LATE PERIOD CERAMIC RIM ATTRIBUTE VARIATION IN THE CENTRAL MISSISSIPPI VALLEY

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Using data from over 7,000 ceramic rim sherds from late period sites in the central Mississippi Valley, geographic and temporal variation in attribute frequencies are examined. These data indicate that variation in the late period archaeological record of the region is much greater than is suggested by traditional phases, the formulation of which was based on ceramic type frequencies. The analytical results suggest that an attribute-based approach to ceramic variability offers considerable potential for refining and revising our understanding of the late period in the study area and beyond. Moreover, the findings suggest that ceramic analysis utilizing only type or type-variety designations masks important cultural relationships.

Discussion of variability in the post-500 BC archaeological record of the central Mississippi Valley (Morse and Morse 1983) traditionally has focused on relative frequencies of ceramic types in surface-collected assemblages, which have been used as the basis for sorting site components in time and space (Phillips et al. 1951) and, more recently, for grouping sites into culture-historical phases (Phillips 1970; see also Mainfort 1999). Recognizing the limitations of the data, Phillips (1970:862) went so far as to state that the "formation of cultural units is consequently so dependent on [surface-collected] pottery that it is only by courtesy that we can call them 'phases' and speak of the 'cultures' to which they are affiliated. 'Ceramic phase' and 'ceramic tradition' would be more accurate terms but are avoided here in the interests of typographic economy." Phillips was refreshingly honest and open about the limitations of his data and methods, including ceramic typology, as well as his efforts at empirically modeling ceramic type frequency variation over time and space (i.e., the formulation of phases). Many later researchers in the region have been neither so self-reflective nor so explicit about why they assigned sites to particular phases; O'Brien (1995) and Lipo et al. (1997) provide pertinent commentary.

Existing ceramic types in the study area, even with the imperfections readily admitted by Phillips (1970) and Phillips et al. (1951), and less charitably discussed by others (e.g., Fox 1992), perform the purpose for which they were created quite well, namely, documenting variation in site assemblages over relatively long time spans (Griffin 1973:375; Lipo 2001; Phillips 1970:522; Phillips et al. 1951:61–64, 219–223; see also Duff 1996). The use of these same types to create culture-historical units, which are assumed to represent relatively short time spans and have both temporal and spatial dimensions, is less appropriate and probably less successful (Lipo et al. 1997; Mainfort 1999; O'Brien 1995). Moreover, the existing ceramic types have not proven particularly useful in achieving *fine-scale* temporal or spatial resolution (e.g., House 1991:219; see Williams 1980 and Mainfort 1996a).

In a recent evaluation of late period (i.e., late prehistoric and protohistoric) phases in the central Mississippi Valley, I noted that "these groups of sites . . . share virtually all of the current ceramic types used in this analysis and are distinguished by relatively small differences in type frequencies. In short, the picture that emerges is one of considerable stylistic uniformity in ceramics throughout the study area" (Mainfort 1999: 166). The published corpus of whole late period vessels from the region (e.g., Hathcock 1988; Phillips et al. 1951), however, clearly contradicts the impression of uniformity suggested by sherd counts, and I argued that the apparent ceramic uniformity could be a product of the ceramic types used to analyze the sherd collections, not of the sherds themselves. Further, I suggested that application of statistical methods to "explicitly defined modes and motifs . . . would produce a data set from which much more pronounced stylistic differences could be identified between groups of sites in the study area" (Mainfort 1999:167).

Here I make an initial attempt to follow through with this proposed research strategy. Specifically, I examine variation between late period assemblages in the central Mississippi Valley (Figure 1) using ceramic rim attributes or "modes" (Rouse 1960) rather than types. The fundamental question to be addressed is: Do the distributions of ceramic rim attributes reveal heretofore unrecognized geographic and temporal variation in the late period archaeological record of the region? I also discuss the degree of concordance between the distribution of the attributes and traditional type frequencies (i.e., archaeological phases) in the study area. The results presented below suggest that an attribute-based approach to ceramic variability offers considerable potential for refining and revising our understanding of late period temporal and spatial variation in the study area and beyond.

Figure 1. The central Mississippi Valley, showing late period sites used in this study.

Data

Attribute analysis of prehistoric ceramics on a regional scale has been strongly advocated by some eastern North American archaeologists for a number of years (Brown and O'Brien 1990; Finlayson and Pihl 1980; Marois 1978; Pendergast 1980; Ramsden 1977; Wright 1966, 1967, 1974, 1980). These researchers recognize the utility of pottery *types* in establishing the general chronology for a region but argue that "the job of working out the more intricate chronological and spatial relationships can only be tackled by using an analysis of individual ceramic attributes, which are more sensitive indicators of complex patterns of interaction than relatively grossly formulated types" (Ramsden 1977:18). In the Southeast, ceramic attributes figured prominently in Ford's (1952) follow-up to the seminal work of Phillips et al. (1951). Phillips (1970) not only used "'marker' varieties and modes" to "clean up the distributions, changing phase attributions of doubtful components or eliminating them altogether" (534) but also employed modal (albeit not specifically rim modes) analysis in his study of Issaquena ceramics (755–858), particularly those from the Manny site (616–697).

More recently, Ian Brown (1982) published a detailed analysis of check stamped ceramics in which he employed rim modes to achieve better spatial and temporal resolution than could be obtained using only types and varieties (see also Knight 1990:69–71; Mainfort 1994:153–160). Brown (1982:24) observed that the "rim treatments occurring in southwest Louisiana, south Alabama, and northwest Florida are so similar that one suspects the different type names may actually be hiding the cultural relationships," which, as will be seen below, is apropos to late period ceramics in the central Mississippi Valley. Also of note are Rolingson's (e.g., 1998:30–53) detailed descriptions of rim modes at the Toltec Mounds site. Nowhere are the advantages of moving away from strict typological presentations of ceramic data better illustrated than in the American Bottom, where a series of phases characterized by very short time spans have been defined based in large measure on ceramic vessel forms and attributes such as temper, lip form, and rim form (e.g., Emerson and Jackson 1984; Fortier et al. 1991; Holley 1989).

This analysis focuses on late period ceramic rim attributes or modes because their potential spatial and temporal importance has been mentioned by a number of researchers during the last 50 years (e.g., House 1991, 1993; Phillips et al. 1951). Three frequently occurring rim attributes are considered here. First, representing the most commonly mentioned rim attribute in the study area (House 1991, 1993; Griffin 1952:236; Lumb and McNutt 1988; Mainfort and Moore 1998; Phillips et al. 1951), is interior beveling, the defining attribute of which is the "presence of a distinct, angular juncture point between the outflaring lip interior and the vertical rim interior wall" (House 1991:193; see also Mainfort and Moore 1998:119; Figure 2). This definition largely mitigates Phillips's (1970:29) somewhat misplaced concerns about the intentionality of interior beveling; "intentionality" is irrelevant if the attribute can be used to measure time or space. Phillips et al. (1951:116) note that interior beveling is "a Memphis area[1] specialty" (referring to Late Mississippian times) but provide no specific distribution data to support this statement. House (1991, 1993), as well as Mainfort and Moore (1998), have published data indicating that interior beveling is associated primarily with the latest occupations in the study area and increases in frequency over time. In recording data for this study, the degree of interior beveling was recorded as sharp, moderate, and slight (see Mainfort and Moore 1998), though the analysis that follows employs only the presence or absence of beveling, which avoids subjective judgments about degree.

The second rim attribute is the beaded appliqué strip, which equates with "the notched or pinched horizontal rim fillet" mentioned by Phillips et al. (1951:123) and "beaded rim," defined by Steponaitis (1983:71) as "a notched appliqué band, positioned horizontally on the

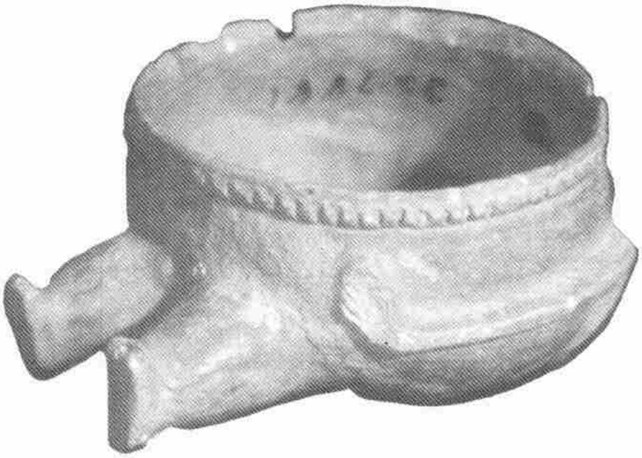

Figure 2. Old Town Red vessel from Upper Nodena with both interior beveling and a beaded appliqué strip.

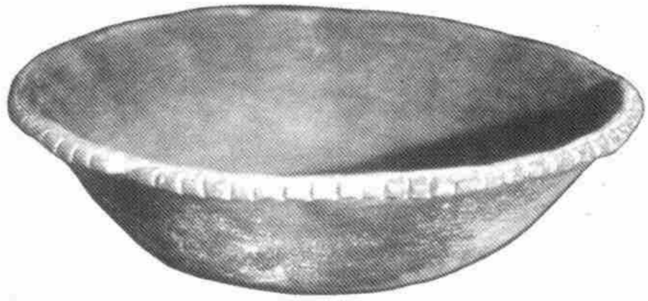

Figure 3. Bell Plain bowl from Upper Nodena that exhibits exterior notching.

rim just below the lip. Usually, the band completely encircles the circumference" (Figure 2). This attribute, like interior beveling, is considered characteristic of late period ceramics in the central Mississippi Valley (cf. Phillips 1970:59). Unlike interior beveling, however, beaded appliqué strips have a relatively broad spatial distribution that extends well beyond the study area, including Moundville (Steponaitis 1983), the Nashville Basin (Ferguson 1972; Trubitt 1998), eastern Tennessee (Lewis and Kneberg 1946:Plate 62), and southern Indiana (Hilgeman 2000).

Exterior notching, the last of the three attributes emphasized in this analysis, refers to closely spaced, short incisions that encircle a vessel immediately below the lip (Figure 3). What I refer to as a "notched lip"—notches placed into the top surface of the lip itself—is rare in the sample analyzed and was recorded as a separate attribute; this treatment does not include exterior notching that may inadvertently extend into the lip itself.

Two additional rim modes, both occurring in very low frequencies, also were recorded, though not used in the analyses below. These are a band of nodes, which "consists of a series of closely-spaced nodes arranged in a horizontal band around a vessel's circumference" (Steponaitis 1983:71), and widely spaced nodes, "in which appliqué nodes are placed individually at wide equidistant intervals around the circumference of a bowl or jar" (Steponaitis 1983:74).

The dataset used for this analysis consists of rim attribute data for 7,195 rims from 55 sites in the central Mississippi Valley, ranging from Otto Sharpe (Lawrence and Mainfort 1995; Mainfort 1996a, 1996b) in the north to the Kent phase area in the south (House 1991, 1993) (Table 1; Figure 1). Traditional culture-historical groups of sites within this area include the Nodena, Parkin, Kent, and Horseshoe Lake phases on the west side of the Mississippi River, and the Jones Bayou, Tipton, and Walls phases along the east side (Mainfort 1999, 2001; Morse and Morse 1983; Phillips 1970; Smith 1990). Some sites used in this analysis, such as Campbell, have very late components and are included in Williams's (1980) Armorel phase or horizon (see also Mainfort 1996a and 2001).

Sample sizes range from 18 (Cheatam) to 473 (Berry). Unless otherwise stated, however, the analyses below include only assemblages with 45 or more rims. While the numbers of rims per site are relatively small in some instances, it is important to realize that the ceramic assemblages required to produce even these counts are quite large. For example, the 203 rim sherds from the Graves Lake site reflect a total ceramic assemblage of 2,751 sherds, the 115 rims from Richardson's Landing were obtained from an assemblage of 1,067 sherds, and the small sample from Dry Arm (n = 30) derives from a total sample of 294 sherds (Mainfort 1999; Mainfort and Moore 1998). Note in this regard that Phillips et al. (1951:223) considered a sample of 50 *sherds* from a site "to be usable," although a sample of 100 was "much better." Lipo (2001:82–84), in an unusually well reasoned discussion of sample size, favors collections of at least 10,000 sherds for late period sites in the study area.

For the analyses that follow, raw counts of rim attribute frequencies for each site were converted to percentage occurrences (Table 2).

Analysis

Despite the comments of Phillips et al. (1951) regarding the chronological importance of beveled rims, subsequent researchers typically have not included tabulations of this—or any other—attribute in discussions of ceramics from late period sites in the study area. A notable exception is House (1991, 1993), who refocused attention on interior beveled rims, which he refers to as the "Memphis Rim Mode," and observed that rims with this attribute are characteristic of post-AD 1450 occupations in the Kent phase area of eastern Arkansas. Moreover, House presented an explicit definition of interior beveling (including illustrations)

Table 1. Rim attribute counts for sites in the study area.

Site	Beaded Appl. Strip	Noded	Widely Spaced Nodes	Notched Top	Notched Exterior	Beveled	N
Starkley	2	1	1	2	7	21	108
Kent	1	0	1	3	4	14	153
Soudan	0	0	0	9	1	2	154
Davis	0	0	0	1	2	2	96
Clay Hill	0	0	0	4	10	19	159
Beck	4	4	0	2	22	42	183
Irby	3	2	2	3	57	48	277
Belle Meade	4	3	1	0	29	44	143
Woodlyn	1	0	0	1	4	10	27
Cheatam	0	1	0	1	1	4	18
Castile Landing	0	1	2	1	0	1	72
Walls	1	0	1	1	8	14	107
Chucalissa	8	1	0	2	11	10	90
Mound Place	2	0	0	1	0	4	48
Young	0	2	1	1	20	38	125
Big Eddy	9	0	0	0	1	14	88
Rose Mound	0	1	0	0	0	2	76
Jeter	2	0	0	0	10	5	61
Parkin	0	0	1	0	4	5	67
Williamson	0	0	0	0	0	2	68
Neely (3CT40)	15	3	3	5	82	44	253
3CT245	2	1	1	0	15	15	57
Bradley (3CT7)	3	1	2	13	77	15	337
Vernon Paul	0	0	1	1	5	3	99
Neeleys Ferry	1	1	0	2	1	1	108
Barton Ranch	0	0	0	1	6	2	102
Rast	6	0	1	2	9	30	102
Fortune	0	0	0	0	0	0	84
Wilder	11	4	1	2	26	51	141
Pecan Point	10	1	0	0	6	8	30
Shawnee Village	2	2	1	2	21	6	133
Richardson's Landing	9	1	0	3	14	27	115
Bell	2	0	0	0	0	8	35
Notgrass	57	7	0	3	23	13	190
Hatchie	12	9	5	3	28	47	140
Middle Nodena	14	0	2	1	41	55	117
Carson Lake	7	3	0	2	41	66	156
Graves Lake	12	3	1	5	31	91	203
Upper Nodena	26	6	1	1	27	29	103
Bishop	9	1	0	0	1	20	32
Porter	12	11	2	3	8	16	111
Fullen	7	3	0	3	19	34	111
Gant	5	0	0	2	15	9	84
Wildy	3	0	1	8	22	3	179
Jones Bayou	14	6	1	1	9	36	96
Sweat	29	2	2	0	12	73	132
40LA17	7	1	0	0	6	16	27
Dry Arm	4	0	0	0	3	13	30
Armorel	29	4	0	6	24	36	141
Knappenberger	36	9	1	8	40	81	219
Campbell	43	0	0	0	37	92	115
Berry	186	0	0	4	77	380	473
Denton Mounds	13	2	0	2	13	49	145
Cagle Lake	54	10	0	2	31	104	273
Otto Sharpe	93	3	7	0	21	237	402

Note: Sites arranged listed from south to north by latitude.

Table 2. Rim attribute frequencies for sites in the study area.

Site	Beaded Appl. Strip	Noded	Widely Spaced Nodes	Notched Top	Notched Exterior	Beveled	N
Starkley	2.0	1.0	1.0	2.0	7.0	19.0	108
Kent	1.0	0.0	1.0	2.0	3.0	9.0	153
Soudan	0.0	0.0	0.0	6.0	1.0	1.0	154
Davis	0.0	0.0	0.0	1.0	2.0	2.0	96
Clay Hill	0.0	0.0	0.0	3.0	6.0	12.0	159
Beck	2.0	2.1	0.0	1.0	12.0	23.0	183
Irby	1.1	0.7	0.7	1.1	20.6	17.3	277
Belle Meade	2.8	2.1	0.7	0.0	20.3	30.8	143
Woodlyn	3.7	0.0	0.0	3.7	14.8	37.0	27
Cheatam	0.0	5.6	0.0	5.6	5.6	22.2	18
Castile Landing	0.0	1.4	2.8	1.4	0.0	1.4	72
Walls	0.9	0.0	0.9	0.9	7.5	14.9	107
Chucalissa	8.9	1.1	0.0	2.2	12.2	11.1	90
Mound Place	4.2	0.0	0.0	2.1	0.0	8.3	48
Young	0.0	1.6	0.8	0.8	16.0	30.4	125
Big Eddy	10.0	0.0	0.0	0.0	1.0	16.0	88
Rose Mound	0.0	1.0	0.0	0.0	0.0	2.0	76
Jeter	3.3	0.0	0.0	0.0	16.4	8.2	61
Parkin	0.0	0.0	0.9	0.9	16.2	11.1	111
Williamson	0.0	0.0	0.0	0.0	0.0	3.0	68
Neely (3CT40)	5.9	1.2	1.2	2.0	32.4	17.4	253
3CT245	3.5	1.8	1.8	0.0	26.3	26.3	57
Bradley (3CT7)	0.9	0.3	0.6	3.9	22.8	4.5	337
Vernon Paul	0.0	0.0	1.0	1.0	5.1	3.0	99
Neeleys Ferry	0.9	0.9	0.0	1.9	0.9	0.9	108
Barton Ranch	0.0	0.0	0.0	0.9	5.9	2.0	102
Rast	5.9	0.0	0.9	2.0	8.8	29.4	102
Fortune	0.0	0.0	0.0	0.0	0.0	0.0	84
Wilder	7.8	2.8	0.7	1.4	18.4	36.2	141
Pecan Point	10.0	3.3	0.0	0.0	20.0	26.7	30
Shawnee Village	1.5	1.5	0.8	1.5	15.8	4.5	133
Richardson's Landing	7.6	0.8	0.0	2.6	12.2	23.5	115
Bell	5.7	0.0	0.0	0.0	0.0	22.9	35
Notgrass	30.0	3.7	0.0	1.6	12.1	6.8	190
Hatchie	8.6	6.4	3.6	2.1	20.0	33.6	140
Middle Nodena	12.0	0.0	1.7	0.9	35.0	47.0	117
Carson Lake	4.0	2.0	0.0	1.0	26.0	42.0	156
Graves Lake	9.4	1.3	0.5	2.2	13.9	44.8	203
Upper Nodena	25.2	5.8	0.9	0.9	26.2	28.2	103
Bishop	28.1	3.1	0.0	0.0	3.1	71.4	32
Porter	9.6	8.8	1.6	2.4	6.4	14.4	111
Fullen	6.3	2.7	0.0	2.7	17.0	30.6	111
Gant	6.0	0.0	0.0	2.4	17.9	9.5	84
Wildy	1.7	0.0	0.6	4.5	12.3	1.7	179
Jones Bayou	14.0	6.0	1.0	1.0	9.0	37.5	96
Sweat	21.8	1.5	1.5	0.0	9.1	55.3	132
40LA17	25.9	3.7	0.0	0.0	22.2	59.3	27
Dry Arm	13.3	0.0	0.0	0.0	10.0	43.3	30
Armorel	20.6	2.8	0.0	4.3	17.0	25.5	141
Knappenberger	16.4	4.1	0.5	3.7	18.5	37.0	219
Campbell	37.4	0.0	0.0	0.0	32.2	80.0	115
Berry	39.3	0.0	0.0	0.8	16.3	80.3	473
Denton Mounds	9.0	1.0	0.0	1.0	9.0	24.0	145
Cagle Lake	20.0	4.0	0.0	1.0	11.0	40.0	273
Otto Sharpe	23.1	0.7	1.7	0.0	5.2	59.0	402

Note: Sites listed from south to north by latitude.

and provided quantitative data on the frequency of this attribute at various sites in his study area. Recognizing the potential importance of House's work for chronologically ordering late period sites, Mainfort and Moore (1998) presented tabulations of varying degrees of interior beveling from a number of sites in western Tennessee and southeast Missouri and hypothesized that several clusters of nearby sites could be ordered temporally based on frequencies of interior beveling.

As shown in Table 3 and Figure 4, the frequency of beveled rims exhibits an intersite distribution that is basically continuous, with the obvious exceptions of Campbell and Berry, at which interior beveling is unusually common. Despite the lack of demonstrable modalities, however, it seems clear that the frequency of beveled rims has both spatial and temporal dimensions. Turning first to the latter, since the association of beveled rims with late occupations has been accepted for half a century, the data presented here generally support this inference. The Campbell and Otto Sharpe sites, both of which have produced European artifacts (Lawrence and Mainfort 1995; Mainfort 1996a, 2001; O'Brien 1994), have very high frequencies of beveled rims, but the situation clearly is not straightforward. For

Table 3. Rim attribute frequencies for sites in the study area, sorted by percentage beveled.

Site	Beaded Appl. Strip	Noded	Widely Spaced Nodes	Notched Top	Notched Exterior	Beveled
Fortune	0.0	0.0	0.0	0.0	0.0	0.0
Neeleys Ferry	0.9	0.9	0.0	1.9	0.9	0.9
Soudan	0.0	0.0	0.0	6.0	1.0	1.0
Castile Landing	0.0	1.4	2.8	1.4	0.0	1.4
Wildy	1.7	0.0	0.6	4.5	12.3	1.7
Davis	0.0	0.0	0.0	1.0	2.0	2.0
Rose Mound	0.0	1.0	0.0	0.0	0.0	2.0
Barton Ranch	0.0	0.0	0.0	0.9	5.9	2.0
Williamson	0.0	0.0	0.0	0.0	0.0	3.0
Vernon Paul	0.0	0.0	1.0	1.0	5.1	3.0
Bradley (3CT7)	0.9	0.3	0.6	3.9	22.8	4.5
Shawnee Village	1.5	1.5	0.8	1.5	15.8	4.5
Notgrass	30.0	3.7	0.0	1.6	12.1	6.8
Jeter	3.3	0.0	0.0	0.0	16.4	8.2
Mound Place	4.2	0.0	0.0	2.1	0.0	8.3
Kent	1.0	0.0	1.0	2.0	3.0	9.0
Gant	6.0	0.0	0.0	2.4	17.9	9.5
Chucalissa	8.9	1.1	0.0	2.2	12.2	11.1
Parkin	0.0	0.0	0.9	0.9	16.2	11.1
Clay Hill	0.0	0.0	0.0	3.0	6.0	12.0
Porter	9.6	8.8	1.6	2.4	6.4	14.4
Walls	0.9	0.0	0.9	0.9	7.5	14.9
Big Eddy	10.0	0.0	0.0	0.0	1.0	16.0
Irby	1.1	0.7	0.7	1.1	20.6	17.3
Neely (3CT40)	5.9	1.2	1.2	2.0	32.4	17.4
Starkley	2.0	1.0	1.0	2.0	7.0	19.0
Cheatam	0.0	5.6	0.0	5.6	5.6	22.2
Bell	5.7	0.0	0.0	0.0	0.0	22.9
Beck	2.0	2.1	0.0	1.0	12.0	23.0
Richardson's Landing	7.6	0.8	0.0	2.6	12.2	23.5
Denton Mounds	9.0	1.0	0.0	1.0	9.0	24.0
Armorel	20.6	2.8	0.0	4.3	17.0	25.5
3CT245	3.5	1.8	1.8	0.0	26.3	26.3
Pecan Point	10.0	3.3	0.0	0.0	20.0	26.7
Upper Nodena	25.2	5.8	0.9	0.9	26.2	28.2
Rast	5.9	0.0	0.9	2.0	8.8	29.4
Young	0.0	1.6	0.8	0.8	16.0	30.4
Fullen	6.3	2.7	0.0	2.7	17.0	30.6
Belle Meade	2.8	2.1	0.7	0.0	20.3	30.8
Hatchie	8.6	6.4	3.6	2.1	20.0	33.6
Wilder	7.8	2.8	0.7	1.4	18.4	36.2
Woodlyn	3.7	0.0	0.0	3.7	14.8	37.0
Knappenberger	16.4	4.1	0.5	3.7	18.5	37.0
Jones Bayou	14.0	6.0	1.0	1.0	9.0	37.5
Cagle Lake	20.0	4.0	0.0	1.0	11.0	40.0
Carson Lake	4.0	2.0	0.0	1.0	26.0	42.0
Dry Arm	13.3	0.0	0.0	0.0	10.0	43.3
Graves Lake	9.4	1.3	0.5	2.2	13.9	44.8
Middle Nodena	12.0	0.0	1.7	0.9	35.0	47.0
Sweat	21.8	1.5	1.5	0.0	9.1	55.3
Otto Sharpe	23.1	0.7	1.7	0.0	5.2	59.0
40LA17	25.9	3.7	0.0	0.0	22.2	59.3
Bishop	28.1	3.1	0.0	0.0	3.1	71.4
Campbell	37.4	0.0	0.0	0.0	32.2	80.0
Berry	39.3	0.0	0.0	0.8	16.3	80.3

example, at Clay Hill, Parkin, and Wildy, all sites with European artifacts (House 1993; D. Morse 1990:77, 82; P. Morse 1981, 1990) percentages of beveled rims are paltry relative to the former sites.

Data from Clay Hill and Parkin, in particular, clearly demonstrate that interior beveling within the study area varies not only over time but also through space. Interior beveling occurs infrequently in the traditional Parkin and Kent phase areas along the St. Francis River, and there is a general trend for the frequency of beveling to increase from south to north within the study area (Figure 5). A simple regression of interior beveling

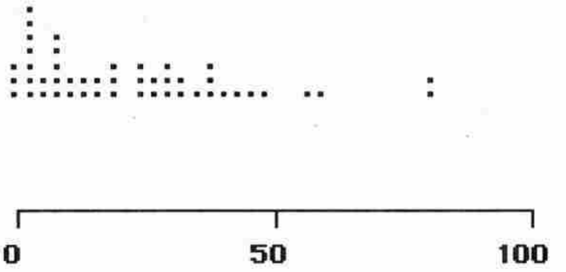

Figure 4. Dit plot of variation in the frequency of interior beveling. Numbers are percentages; dots are sites.

versus latitude, using a dataset that includes only sites at which beveling exceeds 5 percent (n = 36; this condition basically excludes all Parkin phase sites) indicates that this relationship is not strong ($r = 0.632$, $r^2 = 0.400$). Note, too, that interior beveling is very rare—more in line with the Parkin phase area—at Notgrass and Shawnee Village (Table 3), both of which are located in the "core" area of the traditional Nodena phase (D. Morse 1989; Phillips 1970).

The frequency of beaded appliqué strips exhibits a fairly continuous distribution (Table 4 and Figure 6) and appears to increase over time. The highest frequencies in the study area again occur at the Campbell and Berry sites in southeastern Missouri. There is also a high frequency at the circa AD 1650 Otto Sharpe site (Lawrence and Mainfort 1995; Mainfort 1996a, 1996b), but not so high as at Notgrass, which lacks reported European artifacts. The very low frequencies of beaded appliqué strips at Shawnee Village, Carson Lake, and Wildy are noteworthy, as is the pronounced difference in percentages between Upper and Middle Nodena. The relative frequencies at the Porter, Jones Bayou, and Sweat sites in western Tennessee show a progressive increase that is generally comparable, though much less pronounced, than that seen in the frequencies of interior beveling, which may reflect sequential occupations (Mainfort and Moore 1998).

As with interior beveling, the frequency of beaded appliqué strips generally increases from south to north in the study area (Figure 7). A simple regression of beaded appliqué strips versus latitude, using a dataset that includes only sites with 45 or more rims and at which the frequency of beaded appliqué strips exceeds one percent (n = 33), indicates that the relationship is fairly weak ($r = 0.631$, $r^2 = 0.398$). Using the same dataset, a regression of the frequencies of beaded appliqué strips versus interior beveling reveals a slightly stronger relationship ($r = 0.659$, $r^2 = 0.434$), albeit still unconvincing.

Exterior notching varies largely independently of both interior beveling and beaded appliqué strips and does not exhibit a general increase from south to north in the study area (Figures 8 and 9). By far the highest frequencies occur at Middle Nodena (35 percent),

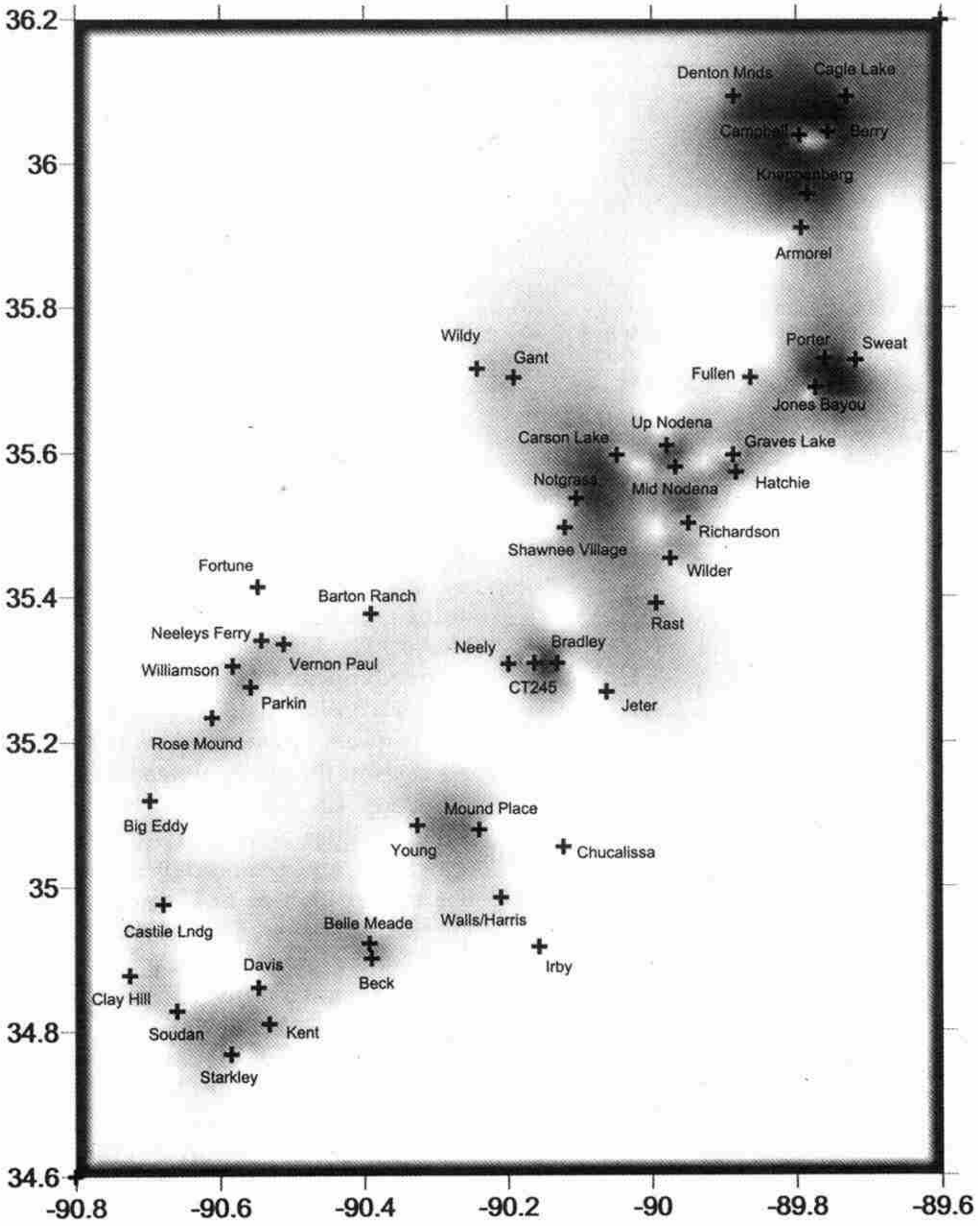

Figure 5. Geographic variation in the frequency of interior beveling. Numbers on axes refer to latitude and longitude.

Campbell (32 percent), and Neely (32 percent), all of which have components attributable to the terminal Mississippian Armorel phase or horizon (Williams 1980). Other very late sites, however, have low frequencies of exterior notching. At Berry, located near Campbell, the frequency is only 16 percent. More striking is Otto Sharpe, perhaps the latest site used in this study (Lawrence and Mainfort 1995; Mainfort 1996a, 2001), with a frequency of only 5 percent. In the small sample of rims from Bishop (Williams 1980) (Table 5), which may be partially contemporary with Campbell and Berry, the frequency is only 3 percent.

Three of the southernmost sites assigned to the Nodena phase—Bradley (3CT7), Neely (3CT40), and 3CT245, which are located in close proximity to each other along Bradley Ridge and which Morse and Morse (1990:209) infer "were contemporary and lasted into the seventeenth century"—present a good opportunity to examine interactions between the rim attributes, as well as similarities and differences among potentially related sites (Table 6). Percentages of interior beveling range from only 4.5 at Bradley to 17.4 at Neely to 26.3 at 3CT245. If the frequency of interior beveling increased over time, this range of variation does not support the Morses' suggestion that the sites were contemporary. Frequencies of beaded rims and exterior notching are fairly uniform between the three sites. Beaded rims occur rarely in all three assemblages (about 1 to 6 percent), with the lowest frequency at Bradley. In contrast, exterior notching is quite common at these

Table 4. Rim attribute frequencies for sites in the study area, sorted by percent beaded applique strip.

Site	Beaded Appl. Strip	Noded	Widely Spaced Nodes	Notched Top	Notched Exterior	Beveled
Fortune	0.0	0.0	0.0	0.0	0.0	0.0
Soudan	0.0	0.0	0.0	6.0	1.0	1.0
Castile Landing	0.0	1.4	2.8	1.4	0.0	1.4
Davis	0.0	0.0	0.0	1.0	2.0	2.0
Rose Mound	0.0	1.0	0.0	0.0	0.0	2.0
Barton Ranch	0.0	0.0	0.0	0.9	5.9	2.0
Williamsnon	0.0	0.0	0.0	0.0	0.0	3.0
Vernon Paul	0.0	0.0	1.0	1.0	5.1	3.0
Parkin	0.0	0.0	0.9	0.9	16.2	11.1
Clay Hill	0.0	0.0	0.0	3.0	6.0	12.0
Cheatam	0.0	5.6	0.0	5.6	5.6	22.2
Young	0.0	1.6	0.8	0.8	16.0	30.4
Neeleys Ferry	0.9	0.9	0.0	1.9	0.9	0.9
Bradley (3CT7)	0.9	0.3	0.6	3.9	22.8	4.5
Walls	0.9	0.0	0.9	0.9	7.5	14.9
Kent	1.0	0.0	1.0	2.0	3.0	9.0
Irby	1.1	0.7	0.7	1.1	20.6	17.3
Shawnee Village	1.5	1.5	0.8	1.5	15.8	4.5
Wildy	1.7	0.0	0.6	4.5	12.3	1.7
Shatkley	2.0	1.0	1.0	2.0	7.0	19.0
Beck	2.0	2.1	0.0	1.0	12.0	23.0
Belle Meade	2.8	2.1	0.7	0.0	20.3	30.8
Jeter	3.3	0.0	0.0	0.0	16.4	8.2
3CT245	3.5	1.8	1.8	0.0	26.3	26.3
Woddlyn	3.7	0.0	0.0	3.7	14.8	37.0
Carson Lake	4.0	2.0	0.0	1.0	26.0	42.0
Mound Place	4.2	0.0	0.0	2.1	0.0	8.3
Bell	5.7	0.0	0.0	0.0	0.0	22.9
Neely (3CT40)	5.9	1.2	1.2	2.0	32.4	17.4
Rast	5.9	0.0	0.9	2.0	8.8	29.4
Gant	6.0	0.0	0.0	2.4	17.9	9.5
Fullen	6.3	2.7	0.0	2.7	17.0	30.6
Richardson's Landing	7.6	0.8	0.0	2.6	12.2	23.5
Wilder	7.8	2.8	0.7	1.4	18.4	36.2
Hatchie	8.6	6.4	3.6	2.1	20.0	33.6
Chucalissa	8.9	1.1	0.0	2.2	12.2	11.1
Denton Mounds	9.0	1.0	0.0	1.0	9.0	24.0
Graves Lake	9.4	1.3	0.5	2.2	13.9	44.8
Porter	9.6	8.8	1.6	2.4	6.4	14.4
Big Eddy	10.0	0.0	0.0	0.0	1.0	16.0
Pecan Point	10.0	3.3	0.0	0.0	20.0	26.7
Middle Nodena	12.0	0.0	1.7	0.9	35.0	47.0
Dry Arm	13.3	0.0	0.0	0.0	10.0	43.3
Jones Bayou	14.0	6.0	1.0	1.0	9.0	37.5
Knappenberger	16.4	4.1	0.5	3.7	18.5	37.0
Cagle Lake	20.0	4.0	0.0	1.0	11.0	40.0
Armorel	20.6	2.8	0.0	4.3	17.0	25.5
Sweat	21.8	1.5	1.5	0.0	9.1	55.3
Otto Sharpe	23.1	0.7	1.7	0.0	5.2	59.0
Upper Nodena	25.2	5.8	0.9	0.9	26.2	28.2
40LA17	25.9	3.7	0.0	0.0	22.2	59.3
Bishop	28.1	3.1	0.0	0.0	3.1	71.4
Notgrass	30.0	3.7	0.0	1.6	12.1	6.8
Campbell	37.4	0.0	0.0	0.0	32.2	80.0
Berry	39.3	0.0	0.0	0.8	16.3	80.3

sites, ranging from 22.8 to 32.4 percent at Bradley and Neely, respectively.

Included in Table 7 are four of the best-known of a dozen or more late period sites located in the Missouri Bootheel (see O'Brien 1994). Based on the presence of vertical appliqué ceramics (O'Brien et al. 1995), various decorative modes, large triangular projectile points, and end scrapers (Price and Price 1990; Williams 1980), these sites "probably offer a firmer basis for positing occupation by a single cultural or ethnic group during the period of circa AD 1500 to 1600" (Mainfort 2001:183) than any other geographically restricted group of late

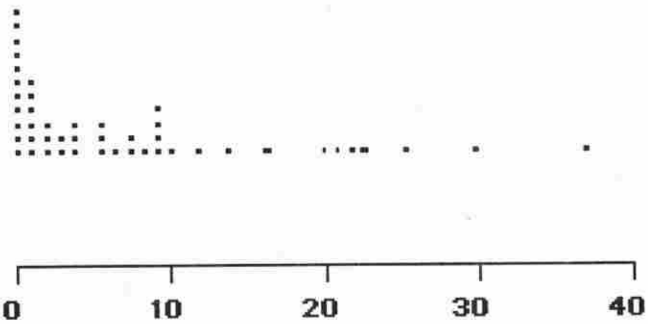

Figure 6. Dit plot of variation in the frequency of beaded appliqué strips. Numbers are percentages; dots are sites.

period sites in the study area. Rim attribute data support the case for cultural-historical relationships between the sites, but also disclose previously unreported ceramic variability. Following discussion by Mainfort and Moore (1998) regarding temporal changes in the frequency of interior beveling, Campbell and Berry are the two latest sites, while Denton Mounds, the only multi-mound site in this group (O'Brien and Williams 1994), is the oldest. Interior beveling and beaded rims covary nicely in the analyzed samples, while exterior notching is much more common at Campbell than at any of the other sites.

Another potentially instructive case is provided by Upper and Middle Nodena, which are interpreted as sequentially occupied sites, with Upper Nodena representing the older (D. Morse 1990:77; cf. Williams 1980). This temporal ordering may be reflected in the frequencies of interior beveling—28.2 percent at Upper Nodena versus 47.0 percent at Middle Nodena. Beaded appliqué strips, however, occur twice as frequently at Upper Nodena, while there is a higher frequency of exterior notching at Middle Nodena.

Data from Upper and Middle Nodena also permit another interesting problem to be addressed, namely, the relationship between the attribute frequencies derived from rim sherds and frequencies of the attributes in whole vessel assemblages (Table 8). The University of Arkansas Museum curates 186 whole vessels from Upper Nodena and 120 vessels from Middle Nodena. All were excavated by museum staff from mortuary contexts in 1932 (Fisher-Carroll and Mainfort 2000; Mainfort and Fisher-Carroll 1996; D. Morse 1989). Thus, the whole vessels represent only a single cultural context from sites occupied for relatively brief period of time (cf. D. Morse 1989:111), while the original context of the sherds is unknowable. Although this is a limitation of the dataset, it is important to bear in mind that such a comparison could not even be attempted at most sites for want of a large sample of whole vessels.

Not surprisingly, the specific percentages of attributes differ between the whole vessels and the rim sherds.

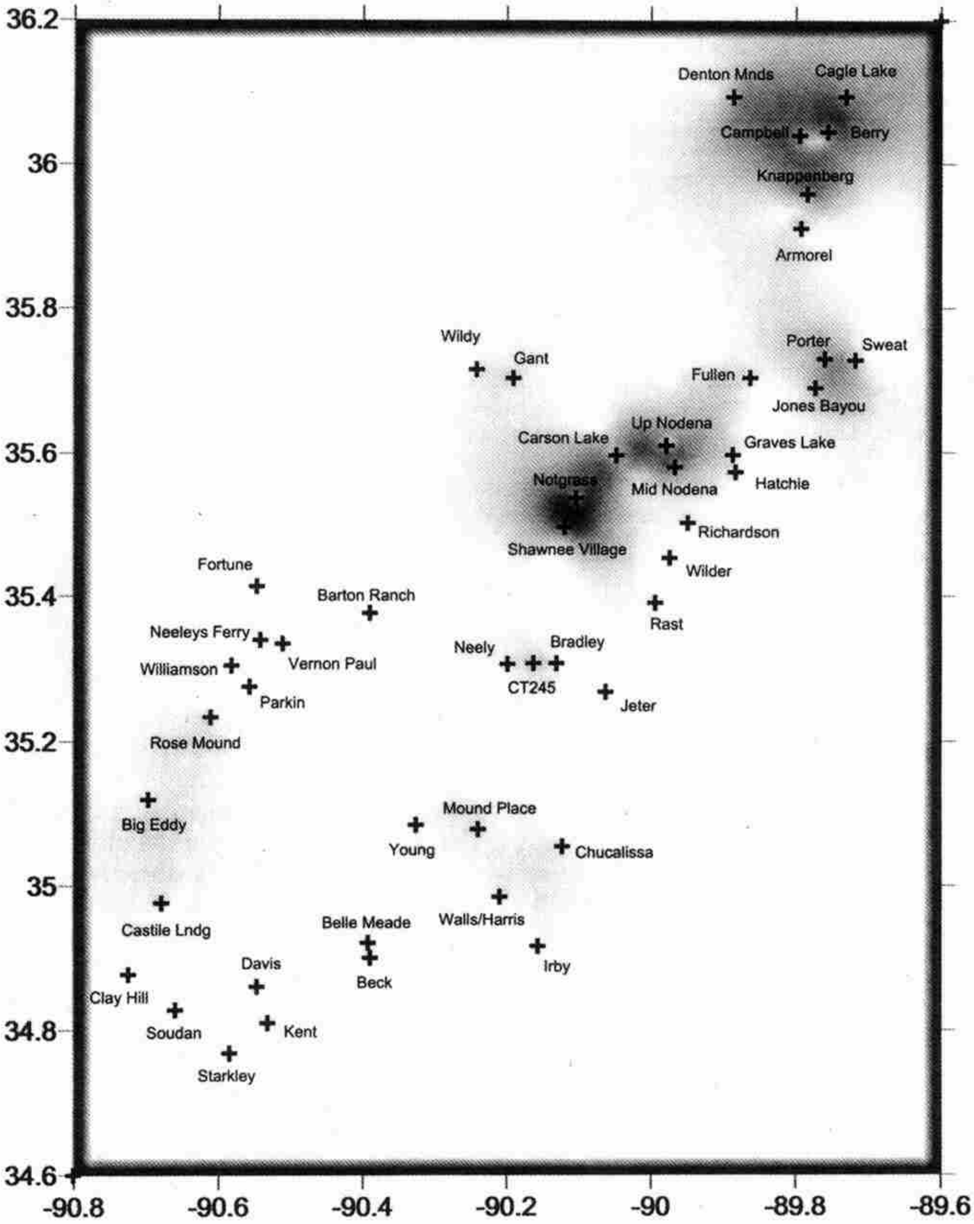

Figure 7. Geographic variation in the frequency of beaded appliqué strips. Numbers on axes refer to latitude and longitude.

Some of the differences are fairly dramatic (e.g., only 7.5 percent of the Upper Nodena vessels have rims with a notched exterior versus 26.2 percent of the sherds). On the other hand, the relative frequencies of attributes between sites are the same—there are higher frequencies of interior beveling and notched rim exteriors at Middle Nodena, while beaded rims are more common at Upper Nodena. A reasonable inference to be drawn from these data is that the surface-collected rim sherds represent a population of vessels that differs from the whole vessels recovered in association with human burials.

Attributes, Types, and Phases

Using all sites previously assigned to a phase and for which data on more than 45 rims were available (n = 47), I performed a discriminant analysis on the dataset to assess the degree to which the original phase assignments of sites, which were based on frequencies of ceramic types, are supported by the rim attribute data. In essence, discriminant analysis assumes that one or more groups (in this case, phases) exist and that the objects (sites) being analyzed belong to one of these groups (Baxter 1994; Huberty 1994; King 1969). Variables used in the analysis were the frequencies of interior beveling, beaded appliqué strips, noded rims, notched exterior, and notched top. Regional phases represented in the dataset are Parkin, Nodena, Kent, Horseshoe Lake, Jones Bayou, Tipton, and Walls. As shown in Table 9, 15 of 47 sites assigned to a phase based on ceramic type frequencies were misclassified. The apparent rate of successful allocation to the "correct" phase probably

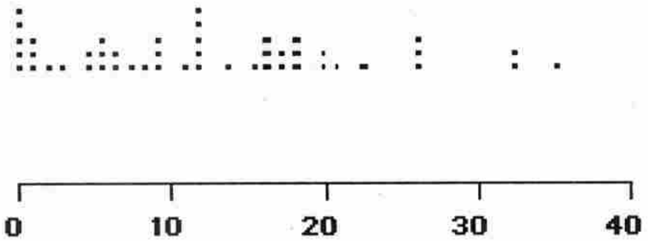

Figure 8. Dit plot of variation in the frequency of exterior notching. Numbers are percentages; dots are sites.

should be regarded as overly optimistic, however, insofar as discriminant analysis, like cluster analysis, will classify all objects into some group even if they are not actually close to one.

A plot of the canonical scores for each site assemblage in discriminant space (Figure 10) suggests that this is indeed the case, as even most of the "correctly" classified sites do not exhibit strong clustering tendencies (see Baxter 1994:187 for an example of reasonably well separated groups). In fact, there is little evidence of any distinct, segregated groups at all. The only exceptions are the sites assigned to the Parkin phase, all of which occur within a fairly compact sector of discriminant space because all exhibit very similar (and very low) frequencies of the rim modes considered here.

Underscoring the high incidence of misclassification shown in Table 9 (7 of 16 sites), sites assigned to the Nodena phase are especially widely distributed in discriminant space (Figure 10), a situation that probably

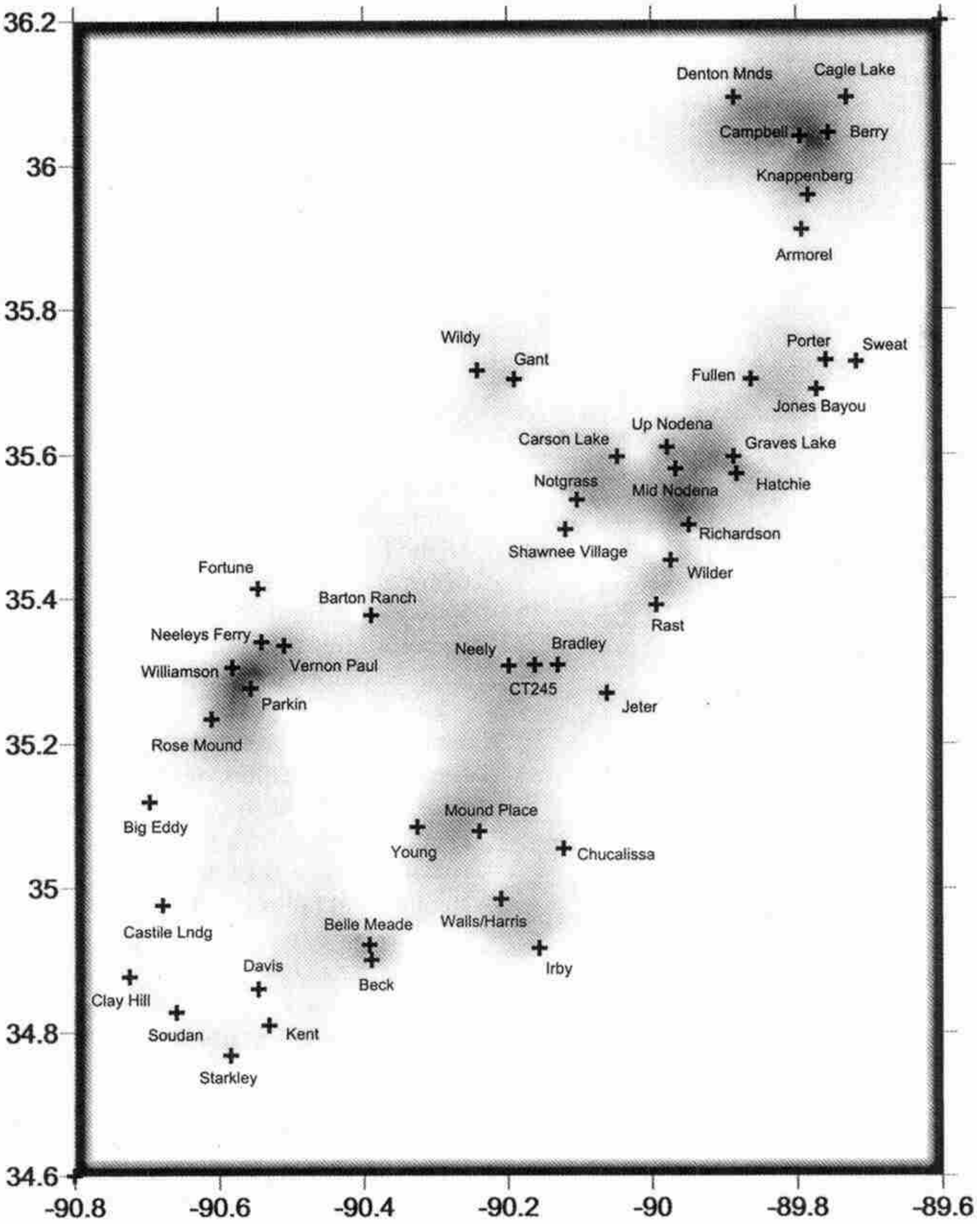

Figure 9. Geographic variation in the frequency of exterior notching. Numbers on axes refer to latitude and longitude.

Table 5. Rim attribute frequencies for sites in the study area, sorted by percent exterior notching.

Site	Beaded Appl. Strip	Noded	Widely Spaced Nodes	Notched Top	Notched Exterior	Beveled
Fortune	0.0	0.0	0.0	0.0	0.0	0.0
Castile Landing	0.0	1.4	2.8	1.4	0.0	1.4
Rose Mound	0.0	1.0	0.0	0.0	0.0	2.0
Williamson	0.0	0.0	0.0	0.0	0.0	3.0
Mound Place	4.2	0.0	0.0	2.1	0.0	8.3
Bell	5.7	0.0	0.0	0.0	0.0	22.9
Neeleys Ferry	0.9	0.9	0.0	1.9	0.9	0.9
Soudan	0.0	0.0	0.0	6.0	1.0	1.0
Big Eddy	10.0	0.0	0.0	0.0	1.0	16.0
Davis	0.0	0.0	0.0	1.0	2.0	2.0
Kent	1.0	0.0	1.0	2.0	3.0	9.0
Bishop	28.1	3.1	0.0	0.0	3.1	71.4
Vernon Paul	0.0	0.0	1.0	1.0	5.1	3.0
Otto Sharpe	23.1	0.7	1.7	0.0	5.2	59.0
Cheatam	0.0	5.6	0.0	5.6	5.6	22.2
Barton Ranch	0.0	0.0	0.0	0.9	5.9	2.0
Clay Hill	0.0	0.0	0.0	3.0	6.0	12.0
Porter	9.6	8.8	1.6	2.4	6.4	14.4
Starkley	2.0	1.0	1.0	2.0	7.0	19.0
Walls	0.9	0.0	0.9	0.9	7.5	14.9
Rast	5.9	0.0	0.9	2.0	8.8	29.4
Denton Mounds	9.0	1.0	0.0	1.0	9.0	24.0
Jones Bayou	14.0	6.0	1.0	1.0	9.0	37.5
Sweat	21.8	1.5	1.5	0.0	9.1	55.3
Dry Arm	13.3	0.0	0.0	0.0	10.0	43.3
Cagle Lake	20.0	4.0	0.0	1.0	11.0	40.0
Beck	2.0	2.1	0.0	1.0	12.0	23.0
Notgrass	30.0	3.7	0.0	1.6	12.1	6.8
Richardson's Landing	7.6	0.8	0.0	2.6	12.2	23.5
Chucalissa	8.9	1.1	0.0	2.2	12.2	11.1
Wildy	1.7	0.0	0.6	4.5	12.3	1.7
Greaves Lake	9.4	1.3	0.5	2.2	13.9	44.8
Woodlyn	3.7	0.0	0.0	3.7	14.8	37.0
Shawnee Village	1.5	1.5	0.8	1.5	15.8	4.5
Young	0.0	1.6	0.8	0.8	16.0	30.4
Parkin	0.0	0.0	0.9	0.9	16.2	11.1
Berry	39.3	0.0	0.0	0.8	16.3	80.3
Jeter	3.3	0.0	0.0	0.0	16.4	8.2
Fullen	6.3	2.7	0.0	2.7	17.0	30.6
Armorel	20.6	2.8	0.0	4.3	17.0	25.5
Gant	6.0	0.0	0.0	2.4	17.9	9.5
Wilder	7.8	2.8	0.7	1.4	18.4	36.2
Knappenberger	16.4	4.1	0.5	3.7	18.5	37.0
Hatchie	8.6	6.4	3.6	2.1	20.0	33.6
Pecan Point	10.0	3.3	0.0	0.0	20.0	26.7
Belle Meade	2.8	2.1	0.7	0.0	20.3	30.8
Irby	1.1	0.7	0.7	1.1	20.6	17.3
40LA17	25.9	3.7	0.0	0.0	22.2	59.3
Bradley (3CT7)	0.9	0.3	0.6	3.9	22.8	4.5
Carson Lake	4.0	2.0	0.0	1.0	26.0	42.0
Upper Nodena	25.2	5.8	0.9	0.9	26.2	28.2
3CT245	3.5	1.8	1.8	0.0	26.3	26.3
Campbell	37.4	0.0	0.0	0.0	32.2	80.0
Neely (3CT40)	5.9	1.2	1.2	2.0	32.4	17.4
Middle Nodena	12.0	0.0	1.7	0.9	35.0	47.0

reflects both the large number of Nodena phase sites included in this analysis, as well as the large geographic extent of the phase. It is interesting to note, however, that the rim attribute data (actually the canonical scores obtained during discriminant analysis) generally segregate Nodena phase sites, which are located along or relatively close to the Mississippi River, from sites to the west, along the St. Francis River, that are assigned to the Parkin and Kent phases. This separation supports a dichotomy noted by Griffin (1952) and even earlier by C. B. Moore (1910:260). Based on both rim attribute frequencies and ceramic technology, sites along the St. Francis River in general can be viewed as participating in a ceramic tradition distinct from sites closer to the Mississippi River. In contrast, the Walls phase, considered by Phillips (1970:936) to be "perhaps the most satisfactory phase dealt with in this entire study," appears rather nebulous in Figure 8, though one of the four sites used in this analysis (Jeter) was assigned to the phase by Smith (1990), not Phillips (1970). Several late period phases proposed for western Tennessee (Smith 1990) also fare poorly.

Table 6. Rim attribute frequencies at Bradley, Neely, and 3CT245.

Site	Beveled Appl. Strip	Beaded Exterior	Notched
3CT245	26.3	3.5	26.3
Neely	17.4	5.9	32.4
Bradley	4.5	0.9	22.8

Table 7. Rim attribute frequencies at Berry, Campbell, Cagle Lake, and Denton Mounds.

Site	Beveled Appl. Strip	Beaded Exterior	Notched
Berry	80.3	39.3	16.3
Campbell	80.0	37.4	32.2
Cagle Lake	40.0	20.0	11.0
Denton Mounds	24.0	9.0	9.0

The structural rules that generate specific combinations of rim attributes, as well as the rules governing the use of rim attributes on specific vessel forms and with specific body surface treatments (traditional types), remain to be defined. This research problem, which could be the focus of several dissertations, can be investigated using the substantial numbers of late period vessels from the central Mississippi Valley curated by various museums (Carroll and Mainfort 1997; Fisher-Carroll 2001; Mainfort and Fisher-Carroll 1996).

Finally, it is worth noting that if analysis of the ceramic rim sherds used here was limited to assigning specimens to traditional type-varieties, the rim attribute data that are the focus of this paper would not have been recorded, much less been used to examine ceramic variability on a regional scale (e.g., Phillips 1970:931). I suggest that failure to record and utilize these data does

Table 8. Comparisons of rim attribute frequencies in sherd collections versus whole vessels from Upper and Middle Nodena.

Site/Data Class	Beveled Appl. Strip	Beaded Exterior	Notched	N
Upper Nodena/vessels	57.0	21.4	7.5	186
Middle Nodena/vessels	63.3	10.8	17.5	120
Upper Nodena/sherds	28.2	25.2	26.2	103
Middle Nodena/sherds	47.0	12.0	35.0	117

Table 9. Classification matrix based on discriminant analysis of ceramic rim attributes.

Site	Parkin	Nodena	Kent	Horseshoe Lake	Jones Bayou	Tipton	Walls	Total
Parkin	8	0	0	0	0	0	1	9
Nodena	0	9	1	1	1	2	2	16
Kent	1	0	4	0	0	0	0	5
Horseshoe Lake	0	0	1	3	0	0	0	4
Jones Bayou	0	0	0	0	2	2	0	4
Tipton	0	0	1	0	1	3	0	5
Walls	1	0	0	0	0	0	3	4
Total	10	9	7	4	4	7	6	47

Note: For sites assigned to the Parkin Phase, 8 are correctly classified and one is "misclassified" (assigned to the Walls phase). Row totals are numbers of sites traditionally assigned to various phases.

considerable disservice to the collections and constitutes not simply "masking" variability but actually ignoring it.

Concluding Remarks

> *In short, we appear to be dealing with a constellation of attributes which possess their own rates of change through time. To force these independent trends into a closed system like the type, is, in my opinion, doing the data a disservice [Wright 1974:243–244].*

The call for reevaluating and perhaps discarding current systematics (e.g., Mainfort 1999; O'Brien 1995) is a challenge that must be met if we are to *explain* variation in the archaeological record of the central Mississippi Valley and elsewhere. The data and analysis presented here demonstrate that late period ceramic variation—both geographical and temporal—in the study area is much more complex than is suggested by traditional regional ceramic typology and phase

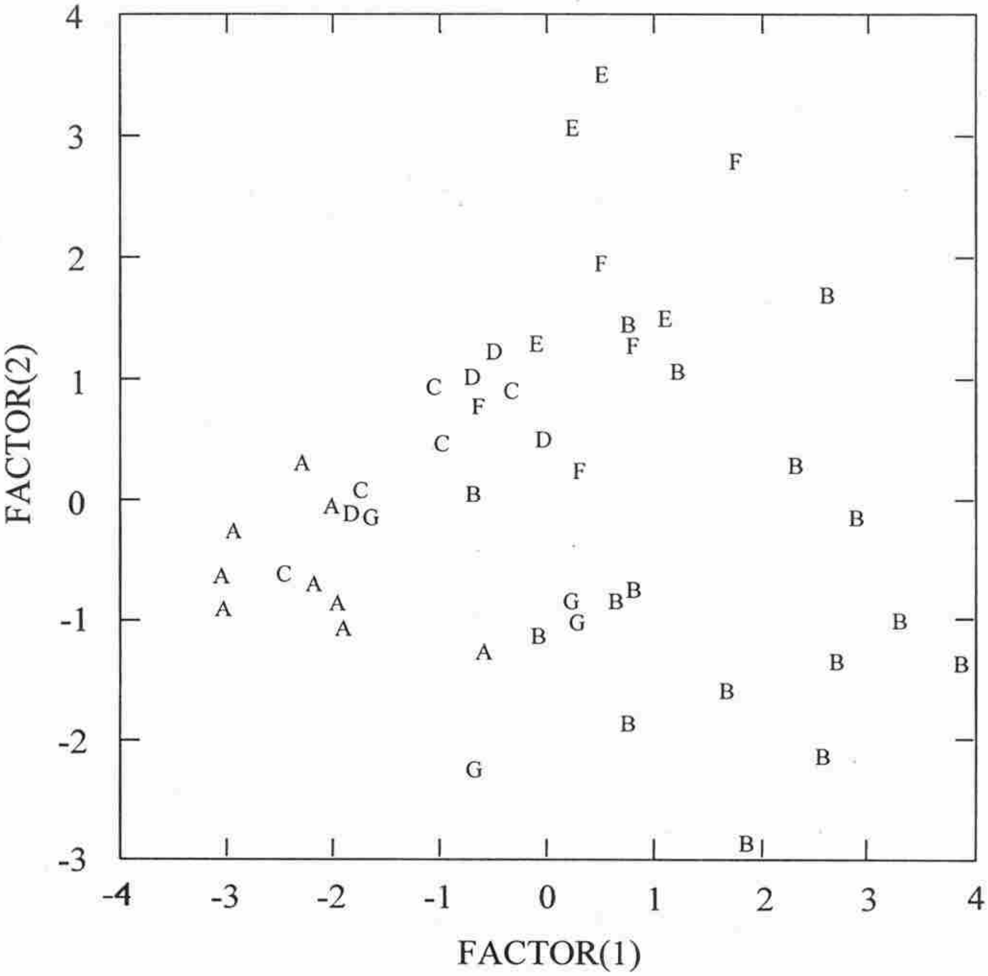

Figure 10. Plot of canonical discriminant scores. A = Parkin phase; B = Nodena phase; C = Kent phase; D = Horseshoe Lake phase; E = Jones Bayou phase; F = Tipton phase; G = Walls phase.

constructs (cf. Mainfort 1999:167; O'Brien 1994, 1995). In fact, the data presented here provide little empirical support for the validity of existing late period phases in the study area, with the possible exception of the Parkin and Kent phases. While it might be argued that the spatial distribution of ceramic rim attributes *should* differ from that of traditional ceramic types (i.e., phases), the inadequacy of phase constructs in the study area also is evident in multivariate analyses of ceramic assemblages classified using traditional type designations (e.g., O'Brien and Fox 1994; Fox 1998; Mainfort 1999).

My intention is not to portray typological and attribute analysis as a better/worse proposition. Both approaches have demonstrated their utility in addressing specific kinds of questions. One problem noted here is that, in the study area, types created to explicate broad temporal trends (Phillips et al. 1951; see also Wright 1966:19) have subsequently been used to formulate archaeological phases, which are intended to represent short-lived phenomena within restricted geographic areas.

What I see as the principal merit of this research is not the use of rim attribute data to critique traditional phases, but the development of systematics more useful for identifying variability, both temporal and spatial, in the archaeological record than traditional typological approaches in the central Mississippi Valley and beyond. It is clear that type-variety analysis does not exhaust the information potential of potsherd collections and, indeed, may cause researchers to overlook data that are critical to explaining the underlying cultural and historical dimensions of this variability.

Notes

Acknowledgments. A number of individuals contributed to this project in a variety of ways. Dan Morse deserves special thanks for making the extensive collections at the Arkansas Archeological Survey's Arkansas State University station available to me, as well as for being a most generous host during numerous visits. John House loaned rim sherds from traditional Kent phase sites and offered much appreciated comments about an earlier version of this article. Charles McNutt commented on an earlier draft and loaned a sample of rim sherds from Chucalissa. Michael O'Brien and Karen Smith loaned rim sherds from the Cagle Lake and Denton Mounds sites. Gerald Smith and Mary Kwas provided access to collections housed at the C. H. Nash Museum–Chucalissa. Michael Evans produced Figures 3, 5, and 7. Others meriting acknowledgment include Jamie Brandon, Shawn Chapman, John Connaway, Lela Donat, Rita Fisher-Carroll, Suzanne Hoyal, William Lawrence, Mary Suter, and Stephen Williams.

[1] Phillips et al. (1951:224–225) defined the Memphis subarea as encompassing much of the Mississippi Alluvial Valley from Helena, Arkansas, to just north of Osceola, Arkansas, excluding what is now considered to be the Parkin phase area along the St. Francis River. Subsumed within the Memphis sub-area are the Kent and Walls phases, as well much of the Nodena phase.

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