Ceramic technology, environment & residential mobility in small scale groups: preliminary trends from north Patagonia, Argentina

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Abstract

The purpose or this paper is to analyse four ceramic assemblage sets and discuss the relationship between ceramic investment, environment and strategies of mobility among Late Holocene hunter-gatherers in southern Mendoza. The analysed assemblages come from the areas of Llancanelo, Atuel Medio, Rio Grande, and surface materials from Volcán Overo. Different attributes of the archaeological ceramic like wall thickness, temper size, and surface preparation, enable us to evaluate the residential mobility of local human populations. Trends within each assemblage and among sets can be drawn from the study. Finally, the results point to heterogeneity between the relationship of the concept of investment in each locality and its implications for making inferences about hunter-gatherer mobility.

1 Introduction

The aim of this work is to improve the understanding of human mobility in southern Mendoza, exploring aspects related to ceramic technology. The sensitivity of different technological variables is evaluated by monitoring variations in mobility strategies. In reference to the proposals of Binford (1980, 2001a, 2001b), using the management of data from quantitative sub-macroscopic analysis of the ceramic material, patterns and trends are searched and hypotheses discussed about the incorporation of pottery by hunter-gatherers who inhabited the northern edge of Patagonia at different altitudinal zones.

Many researchers have used pottery as an indicator of residential mobility patterns between hunters and gatherers in different parts of the world (Simms et al 1997; Bright et al 2005; Eerkens 2008). They suggest that the labour and inversion cost during the manufacturing process is one of the most important factors related to this topic. Others for example had attributed the differences in labour or pottery dependence to the environmental characteristics (Binford 2001a; Neme 2007). In this study we ask if the investment in ceramic technology should be considered the same for all studied locations or does it evidence heterogeneity? Is the degree of investment associated with different altitudinal zones? Is the mobility in the highlands more restricted following logistical patterns or is it the same as those of the lowlands?

In order to discuss some of these questions a description of the selected study area is presented. The background in mobility and the relationship between the former and the ceramic technology is developed afterwards. Finally, hypotheses and results are presented and discussed to evaluate their significance in relation to mobility.

2 Central western Argentina and the southern Mendoza

The southern Mendoza area is located in central western Argentina (figure 1). To the west, it is limited by the Argentine-Chilean border of the Andes, and to the east, by the Desaguadero River, on the plain. The main rivers feeding the landscape from north to south are: Diamante, Atuel and Grande rivers. The south of Mendoza has a semi-arid environment. In general terms the palaeoclimatic evidence suggests that the weather conditions for the last 4000 years have been similar to the current ones (D'Antoni 1980; Markgraf 1983; Zárate 2002).

From the biogeographic approach suggested by Neme & Gil (2008) the region is divided into the highlands, the piedmont and the lowlands.

In the highlands, there are extreme weather conditions during the winter that make human settlement almost impossible due to snowfall (figure 1). However, in the summer months, the abundance of rivers, lagoons and wetlands allows the development of a flora and fauna varied in height.

The piedmont sub-region lies in the altitudinal limit of vegetation changes between Patagonia and Monte, in the region of the Grande River (figure 1). This location has high values of productivity, water availability and low inter-annual variability in resources.

The lowlands are an arid to semi-arid environment, with an average annual rainfall of 250 mm, with typical floristic components called Monte (Roig et al 2000) (figure 1).

In this general altitudinal pattern, rains are not distributed uniformly. Precipitation increases with altitude; the highlands receive between 900 and 300 mm and mainly in the winter. In the eastern plains the precipitation occurs mostly in the summer. In the highlands the water resources are abundant, meanwhile these resources in the plains are limited to the river courses and springs that are heterogeneously distributed.

2.1 Contextual information

Southern Mendoza was occupied as early as ~10,500 BP (Lagiglia 1968). The hunter-gatherer groups remained in the region towards the second half of the Late Holocene (ca 2000 BP) when the first domesticated plants appeared. However, the consumption of domesticated plants did not displace the gathering of wild foods as shown by stable isotope data which support this argument (Gil 2006; Gil et al 2010; 2011). The incorporation of ceramic technology into the

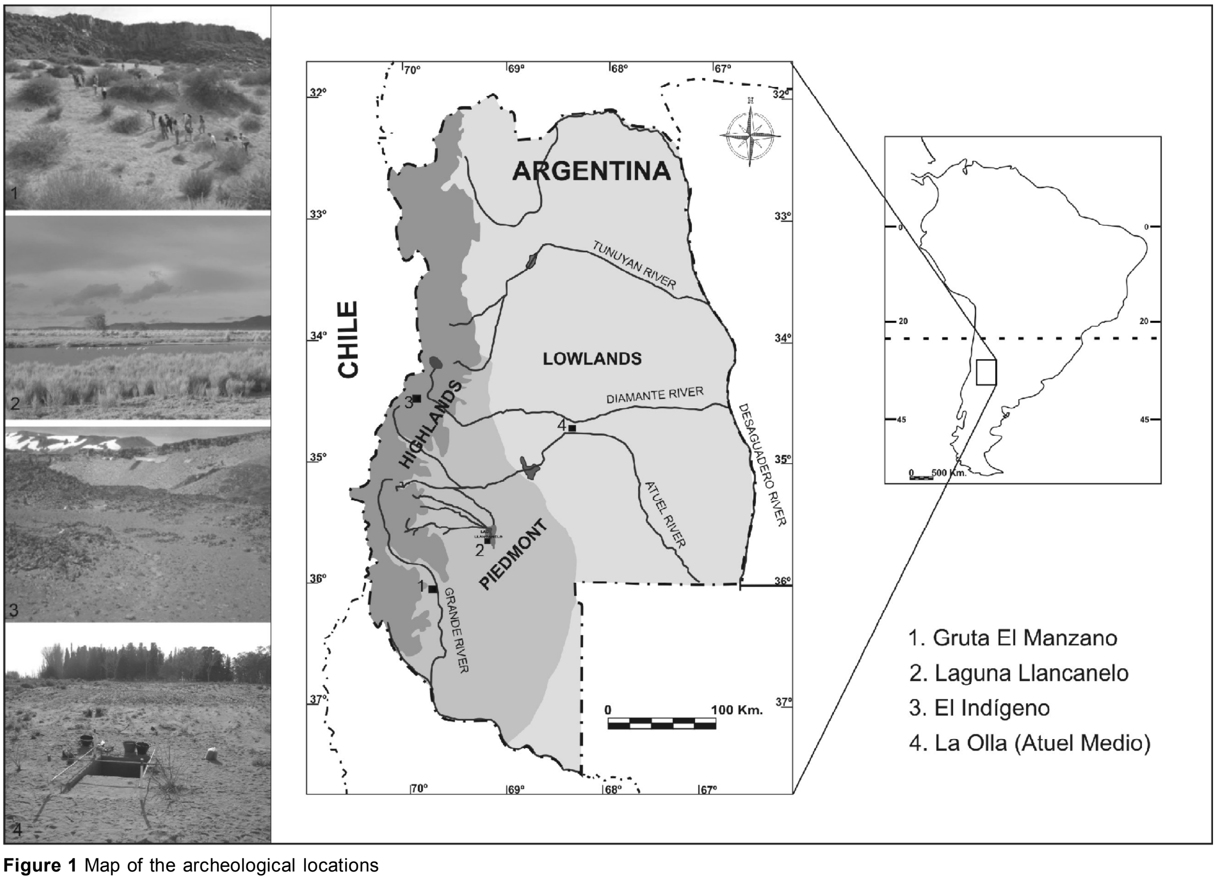

Figure 1 Map of the archeological locations

hunter-gatherer repertoire occurs at time of some subsistence change (Durán 2000; Durán et al 2006).

Lagiglia (1977) proposed a regional cultural sequence for the southern Mendoza with different periods: the first American arrivals and explorations in 10,000 BP, archaic hunter gatherer groups between 8000–4000 BP, specialised hunter-gatherers between 4000–2000 BP and the first agricultural groups with use of pottery technology in 2000 BP till the Spanish contact. The model has been discussed mainly in the last stage (Gil & Neme 2010). The idea of agriculture has been discarded showing that maize remains are rare and incorporated by trade, however the use of pottery is widely evident (Gil 2006; Neme 2007).

Lagiglia described many pottery styles, and argued that some of them are related to the highlands and others to the lowlands. However this attribution of styles to locations has been criticised by Chilean archaeologists (Falabella et al 2001) who see the pottery from the highlands related to styles from the western side of the Andes.

Duran (2000) worked in the area of Rio Grande, and he explains the use of these locations by hunter-gatherer groups from the eastern side of the Andes where they used to establish their winter camps. In summer these groups followed the guanaco (*Lama guanicoe*) migration to the highlands establishing their summer camps in small groups.

Gil & Neme (2010) have proposed a series of changes for the late Holocene period: 1) an increase of the diversity of taxa in animals and plants, 2) expanded trade relationships, 3) pottery as a new technology and of great importance in certain locations, 4) more use of foreign obsidian sources but at the same time more territoriality and permanence in the sites. These combined developments have been interpreted as indicators of a process of economic intensification.

3 Human mobility and environment in archaeological perspective: small-scale human groups

Mobility in human groups has been considered by several authors in anthropological and archaeological literature. Marcel Mauss (1979) related the seasonal mobility of the Inuit with their religious and moral lives. Furthermore, Sahlins (1983) sees mobility as a determinant of cultural attitudes towards material goods, which implies that an increase of the assets in the material culture limits the mobility of a group.

Other researchers have examined more closely the mobility-environment relationship as a way of understanding both the causes and the magnitude of it. Steward (1938) argued that residential mobility in the Great Basin of the United States is inversely correlated with population density, which in turn is correlated with precipitation and bio-productivity. This leads to higher mobility during the exploitation of low density and spatially variable resources.

Binford (1980, 2001a) addresses this issue from the structure of resources, taking data from the work of Murdock (1967). He specifically finds a strong relationship between effective temperature and the system of settlement of human groups. Thus, he develops a model for mobile groups based on two alternative ways: foragers, groups that move to resources; and collectors, those who travel to resources and return them to base camps. Kelly (1995) suggests that there are no completely sedentary societies, and that mobility can be individual or collective. In this sense, from ethnological studies, he identifies five dimensions for the study of mobility in relation to the distribution of resources, the effective temperature and primary biomass. These dimensions are the number of residential moves per year; average distance travelled; total distance travelled each year; total area covered each year; and average distance of logistical movements.

These contributions show that mobility in human groups, past and present, has been important in the development of the discipline. However, archaeological research has focused on mobility from resources (Binford 1980, 2001a; Kelly 1995), or from the lithic technology (Kelly 1988; Kelly & Todd 1988), with little attempt from the perspective of ceramic technology (Simms et al 1997; Bright & Ugan 1999; Bright et al 2002, 2005; Eerkens 2003, 2004, 2008). These studies have shown the importance of the environment in human mobility, especially related to the distribution and abundance of resources. Environmental variables should also play a role in the adoption of ceramic technology by hunter-gatherers.

3.1 Ecology, mobility and ceramic technology

Arnold (1985) sets three factors that must be present for a group of people to get involved with ceramic production: availability of water and clay sources; a favourable climate for manufacturing; and sufficient minimum stay in a village to raise, dry, and fire the piece. The lack of a sedentary lifestyle limits the amount of time available to produce ceramics in a given locality. This is important because ceramics are a fragile device and, furthermore, such a characteristic is accentuated during the time of manufacture and particularly at the time of drying. Furthermore, the most favourable time of the year to produce ceramics generally does not concur with the location of human groups in ecological niches with the resources needed for production.

Moreover, Arnold (1985, 2000) incorporates the concepts of community resource area and pottery ecology, in which a group of people are well aware of the raw materials available in a location for the production of pottery. Human groups use these resources to keep their own recipes and traditions of production, reflecting an identity of the community with a strong relationship with their environment.

Conversely, Eerkens (2008) warns against the tendency to stereotype the existence of a correlation between sedentism, agriculture and pottery. His argument states four problems or conflicts that all mobile societies, whether hunters or producers, must resolve in order to produce ceramics. First, the vessels are relatively heavy in relation to containers made from other raw materials. Secondly, the vessels are fragile and vulnerable to fractures during the residential movements. Thirdly, mobile groups tend not to stay long enough to complete the cycle of ceramic production. Fourthly, in general the best time for the production coincides with the period of seed gathering.

Eerkens (2008) suggests that one response to conflicts arising in relation to the weight and fragility of pottery is occupational redundancy involving keeping separate places provisioned with pottery for potential reuse. The most favourable locations are those with permanent water sources available where resources tend to be more predictable. There, groups can find favorable conditions to remain for longer periods of time and complete the production cycle of ceramics.

Meanwhile, Simms et al (1997) proposes that increased investment in ceramics is associated with downward mobility. These authors suggest that: 1) a fine thickness offers advantages in terms of resistance to thermal stress and thermal conductivity; 2) finer inclusions increase the resistance to fractures that can occur as a result of mechanical stress and/or heat, allowing the making of thinner walls; and 3) smoothing the pieces increases the abrasion resistance and allows greater impermeability. These qualities indicate a greater investment of time and effort in ceramic manufacture. The authors incorporate the variability of raw materials in different types of sites including base camps, camps for short stay, and longer-term residential base camps. Hunter-gatherer groups typically develop a ceramic technology characterised by a greater variability of raw materials than sedentary farmers.

Eerkens (2003) and Simms et al (1997) assume that there is a direct relationship between type of mobility and investment of time and effort. Eerkens compares mobility among hunters west of the Great Basin while Simms compares farmers with hunters in northeastern Great Basin with the analysis of Fremont groups, who are ‘flexible’ farmers. Bright et al (2005), on the other hand, relate the degree of investment with logistic mobility, giving the example of short stay sites that are within 50 km of residential camps where pottery is made and much time invested.

To make clear the expectations towards the investment concept it is worthwhile to consider that the choice of raw material and manufacturing technique will involve a compromise according to their labour and material costs, and the desired vessel life expectancy, relative to the need or demand for the final product (Braun 1983). The character and degree of residential mobility will also impose an external constraint on vessel use-life and potters will modify their level of ceramic investment accordingly (Simms et al 1997).

Furthermore, the investment concept in wall thickness has been used with stable isotopes to chart changes in mobility (Hart 2012), to infer a role for social inequality among early farmers (Laguens 2004) and to study changes in the ceramic technology used by hunter-gatherers (Gil 2002, Chiavazza 2007).

3.2 Ceramic and mobility in south Mendoza

Neme (2007) believes that ceramic technology was of great importance for the seasonal occupation of high altitude environments (Cordillera de los Andes) in southern Mendoza. To investigate this hypothesis, an index for each site was made, showing the relationship between potsherds and the lithics plus identified bones, and how they co-vary with the altitude. This index attempts to monitor the quantitative importance of ceramics in these assembles, in relation to altitudinal differences.

In a yearly seasonal round, locations in the lowlands offer good availability of plant resources and a wide range of small animals to hunt. Despite water resources being distributed more heterogeneously than in the other sub region, it is expected that the sites will be similar in size because the resources are more ubiquitously distributed across any of the sides of a river or a lagoon. The piedmont is a sub region of transition between the lowlands and the highlands, despite a lower ecological diversity, it is spatially important for reaching resources from the lowlands and the highlands. In the highlands, guanaco, the most important animal resource in the region, is very abundant. This sub region is only used during summer and the sites are very specifically located near springs.

Morgan (2009) explains that risks associated with moving increase under more variable environmental conditions, and extreme environmental variability could conceivably favour increased sedentism supported by logistical forays.

Goland (1991) argues that unpredictable circumstances require 'flexible strategies', implying that incorporating logistical and residential mobility types maybe the best way of coping with extreme environmental variability.

The construction of residential structures indicating some form of logistical mobility appears in rare circumstances. Aldenderfer (2006) explains these patterns by arguing that because mountain environments are marginal, seasonal, patchy and uncertain with regard to resource productivity, people should be risk-averse, choosing to employ little residential mobility and support themselves with logistical forays in small catchments. This would be the case expected for the highlands.

These described models attempt to generate a framework for understanding the environmental structure of southern Mendoza, the resources available in each altitudinal location and the possible use of each of them in a seasonal mobility pattern. In this pattern, ceramic technology is expected to be incorporated into a catchment strategy. Those locations with more ecological heterogeneity will be the ones where more investment is expected due to the importance of this technology to manage other resources in a more efficient way. These resources might have been plants seeds and proteins from big game animals and fishes.

Based on the models above mentioned, a scenario is detailed for the case of southern Mendoza.:

Hypothesis: the investment in ceramic technology is greatest in the highlands, decreasing in the piedmont and least in then the lowlands.

This hypothesis is related to the proposals of Neme (2007) for the mountain area, where there is a greater proportion of ceramics in relation to other archaeological materials. Given the complexity of investigating the different degrees of mobility, Eerkens (2003) used ethnographic sources, while Simms et al (1997) used type sites. It is expected that sites from the highlands will be involved in logistic mobility and therefore will have more reuse of ceramics with higher investment. An exploration of the heterogeneity of the selected variables in relation to the different locations in the sample is developed below. Table 1 shows the degree of investment according to each variable state.

4 Methodological framework

Four ceramic assemblages were used to discuss mobility strategies in different environments of human groups in southern Mendoza. The sites selected are the only ones available with enough data on which to base a meaningful quantitative analysis.

Sets analysed include surface materials and stratified artefacts from Llancanelo (Gil et al 2006) and Atuel Medio (Gil & Neme 2010) grouped as lowland. Llancanelo is a big salty lagoon in a sedimentary landform located at 1400 masl (figure 1) located in Malargüe. This sector comprises alluvial deposits and deposits of the piedmont plain (Nullo et al 2005). The water being a brackish lagoon, Llancanelo also has various freshwater courses of importance, including springs (Gil et al 2006). Atuel Medio has semi-

Table 1 Investment expectations for each variable following Simms et al 1997

	Thickness	Temper Size	Surface Preparation
High Investment	5 mm	Fine (0-2mm)	Polishing
Moderate Investment	6 mm	Medium(2-5mm)	Smoothing
Low Investment	7 mm	Large (+5mm)	Brushing

arid conditions, with summer rainfalls of 250 mm. In addition, Gruta El Manzano site, a cave which is located at 1500 masl, 30 metres above the Rio Grande (Duran 2000; Gambier 1980, 1987; Neme et al 2011), was considered as being from the piedmont. El Indígeno site (Falabella et al 2001, Lagiglia 1997; Neme 2007;) has a concentration of 126 residential structures built next to a meadow at an altitude of 3500 masl, between the headwaters of the rivers Atuel and Diamante (Lagiglia 1997; Neme 2007), was considered as being from the highlands.

All contexts analysed correspond to occupations from the last ca 2000 years. The sample included 217 potsherds of the lowlands, 130 from the piedmont and 668 of the highlands (table 2, table 3).

Ceramic materials (n=1015) were cleaned and then subjected to low power microscopic analysis. A binocular microscope was used (Nikon SMZ stereomicroscope 800) with objective magnification of 1x and 10x eyepiece. The variables surveyed were: thickness (mm), surface preparation (brushing, smoothing, polishing) and temper size (fine, medium and large), according to the categories proposed by Orton et al (1993; 1997) and Simms et al (1997) (table 1).

5 Results

Figure 2 shows the trends of the average and the maximum and minimum thicknesses of sherds per

Table 2 General data of the sample N per location & general data of the sample (E: excavation, SM: surface material)

Altitude	Archeological Sites m2	Cronology	N	References
Highland Piedmont Lowland	El Indígeno (EI) 1500 (SM) Gruta El Manzano (EM) 8 (E) Llan 1, 2, 17, 18, 21, 22, 23, BM, 2-75, T5, T8, T18, Lo y Lo2	1400 BP 2100 BP 269000 (SM) 9 (E)	668 130 1000 BP 217	Lagiglia et al 1994,Neme 2007 Neme et al 2011 Corbat et al 2009; Gil & Neme 2010
Total			1015	

Table 3 General data of the sample

Altitude	Thickness average	Temper size								Surface Preparation				**Total N**
		F	F/L	F/M	F/M/L	L	INDET	M	M/L	Brushing	Smoothing	Polishing	?	
Highland	7.47	89		3		54	70	450	2	572	50		46	668
Piedmont	5.96	48	2	19	2	1	3	44	11	4	30	95		130
Lowland	5.78	90	10	33	3	2	5	61	13	32	136	41	8	217
Total	6.25	227	12	55	5	57	78	555	26	36	738	187	54	1015

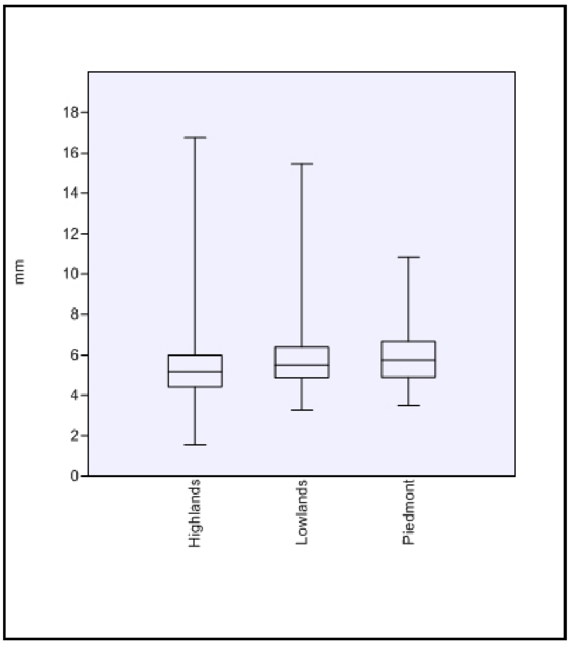

Figure 2 Trend of thickness per area

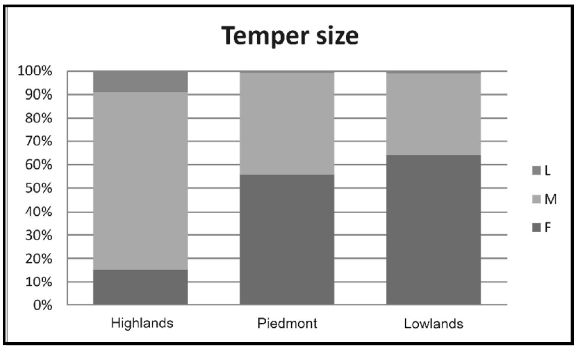

Figure 3 Trend of temper size per area

Table 4 Thickness One-way ANOVA

Thickness One-way ANOVA			
	Highlands	**Lowlands**	**Piedmont**
Highlands		0.0256	0.0003774
Lowlands	3.67		0.4271
Piedmont	5.43	1.759	

geographical area. The averages are similar among sites from the lowlands and the piedmont, ranging from 5 mm to 6 mm. This pattern differs from the average thickness of the highlands which has a value close to 7 mm. The average thickness of the combined assemblages is 6 mm, but the highlands and the lowlands show a greater range of values from 2 to 16 mm.

Figure 3 shows the trends of temper size of the three areas analysed. For fine temper size values (F) the lowlands reach 65 per cent (N = 136) and the piedmont reaches 60 per cent (N=71). For medium temper size values (M) the highlands reach 70 per cent (N = 452) and the piedmont reach 45 per cent (N=55). Thick temper size values are poorly represented, but in the highlands, the percentage is around 10 per cent (N = 54), relative to other groups, is significantly more abundant.

Figure 4 shows the trends of surface preparation by area (table 3). The lowlands present 15 per cent (N = 32) of brushing (B), followed by the piedmont with 4 per cent (N = 4). The highlands, however, show a high percentage of smoothing (S) with 70 per cent (N = 572) and 10 per cent (N = 50) of polishing. The piedmont have a high percentage of polished, 80 per cent (N = 96) and 16 per cent (N = 30) of smoothing.

In order to test the significance of the variability between and within the areas for the thickness variable, a one way ANOVA test was used. The values show a significant difference between the highlands, the piedmont and the lowlands, but no significant difference between the last two (table 4).

For the variable temper size Chi-square was used, showing the same pattern as the variable thickness (table 5). For the variable surface preparation, the results show that all areas differ significantly (table 6).

Table 5 Chi^2 Temper size

Chi^2 Temper size		
Lowland vs. Highland	**Highland vs. Piedmont**	**Piedmont vs. Lowland**
Chi^2: 184.6 p(same): 8.22E-41 Deg. freedom: 2	Chi^2: 101.49 p(same): 9.15E-23 Deg. freedom: 2	Chi^2: 2.624 p(same): 0.26928 Deg. freedom: 2

Table 6 Chi^2 Surface preparation

Chi^2 Surface preparation		
Lowland vs. Highland	**Highland vs. Piedmont**	**Piedmont vs. Lowland**
Chi^2: 176,95 p(same): 3,76E-39 Deg. freedom: 2	Chi^2: 322,72 p(same):8,36E-71 Deg. freedom:2	Chi^2: 61,382 p(same):4,69E-14 Deg. freedom: 2

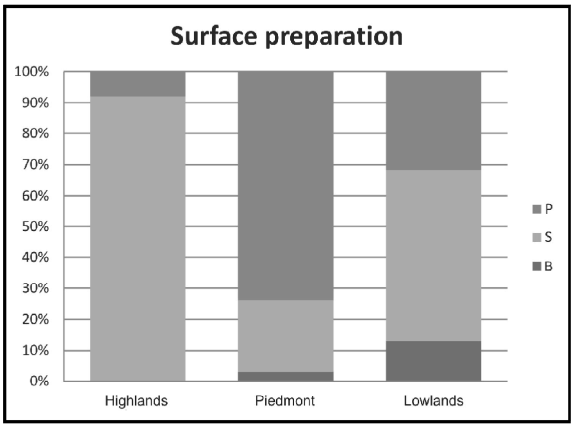

Figure 4 Trends of surface preparation per area

6 Discussion

In relation to the proposed hypothesis of altitude based mobility strategies, it is noted that the highlands differ from the others in having a greater thickness average and at the same time, greater thickness variability. Little standardisation and low investment in relation to the thickness is evident. The highlands present all categories of temper size, but have a predominance of medium size (70% medium temper), being significantly different to the other assemblages that have a predominance of fine and medium temper size (between 40–80% and 10–40%).

For the surface preparation, the highlands and the lowlands have high percentages of smoothing which implies a moderate investment. The piedmont, however, has a great investment because of the high percentage of polish. In contrast, the lowlands differs by having higher percentages of brushing, implying a low investment.

The following trends are observed: there is greater variability in the highlands and low technological investment. Meanwhile, the lowlands have moderate investment and in the piedmont high investment can be observed.

The hypothesis is therefore refuted based on this set of samples. In fact, it suggests the opposite situation to the postulated one, as the investment is greater in the context of the piedmont and the lowlands. The highlands archeological context differs from the rest.

The highland site of El Indígeno has 126 residential structures and predictable resources like water and firewood. These characteristics of the site, according to Neme (2007), allow an occupational redundancy through time. Simms et al (1997) and Eerkens (2003) have argued that the reoccupation of sites is a strategy for incorporating ceramics by hunter-gatherers, associated with logistical trips, a situation that might be expected from the groups that made use of El Indígeno. It is important to mention that some vessels has been found upside down, protecting the craft from the snow. This strategy may have been related to the reoccupation of the site.

The piedmont site of Gruta El Manzano has a high degree of investment in surface preparation and temper size, and the thickness average, close to 5 mm, also implies a high investment. It is a site with early occupancy, and also with early pottery in the context of the emergence of this technology in southern Mendoza. Finally, the lowland locations Atuel Medio and Llancanelo show a moderate investment strategy.

Other complementary lines of evidence have be used to understand the mobility patterns in the region. The most important are stable oxygen isotopes on human bone (ä^{18}O) (Gil et al 2011) and x-ray fluorescence (XRF) on obsidian lithic technology (Cortegoso et al 2012). Gil et al (2011) tested residential mobility using water samples as a proxy of residential mobility. The results show a higher use of water sources from the lowlands, which might be a consequence of the seasonal limitations to inhabit the highlands. In addition, the results show that even in the north of Mendoza and southern San Juan, where more settled patterns linked to agriculture were expected, high mobility was the norm (Ugan et al 2012).

Cortegoso et al (2012) explain the use of different obsidian sources through time using XRF. The results show that the sources in the highlands are at least located at 2500 masl, thus they are used seasonally. There are some sources available in the lowlands the whole year, but they are not the most used ones. Remarkably, the use of the sources follows an east-west (highland-lowland) circuit pattern rather than north- south. Each source is located in a specific latitudinal location and has a particular area of influence, where it can be used locally in 200 km2. This evidence allows us to infer high mobility marked by seasonal resources.

The concepts of forager and logistic mobility have not been used in studies of the regional archaeology as it is difficult to identify these categories among groups who might apply a continuum of strategies depending on season and habitat.

The concept of greater investment of time and effort is more easily applied in the context of occupational redundancy with more settled groups using logistical mobility. However, this concept is also difficult to test where many forms of mobility may lie between the extremes of high mobility and sedentism occupational redundancy is a strategy that may have different signals, so each case should be studied in relation to other locations from a regional perspective. Moreover, on a smaller scale, testing relationships among temper size, thickness and surface preparation, to infer correlations in the investment, will be an important pathway to understand variability in the ceramic record.

7 Final remarks

The hypothesis that the highland environment was a stimulus for greater investment in ceramic technology is refuted. The piedmont and the lowlands show more investment in thinning and burnishing which suggests a reoccupation of these areas from a mobility perspective.

This work represents an initial approach to the study of pottery technology in the Mendoza Region. The next step is to apply petrographic and elemental studies to assess the origin and transport of the craft.

In addition, the materials analysed from surface and stratified contexts (Neme 2009) provide a large heterogeneity in the sample which contributes to the record of technological variability. In the future it will be beneficial to link this information with more distributional studies that will allow mapping of presence and absence of pottery, densities, and its relationship to other archaeological materials, creating a closer analysis of mobility and subsistence strategies among hunter-gatherer groups in southern Mendoza.

In relation to Arnold's concepts mentioned above, the finer temper sizes found in the lowlands and the different temper sizes found in the highlands may reflect selection from the natural size gradient of mineral sands available between these regions. Further work is needed to explore this source of variability.

There are also significant chronological issues. The sites compared are not direct contemporaries and more radiocarbon dates and TL analysis will improve the understanding of the changes in this technology in the last 2000 years. However, the four locations are dated in the last period of the late Holocene, from 2000 to 1000 BP, making the comparison among them suitable for a preliminary study. Some studies have been done in the Mendoza region using the investment concept in pottery to explain changes in this technology in the last 2000 years, Gil (2006) and Chiavazza (2007).

The investment concept discussed in this paper is limited to: thickness, temper size and surface preparation. However, Bright et al (2002) incorporated expectations about investment on firing of assemblages and other attributes, which are applicable and inexpensive to be investigated. It is also important to incorporate a morphological study that will show the relationship between diameter and thickness to account form and functionality of vessels. Eerkens (2011) has already set a model in base to trade and arid conditions environments from which some expectations of form and technological characteristics can be drawn for pottery craft.

In the Great Basin there is evidence of a phenomenon of experimentation in marginal environments. One indicator of this is the long period of time between the initial phase of experimentation (1200 years BP) shown on the east side of the region and the eventual adoption delayed (600 PA) in the west, which means, according to Eerkens (2003) the incorporation of new technologies by using a conservative approach.

Bright et al (2005) also warns that at the end of Fremont (700 BP) there was a coarser ceramic with less investment, which means an expansion of this ceramic technology from west to east. In the case of southern Mendoza, this can be proved by testing the relationship between ceramics and mobility since its appearance in the record about 2000 years BP and its use trough the late Holocene.

Finally, the concept of investment in ceramic technology may be linked to the use of seeds and millstones which increase in the Late Holocene (Llano 2011, Eerkens 2004). By expanding the project to encompass other resources and technologies, we can develop a broader perspective on the role of ceramics within the subsistence strategies of these groups including a possible intensification process. This study is a first step to test a hypothesis and method, and the data collected will be the basis for much more research in the future.

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