

MULTISCALAR PERSPECTIVES ON SOUTHWEST SOCIAL NETWORKS, A.D. 1200-1500

Barbara J. Mills¹, Lewis Borck¹, Jeffery J. Clark², Wm. Randall Haas, Jr.¹, Matthew Peebles^{1,2}, and John M. Roberts, Jr.³

¹School of Anthropology, University of Arizona; ²Archaeology Southwest; ³Department of Sociology, University of New Mexico



INTRODUCTION

The late prehispanic Southwest (A.D. 1200 to 1550) was a dynamic period of migration and aggregation. Our project seeks to understand how social network analysis (SNA) can provide insights into past social dynamics. We reconstruct social network ties among sites via similarities assessed on a record of 4.3 million ceramic artifacts compiled by the Southwest Social Networks (SWSN) Project (Mills et al. 2011). Ties indicate pairs of sites with especially similar ceramic assemblages. SNA is used to characterize the structure of prehistoric social networks and illustrate how these structures changed at the micro-, meso-, and macro-scales. The results illustrate the importance of scale in applying SNA and the usefulness of SNA for understanding relational questions asked of Southwestern data.

SOCIAL NETWORK ANALYSIS (SNA)

SNA is a field most widely employed in quantitative sociology, where it is used to look at the relationships or ties between actors (e.g., Wasserman and Faust 1994). Actors are represented as nodes or vertices and their connections as ties or edges.

A fundamental aspect of network analysis is that it is relational. In archaeology, these relations are defined using material culture similarities and modes of transmission. Here, settlements are the nodes and decorated ceramics are the currency of interaction. Our ties are based on similarities in ceramic frequencies using an index that is comparable to the Brainerd-Robinson coefficient (Roberts et al. 2012) used widely by archaeologists. An SNA approach to archaeological data provides a way of thinking explicitly about different kinds of ties and a formal set of methods for characterizing different kinds of networks across space and through time.

MICRO-SCALE ANALYSIS: SAN PEDRO RIVER VALLEY

The San Pedro River Valley (Figure 1), has clear evidence of ancestral Puebloan immigration in the late 13th century A.D. (Clark and Lyons 2012). The non-migrant, "first-comers" constructed residential compounds and, later, ceremonial platform mounds. Migrant villagers lived in pueblos, constructed kivas, and produced much of the Salado polychrome (Figure 2) found in the valley.



Figure 1: Colored-coded map of regions in Southwest. These are all included in the macro-scale analysis. The San Pedro Valley is located in the southeastern portion of the study area.



Figure 2: Salado Polychrome (Gila Polychrome: Tonto Variety). Photograph by Matthew Devitt, courtesy of the Arizona State Museum.

SNA analysis shows that there is a dramatic change in relations among all of the villages between A.D. 1250-1300 (Figure 3) and 1300-1350 (Figure 4), during and shortly after the period of maximum immigration. Compared to the network of A.D. 1250-1300, the network of A.D. 1300-1350 is more densely clustered. In the later period, sites are more similar to each other in their consumption of decorated ceramics as migrant villages became quickly integrated into the valley system. There is still some differentiation in the network in the later period of migrant and non-migrant communities, but it is very subtle (note the first-comer villages at the top of the diagram with squares and migrant villages at the bottom with triangles).

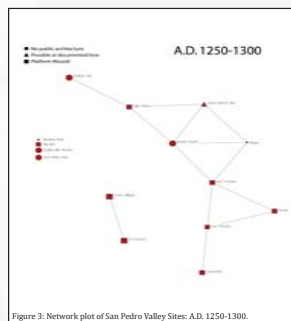


Figure 3: Network plot of San Pedro Valley Sites: A.D. 1250-1300.

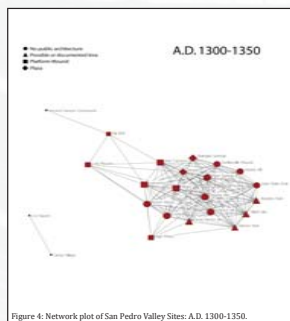


Figure 4: Network plot of San Pedro Valley Sites: A.D. 1300-1350.

MESO-SCALE ANALYSIS: GREATER HOHOKAM AREA

The Greater Hohokam region of the southern Southwest shows how changing the spatial scale influences network topology. During the period of migration, from A.D. 1250-1300, each valley system was distinct (Figure 5). Despite this distinctiveness, the less densely connected network (i.e., fewer ties per settlement) of the San Pedro Valley can be contrasted with the more dense networks in the Tucson and Phoenix basins. Outliers are almost all villages without platform mounds. At least in terms of relations based on painted ceramics, those villages that did not have public architecture were on the outskirts of all of the other networks, regardless of valley system.

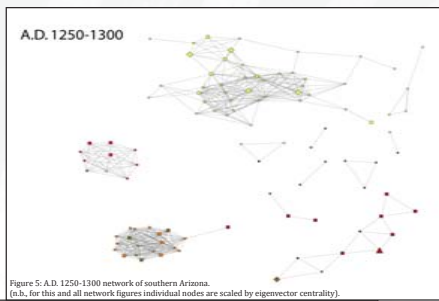


Figure 5: A.D. 1250-1300 network of southern Arizona. (n.b., for this and all network figures individual nodes are scaled by eigenvector centrality).

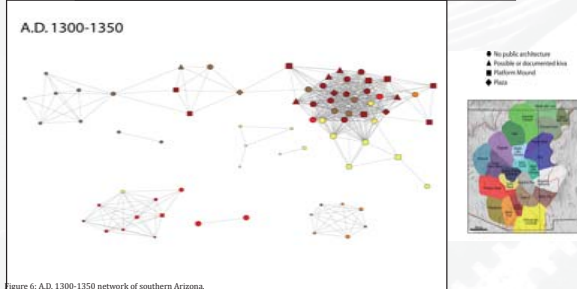


Figure 6: A.D. 1300-1350 network of southern Arizona.

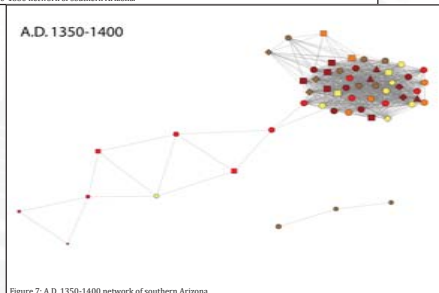


Figure 7: A.D. 1350-1400 network of southern Arizona.

Over time, there are closer relations among the different subareas of the southern Southwest. During the A.D. 1300-1350 period (Figure 6) Phoenix and Tucson still stand apart, but other areas show closer relationships with each other.

The trend toward increasing integration in this large area of the southern Southwest is even more pronounced in the A.D. 1350 to 1400 period (Figure 7). The overall diameter of the network has decreased and most sites are highly connected to all other sites. There isn't one particular site or region that is more central than others.

MACRO-SCALE ANALYSIS: ARIZONA AND WESTERN NEW MEXICO

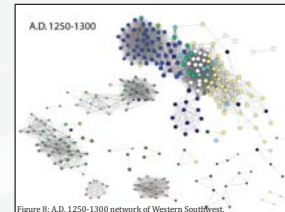


Figure 8: A.D. 1250-1300 network of Western Southwest.

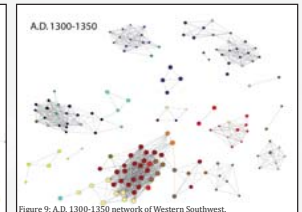


Figure 9: A.D. 1300-1350 network of Western Southwest.

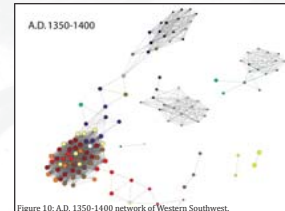


Figure 10: A.D. 1350-1400 network of Western Southwest.

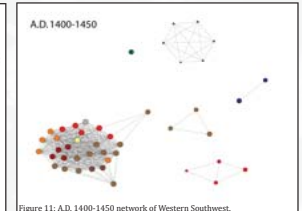


Figure 11: A.D. 1400-1450 network of Western Southwest.

A macro-scale perspective of the Southwest is based on all of the sites in the SWSN database in Arizona and New Mexico west of the Continental Divide (Figure 1). Between A.D. 1250-1300 parts of the Southwest are highly connected, especially Zuni, the Mogollon Highlands, the Little Colorado, Silver Creek and the Tonto Basin (Figure 8). Non-Plateau settlements, other than the Tonto Basin and the Mogollon highlands, are largely disconnected from each other.

A dramatic change in social relations occurs following the late 13th century migrations, shown in the network diagram of the A.D. 1300-1350 period (Figure 9). Zuni becomes much more isolated; Silver Creek is more closely tied to the Central Arizona Highlands; Hopi, Flagstaff, and the Verde Valley form another cluster; while the Tonto Basin settlements are more similar to those in the Phoenix Basin.

The "hegemony" of the southern Southwest, largely driven by the Salado polychromes that were prominent in building relational networks at the other scales, becomes even more striking in the next two periods: A.D. 1350-1400 and A.D. 1400-1450. Villages in the Southwest are the most connected during the A.D. 1350-1400 period (Figure 10), reflecting in part the spatial aggregation of settlements. Yet, the tight cluster in the southern valleys shows that spatial propinquity does not always correlate with social propinquity.

In the final period, A.D. 1400-1450, the Southwest becomes more disconnected (Figure 11). The diversity subsumed in the southern (greater Hohokam) area is not apparent in any other area - instead, the other areas become more distinct from each other.

CONCLUSIONS

In terms of the ways in which relations are constructed here, i.e., decorated ceramics, our analyses show that there is a more homogenous community of practice among all of the sites in the post-migration period at micro- and meso-scales. In the southern Southwest these ties are largely based on frequencies of Salado polychromes, which are known for their ideological significance (Crown 1994; Figure 2). Decorated ceramics, which are mostly serving bowls, were one means of bridging different communities - socially and spatially - in the late prehispanic Southwest. Commensal politics and the social diversity created in the post-migration period combined to increase relations among villages across this region.

At the largest scale, however, network analyses illustrate how certain areas may have served to bridge the northern and the southern Southwest, and how different areas became disconnected. For example, the Tonto Basin and the Mogollon highlands are initially more connected to Plateau settlements than they are to other settlements below the Mogollon Rim. This changed in the post-migration period with the Salado polychrome network incorporating a diversity of areas unlike the rest of the Southwest. This scale clearly shows the impact of migration on changing social relations in the Southwest and also how scale changes the perspective from one of greater connectivity over time to one with greater differentiation.

ACKNOWLEDGMENTS

The SWSN Project has been funded through the Human and Social Dynamics Program of the National Science Foundation (Grant No. SES 0827007, Mills and Clark co-PIs). We thank our many collaborators for their input into the project: Ronald Breiger, Brett Hill, Deborah Huntley, Patrick Lyons, Susan Ryan, Steve Shackley, and Meghan Trowbridge. We also thank the many institutions that provided data for the project and/or access to sites, archives, and collections, including the Arizona State Museum, Museum of NM Laboratory of Anthropology, Museum of Northern Arizona, and the U.S. Forest Service (especially the Apache-Sitgreaves and Gila NF).