ON THE EXTREMES OF HUNTER-FISHER-GATHERERS OF AMERICA’S PACIFIC RIM.

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1. Introduction

This paper returns to the topic of prehistoric art, which we discussed nearly 30 years ago (Estévez, 1981). During those 30 years we have worked on the archaeology of hunting and gathering societies in Spain, France and different South American countries. We have been researching the ethnoarchaeology of Tierra del Fuego since 1986, and more recently studying the societies of the North West Coast of British Columbia in Canada, to try to understand the variation in strategies of exploitation of littoral resources. As a result, we have first hand information about the two geographic extremes of the Pacific Rim and, at the same time, about the two extremes of the supposed variation in hunter-gatherer societies. These studies allow us to compare and contrast these societies, and especially to think about the relative social importance of their similarities and differences.

2. A discussion of the ethnographic record of both extremes: setting the ethnographic record in its epistemological context.

For our comparative analysis, we began with a critical analysis of the ethnographic evidence about both groups of societies and constructed a picture from the available archaeological evidence in both situations (Estévez and Vila, 1995, 1998; Vila and Estévez, 2010; Piana, 1984; Orquera and Piana, 1999).

The main ethnographic evidence from the extremes of the Pacific Rim, aside from a few initial records from sailors and various other travellers, was recorded following the epidemics that decimated their populations and the collapse of the original social organization.

The motivation of the two principal ethnographers, Martin Gusinde and Franz Boas, both raised in the context of German scholarship, was to fight against evolutionism and emphasising the issues of the historical particularist school of anthropological thinking. Father Martin Gusinde sought to show that the people Darwin had described as 'the most primitive people on Earth' had very advanced beliefs and even believed in a superior being. According to Gusinde, physical appearance, subsistence strategies, technology and social organization were unconnected from the spiritual.

As a result, he tried to deny the existence of evolution in the ideological realm of humanity.
Franz Boas, too, in studying the hunter-gatherer groups of the North West Coast of the Americas, sought to show the inadequacy of an evolutionary approach. They were, in his view, groups of hunter-gatherers, with a social and demographic structure, which did not correspond to the level of simplicity expected at the technological and economic level of hunter-gatherers. So he questioned the idea of a linear evolution from simple to complex in the social as well. Boas's proposition was important in underlining the complexity of the organisation of societies of the NW Coast who were simply hunter-gatherers.

Gusinde's proposal served to demonstrate the opposite: the complexity of spiritual thought, in the most primitive society, that of Tierra del Fuego. At the same time, the picture emerged that of the two hunter-gatherer societies, the Fuegians were culturally simplest, with no art and no other sort of sophistication, while the people of the NW Coast were the most complex from a social perspective as well as excellent artists and sculptors of totem poles.

3. Art and complexity: the social meaning of art.

Is the presence of what has been considered "Art" really a mark of social complexity? Is there really a correlation between the presence or absence of "artistic" objects and the differences among the social structures of the inhabitants of the NW Coast and those of Tierra del Fuego?

The first question is related precisely to the subjectivity of the concept of "Art". Historically, this concept has distinguished between two types of goods: those that are utilitarian and consumed directly; and those that are refined, with added subjective value, of restricted access and loaded with higher spiritual values.

It is no coincidence that the acceptance of European Cave Art by the Academy occurred at the same time as the development of anti-evolutionist thought in reaction to the first scientific interpretive-nomothetic approach to the evolution of societies. Cartilhac's change of mind about Paleolithic Art in 1902 was a result of a general intellectual movement towards idealist positions that sought to use the existence of "Quaternary Cave Art" as the proof of the presence of a "superior" intellect from the first moment of human existence (that is, of God's Creation). Nor is it a coincidence that a priest like the Abbé Breuil devoted his main effort to the study of "Prehistoric art". Prehistoric "Art" was tied up with mystical experiences, Shamanism, belief in a supernatural world, and, above all with religions and their rituals (Estévez and Vila, 1999; Moro and González-Morales, 2004). The "spiritual life" was separated from the "material", from biology, and also from the economic and the social.

Overall, according to this theoretical position, the analysis of "ritual" could be separated from the analysis of all other human activities (Estévez and Vila, 1999; 2006). This particularist approach, moreover, denied the possibility of generalizations and emphasized the unique character of every cultural manifestation.

4. Art, just and not less than a social product: trying to objectivize the production of art.

As archaeologists we have to stick to the material evidence (in broad terms and without being restrictive or mechanistic about it). We should study the archaeological record by treating prehistoric societies as a whole: both the social relations of production and those of reproduction (which include and refer particularly to the transmission of knowledge and ideas, and the maintenance of
social order), as well as the interaction between production and reproduction and the dominance of one kind of relationship over others. It is impossible to produce significant new knowledge or to make cross-cultural comparisons based on the archaeological record without first subjecting idealist positions to critical analysis. We need objective concepts that can be used cross-culturally and we need to avoid extrapolating those preconceptions that are a result of subjective analysis of our own society. But we also cannot expect to adopt a perspective from within the past society, and we can't carry a modern "emic" perspective back into the prehistoric past. Societies described by ethographers were not fossil societies. The societies of both the Fuegians and the people of the North West Coast had just as much history as any contemporary society. The changes that each society has undergone in their history, as shown in their demography, the diversity of work or social position of each individual, the energy invested in the reproduction of society, the society's efficiency, its capacity to transform the environment -these are variables that can be measured objectively and to some extent are correlated to changes in the production of the components of the ideology. Extreme or apparently anomalous cases do not prevent a scientific or nomothetic interpretation but they often require us to go back to the archaeological record using a different approach for interpreting the evidence and a review of the social and historical context. The most obvious example is the need for to review what has been said about "Prehistoric Art" in Europe. First of all, absolute dates for the cave art are needed. The chronological sequence was worked out on pseudo-evolutionist assumptions about a development from simple to more complex or sophisticated. As a result there has been dispute about any evidence, which does not fit into this pre-ordained scheme (the most well-known example is the case of the images in Chauvet Cave in France) (Clottes, 2001; Pettit and Bahn, 2003). Among academics such prehistoric evidence is classified as “Art”, following a modern and fuzzy concept of what is Art (1). We think it would be more useful to describe such phenomena from the starting point of what we know, that is to say the processes involved in their production: thus, it might be more appropriate to use the acronym PEDS to refer to paintings, engravings, drawings and stencils (as suggested by Davidson 1997). Only after we have identified repeated patterns will we be able to see which categorization we can assign to those phenomena in their different chronological and social contexts, how we can group them together and on what basis. Here we are more interested in relating PEDS to the development of social relationships, in particular the organization of production and reproduction, than in archaeological aspects of psychology or neuro-psychology, or in getting into the minds of prehistoric people: that is to say, in the translation of the archaeological record of PEDS into theory about the development of social relations. We are interested in the social characteristics of the activities that resulted in the production of PEDS. There is little doubt that most such materials were produced in a social context, as is true for most human activity that is not strictly neuro-physiological or mechanical, and that many are clearly associated with communal activities (e.g. Arias 2009). So they are yet another example of a social product, the result of the need for society to continue from generation to generation and to manage their resources.
The PEDS we see are social responses. They represent the use of particular tools (figures of animals, humans or geometrics) produced to reinforce realities or to communicate or pass on knowledge, and/or to reinforce and normalize particular social categorizations or social roles and rules that might not be accepted spontaneously.

The most productive study of PEDS should begin by putting them into context and integrating them with the other evidence, within the whole set of strategies and processes of production and of social reproduction (Estévez 1981). We want to analyse the processes that produced those PEDS together with those that produced all sorts of activities and artefacts involved in maintenance and reproduction of social relations including thoughts and ideas. That means that we need to include some things that others do not normally understand as art, such as architecture, performances and displays—including the movement of bodies and objects—the production of sounds and also painting and modification of the human body.

It means that, as we do whenever we study social activities, we have to look at who were the producers and how was the object produced, distributed and consumed (in what context of consumption) rather than concentrating on the form or on the style of the product itself (as in the classical approach of Leroi-Gourhan, 1965), which would be much closer to the classic definition of Art and as is the main aim of Art History.

Although this seems possible, it may not be easy to achieve because of the long tradition of studying the products for maintenance, reproduction and ideology separately from other products like tools, weapons and some utensils.

In many cases, they have been explained in isolation, searching for a significance in their own terms, without analyzing the social process that (perhaps) provided them with that significance. The greatest analytical effort is generally put into studying prehistoric tools and implements. Those things studied in the traditional category of Art have, above all, been described in formal or stylistic terms, and sometimes only in those terms. (e.g. Apellániz, J.M. 1990, 2002)

The study of PEDS in an integrated way, that is to say by analyzing the rôle they played in the whole effort invested by the society in the maintenance and reproduction of the social system, has often been sidelined.

By defending caution in interpretation the way has been left open to subjective (intuitive and phenomenological) interpretations instead of analysis of PEDS as main elements of the social structure.

But the culture-historical approach found itself up against impossible explanations, for example, hand stencils are found at the very ends of the ranges colonized by hunter-gatherers: in Tasmania and other parts of Australia, in the extreme southwest of the European peninsula and in the most remote painted rockshelter on the Strait of Magellan, but not always in the points in between on the routes to those "uttermost part of the earth".

Some motifs are shared by societies which we know with certainty have had an independent development: that is the case with the double headed serpent which can be found from classical Greece to Asia through the North West Coast ethnographic societies of America as far as Maya society in Mexico. And, whether or not this motif had a common origin is unimportant, now, except as evidence of the long survival of some ideological elements which may survive in different contexts and types of social organization changing their rôle and significance. (*)

We know from ethnographic studies from both ends of the Pacific coast that some mythological elements passed from one group to another, sometimes changing iconography, sometimes not, and that some imagery crossed boundaries without carrying the ideology with it.
It was possible for different survival strategies to coexist (for example, there were at least two on the Isla Grande de Tierra del Fuego); it was possible for there to be different languages (at least three in Tierra del Fuego) despite the fact that people moved from one group to another and that distinct groups shared ceremonies of social reproduction.

Nevertheless, despite this apparent lack of correlation between the different levels of social organization we can include these PEDS elements among the social mechanisms of different societies. And we can work out their rôle in those mechanisms, the effort involved in their production, their pattern of distribution and their use, and put them into the context of technological and general development in each society. For instance, drawing a red deer in the same way in a cave today may or may not have the same meaning (for example, just evoking an animal seen by the artist) as it once had in the cave of Altamira, but what is completely different and what explains the most about of the artist’s ideology and role is the social context, the different effort involved in the production, the educational background of the artists and the way society will “consume” (will look at) the item.

Analyzed in this way, PEDS become for us artefacts that contain a lot of information about the global development of these societies. Indeed both the people of Tierra del Fuego and those of the North West Coast invested heavily in the work of producing goods and of undertaking activities to maintain social order. In both people engage or engaged in dance, singing, the use of masks, body painting and the construction and decoration of houses. Through comparison between the societies of the effort invested and its differential distribution among the people in each society we can learn a lot about the characteristics of these societies. For instance it is not just the kind of motifs that are painted on wooden planks but the kind of houses they are painted on, and when and who is using those decorated houses, that really makes the difference between the societies and the meanings (the social roles) of the paintings.

Anyway, what makes the great difference between societies is not only the goods themselves, nor their function, nor the amount of work invested, but the way labor and social reproduction were organized. And that organization is, at the same time, an outcome of the way production of the material means of subsistence and of social reproduction have been articulated throughout their history.

We are proposing a method derived from a particular theoretical approach, which would allow us to produce an explanation of the development of hunter-gatherer societies. The production of PEDS, which, like any other product, has its beginning and its end, ought to be analyzed in its historic context. Indeed, the explanation of them can only emerge after they have been put into a diachronic historical context (Davidson, 1997; 2006).

5. Social development in Tierra del Fuego and in the NWC.

As an illustration of the way our approach could be applied in future research, we summarize the historical trajectories in the two regions as can be derived from the existing archaeological evidence (Figure 1).

Despite the local variation within each region, both in the North West Coast and in the coastal strip between Chiloé and Cape Horn (in Chile) there are common denominators among the pre-contact populations that allow the definition of a "NWC pattern" in the north (Ames and Maschner, 1999; Matson and Coupland, 1995), and "Magellan-Fuegian canoers" in the south.

In the far south, the archaeologically best-known zones are the east coast of the Beagle Channel (Orquera and Piana 1999; Ocampo and Rivas 2000) and the western part of
coasts of the Strait of Magallen and up to the north, the island of Chiloé, although the last two are less well-known (Ocampo and Rivas, 2005; Massone and Prieto, 2004). In the NWC, the region with the greatest tradition of research is the Gulf of Georgia and the north of British Columbia (Matson and Coupland, 1995).

Even allowing for the limitations of the existing archaeological record, the societies at the two extremes of America had a parallel evolution up to a particular moment when their development began to go in different directions (Figure 2).

In these two vast regions the first occupations that are well-documented date to the final moments of the last deglaciation. There is, still, no complete consensus about the occupation of the Pacific coast of the Americas before the Last Glacial Maximum (see Carlson and Dalla Bonna, 1996). The dates of some American archaeological sites are not consistent with a passage through an ice-free corridor in Alberta at the beginning of the post-glacial. But there is also no consensus about a late Glacial presence of people in the NWC which would support the hypothesis of a late Glacial coastal colonisation as was proposed by Fladmark (1979)(iii).

Great geomorphological transformations (erosion and periglacial till, catastrophic breakouts of glacial lakes [Blaise, et al., 1990; Blais-Stevens et al., 2003] transgression of the coast line, etc) as well as the problems of undertaking surveys in such regions could easily explain the absence of better evidence of occupation or much earlier migration which would be consistent with the most ancient southern evidence.

Leaving the oldest sites to one side, for the moment, in both regions there are clear signs of peopling before the beginning of the Holocene. In the north of the Chilean fjords there is a human occupation well-dated to 13,000 BP (Dillehay, 1989; Dillehay, 1997); in Magallanes and Tierra del Fuego the oldest dates are between 12,380 and 9,505 BP (Massone and Prieto, 2004). This is similar to the situation documented for the NWC.

In the western edges that were ice-free, there is evidence of human presence, albeit tenuous, before 12 000 BP (Fedje and Mathewes, 2005; Fedje et al., 2008; Ward et al., 2003; Wilson et al., 2009). In both ends of the Pacific, the pre-Holocene people exploited animals that became extinct. And in both regions there are important chronological gaps between the late Glacial and Holocene archaeological evidence, thus maybe a possible reduction of population.

In the extreme south, after an intriguing hiatus possibly associated with some catastrophic events around 9000 BP (glacial lake outbursts, rapid changes in the landscape and rises in sea level), the Holocene environmental traits began to be established and to stabilize after the opening of the Strait of Magellan.(iv) The fauna exploited in the known sites of both regions in the Holocene is very similar to the modern fauna. Some of the oldest sites on the coast of both regions share particular characteristics: both in Tierra del Fuego (Tunel I) and in the NWC (Namu, in the central coast, Glenrose, on the Fraser delta, Gbto23, in Prince Rupert, and Bear Cove, on the north of Vancouver Island) there is evidence of an initial occupation which did not involve intensive exploitation of shellfish, and does not seem to have a specialization on any particular type of resource.

In the south the documented subsistence was of terrestrial animals such as guanaco and rhea, despite the fact that the sites are close to the modern coast (Legoupil, 2003; Orquera and Piana, 1999; Laming-Emperaire et al., 1972). All of the sites seem to represent incursions by people who hunted terrestrial fauna, without any specialization on littoral environments (Orquera and Piana, 2006).
In the middle of the NWC there is more evidence of fishing and exploitation of marine animals, which has sometimes qualified as a specialised littoral exploitation, but that could be more easily and better interpreted as the occasional exploitation of such resources within an opportunist strategy of catching a resource that was seasonally abundant (e.g. Matson and Coupland, 1995).

In the south after a break in occupation that followed an important volcanic episode around 6980±110 BP, there was a change towards intensive exploitation of littoral resources:

From the island of Chiloe to Tierra del Fuego, 1500km to the south (Orquera and Piana, 1987; Legoupil, 1985-1986; Legoupil, 1994; Ocampo and Rivas, 2000; San Román et al., 2002), from that time onwards, the coastal sites were based on the exploitation of littoral resources, specifically hunting pinnipeds and fishing, hunting terrestrial birds and occasionally land mammals (specially guanaco or huemul) and the collection of crustaceans, fruits and fungi. But, at least in coastal areas of the Beagle Channel of Tierra del Fuego, the staple that was basic and critical to daily diet was the collection of mussels (Estévez and Vila, 1995; 1998).

In a similar fashion, there were volcanic episodes in the NWC such as the eruption of Mazama at about the same dates as the southern episode (6730±40 14C yr BP o 7627±150 cal yr BP), but the collection of molluscs began, or increased spectacularly, around 5500 to 4500 BP (Wessen, 1988). Collection of shellfish was a general trend in sites from the Gulf of Georgia to the north of British Columbia.

In the NWC, the change towards the collection of shellfish coincided with a rapid increase in the numbers of sites (see Grier, 2003). This has been interpreted as the being the result of an intensification in the exploitation of the environment (Ames and Maschner, 1999) or as an option to support an increasing population (Croes and Hackenberger, 1988). It is interesting to note that the most commonly collected mollusc in coasts separated by such a large distance was the mussel, which is found in inter-tidal zones and is very productive in terms of the output for a unit of work.

The beginning of broad spectrum exploitation aimed specifically at littoral resources is related to the appearance of harpoons and so of a technology developed for fishing and hunting in the water, with a pattern of annual exploitation and highly mobile logistics, without permanent structures nor clearly established social inequalities (Matson and Coupland 1995; Estévez and Vila, 2006b; Orquera and Piana, 1999).

In both regions, the NWC and the TdF, bone and stone artefacts appear with engraved decoration, or even small sculpted figures in the case of the Saint Mungo period (5500-3500BP after Matson and Coupland, 1995) at the mouth of the Fraser River. According to the Argentinian authors Orquera and Piana (1999) and in the view of some Canadian authors (e.g. Carlson and Dalla Bona, 1996; Fladmark et al., 1990; Ham et al., 1986), from this time onwards in the Beagle Channel and in the NWC basic subsistence strategies consolidated into adjustments to local littoral resources with some local variations (v).

Nevertheless, despite the general stability in the non-biological conditions and an identifiable continuity of occupation in some sites and in the qualitative nature of the exploited resources, in fact we cannot say that there was a simple, fixed and stable adaptation to the environment from the mid-Holocene in either region.

There are obvious changes and hiatuses in the archaeological record that demonstrate that there were crises and readjustments, some of which affected a whole region. Some, but not all, times these were related to natural changes of a sudden nature, or volcanic activity or tsunamis (see Fryxell and Daugherty, 1963; Bacon and Lanphere, 2006;
All in all, the record shows that there was an intention to maintain stability within a dynamic equilibrium, but that it was not always possible to achieve this successfully. Apart from these potential natural triggers in the crises in key resources, the critical problem that imposed the limiting factor on these systems (as proposed in the model of Croes and Hackenberger 1988 for the NWC and in the conclusions we have reached for Tierra del Fuego), was not the fundamental resources such as the sea lion, terrestrial hunting or fishing, although these provided the greater part of the calories. The problem is in the reliability resource: in the easy availability but rapid depletion of mussels, which, although they appear in large quantities and easy to collect also have a relatively slow recuperation, especially if they are intensively exploited (Mannino and Thomas, 2002). The subsistence in broad regions of both American coasts relied on this type of key resource, although it was sustained mainly by marine mammals and generally by fishing in both Tierra del Fuego and the NWC.

In the southern sequence, one of the marked breaks occurred a bit before 5000BP (Rivas and Ocampo, in press 2006). But the break that was most marked (Gassiot and Estévez, 2006) and is most controversial to interpret occurred between 4100 and 4500 BP ((Piana and Orquera, 1999; Legoupil and Fontugne, 1997). At this time, there appeared a type of coarsely made, bifacially flaked stone points made from non-local stone which characterized the assemblage of tools of production at a time when terrestrial mammals were more abundantly consumed than pinnipeds (Morello et al., 2002).

In the NWC there were also stratigraphic breaks in most of the sites (Mitchell, 1971; Matson, 1976; Cybulski, 2001). But the most marked break occurred about 3500BP in both the coast and the inland plateau (vi). From this time onwards, behaviour in the two regions diverged increasingly quickly.

In Tierra del Fuego after 3300BP the basic features of the tools and the archaeologically documented strategies remained unchanged until the arrival of Europeans. From the first moment of coastal exploitation right through the following period, the tool set remained mainly the same, the only changes were its simplification, the disappearance of decoration on bone artefacts, and the incorporation (perhaps around 2,600BP but certainly before 1,400BP) of bows and arrows (Mameli et al., 2003).

Even taking into account a possible demographic increase that happened in one part of Tierra del Fuego (Rivas and Ocampo, en prensa 2006), in fact people used a great variety of particular strategies to adjust to the slight geographic and temporal environmental variations. A successful social control of social reproduction together with flexibility and a high supply of marine resources which flowed in from breeding grounds that were located outside the normal reach of groups, maintained the balance between resources and population until the arrival of Europeans (Vila and Ruiz, 2001; Gassiot and Estévez, 2006).

In contrast in the NWC the dynamic of change was a spiral. Around 3500BP there was an important change of emphasis in gathering strategies: they changed from collecting mussels (which occur in concentrated patches and could be collected easily) to collecting molluscs from sandy bottoms (which are more dispersed and must be often gathered one by one) (vii). Around the Gulf of Georgia this change was accompanied by an emphasis on fishing for large fish, and this provides the first evidence of the preservation of salmon. Almost all authors (Borden, 1970; Matson and Coupland, 1995) agree that, only 1000 to 1500 years after the change in most abundant mollusc species,
around 2500BP, in the Marpole period, there were all the elements of the distinctive NWC model:
Intensive exploitation and storage of salmon and other fish species such as herring and candlefish, large/long houses, social complexity which is related to the production of objects of great added subjective value including, for example, stone sculptures. But not everything was unchanging. There was another intriguing break between 1700BP and 1500BP and more or less at the same time there is evidence of a war-oriented settlement pattern, defensive structures and obvious signs of conflict such as weapons of war (Angelbeck, 2009). Stone sculpture disappeared, and there was a substantive change in burial practice—from about 1300AD the practice of burial in shell middens ceased in the coastal zone (Cybulski et al., 1992).

6. Explanation
We explain the different directions of the histories in the NWC and Tierra del Fuego from the perspective of the contradiction between production and reproduction (Estévez, et al. 1998; Vila and Estévez, 2010) and a difference in the management of reproduction through history in both extremes of the Pacific Rim. This distinction in the management of reproduction (always in relation to subsistence production, though not directly derived from or caused by it, as must be concluded by the astonishing similarity at the starting point) is what denotes the different directions. The crisis that occurred around 4000BP in Tierra del Fuego did not get solved in the same way as the crisis about 500 years later in NWC. There were several options for intensifying the exploitation of different resources from among the large number of possible resources that were already known. Developing fishing to a greater extent was a good solution in both areas. The people had the experience and the necessary techniques on one hand and, on the other hand, fish stocks had the advantage of being difficult to over-exploit with existing technology. The traditional systems were not effective enough to deplete the stocks, and therefore people could overcome the problems of decreasing yields without recognising an immediate limit.

But in Tierra del Fuego fishing was a task performed just by women, and the intensification of fishing would signify an increase of the labour effort of men and women: improving the canoes, collective net fishing, constructing fish traps along the coast. The main breeding grounds of sea lions were far from easy access with the available seafaring technology and therefore the substitution of a relative stable supply was assured.

In the NWC implementing a massive extraction system was, in principle, the least-cost solution because it did not need a great investment in new technology nor did it require a spectacular increase in male work. Once the preservation techniques for fish (drying, smoking, oil extraction) were implemented, the only problem was that it would require a notable increase in the amount of female labour in processing, and preparing and maintaining the infrastructure (hearth, drying facilities, etc.). This would create a demographic trap which could spiral out of control: more women were needed to increase production, and that would generate more reproduction and thus more demand. In these circumstances there would be a spiralling geometric increase in demand. From our point of view, it is probable that this system was freed of the central contradiction between production and reproduction: The more (female) labour invested in processing the fish captures the more product was obtained because a large amount of biomass could potentially be extracted without menacing the continuity of the reproduction of
the main resource. Thus the society would be transformed into an expanding system (as an agricultural system does) and would end up taking over the neighbouring societies. Setting free the power of reproduction is the dominant factor that underlies all other causes that determined or triggered all the developments in the NWC. Despite the abundance of resources exploitable with the available technology, these societies were subject to socio-economic stress. The great potential of production (and storage) was conditioned to the availability of enough (women) labour force. This put pressure on reproduction and as a side-effect on social organization that invested huge efforts for managing, controlling and catching of labour force (Vila and Estévez 2010).

Clearly the strategy followed for management of reproduction did not produce the same effect in the NWC as it did in Tierra del Fuego despite having some starting conditions which could have been rather similar in terms of time costs and the types of resources initially exploited. And those differences are reflected in the production of PEDS.

7. And what about rock art?

There was a long tradition of prehistoric PEDS on the rocks and rock shelters both of the North West and in the most southern West. The two regions share the general problem of the lack of dating but there are different styles among the paintings and among the engravings that have been used to provide a chronological sequence. Many authors think that the first cave paintings appeared in the Mesetas of Patagonia around 9000BP (Aschero, 2007). They think that the majority of the figurative cave paintings started at this date and continue until 4000BP. These are realistic, dynamic and narrative representations of hunting scenes accompanied by hand stencils. This earliest Patagonian art is associated with guanaco hunters and their strategies of managing both social reproduction and their limited resources (Figure 3). The second phase has an abundance of hand stencils of women and children and representations of guanaco that are less naturalistic and are shown in static groups. Hunting scenes are completely absent.

The final phase is marked by an emphasis on abstraction and schematization, by linear anthropomorphs and by a majority of geometric shapes such as zig-zags, stepped triangles, concentric circles, suns and spirals. This final phase is distributed in the valleys that cross the Andes towards the west (Aschero, 2007; Gradin 1999; Podesta, e.a. 2005).

This last type of motifs and style is what is found in the sites of the northern part of the Strait of Magellan (Bate, 1970; 1971; Massone, 1982; 1985). Various assements and dating of the context suggest a chronology in the order of 2000BP (Gallardo, 2009) in this area. In the north, in the valleys of the Andes, images of horses and riders suggest the tradition survived until European contact.

This art has generally been associated with terrestrial hunter-gatherers, but some art has recently been found in a cave on the island of Madre de Dios, which can only be reached by boat. These are schematic paintings very similar to those in the sites of the Magellan region attributed to the final phase.

Parece pues que la ausencia, hasta ahora, de pinturas rupestres y grabados en la costa sur del estrecho de Magallanes y en las otras islas puede ser sólo una cuestión de suerte en las prospecciones o de mala preservación, en vez de una cuestión relacionada con una actividad exclusiva de gente cazadora pedestre.

It would seem, then, that the current absence of cave paintings and engravings in the coast south of the Strait of Magellan and in other island could be no more than a
question of luck in surveys or of bad preservation, rather than a consequence of activities exclusively performed by foot hunters.

The oldest rock art of the NWC is also found in the interior, on the Columbia Plateau and is older then 6000BP.
A naturalistic style, basically representing quadrupeds, seems to have begun in the inland Plateau and from there extended towards the coast. As for the hinterland of the NWC, there is at least one pictogram dated in the order of 2000BP (Keyser, 1992; Lundy 1976) in the valley of Okanagan.
At more recent dates there were more and different styles of rock art in the NWC: on the coast there were conventionalized styles among which human and animal figures were very lineal and curvilinear. Some figures clearly resemble the sculptures of the Middle Period (from 6500BP to 500BP), and some clearly refer to the paintings and sculpture of wood or argillite of the ethnographic period.
There are also representations in abstract geometric styles, one curvilinear and the other using straight lines which is thought to have originated in the inland and moved to the coast (Lundy, 1976).
Finally, as in the far south, there are some engravings and depictions of European horses and riders, and boats.

So there are some very general trends in common between the two geographic extremes: from more or less realistic or conventionalized representations there was a move to more abstract images. But the important point is not to discover the specific meaning, but the historical and social processes that led to people producing or ceasing to produce this behaviour: Why did they abandon the decoration of bone objects? Why did they stop producing stone sculptures in the NWC? Why was there no painting on rocks when Europeans arrived in the extreme south?
Unfortunately, to answer such questions much more research needs to be done from survey to absolute age determination to correlation with the historic sequence.

**8. Discussion: recurrences in human behaviour**

It is important to analyze the circumstances in which a society made use of PEDS to respond to a social necessity that went beyond the needs of the individual.
What common interest did members of societies have that they used the tools they knew (burins, pigments, fats etc) to make things that were completely new and different (PEDS)?
When did they develop this? Their use could have been to provide support or as a mnemonic or to fix changes in their social organization. The different contexts could enable us to distinguish between these different uses.
And the abandonment of the production of a particular type of PEDS could be an indication of the bedding in of the function that they had had for this new instrument.
We can probably identify some significant repetitive patterns.
That societies in a similar stage of their development use similar behavioural products that are socially necessary, would reemphasize that the need was structural and not contingent or circumstantial.
It is probable that throughout the evolution of societies we can identify changes in the emphasis on investment in social reproduction through the production of PEDS.
In European prehistory, for example, where we know the most detailed sequence, perhaps we can see these changes in emphasis. At the beginning there was an attempt to enhance self knowledge and self awareness (personal ornaments are the first items we can associate with social reproduction). After that there was an emphasis on the identification of women and reproduction which goes hand in hand with aggression and power (Hahn, 1986). This emphasis translates also into the representation of carnivores and large mammals, just at the time when these large mammals began to become rare and disappear (Estévez, 2004).

In hunter-gatherer societies with appropriate technological development a higher investment in labour jeopardizes the maintenance of production. The reproduction of the system, social sustainability, requires the avoidance of over-exploitation and the absence of excessive growth, as well as the maintenance of stable interactions between men and women which makes the second of these possible.

In sum, it would not be surprising to find an ideological reinforcement (through the use of PEDS) of the control of reproduction (that means of the bodies of women) and a brake on over-exploitation, especially of animals with a slower reproductive cycle. As some authors have repeatedly pointed out (Altuna and Barandiarán, 1969; Davidson, 1986; 1997; 2006) there is no direct relationship between the animals depicted and those on the daily menu towards the end of the Pleistocene in Europe: the ensemble of the depicted animal species usually represents a sample of animal species of larger body size than the ensemble of actually hunted animals (Estévez, 1981).

In the Mesolithic, at the beginning of the Holocene, when the system had begun to collapse, the animals that were on the main menu also began to be those most represented in the imagery, and an emphasis began to be put on scenes of everyday life involving different work done by women and by men (the division of labour by sex) (Escoriza, 2002). Finally, abstract figures seem to go with the establishment of economic and political territories, and with agriculture.

We have described a series of common traits in the development at the two extremes of the Pacific coast of America until a certain moment in time. Likewise a parallel sequence of the more general traits between European and American rock art can be glimpsed: from marking and depicting bodies and body parts (specially hands), animal samples bigger than those actually hunted, to scenes and geometrics. This whole sequences are probably not directly dependent on the strategies of getting food (hunting and gathering, or agriculture), but on the overall social evolution. As a final consideration we should take into account the instruments (the means) that contribute to the articulation of the production and reproduction of the society. That is to say all those means (institutions, ceremonies or rituals and all related ideological features) that function to maintain traditional social relations, among which would be those that marked control of reproduction and discrimination against women (Figure 4).

This paper is only a first attempt at synthesis of those regularities that might be present in the record, but it also shows that the record is neither appropriate nor sufficient (especially as the absolute chronology is not established and because we can be sure there are biases caused by taphonomy and the vagaries of research).
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NOTES:

i “Art” was derived from the Latin word “Ars” that is equivalent of the Greek "techne", Art as activity. The subjectiveness of the meaning of this concept is derived from its history and the bourgeois conception of art as opposed to craft that began in the XV Century. It has been also defined as a system of expressing emotions and ideas through intellectual and use items or as “Activity made with the intention of stimulating thoughts and emotions”; “a special human faculty together with religion and science emphasizing formal elements”. As it is very difficult to enter into another person’s mind, even by doing direct analysis of behavior or interviews, it is probably an illusion to search for prehistoric intentions and (altered) states of mind, without projecting our own phantasies and extrapolating from modern behaviour.

ii Christian mythology itself, which retains a lot of significant symbols of the Neolithic in the Near East in an industrial and capitalist context, is just one example of the persistence of ideological elements, icons and symbols.

iii The state of the question of the first peopling of the two regions, and of the Americas in general, reminds us of the state of the discussion of the first peopling of western Europe during the 1980s: Peopling earlier than 700,000 years ago was not the majority view and was discussed by questioning the artefactual nature of flaked cobbles on river terraces and doubting the chronology of stratified sites. The discovery of hominin remains clearly outside the range of erectus/heidelbergensis at Dmanisi, Atapuerca and probably Orce has cleared up that question, only to raise other questions, such as why a stone industry based on flaked cobbles appeared/arrived a million years later than it did in east Africa, or about the continuity and evolution of the first people, or else their replacement by a second wave of Out of Africa, etc.

iv Although significant environmental changes are documented for the Holocene they had their major impact on the mainland, in terms of climate variations, especially humidity and the advance and retreat of Andean glaciers (Franco, e.a., 2004; Rabassa, c.a. 2000). After the climatic optimum, most climatic variations, even when reflected in sea temperature, did not make significant differences to the range of shore fauna that people exploited.

v In the north of the NWC the sequence is very slightly different: although the old period is very little known, the few data there are seem to indicate that the first Holocene occupation (after 10000 BP) was already oriented towards the exploitation of littoral resources (Ackerman, e.a., 1989), but towards about 4000 years ago an expansion started which, 1000 years later, became an intensive exploitation of aquatic resources with emphasis on fishing, and about 1000 years ago ended up with a proliferation of fortifications (Moss and Erlandson, 1992).

vi The chronology is out of step with respect to Tierra del Fuego to about the same extent as the difference in time for the establishment of mollusc exploitation (about 6500BP in the south and 5000BP in the North).

vii This change is documented in many places: the north of British Columbia (Mitchell and Donald, 1988), the Gulf of Georgia (Mitchell, 1971; Stein, 2000; Coupland, 1991; Matson, 1976) and in the south of British Columbia (Butler and O’Connor, 2004). There were also changes much further south towards the coast of Santa Barbara in California (Erlandson, J.M. and Moss, 1999). This has been attributed to factors such as the transformation of coasts and their stabilization and the advance of deltas, or to cultural factors of over-exploitation (Cannon, 1991; Wessen 1988; Croes and Hackenberger, 1988).
Figure 1. Map of the American Pacific rim. Details at the same scale of A) the NWC and B) the Southern cone with the most significant archaeological sites: the most ancient sites: A- Pali Aike, B- Fell and Cerro Sota sites, C- Zone of Milodon, Lago Sofia, Dos Hermanas caves, D- Tres Arroyos site, E- Marazzi, F- Piedra Museo, G- Los Toldos, H- Piedra Parada, I Monte Verde. Canoe people sites: 1 Piedra Azul, 2 Puente Quilo, 4 Punta Baja, 3 Englefield, 5 Ponsonby, 6 Punta Sta Ana, 7 Lancha Packewaia, 8 Túnel, 9 Isla Salmón, 10 Imiwaia, 11 Lanashuaia, 12 Caleta Segura, 13 Aridos Guerrico, 14 Grandi. The Ω sign indicates the main sites with rock art.

Figure 2. Sequence of dates in the NWC (Estévez and Vila, 2010: 187) and Tierra del Fuego (dates from Orquera and Piana, 1999). The main hiatuses are marked with an arrow. The major social and economic trends are also indicated. Pictures of the different harpoon types in Tierra del Fuego are posted in their chronological position. In the Marpole period of the NWC there was a type of harpoon very similar to the oldest type of Tierra del Fuego.
Figure 3. Example of the paintings in Cueva de las Manos of Patagonia. Guanaco figures are superimposed on hand stencils.

Figure 4. Impossible picture. Two native women at the beginning of the XX Century. On the left from the NWC at the right from Tierra del Fuego. The discrimination and subordinate role of women was a common feature in both extremes of hunter-gatherer societies.