Projectile Point Networks in the Western Pueblo Region

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A portion of my dissertation research, was generously funded in part by the Arizona Archaeological and Historical Society. Here I present some preliminary results from several sites in my dissertation database (Table 1).

Table 1: Sites Used in Network Analysis

site	beginDate	endDate	rooms	project
Awatovi	1200	1700	1225	Awatovi
Bailey Ruin	1250	1330	225	SCARP
Cienega Ranch	1275	1375	500	CARP
Homol'ovi I	1275	1400	1100	Homolovi
Homol'ovi II	1350	1400	1200	Homolovi
Grasshopper	1300	1400	500	Grasshopper
Pueblo de los Muertos	1275	1375	880	CARP
Pottery Hill--Silver Creek	1250	1300	60	SCARP
Scribe S	1225	1275	410	CARP

Projectile points do not receive as much attention as ceramics in the Southwest, particularly at a regional level. One reason may be that different projects use different typologies. A way to avoid this difficulty is to reanalyze all of the data. This can be a daunting task, but the development of geometric morphometrics has not only eased the task, but I believe it has improved it. Geometric morphometrics originated in biology (Rohlf and Marcus 1993) and has been adopted by archaeologists in a growing number of publications (see Okumura and Araujo 2019 for a recent review). Essentially, this field uses quantitative methods to analyze shape. Rather than relying on a series of linear measurements, the shape of an object is converted into a series of coefficients that can be compared directly with other shapes in either two or

three-dimensions

Figure 1: Map of primary site locations used in this analysis.

This analysis used a form of geometric morphometrics known as landmark analysis. Five landmarks were placed on triangular points and eight on side-notched points as shown in Figure 2. The tip of the point was excluded and landmarks were placed on one half of the point in order to account for broken points. I refer you to other publications for more details (Bischoff and Allison 2020; Bischoff 2022a).

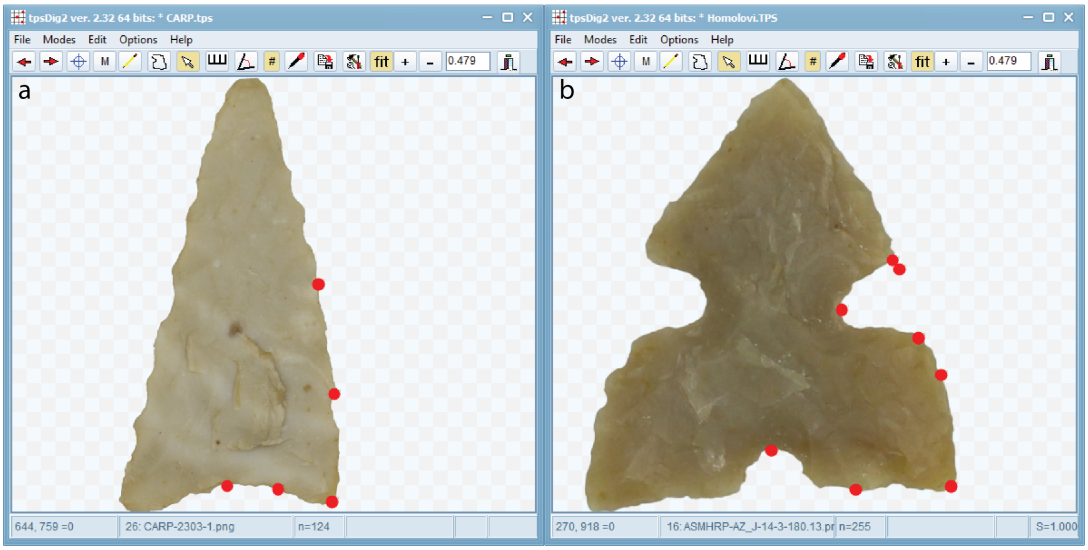

Figure 2: Placement of landmarks on (a) triangular points and (b) side-notched points. Points were placed at the corner of the point and midway to the tip, in between those two points, and at the center of the base and in between the corner of the point and the center of the base. Side-notched points had additional landmarks placed where the notch began and ended, as well as at the center of the notch.

Figures 3 and 4 show the projectile points used in this study and how they relate to each other. Several notable clusters formed around various points, but all of the points form a single network within the triangular and side-notched types.

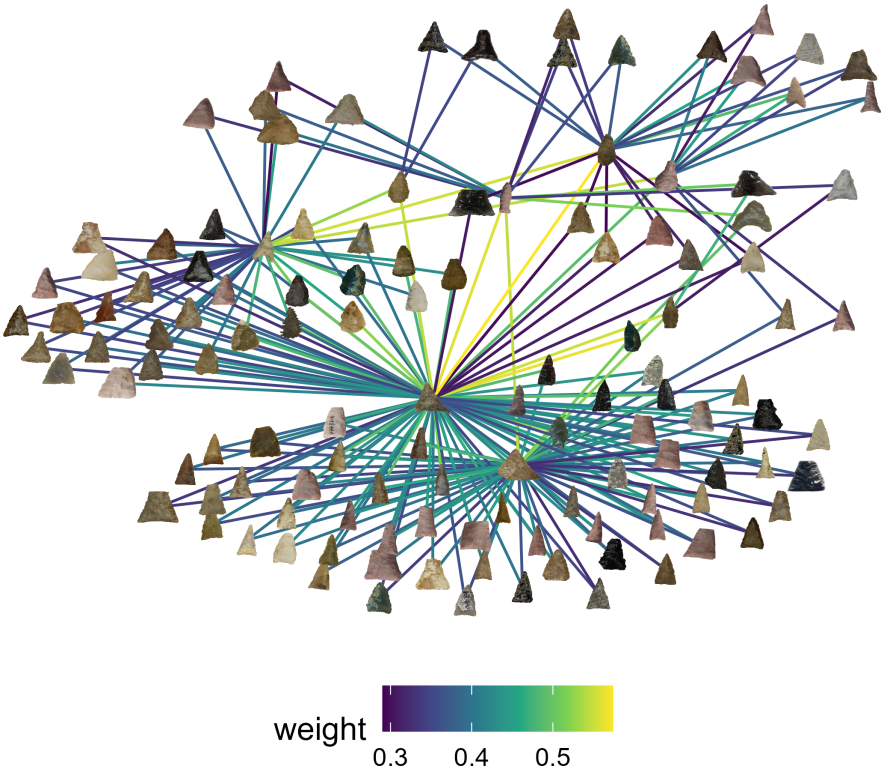

Figure 3: Network of geometric morphometric distances between triangular points. Only the strongest two links between each point are shown.

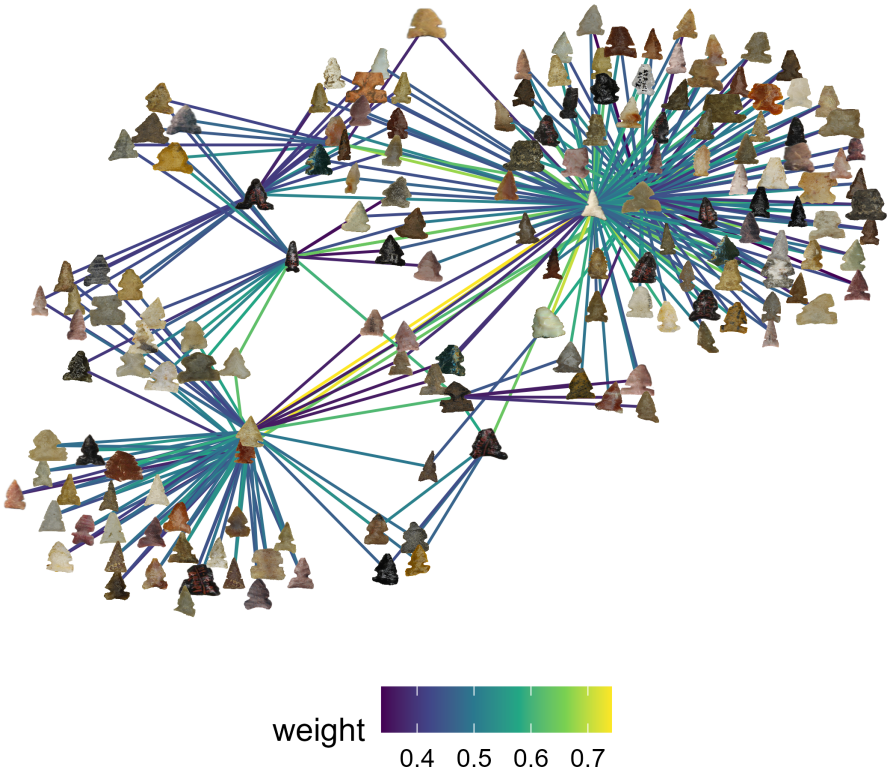

Figure 4: Network of geometric morphometric distances between side-notched points. Only the strongest two links between each point are shown.

The final analysis is shown in Figure 5. The details of how this network was created are similar to those used in this publication (Bischoff 2022b), but essentially this network shows how closely connected each site is based on how similar their projectile point types are. Projectile point types were created using hierarchical clustering and a distance method was used to calculate similarity. The two least connected sites are Scribe S and Awatovi. Scribe S is the only site not occupied in the 1300s, and Awatovi had a very long occupation. Pueblo de los Muertos and Cienega Ranch–exacavated as part of the Cibola Archaeological Research Project (Watson, LeBlanc, and Redman 1980)–have the strongest connection, and Pottery Hill and Bailey Ruin–excavated as part of the Silver Creek Archaeological Project (Mills, Herr, and Keuren 1999)–are also closely connected. These sites are close spatially and are expected to be similar. Surprisingly, Homol'ovi I and II are not closely connected, although I have not finished analyzing the entire collection. Interestingly, Grasshopper shows strong connections to most of the sites. Overall, there are more similarities than differences between these sites.

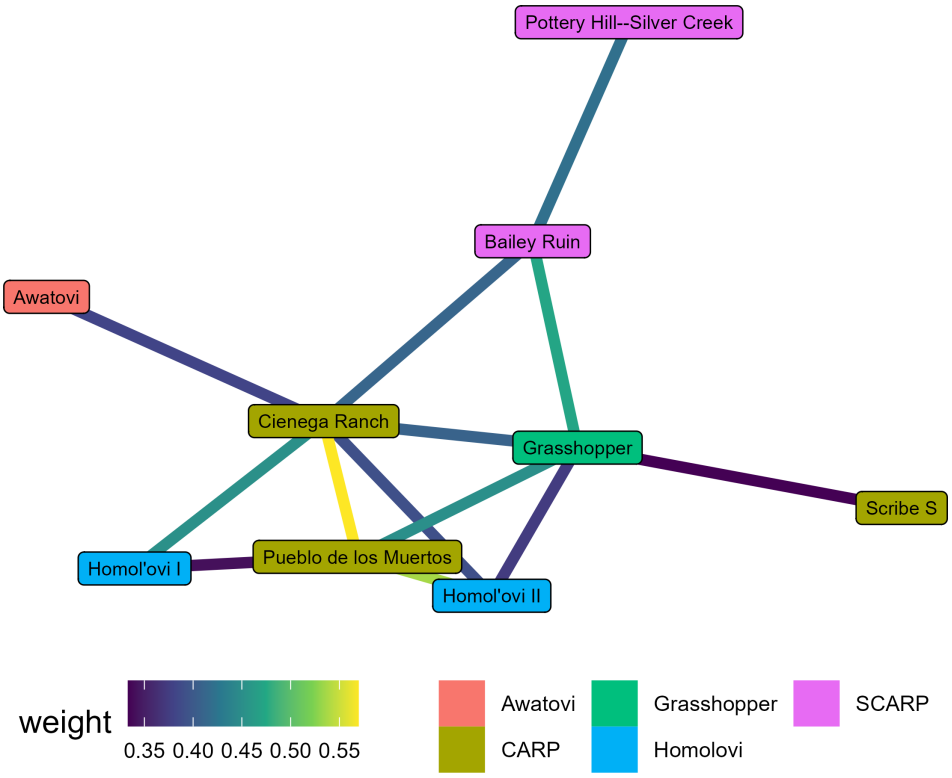

Figure 5: Network of sites based on projectile point similarities. Only the strongest two-thirds of links are shown.

The projectile point analysis shows no clustering by site or project area; however, the network analysis by site demonstrates clear patterns of interactions, even if the differences are small. This analysis includes only a few sites from my dissertation. A much clearer picture of interaction will be demonstrated by combining the projectile point networks with networks derived from additional types of material culture: ceramics and architecture. Examining different lines of evidence will further our understanding of regional interaction in this turbulent period of the Southwest.

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