Variability in the lithic and faunal record through 10 reoccupations of a XIX century Yamana Hut

Jordi Estévez and Assumpció Vila

Publicado en el:
Journal of Anthropological Archaeology
Volume 25, Issue 4, December 2006, Pages 408–423
Multidisciplinary Approaches to the Study of Site Function and Settlement Dynamics in Prehistory

El original disponible en www.sciencedirect.com
doi:10.1016/j.jaa.2006.03.007

Abstract

The excavation of Tunel VII, a Yamana site dating to the indigenous/European contact period was part of a long term research project based on the north coast of the Beagle channel (Tierra del Fuego, Argentina). The aim was to evaluate the theory and methodologies and devise an archaeological method that would enable a complete picture of subsistence strategies to be constructed. At Tunel VII (a site with shell middens), we were able to analyse these strategies through 10 successive occupation events on a single location. Archaeozoological analysis of the faunal remains and use-wear analysis of lithic material were used to examine the management of resources. Production and consumption are two very useful concepts, and together they have been used to create a methodology, which, together with spatial analysis using significant variables, has enabled identification of recurrent or significant tendencies in relation to alteration or continuity in subsistence strategies. In the case of Tunel VII, we know that the people who continually occupied the hut were all from the same group.

Keywords: Ethnoarchaeology; Fisher–hunter–gatherer; Yamana; South–America; Methodology; Shell middens

Continental European hunter–gatherer archaeology changed towards the end of the XXth Century (see Estévez and Vila, 1999 for a more detailed discussion). Archaeologists using Culture Historical and particularistic approaches adopted key concepts from the North American and British processual paradigms. For example, the dual concept of forager–collector, where foragers are opposed to collectors with logistical behaviour, was incorporated into the taxonomy of traditional cultures. The term Paleoeconomy is now commonly used too, though in a simplistic way to describe only some aspects of the subsistence system or subsistence strategies; arguably the concept of the “economy” should have a more comprehensive meaning that includes the social organisation of production and consumption.
The concept of foragers has been used in a way that is independent of time or cultural tradition, for example the term has been applied equally to Neanderthal subsistence strategies and to Mesolithic hunter–fisher–gatherers. The striking contrast between the Neanderthal world and Mesolithic societies (with their highly specialised technology including harpoons, canoes, bows and arrows, fish traps, etc. and social development that includes villages, organised cemeteries, warfare, etc.) makes it difficult to apply the term forager to both and this has led to the search for logistical organisation in Mesolithic societies (for example: seasonality and logistical nomadism between coastal shell middens and inland settlements). Some researchers have even used the complex social structures of ethnographically known American North-West Coast societies linked to anadromous fish resources as an analogy for the Upper palaeolithic and Mesolithic, and have tried to identify this kind of resource exploitation along the prehistoric coasts of western Europe.

This has led to a reinterpretation of ethnographic societies, in which seasonal behaviour (or logistic behaviour) is assigned to coastal groups even when there is no direct evidence for this, but only a sophisticated curate technology. The coastal groups from Tierra del Fuego provide a good example of this (Stuart, 1972 versus Orquera and Piana, 1999).

The inadequacies in the interpretive framework and the theoretical–methodological ceiling that was reached in Paleo-Mesolithic Archaeology in the 1980s led us to the conclusion that a complete rethink of the foundations of the discipline was necessary (Estévez and Vila, 1998, 1996b). This took us outside Europe and formed the basis for our work in Tierra del Fuego (Piana et al., 1992).

We use the term Ethnoarchaeology (in the broadest sense) to describe our projects to highlight the specific, constant and dialectic use we have made of both disciplines. Our aim is to construct a methodology that is specifically archaeological that will enable a new, holistic, and more detailed understanding of past hunter–gatherer society. The aim is to use a deductive approach, based on direct archaeological evidence, to understand the complex relationship between social relations and productive and reproductive systems (Estévez and Vila, 1996a).

The application of our project in terms of actual ethnoarchaeological data was centred on the main Island of Tierra del Fuego. Human groups who employed two basic subsistence strategies, one that was primarily based on hunting terrestrial animals and the other which was based on the exploitation of coastal resources, occupied this island. We focussed on the second group and concentrated our efforts on the Argentinean part of the north coast of the Beagle Channel (Fig. 1).

The reasons for selecting this area have been published elsewhere as has the methodology. This includes: (a) an initial working hypothesis of the internal structure of societies who do not control reproduction of their resources (Estévez et al., 1998), (b) testing this hypothesis using a specific case study, the Yamana for whom there are many and varied ethnographic accounts (written accounts from the 16th Century to the 20th Century, photographs, ethnographic collections), and (c) excavation of a sample of sites reflecting all aspects (Piana et al., 2000) of the way this society functioned (living sites, burials, and ritual locations) and for which there was direct ethnographic information. We have been able to re-evaluate our archaeological methods constantly using the ethnographic data as key for the “black box” and we have been able to assess the success of our methods and identify the problem areas (Estévez and Vila, 1998).

The Yamana were so named by the Ethnographer Martin Gusinde, while the missionary Thomas Bridges called them Yaghan. Yamana living sites are what would be identified archaeologically as shell middens. One of the reasons for selecting Tierra del Fuego for this work was the excellent preservation and high visibility of sites all along the coastline and the absence of notable human activity here subsequently.

The highly visible nature of the archaeological record here enabled us to select with great precision appropriate sites for excavation, based on our requirements for hypothesis testing. Our selection was based on the chronological placement of sites and the local environment, that is sites that were located securely within the ethnographic present (optimally from the XIXth Century) and geographically within the resource bases exploited by this canoe-using group.

Yamana society has been described as a case of littoral specialisation (Orquera and Piana, 1999), a forager system (in Binford’s sense) with a certain degree of flexibility and some collector features such as the hunting of guanacos by teams of men as described in ethnographic studies. Subsistence was based on shellfish, fishing and hunting of birds and sea lions, with little focus on plants for food. Despite some seasonal variation in the environmental
supplies between summer and winter (for example in the species of pinnipeds, birds, and fish present in the Channel), this did not lead to markedly seasonal changes in the overall human strategies. Overexploitation of the day-to-day resources, such as shellfish, was avoided by a strategy that included almost continuous movement up and down the channels and around the islands, by canoe. They were able to cover large distances in a relatively short time. In addition to these bark canoes, their curate technology included several different types of harpoons, spears, bows and arrows, daggers, traps and other items for fishing, and containers. The balance between long term production and reproduction was maintained by an organisation based on a marked sexual inequality in favour of men (Vila and Ruiz, 2001).

In addition to the site of Tunel VII (Fig. 2) our Hispano/Argentinean team has excavated two other sites, Lanashuaia (Fig. 3) and Alashawaia. These three sites, all from the contact period, together represent the complete environmental spectrum, as they are all located in different biotopes, with 80 km between the two most distant. Excavation also took place in the location where the last known ritual ceremony was held: Cabana Remolino, and an individual burial site located in a rock shelter, Mischwen III (Vila, 2004).

This paper is focussed on the relationship between lithics and bone and the methodology employed in excavation of Tunel VII. The final aim is to illustrate the need to rethink some general categories in hunter–gatherer archaeology, that arises even from the simple description of activities undertaken at the site, based on analysis of food remains (bones) and the use of tools (stone and bone).

The sample studied

Tunel VII is situated on the north shore on the Beagle Channel at 54°49’15” latitude south and 68°09’20” longitude east, in a small bay some ten kilometres from Ushuaia, the capital of the region of Tierra del Fuego and South Atlantic Islands. Another site lays less than 50 m away, Tunel I, where one of the earliest occupations in the region has been documented. Tunel VII is a shell midden, and like all other shell middens in the area, is well preserved, due to the very rapid sedimentary build up and the pH neutralizing effect of calcium carbonate (Fig. 4). No major taphonomical problems were encountered, due to the recent age of the site and the small amount of subsequent human activity in the area.

Our aims required an excavation methodology (methods and techniques) that covered a large area to undertake optimal analysis of the use of space. The initial excavation was of an area of 72 m², we later focused on a 32 m² zone where we could
identify the centre and surrounding area of one occupation unit (Estévez and Vila, 1998). The centre of the occupation unit was circular with a large hearth in the centre. It was surrounded by an accumulation both of food residues (the most abundant being mussel and other mollusc shell) and a range of other activity and waste material. This accumulation of litter around the living area is what creates the characteristic circular shape of shell middens in this zone (Fig. 5).

Using the excavation method of peeling that was developed initially by our Argentinean colleagues specifically for the excavation of this type of shell midden, it was possible to distinguish successfully very thin stratigraphic subunits (some of them of less than one litre of volume) linked to individual
discard events (Orquera, 1996; Orquera and Piana, 1996). This enabled to determine a very detailed sequence of occupation events. Within this, 274 microstratigraphic units were identified (Estevez and Vila, 2000); this has enabled the sedimentary dynamics to be understood (Fig. 6). Using spatial distribution and association among all of the elements combined with microtopographical analysis and soil micromorphology (Fig. 7), it was revealed that this site was formed by the repeated use of this place by an occupation unit (Taulé, 1996).

In the centre of the circle defined by the waste from shellfish consumption (midden), a sequence of hearths was separated by fine layers of sediment, which corresponded to periods of abandonment (Fig. 8). At least 10 different occupation events were distinguished in this location. Within this space, which measured $8 \times 4$ m, a circle of 3.5 m in
Fig. 6. Stratigraphic schema of the upper occupation episodes.

Fig. 7. Examples of the stratigraphy and soil micromorphology thin slide.
diameter had been demarcated, arranged, and covered. Small postholes were identified around an almost circular area, which matches with ethnographic descriptions and can be explained as the repeated location of a hut (see again in Fig. 5).

Dendrochronological data have placed these occupations between end of XVIII and the end of the XIX century (Orquera and Piana, 1996) that is after European contact. These dates correspond with the presence of some faunal remains (ovicaprinae) and evidence of some European raw material and artefacts (fragments of glass, and cut marks using iron tools on some bones).

Evidence of material cleaned out from the circular area was found around outside the hut. Within the different stratigraphic subunits identified, remains of animals, plants remains, and lithics were found in different proportions; all documenting activities related to production and consumption.

Our study needed the establishment of appropriate variables for analysis of lithic and bone material. Study of production waste and the use of artefacts of stone, bone, mollusc, and European materials was based on the analysis of the provision of raw materials, technological processing, resulting morphology, and use-wear. The aim was to understand the global management of mineral resources for the manufacture, use (and discard) of lithic tools, and those made from hard animal products.

The archeozoological study of the faunal remains and the paleobotanical evidence was focused on the processing of animal and forest resources, both as food supplies and raw materials for the manufacture of tools and utensils. Detailed macro and microscopic analysis of food remains was carried out to understand in detail the processing and distribution of these products, prior to being eaten. Analysis of the distribution and densities of these elements, considered as by-products of production and consumption activities (Wünsch, 1996), within the defined space, enabled the identification of a pattern of organisation of the occupation units that corresponded to the ethnographic information about the huts of yamana people (Fig. 9).

This archaeological methodology applied to the search for hunter–gatherer social organisation, previously known from ethnographic information, is allowing us to re-evaluate and readjust the normal methodological standards in prehistoric archaeology beyond simple description. The contrast between the social/holistic information that we already have gained from the ethnographic record (discussing written records, photographs, drawings, and objects of material culture) and the information we are able to collect from the archaeological record, filtered by the taphonomical and experimental approach (Estévez and Mameli, 2000), provides us with the
basis for evaluating the archaeological standards (Piana et al., 1992).

Here, we are going to describe briefly the results from a holistic analysis of the activities documented in each of the occupations, based on analysis of bone and lithic material (Briz, 2004; Clemente, 1997). The description will include seasonality markers obtained from faunal remains (presence and absence of species, osteological development of the mammals, and growth lines on pinniped teeth) (Schiavini in Vila et al., 1997).

**Results**

The resulting general occupation pattern has allowed us to isolate the central stratigraphic sub-units (identified as the covered space) that were characterised by humus and fine sediment. In the centre of this space, small areas of thermo-altered sediment were superimposed (becoming slightly displaced in between one occupation and another). Its layers enabled the distinction between the 10 different occupation events. Around this central or inner circle which was kept reasonably clean, a large quantity of material taken from the inside the hut was deposited, both food waste and waste from production of objects that took place inside the hut. In some cases, small, lightly thermo-altered zones were also present in the peripheral areas of the hut and in the area immediately outside. Some internal areas contain evidence of stone knapping waste, notably evidence of secondary knapping and tool manufacture, though this is more common outside the hut (Fig. 10).

The maximum thickness of the sequence is about 30 cm, of the 50 cm total average thickness of the site’s stratigraphy. The way in which the deposits overlay one another, and the hearth sequences and associated deposits enabled most of these waste deposits to be assigned to individual occupation events, though in certain case the lack of a clear association with the central area made the exact correlation difficult. A small amount of mixing occurred between the uppermost part of each lower deposit and the lowest portion of the higher overlaying deposits. We therefore focussed on material that was clearly and without question assigned to specific occupation events.
The subsistence activities throughout the suite of occupation events (Estévez and Martínez, 1997) are: seal hunting—3956 bones, total MNI for all the occupation events is 27;—guanacos (122 individual bones from different individuals), exploitation of large sea mammals (520 fragments of bones from a Mysticeti and one dolphin), hunting of birds: 5.064 elements from cormorants (39% of the NISP), penguins (27.5%), big sea birds like albatross and giant petrels (18.5%), small sea birds like petrels (6.4%) and gulls (2.9%), shore birds—like Kelp goose and ducks—(0.59%), prey birds (1.1%), and inland species—like parakeets and Passeriformes (3.83%), fish (tens of thousands of bones), shellfish collection (thousands of shells, mainly mussels, but also limpets and whelks).

The most important food resource for the supply of calories (not including the whales, whose contribution to diet is unknown because bones could have been collected for tool manufacture) comes from pinnipeds hunting. But the most time-consuming subsistence activity was fishing; thousands of fish (yielding more than 200,000 remains with a density of 1 to 323 remains per dm$^3$) must have been caught from canoes using baskets and lines and on stranding, and above all shellfish collection. Shells represent the second most important food resource (Estévez, 2001; Estévez and Martínez, 1997; Estévez and Vila, 1996b). The density of remains ranges from 35 to 420 individuals per dm$^3$. This represents an MNI of more than 769,245 NMI of mussels for all the occupation events together.

The lithic analysis (production and use of tools) has shown that stone tool manufacture and tool maintenance was an important activity (24,924 pieces including residues and waste material) and 893 used artefacts including knives, scrapers, arrow points, and daggers (Fig. 11) (Clemente, 1997; Clemente and Terradas, 1993; Terradas, 1997). This labour was undervalued in the ethnographic accounts, most likely because the most detailed accounts come from the most recent periods following substantial European contact. By this time tools with metal or glass edges had almost completely replaced stone. Shell was also used to make tools...
(3 fragments of valve shell *Mytilus* and *Aulacomya*), and bone: chisels, wedges, and harpoons were all present made from cetacean or medium sized mammal bone (10 fragments), awls made from mammal bone (4) and bird bone (14), and retouching tools made from guanaco metapodia (2). Though many tools were discarded after becoming no longer useful, many others were abandoned before being completely exhausted.

Both directly and indirectly (Zurro and Madella, 2004), the use of wood, bone, and skin to make tools and other objects was also identified at the site (35 necklace beads).

The construction, organisation, and maintenance of the living space and the provisioning of necessary materials (fuel, fire upkeep, construction of movable objects, sleeping and manufacturing areas, and maintenance of the huts themselves) must have all taken up a lot of time (Mansur and Vila, 1993). An estimate suggests that around 40 kilos of wood per day was required to keep the central fire going. Ethnographic information confirms that the provisioning and the permanent upkeep of the fire were of critical importance (Piqué, 1999).

**Description and characterisation of the 10 occupation events**

The pattern described below reflects the general impression gained following analysis of the most significant elements of the excavated material, through the 10 occupation events, though the different occupations show some interesting biases. Though these biases have been identified exclusively on the basis of qualitative and quantitative examination (signification tests and correspondence analysis) of the faunal and lithic analyses, they do enable certain assertions, outlined at the beginning of this article, to be examined in further detail and allows for some reflection on the meaning of the archaeological sample.

A. The first occupation (Fig. 12) occurred probably during spring. No bone artefacts and few sea lion bones were found, but cetacean and guanaco bones were abundant and a strange non-habitual consumption of austral parakeet was evident. The austral parakeet is a small bird of around 35 cm long, and it does not provide much meat, just 80 g. However, many bones have evidence of butchery, and also bite marks on them. It is possible that this bird may have been important in another way, for example it is the only bird to live on the Fuegian coast that has green feathers, but no ethnographic account is made of any importance in this respect.

B. During the second occupation, probably also in springtime, people were involved in stone knapping, bone working, sea lion consumption, and leaved manipulated cetacean bones (Fig. 13).

C. The third occupation, during late winter or spring though for a shorter amount of time, had evidence of bone working, sea lion, and guanaco consumption, as well as cetacean bones (resulting from consumption of whale meat or its use as bone raw material) (Fig. 14). During all of these occupations people discarded their empty shells in middens on the southwest side of the hut. We believe that this was done consciously to provide a little more protection from the wind.

D. In fourth occupation event evidence for arrow point manufacture was present. A stone knapping place was located close to...
the central fireplace. Two other small secondary fireplaces were located to the north of the hut centre: one inside the hut and another outside. Woodworking and sea lion consumption were the main activities. They also left cetacean bones. It was also a winter or spring occupation, but here, people began to accumulate their waste on the eastern side of the hut. The centre of the hut became sunken and encircled by the shell midden (Fig. 15).

E. The fifth occupation, during winter, was more complex. It is indicated by a stone knapping place outside the hut and a working area in the interior. The main evidence for consumption was sea lion and guanaco bones. There is a high proportion of cetacean bones, but consumption of birds was less important. The winter season corresponds with a more intense use of fire: at the entrance another fireplace was located near the central one. Several other patches of thermo-altered soil indicate secondary fireplaces. This use of secondary hearths was also noted ethnographically. The hut opening faced southwest, the direction of least wind during winter (Fig. 16).

F. The sixth occupation occurred in early summer. It contained many bone tools, a reduction in sea lion consumption and an increase in cetacean bones and evidence for the consumption of bird and fish. A fireplace was again located in the centre with a second fireplace located outside the perimeter of the hut. The opening faced south directly towards the sea. Small areas of thermally altered soil indicate the location of secondary fireplaces in the interior, around the edge of the hut. Food residue and tool manufacturing waste material as well as other bone objects were scattered around the northern part of the interior (Fig. 17).

G. The next occupation, which took place over a short time, yielded residues of bone manufacture, notably arrow points, sea lion, seabird, and fish consumption. A reduced central fireplace area and some small secondary hearths are located inside the hut around the edge (Fig. 18).

H. The eighth and ninth occupations occurred during summer. They contained lithic tools for animal processing, and evidence for cetacean, guanaco, and also abundant bird and fish consumption. It is difficult to separate
clearly these two occupations; it is possible that they occurred very close in time. In both occupation events, the fireplaces were slightly displaced, but the perimeter of the hut and the associated stratigraphic units were difficult to correlate specifically with either of these occupations (Fig. 19).

J. The final occupation was a short summer visit. Deposits comprised lithic tools for animal processing and a low but varied animal consumption (Fig. 20).

After this last settlement the concavity of the central depression was not occupied again and was filled with sediment and residues produced by the inhabitants of a hut that was probably placed very nearby to the west or east. As a result the surface was flattened and was finally covered by a layer of organic matter and sediments.

Discussion

Biases are not seasonally oriented

Examining the sequence as a whole gives a clear impression of the sequence of occupation events but it does mask the more complex individual dynamics. The holistic information is representative of a series of occupations that took place over more than a century and which cover all the different seasons. There is no evidence of seasonal-based bias in the use of the site, neither in the use of the space nor the exploitation of resources. Some of the occupation events are short, while others are long, and no correlation exists between the length of stay and the season (Delgado, 1998). The only visible repeated pattern in the use of space during the individual occupations was the use of the centre of a circle as the place for the main hearth in the hut. This practice and the non-random nature of the deposits together, finished by conforming a slight hollow surrounded by the depositions of waste. The microtopography resulting after the activities of each occupation conditioned the dynamics of subsequent ones. Though the holistic perspective on the occupations provide clear indicators of economic strategies, the microanalysis of the sequence was also shown to be very useful. Examination of the sequence of occupation events reflects a series of biases and also illustrates a flexibility in the system which permits specialised opportunism, superimposed on a series of normal repeated strategies, both with respect to the dietary resources (pinnipeds hunting with harpoons, arrow point manufacture, fishing with lines and baskets, use of canoes etc.) and the use of the living space (clearing out of the central area, deposition of waste material towards the perimters) (Figs. 21–24).

Specialisation in a "not specialised" subsistence system

In Tunel VII a curate (Briz et al., 2005), specialised technology existed (sophisticated manufacture of tools, a range of bifacial point types, three types of harpoon etc.) to provide for non-rigid subsistence
Fig. 21. The frequencies of cetacean bones are correlated with the relative number of used tools calculated against the total number of lithic remains. This indicates that the choice for the first occupation of the site was related to cetacean consumption and an intensive use of stone tools. Both variables are not correlated to the deposition of molluscs, that is with the volume of sediment. This introduces the hypothesis that first occupations of new places may be related to cetacean consumption (may be close to strandings of this animals).

Fig. 22. The frequencies of molluscs, birds and guanaco bones are good correlated. This means that the main volume of sediments proceeds from molluscs consumption and this activity is correlated to broad spectrum subsistence moments. The graphic shows that the consumption of birds increases relatively over time.

Fig. 23. Sea lion remains are best correlated to the total amount of lithic remains. This can be seen as a relationship between the activities of sea lion consumption and the need of lithic tools. These activities are most represented in the middle occupations and they decrease during the last occupations.
behaviour. This non-rigid system combined different, complex strategies such as the intercepting of pinnipeds with harpoons, fishing from canoes, guanacos hunting using bow and arrow in winter by small teams of men, or the hunting of nesting birds, together with other different opportunistic procedures (such as for example the occasional hunting of seals with bow and arrow). Given this flexibility the subsistence strategies could not be simply classified either as collecting or foraging.

At Tunel VII the 10 consecutive occupations would seem to indicate that it is more accurate to call this strategy “non-specialised specialisation” (Gassiot and Estevez, 2005). Each occupation reveals differences in the kind of birds hunted and fish species caught (Mameli and Estevez, 2005). We can therefore state that, over a short period of time, people adopted a wide range of strategies to adjust to small environmental variations in space and time. In short, though there was a general and overall tendency towards the exploitation of littoral resources and mussel gathering, they took the best advantage of whatever was available. One observes some opportunistic use of tools: i.e., although the most suitable weapon used was the harpoon, pinnipeds were also hunted on land with bow and arrow probably as a result of casual encounters which were probably not infrequent. (Mameli et al., 2005).

It was essential to distinguish between the whole sample and those partial samples originated during each discrete occupation. The joint analysis of stones and bones does not provide a direct translation of events that took place on the site if the nature of the sample being studied is not considered. Considering the palimpsest as a single occupation period allows maybe dominant behaviour patterns to emerge in terms of subsistence strategies, but it does tend to hide more complex behaviour related to opportunistic, short term improvisation.

The simplistic classification scheme of collector or forager impedes analysis of the full range of possible hunter-gatherer subsistence strategies. It is of course not possible to compare the Yamana society to a Middle Palaeolithic group of foragers, even if both groups had a subsistence system based on the collection of molluscs and exploited a broad spectrum of resources with some opportunistic exploitation behaviour trends. It is strictly not correct to categorise Yamana groups as foragers on this basis, nor on the other hand, to consider them as collectors (considering the curation technology of harpoons, canoes, and arrows) and assume, therefore, a strict seasonal basis to their behaviour. At the same time we cannot do the same for Mesolithic coastal societies based on analogies with ethnographic examples, even if they show a similar overall organisation of their subsistence system or similar trends in the curation of their technology.

We can demonstrate that there is an overall strategy of specialisation, and at the same time an opportunistic day-to-day exploitation of resources, because of the nature of the sedimentation in our shell middens, the excavation system used, and the controls on our data provided by the ethnographic information. Unfortunately, this situation is not
common and has rarely prevailed in the Archaeology of prehistoric hunter-gatherer settlements and shell middens.

The palimpsest should, or rather must be, split up to visualise evidence for different strategies and their possible combined use. It is worse to assume that all archaeological sites are indivisible palimpsests. We can only begin to see the alternatives that may have been available to prehistoric people if we develop techniques to dissect more discrete episodes of occupation and if we focus on the study of items primarily as the result of production and consumption processes. In this way, we will be more aware of the adaptive capacity available to a people and therefore the reasons for failure or qualitative shifts in their lifestyles.

References


