Statistical approach to pottery quantification as ways to explore chronology, economy and culture of Roman and Late Antique settlements: the case of Artena (province of Rome)

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Quantify archaeological artifacts

Some of the benefits of ceramic quantification have long been acknowledged by archaeologists. However, studies, such as in the restitution of the proportion of recyclable or perishable vessel (for instance Orton & Hughes 2013; Bassett 2016), applied in Artena in Dienst 2016). Therefore, there is now a recent publication in Central Italy with full quantifications. Many methods exist, there are no less accurate according to the problems, but often difficult to compare between them (Orton & Hughes 2013, 200-212; Arsenio & Scala 1999; Sarratt & Jones 2014, 33-52). The abstract nature of the approach (Orton & Tierney 1993) may partly explain the resistance of some researchers to use them.

Moreover, the degree of representativeness of this information is difficult to assess as a whole. In order to avoid this significant differences from traditional tools can be used. The distribution of values as boxplot is useful for measuring the variability of datasets from a quantification value. On the other hand, the boxplot is one of the most common tools to explore chronology and economy of Roman and Late-Antique periods (Groenenen & Poblome 2003). However, there is no mention of these differences that can be also discribed from the “significant” difference by the use of probabilistic tests (Bartlett 2000, 121-124). Bartlett 2003, 191-194). However, the use of standard deviation calculation, which is often fraught, should be avoided in the case of small populations, such as in archaeology. In favor of the Exact Method, Wald Adjusted Likelihood or Score Interval (Sanu & Lewis 2003), applied in archaeology by Stagno Frère forthcoming. It should be reminded that although it highlights “significant” differences, it is no way rigorous. Reed: ceramic quantification is a funamental work in the formation of the archaeology. In the end of the process, all these methods should be used to describe the results and produce more meaningful conclusions. But, of course, Stagno Frère (1994) may show the specific use of bayesian inference in archaeology.

Using statistics in pottery studies

In addition to the quantifications that already allow conclusions to be drawn on an assemblage, several statistical tools can help to classify raw data generated during the quantification process (CA). Given the very sparse use of Roman and Late-Antique quantification, the use of exploratory techniques for the analysis of the data is important to briefly recall their functioning. They are based on the use of a database in which the items are characterized by the vessel type and the group of the database. However, it might be difficult to compare between them (Orton & Hughes 2013, 203-218; Groenenen & Poblome 2003; Sarratt & Jones 2014, 33-52).

Highlight similarities with hierarchical clustering

If the dataset is based on the computation of distances between the variables of the various assemblages, they can be successively merged into clusters, where the number of clusters is a character of the distance. The clusters are then further merged into clusters, where the number of clusters is a character of the distance. However, this approach can be calculated by different methods, is reflected by the shape of the curve, and it allows to differentiate various different groups of assemblages. The clusters tend to reflect these groups. Although widely used in paleoanthropology, it is often applied to other datasets (Overman 2005, 30-30; Baxter 2013, 140-143).

Highlight transitions with correspondence analysis

When there is a continuum (whether geographical, chronological or functional), it is useful for the researcher to follow the evolution of the phenomenon. With this approach, the correlation between functions and phases from Artena. CA with a large range of assemblages from Artena, based on the quantification table. At right, the classification based on the quantification table and presence-absence, considering all the types or only the common wares.

Case-study: CA and clusters

The variability in quantification methods in Late-Antique and Post-antique requires comparison of values that are not strictly equivalent. Although it is an empirical approach it is not in contrast with expectations, and the null hypothesis is often very different from the values of the population. The comparison of different techniques allows to a clearer distinction between Roman and non-Roman assemblages.

Economic areas

Regarding the economy, we compared the different phases of each site according to type by quantification and presence-absence, consisting of the types or only the common wares.