

# An Examination of the Temporal Trends and Impacts of Mississippian Expansion on Piedmont Village Tradition Projectile Point Technology

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## Introduction

The goal of this research is to quantitatively compare Late Woodland projectile point types at two Piedmont Village Tradition communities in the Yadkin River Valley; Redtail (1285-1415 CE) and Porter (1400-1600 CE). Chronological and functional distinctiveness of the projectile point typology at PVT sites has not been studied extensively. Previous research demonstrated that types are morphologically distinct at Redtail, and this research seeks to validate the typologies at Porter as well. After measuring nine attributes on 60 projectile points from the Porter site and testing our groupings using discriminant function analysis, we compared our data to that of Redtail. In addition to being a later occupation than Redtail, Porter differs in being influenced by Mississippian culture and in utilizing distinct lithic resources of chert. Through this study we examine the effects of temporal change, material differences, and Mississippian influence on the PVT lithic industry. Our goal is to evaluate how much these typologies can tell us about past behavior (e.g. Bettinger and Erkins 1999; Odell 1988). The utility of and problematic nature of etic typologies has been theorized at length (e.g. Hayden 1984; Read 1974) and will factor in our conclusions and plans for future work.

## Methods

### The Assemblage

Projectile points were recovered during pedestrian survey, shovel testing, and excavation at Redtail and excavation at Porter. We only used those which could be typed in our study; 75 from Redtail and 60 from Porter.



Figure 3a: selection of projectile points from Redtail, whole and broken, used in this study.

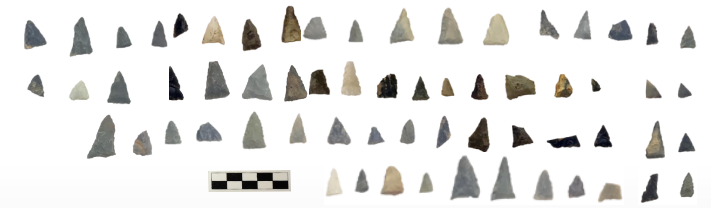


Figure 3b: selection of projectile points from Porter, whole and broken, used in this study.

### Attributes

Using digital calipers, we measured the following attributes on each of the points, listed and displayed in Figure 4.

- A. Midline Length
- B. Blade length 1 (longer side)
- C. Blade Length 2 (shorter side)
- D. Basal Width
- E. Midpoint Width
- F. Basal Concavity (the difference between the total length and the midpoint length)
- G. Maximum Thickness
- H. Basal Thickness (1mm above the base)

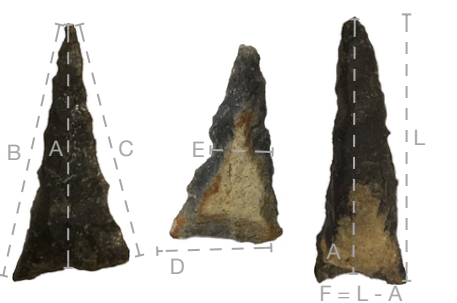


Figure 4: diagram showing how attributes were measured.

### Typing

After measuring, we assigned points to types based on Oliver's typology. We used the following criteria:

- Clarksville: staight sides with edge lengths relatively equal to basal width; between 1:1 and 1.5:1 length to width.
- Caraway: about twice as long as wide; straight sides.
- Uwharrie: about twice as long as wide; immediate narrowing of the body from base to tip.

### Discriminant Function Analysis

We subjected our datasets to discriminant function analysis (DFA) using several models. DFA is a multi-functional, multivariate statistical analysis that compares datasets with internal groupings and several characteristic variables (i.e. attributes). We used it to compare each of our types and the attributes of each point within those types. DFA finds the combination of attributes (i.e. functions) that best distinguishes the groups and shows to what magnitude it can do so. DFA can also ignore the assigned groups and try to create its own using only the attributes of individual cases. Those groups are then compared to the defined groups. Thus, it can validate whether groups can be distinguished or not based on their attributes. In this case, it can also evaluate how much our types are simply reaffirming themselves.

We created and analyzed ten models: 1) points with all attributes; 2) points with no length measurements; 3) points with only basal measurements; 4) points with no basal measurements; 5) points with only length measurements. These 5 models were then repeated using a combined dataset from both Redtail and Porter.

## Results

For each model, the first discriminant function is the most important combination as it maximally discriminates among the types. Each function defines a canonical variable, for which the eigenvalue divided by the sum of all the eigenvalues is a ratio that can be interpreted as the proportion of between-group variation explained by that canonical variable. The larger the eigenvalue, the more important the canonical variable is for group separation. The structure matrix values show which attributes are related to the canonical variable and how (Figure 5). Finally, the predicted group membership, or cross-validation, leaves out one case and then predicts group membership (Figure 6). We focus on these last two lines of evidence here because the first shows what attributes most distinguish types and the second assesses whether our types are actually statistically supported.

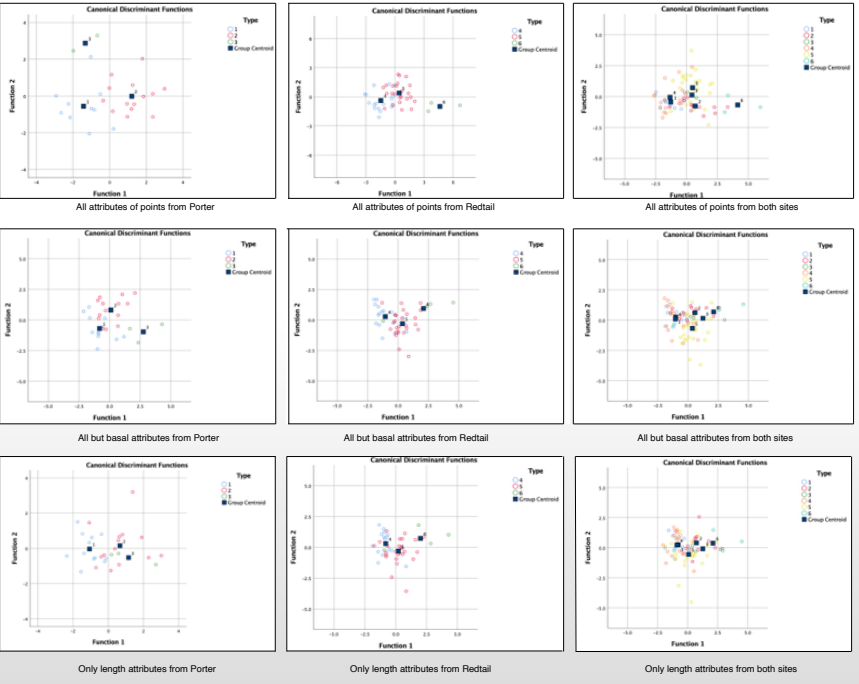


Figure 5: Scatterplots of functions

These results show support for three projectile point types: Clarksville, Caraway, and Uwharrie. In all of the scatterplots above, Function 1 is strongly influenced by length measurements and clearly separates them into the three types. For the Porter groupings, point types are identified as; (1) Clarksville, (2) Caraway, and (3) Uwharrie. For the Redtail groupings, point types are identified as; (4) Clarksville, (5) Caraway, and (6) Uwharrie.

Model	All Attributes	No Length	Only Basal	No Basal	Only Length
% Cross-Validated Porter	61.50%	46.70%	51.50%	62.10%	48.30%
% Cross-Validated Redtail	66.70%	51.10%	56.30%	63.80%	68.10%
% Cross-Validated Both	46.50%	28.60%	27.20%	34.20%	36.80%

Figure 6: cross-validated results for all models.

What we present above are the graphical and tabular results for the models created. The cross-validated results show that although length plays a significant role in separating the three point types; seen by the No Basal and Only Length values for Porter and Redtail separately, all attributes of the points play a role in their typing; as seen in the All Attributes values for Porter and Redtail separately. This result means that the analysis did not simply reflect a bias of typing based on length rather than all attributes were considered in typing.

## Discussion

Our results support variation between the projectile point assemblages at Redtail and the projectile point assemblage at Porter. All three traditional types are found at both sites. We initially interpreted that these different types might be related to functional differences. We then looked for spatial patterns and found that different types were evenly distributed across the sites. Fragmented and whole points also appear to be evenly distributed. However, this does not rule out functional differences. It could be that all three point types were used for hunting different animals, and point production, use, and discard associated with hunting occurred across the sites with little regard to the type of animal being hunted and processed.

To assess temporality we compared the percentages of types at Redtail and Porter to those at other sites with reported projectile point types (Figure 7). When compared to the Donnaha site (Woodall 1984), which was likely occupied for several hundred years before and overlapping with Redtail, the percentages are somewhat different. Looking at Woodall's images of points, we would place his Pee Dee points in the Clarksville category. If we do that, those numbers look similar across the site to Porter and Redtail, but the Caraway:Uwharrie ratio is different. McPherson is very different, almost exclusively having Clarksville points, but this is a reported number and we can not compare images to our points. Either way, the co-occurrence of these three types at both a shorter term site (Redtail) and a long-term site (Donnaha), as well as their appearance in a later site (Porter), suggests that these point types are not temporally distinct.

Site	Clarksville	Caraway	Uwharrie	Pee Dee	Other
McPherson	82.80%	0%	0%	0%	17.20%
Donnaha	0%	31.30%	45.20%	21.30%	2.20%
Porter	33.30%	55.70%	10%	0%	1%
Redtail	30.50%	58.10%	11.40%	0%	0%

Figure 7: Percentage of point types at four Late Woodland sites in the UYRV.

From these results, we believe that the three triangular point styles were distinct and being used in similar proportions at both Porter and Redtail. However, at Porter, there was greater variation of attributes within the Clarksville and Caraway types. When comparing the sites, Clarksvilles are similar, but Caraways and Uwharries vary. Although Uwharrie points were present at Porter, they had taken on more Caraway characteristics when compared to Redtail. The change in Uwharrie is characteristic of later sites where points gradually get smaller (Judge 2018). Caraways vary between the two sites by edge length, primarily, further supporting this trend.

### Guided Variation

We believe that the cultural transmission of point technology between the PVT community at Porter and Mississippians could explain the intra-type variation there. In guided variation, individuals acquire new behaviors by copying other models and modifying these to suit their own needs through trial-and-error experiments. Complex behaviors are frequently compiled in this fashion, using different individuals as models for various attributes of behavior. This results in a composite behavior that is more or less unique. Thus, variables acquired by guided variation will be less correlated (Boyd and Richardson 1985). We believe that the mingling of methods between PVT and Mississippian knappers could cause this variation in attributes of projectile points.

## Conclusions

These results are showing support for all three types at Redtail and Porter and are displaying variation between attributes within types at each site. We believe that these results can benefit future research that examines the technological similarities and differences at hybrid community sites such as these. Next steps would ideally look at how other lithic technologies, other than projectile points, may have changed in these communities because of cultural mingling. Experimental archaeology would be helpful for understanding the methods used by groups to create lithic tools.

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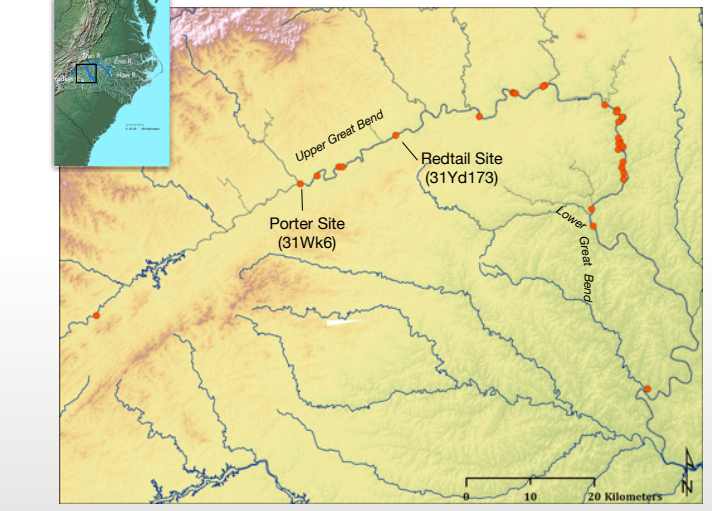


Figure 1: map (left) of the upper Yadkin River Valley, showing the location of the Redtail and Porter sites.

## Background

The Redtail and Porter sites are both located in the Yadkin River Valley (Figure 1). Redtail was first recorded in 1990 and has been the subject of archaeological investigation since 2011. Radiocarbon dates place the site between 1285 CE and 1415 CE (Jones 2018). Porter was excavated in 1990, 1991, and 1997 and was dated between 1400 and 1600 CE. The projectile point assemblages from both sites came from surface, plowzone, and undisturbed contexts. The undisturbed contexts at Redtail include a housefloor, activity areas around the household, shallow pit features located outside of the household, and one small trash pit. The undisturbed contexts at Porter include trash-filled pits, postholes, and human burials (Woodall 1999). We believe that these excavations represent the range of activities that occurred at both sites.

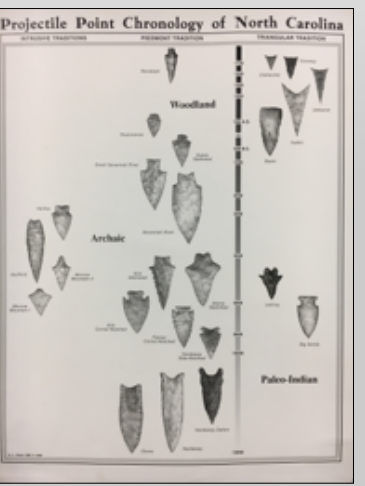


Figure 2: Oliver's 1985 North Carolina Projectile Point typology.

In the current North Carolina projectile point typology by Oliver (Figure 2), there are 3 defined triangular Late Woodland styles; Clarksville, Caraway, and Uwharrie. Uwharrie is generally considered to be earlier but overlapping with the later and more contemporaneous Clarksville and Caraway types.