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Dissecting the palimpsest: an easy computer-graphic approach to the stratigraphic sequence of Túnel VII site (Tierra del Fuego, Argentina)

1 Introduction

The broad spread of quantitative methods in archaeological research is, without any doubt, one of the most outstanding facts in recent years. Nevertheless, the impact of technological development is seldom properly controlled due to the immaturity of our discipline. This means that the relation between archaeology and quantification is not as simple as hoped by its advocates. On several occasions, a weak theoretical methodological frame has gone from the initial fascination for the unknown to the adoration of the incomprehensible. In the advance of social sciences this process is not alien to the quest for 'science' by means of uncontrolled technical sophistication. It does not surprise us then, that some professionals see in statistics and applied computer science the solution to their explanatory incapacity. They could not find anything better to conceal the theoretical weakness than the needless sophistication in the description and analyses of the empirical information.

Archaeologists cannot be excluded from the technological trend. They, too, feel the need to generate complex descriptions of apparently simple phenomena. The availability of statistical packages and scientific software was the starting point for the frantic run in quest of 'science'. In this awkward situation, most of the time the demarcation criterion has not been the perfection of the selected instrument, but the degree of 'technological/psychological impact' among the colleagues. The fascination for these available new 'toys' has caused, on numerous occasions, for the validity and relevance of the results to be relegated to second place. Once again, the professionals forget the aims, and seem to take delight in the objects.

It is clear that the defense of the basics is still essential, and, thus, we wish to insist on the need to perfect the techniques to the real dimension of the problems that are raised. This work, then, becomes another contribution to the following motto: '*the easier, the better*' (Barceló *et al.* 1994). We put up a defense of the potential of quantification and the need to use it as an objective instrument for the description of the empirical reality. Nonetheless, quantification is not a synonym for sophistication, but for accuracy, standardization and agility of data processing. It is not enough to assume a careful attitude towards the correct application of computer-based tools or statistical tests. It is also important to choose the proper tools ensuring that they are user-friendly.

2 An easy computer answer to a simple archaeological problem

Our proposal can be summarized as follows: the selection and application of the easiest computer solution to archaeological problems which are usually fairly simple. The aim is to gain greater control over the operative procedure of analysis which will, probably, make it possible to achieve more useful results. Do not forget that the unnecessary use of complex computer-based tools hides behind its apparent versatility and potential of trouble in its handling. It is not surprising, then, that the archaeologist, as well as the less experienced user, incurs a wide range of errors and inaccuracies. The tool exerts close control over the patient user who regardless of the confusion becomes the 'wizard of data' to those who are not computer users. The interest and reliability of the results often remain unquestioned because the other professionals cannot understand the cryptic language of the so-called experts.

The statistical data processing is the most illustrative example of the 'numerical magic' in service of 'science'. Nobody seems to understand anything but everybody wants to apply a statistical test. However, this is not a unique case in the archaeologists' technological fascination. Recently, graphic data processing has become one of the archaeological research lines which has profusely implemented the new technologies. In a short period of time, the freehand plots have been replaced by the application of powerful drawing software. In our discipline, the possibilities of these tools are almost infinite and, hence, it does not surprise us that they involve a total 'physical dependence' on its users. We believe, though, that it is dangerous to lose the balance that should exist between the dimension of the problem and the quickest, easiest and most profitable solution. From our point of view, the search for this balanced relation between the problem and the solution has to be made within the frame established by the sentence: '*the easier, the better*'.

In order to illustrate our approach, we have selected a concrete problem. This approach consists of the computer processing of drawings which makes the reconstruction of the stratigraphic sequence of the Túnel VII site (Tierra del Fuego, Argentina) more efficient. Furthermore, it will enable the testing of the observational stratigraphic sequence. The aim of this task is to separate the palimpsest into relevant occupational levels for a socioeconomic explanation.

2.1 The Túnel VII site (Tierra del Fuego, Argentina)

The excavation of the Túnel VII site is part of an ethnoarchaeological research project about Magellan-Fuegian groups of the Beagle Channel, carried out in Tierra del Fuego (Argentina). The project is built on a Spanish-Argentinian cooperation proposal (Piana 1988; Piana *et al.* 1992) aimed to test, archaeologically, the available ethnographic image of these groups. To make this test, we work in recent chronology sites (19th century) with evidence of European contact.

The most salient feature of the Túnel VII site (dated to 100 ± 45 BP) is its intensive reoccupation, for short periods of time, which generates a palimpsest that can be delimited for each hut. Moreover, we should mention the taphonomic specificity of these marine coast sites, because they are anthropogenic shell middens formed by food refuse from mollusc consumption and by remains of the working processes carried out there. The taphonomic specificity complicates the excavation methodology (Orquera/Piana 1989-90, 1992) and, consequently, the reconstruction of the stratigraphic sequence.

2.2 From the palimpsest to the stratigraphic sequence

During the excavation we attempt to dissect the palimpsest of the shell midden by delimiting the extraction subunits which are called ‘sub-shell middens’. This procedure should enable us to obtain an approximate image of the depositional sequence and of the taphonomic dynamics of the site. The main problem is to correlate the different subunits, which are overlapping in the configuration of the shell midden, in order to obtain an approximation of the social activity that they represent. The explanation of the site dynamics lies in the building of an ‘ideal’ stratigraphic sequence that can be tested against the photographic record and the refitting between the lithic or bone remains. To do so, it is very important to count on graphic representations of the subunits delimitation.

At first, the drawings were made from the coordinates record of several points which delimit the shape of the extracted subunits. Our proposal is simply to facilitate the obtaining of these plots by using simple computer-based tools. By doing this we wish to make its handling more efficient for testing the hypotheses about the stratigraphic sequence.

3 The computer-graphic approach

Since the problem is simple, the computer solution should be simple too. It is not necessary to turn to complex tools of graphic design to obtain simple two-dimensional representations. From the first moment, the computer design is based on the combination of conventional software tools which enable the transfer of numerical information to graphic image. However, the adjustment to the data set has already imposed certain restrictions on the first implemented design. These restrictions minimize some agility in its management. The operational scheme in the Apple Macintosh platform consists of the following steps:

a. Building an ASCII file with the coordinates of the points that form the delimitation of every subunit. The coordinates can be obtained from a data base or can be introduced from a text editor.
b. Obtaining a graphic image of the delimitation by means of a simple program in BASIC language. This will allow the generation of hard copies (printed or plotted) or files in PICT format.
c. Recovering the graphic files from an adequate software for the management of drawings. We have mainly used MacDraw, because it is user-friendly. However, it is preferable to work with Canvas because it enables you to combine, in an easy way, many drawings and to generate overlapping or sequentially enchained layers.

All in all, the procedure always includes three main steps:
a) to generate the initial subunit delimitation,
b) to import this drawing from a graphic software, and
c) to handle the obtained drawings.

In a second stage, we have tried to improve the chaining between the different types of selected software. The ideal operational scheme implies the following steps:

1. Capturing the subunits’ delimitation in the excavation by recording points, an automated process if done with the help of a total station. Having carried out this first step, it is easy to create files in ASCII format. Another possibility is to digitize or scan the image and save it in PICT format.
2. Recovering the coordinates files from the software Surface, in order to obtain the delimitation plots (outlines). The drawing should be saved in PICT format (fig. 1).
3. Importing the PICT drawings from a software such as Canvas. Canvas facilitates its correction and, henceforth,

the handling of the different subunits' delimitation can be carried out. This implies the use of graphic software as an adequate platform for the efficient management of data. With this software package we are able to create new graphic representations by simple cut & paste operations. And so, Canvas becomes a very flexible visual tool that enables us to study the overlapping or isolation of the subunits.

It is also feasible to combine the delimitation plots with distribution plots of the material remains. With the processing of the different delimitations we can make hypotheses about the stratigraphic sequence, testing, that way, the field observations (fig. 2).

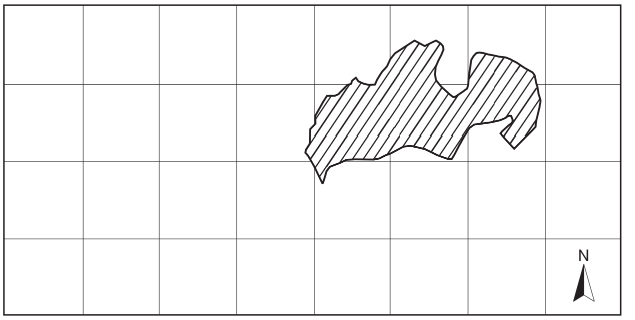

Figure 1. An example of a PICT file. The drawing shows an excavation grid and a subunit delimitation from the Túnel VII site (Tierra del Fuego).

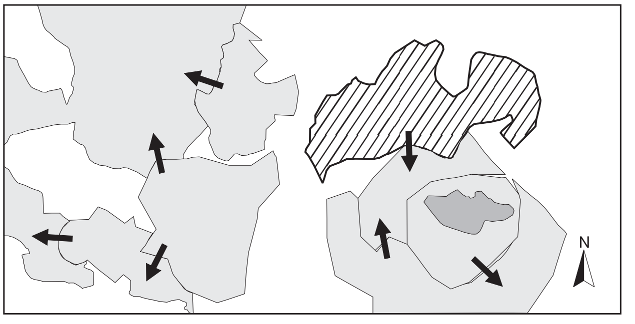

Figure 2. Example of a stratigraphic sequence of the Túnel VII site. We show the overlapping of subunits that belong to the same occupational stage. The arrows illustrate the hypothesis of depositional dynamics.

4 Summary and conclusions

The aim of this work was to provide a brief example of the controlled application of a design for graphic data processing. Since the problem is very simple, we have tried to provide a simple solution based on the combination of commercial software. With the graphic processing we tried to facilitate the determination of observational criteria for the delimitation and location of the subunits which form the studied shell midden. In order to carry out the testing work of the draw hypotheses on the excavated area stratigraphy, it was necessary to rebuild the sequence but in an inverted way, that is, beginning from the successive subunits overlapping along the different occupational stages.

The making of the subunits' delimitation plots and their combination in a computer-based platform has been an easy and adequate solution to the assessment of stratigraphical or spatial hypotheses. Moreover, it is possible to generate in a second stage of the analysis a dynamic vision of the stratigraphic sequence by chaining the layers or by QuickTime 'animations'. In any case, the most important idea lies in the control of the selected tool, in order to achieve relevant results which agree with the features of the posed problems.

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