Stylistic variability of stemmed obsidian biface tools on Easter Island

Roberta Thomas and Brooke Hundtoft
California State University, Long Beach

Introduction
The bifacially-flaked stemmed obsidian artifacts from Easter Island -- known as mata'a -- vary greatly in terms of the shape and form of their stems. The stem variability appears to be largely stylistic in nature as its variation does not affect the function of the tool and thus is free to change. Since performance is not a factor in structuring variation, patterns of similarity across stylistic classes of mata'a stem shape potentially reflect the effect of cultural transmission through time and across space. In order to generate hypotheses about the structure of transmission, we measured 135 complete mata'a that were collected during the 2005 CSULB archaeological field school on Rapa Nui. Using the software, CLADOGEN, consisting of 7 dimensions, we performed cladistic, genetic, seriation, and correspondence analyses. We avoids for the mata'a to show spatial similarity due to the different areas of the island's five main villages. The results were compared with the results of the cluster analysis, however there were no significant similarities between these two analyses.

Background
The stemmed obsidian biface tool, referred to as a mata'a on Easter Island, is one of the most abundantly found artifact on the island. Although the tool is commonly assumed to be a weapon used in warfare but recent analyses suggest that the biface is likely related to agricultural activity. The mata'a exhibit a high degree of stylistic variability in shape and form particularly on the distal end. The majority of these objects are not pointed and have curved or obliquely angled ends. The most common example of these tools is a spade but even this form demonstrated a wide range of shapes and sizes.

Methods
We described the mata'a using a series of metric and qualitative measurement. Metric measurements included the maximum length of the stem, the maximum width of the stem, and the measure of the angles at right shoulder angles. We made frequency seriation of the measurements of mata'a using ACD System's Canvas, a computer-based drafting program. Qualitative measurements include the shape of the stem (square, sub-rounded, rounded, and broken), and the shape of the stem (normal, altered, circular). Based on these metric values, we conducted a statistical analysis using JMP, a statistical computing software. In order to determine the degree of similarity between mata'a, this analysis provides information about the patterning of relative shape as it exists across the different sites on the island (or across the whole of the mata'a as a whole). The correspondence analysis and frequency seriation were conducted with the full set of mata'a (near 300) and a subset of the 135 complete objects.

Conclusions
These results can be interpreted as inconclusive at this point. The results do not show the patterns we expected to see and, therefore, need to be analyzed further. Perhaps if the attributes were measured in a different way these analyses would produce more desirable results or possibly there is just no spatial variation among these parcels of land. Despite the lack of obvious patterns it is important to note that the cluster analysis generated very large clusters that were composed of classes incredibly similar to each other. The cladistics analysis also only generated one tree indicating a close relationship among the classes generated. This is significant because if there is no spatial patterning we would expect the classes to be very dissimilar but these analyses clearly indicate a high degree of similarity among the classes. Further research should be done on areas of the island further away from the parcels to determine if spatial variation occurs over a greater distance or wider area.

Figure 1: Map of Easter Island displaying the two areas of the island in which the parcels are located. Each parcel is represented by a different color.

Figure 2 (left): Plot produced by the correspondence analysis illustrating the correlation of the parcels and the classes that they belong to.

Figure 3: Map of Easter Island

Figure 4: Map of Easter Island

Figure 5 (left): Results of the correspondence analysis of the mata'a on Easter Island.

Figure 6: Cladogram showing a relationship among the mata'a classes using 7 dimensions.