41-50 (015)
   6. 51-60 (016)
   7. 61-70 (017)
   8. 71-80 (018)
   9. 81-90 (019)
   10. 91- >100 (020)

V. Entrance direction
   1. North (021)
   2. Northeast (022)
   3. East (023)
   4. Southeast (024)
   5. South (025)
   6. Southwest (026)
   7. West (027)
   8. Northwest (028)

VI. Number of Hearths present
   1. 0 (029)
   2. 1 (030)
   3. 2 or more (031)

VII. Estimated Size of House Area (excluding entrance)
   1. 0-250 sq. ft. (032)
   2. 251-500 sq. ft. (033)
   3. 501-750 sq. ft. (034)
   4. 751-1000 sq. ft. (035)
   5. 1001-1250 sq. ft. (036)
   6. 1251-1500 sq. ft. (037)
   7. 1501-1750 sq. ft. (038)
   8. 1751- > 2000 sq. ft. (039)
Figure 3-Ecological Traits and Character States of Plains Tribes

Mean Temperature January
001-Below 20 Degrees
002-20.0-32.0 degrees
003-32.1-40.0
004-40.1-50.0

Mean Temperature July
005-60.1-70.0
006-70.1-80.0
007-80.1-90.0

Vegetation Zones

Domain
008-Dry
009-Humid Temperate
010-Polar

Divisions
011-Hot Continental
012-Prairie
013-Temperate Steppe
014-Temperate Desert
015-Tropical/Subtropical Steppe
016-Tropical/Subtropical Desert
017-Subarctic

Province
018-Dry Steppes
019-Steppes
020-Forest Steppe and Praries
021-Steppes and Shrubs
022-Forest-Steppe-Coniferous Forest-Meadows-Tundra
023-Prairies and Savannas
024-Broadleaved Forests, Continental
025-Semidesert
026-Tayga
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<td>AR</td>
<td>Arapaho</td>
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<td>Sarsi</td>
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Appendix B
Diagrams and Abbreviations of House Structures

Figure 1-Abbreviations of House Structure Sites

Central Plains
RW-Red Willow
OS-Owens
HD-Holdredge
MB-Mowry Bluff
TDB-Theodore Davis B
TDC-Theodore Davis C
PT-Patterson
LPC-Little Pawnee Creek
ST-Sweetwater

Middle Missouri
DOa-Dodd A
DOB-Dodd B
DOc-Dodd C
BD-Breeden
SWa-Swanson A
SWb-Swanson B
PH-Pretty Head
LD-Langdeau
JT-Jiggs Thompson
MT-Mitchell
TRa-Thomas Riggs A
TRb-Thomas Riggs B
CBa-Cannonball A
CBb-Cannonball B
BN-Bendish
FHC-Fire Heart Creek
HF-Huff
SM-Shermer

Coalescent
BP-Black Partizan
AZ-Arberberger
CCa-Crow Creek A
CCb-Crow Creek B
TCa-Talking Crow A
TCb-Talking Crow B
DM-Demery
OLR-Over’s La Roche
ML-Molstad
BVa-Big Village A
BVb-Big Village B
LAFa-Like a Fishhook A
LAFb-Like a Fishhook B
Figure 2-Example of Central Plains House Structures

Mowry Bluff House 1

Owens and Holdredge Site
Figure 3-Examples of Middle Missouri House Structures

Dodd Site Feature 79

Thomas Riggs Site House 1
Figure 4-Examples of Coalescent House Structures

The Arzberger Site House 3

Big Village Site House 2
References

Alex, R. 1973 Architectural Features of Houses at the Mitchell Site Plains Anthropologist, Vol. 18, Pp149-159


1999 *Archaeology of the Patterson Site, Native American Life in the Lower Platte Valley AD 1000-1300*. Lincoln: Nebraska State Historical Society.


1971. *Introduction to Middle Missouri Archaeology*. Washington DC, National Park Service.


