

CULTURE CONTACT AND THE ANALYSIS OF CHANGE IN ARTIFACT ASSEMBLAGES: THE ARIKARA CASE

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ABSTRACT.

The Historic Period presents a useful opportunity to explore the relationship between a variety of historical and social themes and the implications these hold for variability in the material record. During the eighteenth and nineteenth centuries disruptions in Arikara society, on the Northern Plains, were closely connected to the motivations of the fur trade, epidemics, changing resources, and warfare. By defining the implications of a series of "artifact processes", predictable relationships are delineated between the social changes noted from documentary sources and those observed in the archaeological record. The results support the identification of contrasting strategies for cultural survival used by the Arikara, involving both rejection of and capitulation to European pressures. The results also hold implications for interpreting archaeological material variability and processes of culture contact.

The interpretation of material variability is basic to archaeological research and many studies have shown the complexity of the material record (Charlton 1981:151-156). In a significant number of these cases, however, only a rudimentary understanding of the causes or meanings behind that variability has been achieved (Hodder 1978). This paper examines the social implications of diversity and similarity within archaeological assemblages by exploring a case that is well documented both historically and archaeologically. In particular, this study investigates the material consequences of culture contact in the eighteenth and nineteenth centuries among the Arikaras, a North American Plains agricultural group

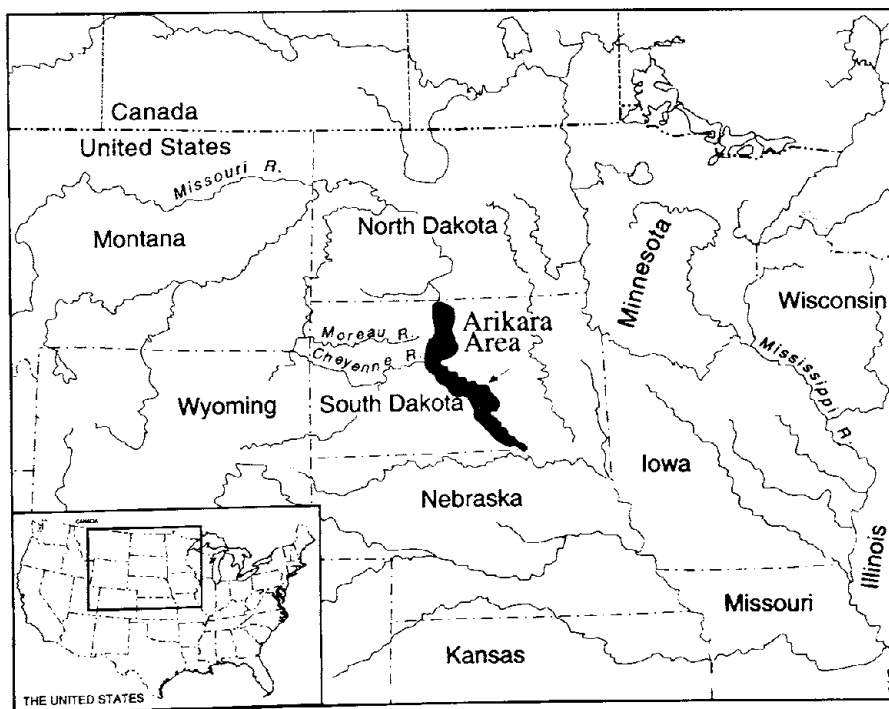


Figure 1. The northern Great Plains showing the region occupied by the Arikara prior to the mid-nineteenth century.

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Two major themes dominate this study: First, the definition of links between social and material change by using the concept of "artifact processes". Essentially, these processes are a series of non-context specific linking arguments about the social/material relationship. Using the "artifact processes" illustrates the potential for identifying predictable linkages beyond the example discussed here. Second, the combination of archaeological and ethnohistorical data to investigate strategies used by native peoples to control or socially mitigate the consequences of contact. In the Arikara case, the archaeological data provides support for alternative native approaches that at different times stressed either cultural revitalization/maintenance or capitulation to European pressures and interests.

In order to investigate these issues, the basic outlines of Arikara history are established for the time ranging from the late-seventeenth to the mid-nineteenth centuries. This historical review emphasizes those elements that patterned the interaction, including changing perceptions of Europeans, economics, epidemics, and other factors. Following the historical overview a set of "artifact processes", or hypotheses, are identified concerning the material implications of the socioeconomic changes evident in different phases of the historical sequence. Finally, the expected relationships are compared with the archaeological data through the identification of an appropriate context and artifactual criteria--in this case, domestic earthlodges and their contents.

Although the objectives of this study are consistent with those of ethnoarchaeology, this work might best be referred to as ethnoarchaeology once removed, or ethnohistorical ethnoarchaeology (e.g., Pyszczyk 1989). This is because it does not deal with a contemporary ethnographic context. Instead, it relies on a historical framework built from many documentary sources, which incorporate a variety of advantages and disadvantages. The most important advantage is that with the richly documented encounters between the Arikaras and Europeans, a history can be constructed that recognizes details of social and economic processes in the contact period. This permits a diachronic view stretching over nearly two hundred years--an opportunity to examine long-term change not available to most ethnoarchaeological investigations. The principal disadvantage is also tied to the historical record; that is, history is to some extent a hypothesis that must be constructed, certainly without the kind of direct observation available ethnographically. Although ethnographic observation has its biases, the historical record introduces an additional layer--those of the original observers--that must be likewise taken into consideration. These biases, however, do not outweigh the advantage of an opportunity to explore changes documented both historically and archaeologically over an extended range of time. As such, the Arikara case provides an excellent opportunity to explore the material implications of social and historical change.

Throughout the first two centuries of contact, trade was the primary reason most Europeans came to the Northern Plains. Certain material implications of this encounter are represented by the changes in the Arikara material assemblages. Like people around the world, Arikara individuals adopted or rejected various kinds of trade goods, such as metal knives, pots, or glass beads, on the basis of their own needs and preferences (Bradley 1987:168). While on a larger scale, the fluctuations in the economics and shared perceptions of the trade process impacted both the availability and demand for European goods (e.g., Bradley 1987:170). It is argued that many European objects were conceptually linked with Arikara perceptions of Europeans (cf. Helms 1988:205). Through time as these perceptions changed so did at least one component of Arikara demand. Other components of Arikara demand, including economic and functional, were tied to other factors, such as profit motivations and the changing availability of new technologies. Each of these factors likewise played a significant role in the patterning of Arikara material change.

AN OUTLINE OF ARIKARA HISTORY

The first step in the analysis is to identify the major elements patterning the history of the encounter. The first direct Arikara contact with Europeans probably came late in the seventeenth century, although written evidence does not verify the encounter until the early eighteenth century (Giraud 1953:330-333; Nasatir 1952:25). While it is almost certain that some trade goods and the effects of epidemic disease (Ewers 1954:436; Ramenofsky 1987) had reached the Arikara villages on the Upper Missouri River prior to direct contact, the actual presence of Europeans in the area certainly added a new dimension to the interaction process. For analytical purposes, the history of Arikara-European interactions is summarized in six periods spanning the time from just prior to first contact through to the incorporation of the Arikara with the Mandan and Hidatsa in 1862 as part of the Three Affiliated Tribes (Cash 1974; Meyer 1977).

Period I (late 1500s-1680) is a prehistoric time frame used as a starting point for the comparison of subsequent introductions of European goods with changes in the Arikara material inventory. Although the Arikara may have already experienced indirect pressures from Europeans, there are indications that Arikara society was relatively stable and that the material inventory did not yet contain any objects of European origin.

Period II dates from 1681 to 1725. It is estimated that the first direct European contacts may have begun in the 1680s and were certainly underway by the 1720s (Hyde 1952:39; Margry 1876-86, 6:455). Although the documentary

evidence for this time frame is meager, certain characteristics of these early encounters can be identified. The early European traders came in very small numbers, and while the Arikara were accustomed to the arrival of trading parties from other native groups (see Ewers 1954:436; Wood 1974:11-13), later sources strongly indicate that Europeans and their trade goods were perceived as having supernatural status and powers (Abel 1932:124, 127; Abel 1939:134, 200-201; Beaugard 1912:24, 39-40, 47; Hall 1879:66; Rogers 1987:76-93). Arikara views of Europeans as having special powers, documented throughout the eighteenth and nineteenth centuries, is consistent with the perceptions held by many, but not all, native societies contacted by drastically different and technologically powerful alien peoples (e.g., Fagan 1984; Sahlins 1985:104-135). As Helms (1988:173) observes of initial contacts, "Europeans almost invariably appeared as manifestations of some aspect of the unregulated 'power outside,' suddenly and often inexplicably made manifest and intrusive into regulated society." Yet, the Arikaras were not so awe-struck that they did not immediately recognize the economic advantages of trading with Europeans, and of controlling the trade between the newcomers and other Indian groups (Berry 1978). Period II was a time of stable trade relations, with both Europeans and Arikaras actively and profitably pursuing their often mutually exclusive goals. Although there is some evidence that the Arikara and other village groups had already suffered from the affects of European introduced epidemics by Period II (Ramenofsky 1987:134), the viability of Arikara society was not yet threatened.

During Period III, 1726 to 1775, the pattern of interaction established in Period II continued. Trade relations remained good and the Arikaras were successfully operating as trade intermediaries with other Indian groups. The primary difference between Periods II and III was the intensity of the contact. Evidence from Period III shows that an ever increasing number of Europeans made their way to the Upper Missouri villages. During this time Arikara access to horses, by 1738 (Burpee 1927:335-337), and guns, around 1750 (Ewers 1954:437) is first documented.

In Period IV, 1776 to 1805, the frequency of contact was once again intensified and there was evidence for the devastating impact of epidemics (Nasatir 1952:299). One account notes the presence of seven Arikara villages in 1785 (Nasatir 1952:109) while by 1794 there were only two villages (Beaugard 1912:28). Such drastic population decline resulted in a disruption of status and other social organizational patterns (Abel 1939:125-126; Beaugard 1912:29; Nasatir 1952:296-298).

Although trade relations remained good, there were indications that the Arikaras found it increasingly difficult to participate in the fur trade. This was a result of declining population, increasing attacks by the Sioux and other groups, depleted fur resources in the area, and the efforts of Europeans to make their way further up-river to more pristine hunting territories (Nasatir 1952:83, 262-263). By Period IV the Arikaras were clearly in a weakened position both economically and in terms of cultural maintenance. Therefore, Period IV is defined as a time of potential collapse and reorientation of the sociocultural system.

In the following decades--Period V--dated 1806-1835, Arikara ability to withstand the mounting pressures experienced in Period IV continued to decline. There was a sharp increase in hostile relations between the Arikaras and Europeans, corresponding with an international decline in the fur market (Orser 1980:161-164) and the successful efforts of traders to by-pass the Arikara villages (e.g., Abel 1932:344; *Missouri Intelligencer* 1822; Wishart 1975:45). The Arikaras could no longer effectively operate as trade intermediaries and for a time abandoned their villages on the Missouri River in favor of residence with the Pawnee on the Loup River (Meyer 1977:281).

By the final period--Period VI--dated 1836 to 1862, the Arikaras had returned to the Missouri River and resumed trade relations, although animosities with European traders remained high. Rather than involving beaver and other "high grade" fur-bearing animals, the trade of the 1830s and later was based on buffalo robes, a resource the Arikaras were in a reasonably good position to obtain. Continuing population decline and virtual domination by the Sioux, however, meant only worsening conditions (De Land 1918:107). By the end of the final study period (VI) the Arikaras were dependent on annuities provided by the U.S. government (Boller 1959:30), and in 1862 were forced into residence with the Mandans and Hidatsas for mutual protection. These three groups remain closely affiliated today.

LINKING ARGUMENTS

The material implications of the above historical outline are constructed here as a series of "artifact processes" designed to express the range of variability that might occur in artifact assemblages under conditions of culture contact. In effect, these "artifact processes" are hypotheses about the cultural change implications of material variability. Five processes are defined: Maintenance, Addition, Replacement, Rejection, and Transformation. Each process is described below as a separate entity; during any one time period, however, there may be multiple processes operating simultaneously.

Maintenance is characteristic of an artifact assemblage that is undergoing relatively little change and is hypothesized to be indicative of a social system experiencing minor disruptive social or economic pressures. Under Maintenance there is relatively little change in the presence/absence or frequency of objects that make up the assemblage associated with a particular context. Maintenance, however, does not preclude possible stylistic changes

within the artifact assemblage. The focus, instead, is on the more readily observable functional (defined broadly) changes that may be linked to shifts in social and economic patterns.

The second process, *Addition*, describes an artifact assemblage that is expanded in scope, but not changed in its basic dimensions. Addition may involve the incorporation of new categories of native-made objects and trade goods, whether European or native in origin. This might include the addition of major items such as the gun, or minor items such as mirrors. But, under Addition these items do not replace already existing categories, instead, they add to the assemblage. An artifact assemblage that is undergoing Addition is hypothesized to be related to a social context experiencing a variety of potential social and economic stresses. These stresses, however are not disrupting pre-existing material usages. That is, the core set of social conceptions of value (however defined) and proper usage are still in operation and the new artifact categories are seen and used in addition to already existing categories.

Replacement, the third process, reflects an artifact assemblage that is undergoing some kinds of change but is remaining stable in general outline. Replacement is viewed as the interchange of equivalents within the assemblage; for instance, the use of glass beads in the place of shell or stone beads. Although Replacement is tied to major changes in the outward appearance of a particular assemblage, through the incorporation of trade items, it is not associated with significant differences in how the objects are used or in how the tool kit relating to a particular task might be constituted. Replacement is assumed to be associated with a social system that is open to major forms of interaction with the contacting group, but is also maintaining the preexisting components of the cultural and economic modes of operation.

While it is well known that in the long run the Arikaras did switch to an almost completely European material inventory, there is no reason to assume that this was an orderly or uniform process, nor is it reasonable to assume that any European object offered in trade was readily accepted. On the contrary, there is ample evidence to indicate selective consumerism by the Arikaras, and other groups in the region, based on changing social and economic considerations (e.g., Abel 1939:72, 171; Boller 1959:302). For their part, European traders knew full well that they must tailor their inventories to local demands. Items that did not meet the fashion of the day or that had little or no relevance for Arikara social and economic objectives were simply not accepted in appreciable numbers. These characteristics lead to the definition of a fourth "artifact process"--*Rejection*. If a culture Rejects some or all of the items offered in trade, then it is assumed to be maintaining coherency through a strategy of "compartmentalization" (Dozier 1961:94; Spicer 1954:666-668, 1961:533). In this way the native culture attempts to minimize disruptive influences by segregating and controlling the sources of potential change. Among several possibilities, this approach might be accomplished by efforts of the chiefs to restrict access to traders, by attempting to redefine the social value of the trade goods themselves, or by conscious efforts to eliminate the trappings of European influence (e.g., Lomawaima 1989:97).

The final process under consideration is *Transformation*. Which is reflected in an artifact assemblage that has undergone substantial change. In the process of Transformation several artifact categories might be added while others are deleted from the assemblage; it is, in effect, a drastic form of change in the material assemblage based on the characteristics of one or more of the "artifact processes" defined above. Transformation is assumed to be associated with a social system that is experiencing extreme pressures and is making major readjustments to those pressures. These readjustments might include significant changes in economic activities, such as an abrupt transition from middleman trading to large-scale bison hunting, or in social relations, such as changes in the basis for status definition. From an archaeological point of view, because of its abrupt nature, Transformation is probably the most easily recognized process.

The "artifact processes", or hypotheses, provide a means to assess the material implications of the historical outline. These hypotheses can be evaluated against the data by providing a series of expectations about which "artifact processes" are associated with each time period (Table 1). While it is possible that, in varying degrees, all of the processes might be in operation simultaneously in any one period, the objective, however, is to identify the processes that serve to characterize each period. Period I is pre-contact and for analysis purposes the material assemblage is assumed to be in a state of Maintenance. Period II is exploratory from the culture contact point of view, and based on the limited historical record for this time frame and available information on the general nature of the initial stages of contact between Europeans and native groups, it may be anticipated that Addition and Replacement will be the dominant processes due to the high esteem given to Europeans and their goods. Good trade relations continue in Period III and it may be anticipated that European goods introduced in Period II will be Maintained as a continuing part of the material inventory, but that the Arikara will also be open to the continually expanding availability of trade materials. The latter will be reflected by the process of Addition.

Periods	Dates	Artifact Processes
VI	1836-1862	Maintenance, Transformation
V	1806-1835	Maintenance, Transformation
IV	1776-1805	Maintenance, Rejection
III	1726-1775	Maintenance, Addition
II	1681-1725	Addition, Replacement
I	1500s-1680	Maintenance

Table 1. Expected Relationship of Artifact Processes to Time Periods.

To some extent, Period IV represents a continuation of the trade activities recognized in Period III, but, as mentioned above, there are increasingly disruptive pressures on Arikara society. There are also abundant indications that the Arikaras associated many of their problems with the arrival of the Europeans. Because of this continuity in trade relations, yet the near crisis in Arikara social viability, Period IV is defined as being characterized by Maintenance and Rejection. That is, there was continuity in native and European items used in earlier periods (Maintenance); for instance, guns, horse gear, metal knives, and other tools had for generations been a routine and expected part of the material assemblage. Rejection of newly introduced European goods, and perhaps some existing types of objects, is also a possibility as part of an Arikara effort to retain social viability and autonomy. If Rejection is part of the sequence of change then it should occur at a point at which the culture retains some viability in the face of mounting pressures.

By Period V social and economic disruptions clearly reached a crisis level and it is expected that the material inventory is characterized by Transformation, although there will undoubtedly be some Maintenance. With the return to marginally normal trade relations in Period VI, yet the disintegration of Arikara autonomy, there will be some continuity, expressed as Maintenance, although Transformation is once again more likely to be the dominant process.

THE ARCHAEOLOGICAL DATA

To evaluate the above expectations a data set was constructed to take into account both contextual and artifactual criteria. For this study the most relevant Arikara archaeological context is the domestic earthlodge. The earthlodge is the principal focus of Arikara everyday life, and reflects the widest range of activities and artifacts. A number of earthlodges were systematically excavated at Arikara sites in the 1950s and 1960s, principally by the Smithsonian's River Basin Survey program (Jennings 1985; Lehmer 1971:17-18). The archaeological evidence typically consists of a circular floorplan defined by a series of perimeter postmolds, usually with four interior supports and an extended post-lined entryway (e.g., Krause 1972; Lehmer 1954). A sample of these buildings (n=69) had a mean diameter of 10.2m and typically contained evidence for a hearth and one or more storage pits.

A series of 19 sites was selected for inclusion in the analysis based on the quality of chronological and excavation controls and the amount of evidence for disturbance through natural or human actions. Additionally, a variety of data characteristics were taken into consideration in assembling the data set, including the effect of differential samples sizes for each period (Grayson 1981; Jones et al. 1983), occupation span, earthlodge size variation, and differences in artifact and artifact category frequencies in each period. Each of these factors is discussed in detail in Rogers (1987:188-189, 196-213). Although there are over 100 completely excavated Arikara earthlodges, the application of the various data controls reduced the size of the usable sample to 65. The sample for Period I contains 10 earthlodges, Periods II, III, and IV each contain 14 earthlodges, Period V includes 9, and Period VI includes 4. Due to small sample size Period VI is not included in the principal portion of the analysis.



Figure 2. The Arikara ceremonial earthlodge as photographed by Edward S. Curtis about 1908. Courtesy of the Smithsonian Institution National Anthropological Archives (No. 76-4338).

The second aspect of constructing the data set is the definition of the actual means of contrasting one period with another. In this case artifact categories and functional category groupings form the basis for comparison. The Arikara and European artifacts recovered as part of the archaeological sample from each of the earthlodges was tabulated as belonging to one of 164 artifact categories. Constraints on space prevent listing the types of objects here; examples include, however, such categories as ceramics, stone pendants, stone knives, bone needles, glass trade beads, various kinds of metal ornaments, iron knives, and metal containers. One aspect of the analysis is based on objects at this category level while another focuses on a series of 25 activity sets, each encompassing one or more of the artifact categories. The activity sets are Straightening, Piercing, Chopping, Digging, Scooping, Abrading, Incising, Pounding, Wedging, Joining, Perforating, Knapping, Cutting, Containing, Grinding, Scraping, Smoothing, Decorating, Drilling, Fastening, Painting, Other Personal Appearance (includes activities associated with beads and miscellaneous adornment objects), Worshiping, Smoking, and Gaming. These activity sets are designed to encompass those behaviors that can be reasonably inferred from the presence of the various kinds of objects, but not necessarily representing the full range of activities associated with an earthlodge. Likewise, not all of the activity sets are actually represented in the sample chosen for study. See Tables 2 and 3 for applicable activity sets.

	Periods					
	I	II	III	IV	V	VI
	No. of Earthlodges					
	10	14	14	14	9	4
Activity Sets						
Containing	1364.9	630.2	1099.7	653.4	506.3	75.0
Scraping	34.0	19.7	21.6	13.4	10.1	0.0
Cutting	31.0	21.9	30.3	14.4	10.8	0.5
Piercing	10.0	3.2	2.4	4.6	3.3	0.0
Abrading	8.8	5.9	12.1	2.9	6.1	0.0
Pounding	4.4	3.3	5.6	4.1	3.3	0.0
Painting	4.4	1.4	3.4	1.4	0.4	0.3
Knapping	3.9	3.1	2.1	3.6	0.10.0	
Perforating	3.9	3.1	2.1	3.6	0.1	0.0
Smoothing	2.6	1.6	4.6	2.3	1.0	0.5
Other Personal Appearance	1.8	0.4	1.9	0.6	0.8	0.3
Chopping	1.1	3.8	1.4	2.2	0.0	0.0
Digging	0.9	1.9	3.7	8.4	2.6	0.0
Worshiping	0.8	0.6	2.2	0.3	1.1	0.0
Grinding	0.8	1.7	2.2	1.0	8.7	0.3
Drilling	0.7	0.6	0.5	0.4	0.0	0.0
Decorating	0.4	0.1	0.1	0.7	0.1	0.0
Gaming	0.3	0.2	0.4	0.7	1.9	0.3
Smoking	0.1	0.4	0.4	0.1	0.4	0.0
Incising	0.1	0.0	0.1	0.1	0.0	0.0
Straightening	0.1	0.6	0.8	0.7	1.4	0.0
Scooping	0.0	0.0	1.1	0.6	0.0	0.0

Source: Rogers (1987:237).

Table 2. Mean Number of Arikara Artifacts Per Period for Activity Sets.a

	Periods					
	I	II	III	IV	V	VI
	No. of Earthlodges					
	10	14	14	14	9	4
Activity Sets						
Containing	0.3	0.1	0.1	0.1	2.7	4.3
Scraping	0.0	1.1	4.4	0.7	11.7	0.3
Cutting	0.0	1.1	5.0	1.1	12.1	7.5
Piercing	0.0	0.1	1.4	0.9	3.3	1.0
Abrading	0.0	0.0	0.0	0.0	0.0	0.3
Knapping	0.0	0.0	0.1	0.1	0.0	0.0
Perforating Other Personal Appearance	0.0	0.0	0.3	0.1	0.1	0.0
Digging	0.0	0.0	0.0	0.0	0.1	0.0
Worshiping	0.0	0.0	0.1	0.0	0.4	0.0
Drilling	0.0	0.0	0.0	0.0	0.0	0.3
Smoking	0.0	0.0	0.1	0.0	0.4	0.0
Fastening	0.0	0.0	0.1	0.4	0.0	0.3
Wedging	0.0	0.0	0.0	0.0	0.3	0.0
Joining	0.0	0.0	0.0	0.1	0.4	3.3

(Source: Rogers (1987:238).)

Table 3. Mean Number of European Artifacts Per Period for Activity Sets.

Defining the relationship between the artifact categories and the activity sets is a crucial step in the analysis, and although it would be ideal to have Arikara ethnographic data on the use of each type of object, such information is only partially available (e.g., Gilmore 1924, 1931). To some extent, therefore, object function must be inferred from ethnohistorical information obtained from neighboring groups or from general archaeological interpretations of object use.

The inferred functions of the artifacts are used to link the objects to specific activity sets. This is a typological process that implies the definition of discrete activity sets, however, many of the activity sets are not, nor should they be, strictly partitioned groupings of artifact categories. In other words, it is quite possible and reasonable that one artifact category might belong to more than a single activity set. For instance, clay pipes are certainly part of the Smoking activity set, but they may also function within the Worshipping set. Similarly, worked flakes might be used for Cutting or Scraping; and bone awls might serve as Piercing, Perforating, or Knapping tools. Such potential overlapping relationships are a common dilemma in the development of classifications. Generally the strategy is to devise a system that minimizes the potential for overlapping. However, given the possibility and even likelihood that objects had multiple purposes, and that it is not always possible to be certain of specific functions, it is more appropriate to acknowledge that artifact categories may belong to more than one activity set and to view this as simply a part of the analytical structure rather than as a specific problem. The solution proposed here is to adopt the overlapping set membership approach as described in studies of the relationship between hierarchical cover sets, emphasizing the interconnected structure of data sets (Atkin 1977, 1978; Chapman 1984:214; Gould 1980). For the present study the principal consequence of following this approach is that analysis at the activity set level does not reflect the same count of objects as at the category level and therefore should be viewed as an "index" for activity set comparisons.

The extent to which any of the time periods can be characterized by one or more of the "artifact processes" is assessed by the simple comparison of Arikara and European artifact mean frequencies in each earthlodge for each period, the visual inspection of data trends, and the relative richness, (i.e., number of separate categories represented), at both the artifact category and activity set levels. Although the use of frequencies may introduce biases, depending on the nature of the depositional process (Cannon 1983:789-790), major sources of sampling error have been taken into consideration, and mean frequencies do offer the advantage of allowing a standardized comparison of each period, plus the potential for assessing trends in usage.

COMPARISON OF PERIODS

Period I (late 1500s-1680) is assumed to be characterized by the process of Maintenance, as far as European material influence is concerned. At the activity set level the Arikara material assemblage of this period contains high frequencies of Containing, Scraping, Cutting, and Piercing tools (Table 2). Also common are Abrading, Pounding, Knapping, Perforating, and Smoothing tools.

In Period II (1681-1725) European objects begin appearing in the Containing, Scraping, Cutting, Piercing, and Other Personal Appearance activity sets, although frequencies are low (Table 3). Contrasted to the increase in European artifacts, there is a decline in the frequency of Arikara objects in the same and other activity sets (Table 2). In several cases the decline in Arikara artifacts is on the order of 50%. This indicates that the process of Replacement is in operation. The fact that the frequency of European goods does not reflect a one-to-one replacement rate suggests that the value or durability of European objects is resulting in a lower incidence of discard. Also, the Arikara position as intermediaries in the trade network may mean that trade goods are cycling through several owners, as part of a middleman effect, eventually ending up with other groups more distant from sources of European goods (Orser 1984; Ray 1978; Toom 1979). In terms of the artifact categories, there is a small decrease in the number of Arikara categories (from 40 to 37), which could be due to chance, but an increase in the number of European categories (from 0 to 9). The latter trend is interpreted as reflecting the process of Addition.

In Period III (1726-1775) there is a rebounding of the frequency of Arikara objects making up several of the activity sets, and although there is some Replacement going on, the fact that there is continuity in many of the Arikara objects suggests that Maintenance is the dominant process. At the artifact category level the number of native categories increases by 17 over the number represented in Period II (from 37 to 54). There is also a substantial rise in the number of European categories (from 9 to 24). These changes indicate that the process of Addition plays a major role in the observed changes.

Period IV (1776-1805) provides some interesting contrasts to the earlier periods (Tables 2 and 3). Although minor increases appear in the frequencies of objects making up some activity sets, decline is far more prevalent. At the artifact category level there is a major decline (63%) in European objects and a moderate decline (17%) in Arikara

objects. While the reduction in the number of Arikara categories might be within the range of variation, the decline in European categories is not. The process of Rejection is clearly indicated.

Period V (1806-1835) illustrates a major departure from the Period IV pattern in that there are sharp declines in the frequency of Arikara materials and sharp increases of European materials, both at the activity set level. In three instances--Containing, Piercing, and Other Personal Appearance--the decline in Arikara objects is paralleled by an increase in European objects, suggesting the process of Replacement. There is a small decrease in Arikara materials (7%) at the category level but a strong expansion in the number of European categories (66%), indicating Addition. Although both of these processes characterize the observed changes, the drastic nature of the alterations in the assemblage signify that the process of Transformation best describes Period V.

In the final time frame, Period VI (1836-1862), the size of the available earthlodge sample (4) is inadequate for useful comparison; in addition, the lodges that do make up the sample are known to have been occupied for only a few months in 1862 and therefore do not represent comparable occupation spans with other earthlodges in the sample (Metcalf 1963). Even so, it is worth noting that the Period VI sample is the only one for which several categories of European goods are actually more numerous than Arikara items. This seems to reflect a trend, also apparent in the historical documents of the nineteenth century, away from native products and towards a more nearly total use of European manufactures.

INTERPRETING THE COMPARISONS

In general, analysis of the archaeological data provides confirmation for the expectations in Table 1, indicating that the historical changes are mirrored in the archaeological record. Only in Period IV, where it was anticipated that Maintenance would be one of the dominant processes, were the expectations not fulfilled. In this period Rejection far more accurately characterizes the changes evident in the material assemblage, considering the sharp decline in the variety and quantity of European items.

Throughout the chronological sequence the results provide a useful indication of the relationship between historical and material change. In post-contact periods II and III, the incorporation of European goods into the material inventory was common, and tended to verify the trend typically believed to characterize contact period changes--with availability, the frequency of European goods increases as the frequency of native goods decreases. While this assumed relationship has been a staple for dating historic and proto-historic sites, there is a growing awareness of the complexities that may produce significant discrepancies in the simple assumption of an inverse material relationship (e.g., Ray 1978). The patterns evident in Periods IV and V, in particular, highlight some of these discrepancies. In Period IV (1776-1805), the frequency and variety of European goods declines significantly over levels from previous periods, even though there are no documentary indications of a reduction in the availability of these goods or a decline in Arikara purchasing power. If anything, the increasing presence of Europeans, arriving in major expeditions, along with Arikara accessibility to furs should indicate an expansion in trade good availability.

Considering the importance of this reversal of earlier trends the possibility of sampling error was reconsidered. Several aspects of the data were examined, including the effects of using different earthlodges in the sample, comparison of artifact frequencies from earthlodges in each of the villages making up the sample, and an evaluation of general data parameters with other periods. None of these factors produced any evidence that the Period IV results might be in error (see also Rogers 1987:252-258).

Given the results and the known historical information, the material changes are interpreted as indicating a shift in Arikara perceptions of the trade process plus the adoption of a different strategy for coping with the ongoing social and economic crisis. As indicated in the historical outline above, Period IV is a time of mounting pressures and the point at which long-term disruptions become a real possibility. The shifts in the material inventories seem to indicate an Arikara attempt to strengthen or return to a more nearly traditional form of material usage, implying efforts to mitigate the consequences of European contact by imposing some form of control over at least the material agents of change (e.g., Lomawaima 1989:97; see also Bradley 1986; Thomas 1985:155). This process may reflect an attempt to "compartmentalize" European influences, as mentioned above. Certainly, if the strategy was to eliminate all European goods, the effect was not total. Many items remained as accepted and necessary.

Period V (1806-1835) offers a useful contrast to the circumstances of Period IV. By the first decade of the nineteenth century there is documentation confirming this was a time of drastic social and economic disruptions. Arikara trade connections were breaking down and strong indications of decline in purchasing power appeared (Orser 1980:161-164). This was also when the most drastic changes occurred in the Arikara material assemblage: specifically, large increases in the quantity and variety of European goods. The fact that the Arikara used more European goods at a time when the historical record points to the opposite is an indication of the role played by Arikara motivations in the overall process. This wholesale adoption of European goods is a reversal of the strategy employed in Period IV and indicates a process of social redefinition brought on by a decline in Arikara autonomy and cohesiveness. The fact that European goods began to be used in this period as status indicators in burials is further

evidence of the reorientation of the social environment (O'Shea 1984:277-278; Rogers 1987:282-285). The shift to European goods in domestic earthlodges and burials is interpreted as a reflection of the breakdown in the traditional forms of social control that operated in previous periods. The meager archaeological, but strong historical evidence from the final period (1836-1862) also tends to support a continuing pattern of social breakdown.

CONCLUSIONS

This study presents a means of exploring the relationship between sociohistorical trends and material change. The results indicate (1) a strong connection between major social changes and related fluctuations in the archaeological record, thereby providing an explanatory tool for investigating this basic relationship in other culture contact situations; (2) the complexity of the connection and the necessity of considering the interactive nature of cultural, social, economic, and demographic factors; and (3) the complementary nature of archaeological and documentary data sources. In the Arikara case it was possible to combine a variety of information in the development of a historical outline of culture contact and interaction on the Upper Missouri. With the benefit of the historical record the archaeological data could then be used to help reveal the contrasting strategies (especially in Periods IV and V) employed by Arikaras in dealing with Europeans.

As Adams (1979) and others (Charlton 1976; Tschopik 1950) have illustrated, the social change/material change link can not be defined on the basis of variation in one or even a few categories of objects. Nor by examining only the formal attributes of artifacts. To search simply for correlations in this manner over long periods of time does little to aid in understanding the factors accounting for change. For instance, it is often assumed that the relative quantity of European artifacts in a site assemblage is an index of acculturation. The fact is, however, that the forms of objects and the materials used may change yet their cultural value and function may remain the same (see Bradley 1987:174; Orser 1989:25; Wilson and Rogers 1993). This realization is most evident here in the early contact periods in which the process of Replacement is associated with a viable and fully functioning social system.

As an alternative to looking simply for correlations, this study uses a series of hypothesized "artifact processes", as a device for exploring links with the historical record. While it might be tempting to apply these processes uncritically to other culture contact situations, or simply use the processes as material correlates of a particular type of social change or condition, caution must be employed. Yet, even with restrictions and the difficulties of identifying an adequate data base, there is a notable potential for investigating the validity of the "artifact processes" described here, and perhaps other similar processes, in a variety of culture contact situations.

Other archaeological and ethnohistorical studies of the contact period are also exploring the nature of the relationship between material and social change (Pysczyk 1989), and the strategies employed in the contact process as a dimension of more general patterns of culture change (Gelburd 1978; Gasco 1993; Waselkov 1986). Archaeology is expanding its contributions to historical research by providing not only the opportunity to verify the documentary record, but also by adding new interpretive dimensions. Trigger (1982) has argued that in many cases archaeology represents the primary source of new information in the historic period. At the operational level, the new interpretive dimensions must be supported by the examination of specific contexts and the use of a wide range of archaeological information (e.g., comparison of a variety of contexts and artifact categories or attributes). For now, whether examining a prehistoric or historic context, research into the social/material link should be conducted under tightly controlled conditions. This is more likely to produce useful, although perhaps less dramatic results.

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