STYLISTIC AND SPATIAL AFFINITIES OF EASTER ISLAND *AHU*

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ABSTRACT

The results of a distributional study of Easter Island platform ahu *are presented. A combined spatial and stylistic analysis is applied to this wholly prehistoric type of architectural feature in an effort to describe mathematically the social and political organisation of the prehistoric island community. A platform* ahu *served as the focal point for a* mata, *a lineage based conical clan, and by extension functioned as an emblem and territorial marker of a lineage. Platform* ahu *within a 6.5 sq km area on the west and south coasts of the island were included in this study. Five* mata *once occupied this area according to ethnohistoric sources. The archaeological extension of this textual information is examined.*

INTRODUCTION

Easter Island is among the more remote and environmentally impoverished islands in the South Pacific, a circumstance that makes it a unique place for archaeology. Its long history of cultural isolation with little, if any, noticeable influx of extra-island material culture, in combination with its geographic isolation and scant flora and fauna, produced an exceptionally rich and complex cultural tradition that was an efflorescence of the archaic East Polynesian tradition, unequalled anywhere in the Pacific. The ability of the founding population and its succeeding generations to adapt to and make use of this extreme subtropical environment, to transfer the traditional Polynesian woodworking skills to the medium of stone and in the process create the monumental architecture *(ahu)* and associated statuary which have become synonymous with the island, has captured the imagination of many explorers (Thomson 1889; Routledge 1919;

Heyerdahl 1958), writers and poets (Dos Pasos 1971; Neruda 1985), and even anthropologists and archaeologists (Heyerdahl and Ferdon 1961; Métraux 1940; Mulloy and Figueroa 1966).

For the archaeologist, the island is much like an open air museum, with many prehistoric sites left virtually untouched by the development, ranching and agricultural activity that has taken place over the last 150 years (Figure 1). But this open air museum also has its drawbacks. Much of the traditional lore about the mechanics of everyday life, the social, political and economic organisation of the island as a whole, disappeared with the capture and demise of a majority of the population during the last century. In piecing together the culture history of Easter Island the archaeologist must sort through the scant oral histories recorded by missionaries, explorers, natural historians, and other visitors to the island, draw on analogies from other Polynesian islands, and interpret the mute testimony of the material culture assemblage.

A very crucial and fundamental element in any reconstruction of the prehistoric era is identification of the social and political organisation of the island, as defined by the arrangement of *mata,* or multiple lineage groups (McCoy 1973, 1979; McCall 1979). The following pages present a systematic approach toward this end, through the union of two complementary statistical techniques - a nearest neighbour analysis and a cluster analysis - applied to a series of monumental constructions and specifically directed toward the identification of discrete polities (Beardsley 1990).

Platform *ahu* are the monumental constructions at the center of this analysis because they are the only major architectural features on Easter Island. They are highly visible, permanent features in the island's archaeological inventory; they were identified with specific *mata* and are said to have served as the foci of social, economic, and ceremonial activities of the *mata.* They are also con-
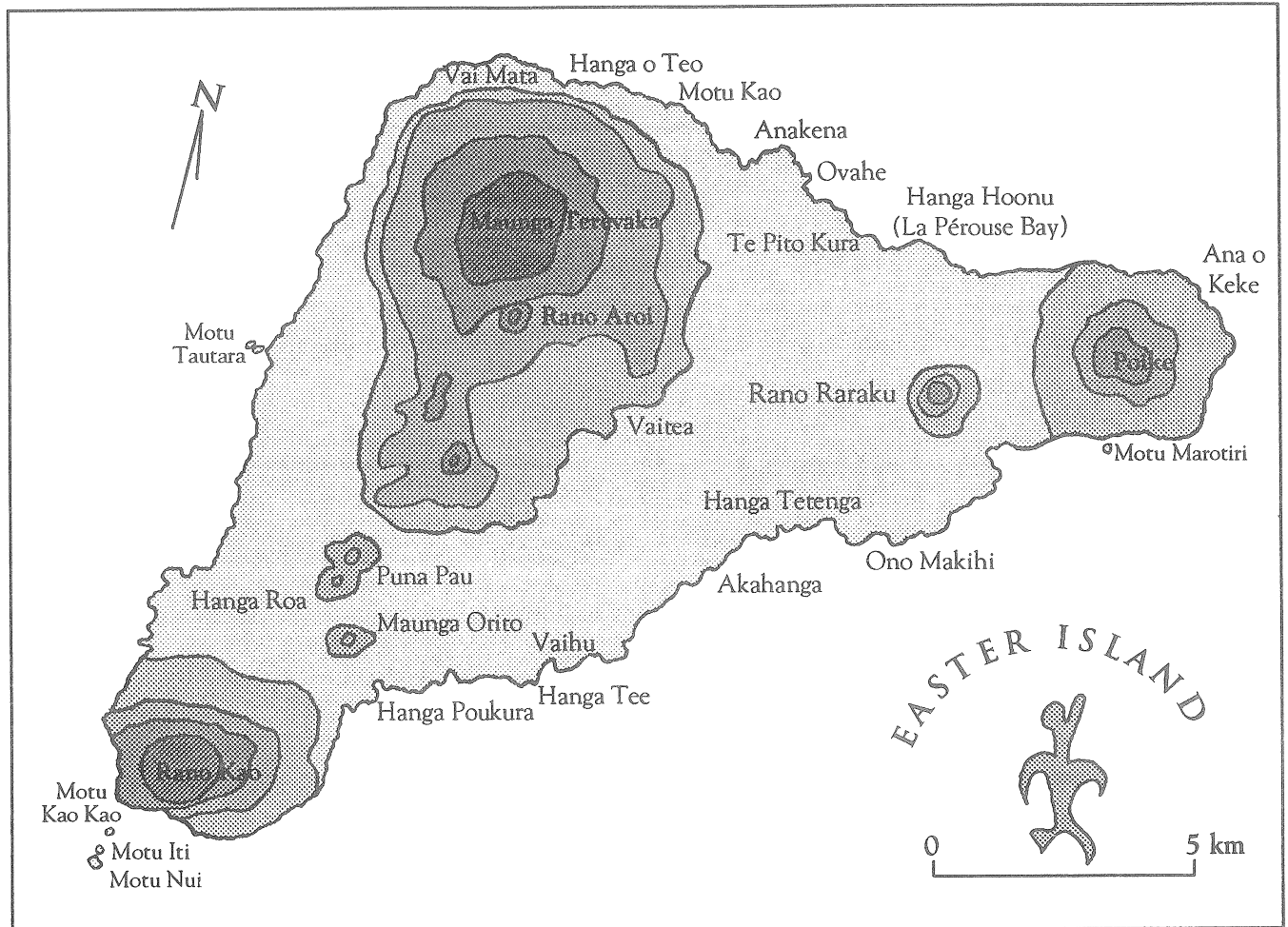
Figure 1: Map of Easter Island

sidered to be the result of a collective design process that not only reflected the selection and arrangement of building stone, but also embodied the basic design conventions established by the respective *mata*. In effect, platform *ahu* provided a direct link to the *mata* and served as a prime reference to the group's territory; they were an emblem of the group, a visual mechanism that relayed information about the existence of that group and the territory it occupied (Weissner 1983). Such associations are in keeping with the common concept of linking monumental constructions with discrete groups of people in at least central and east Polynesia, as such constructions are generally considered symbols of hereditary rank and prestige as well as markers of land ownership (Bennett 1931; Emory 1934, 1947; Handy 1927; Métraux 1940).

MATA TERRITORIES, ISLAND DIVISIONS, ASSUMPTIONS AND *AHU* ATTRIBUTES

Development of the distributional analysis carried out in this paper would not be possible were it not for a few underlying assumptions. The first is that the traditional organisation of Easter Island essentially recounted the general conventions of the Polynesian model of land allocation (Handy 1927; Emory 1947; Goldman 1970; Kirch 1984, 1988, 1989; Kirch and Green 1987), in which an island was radially divided into strips of land that extended from an inland point to the coastal shelf.

Each such strip was administered by a semi-autonomous multiple lineage group whose rights to a particular parcel of land and its concomitant resources
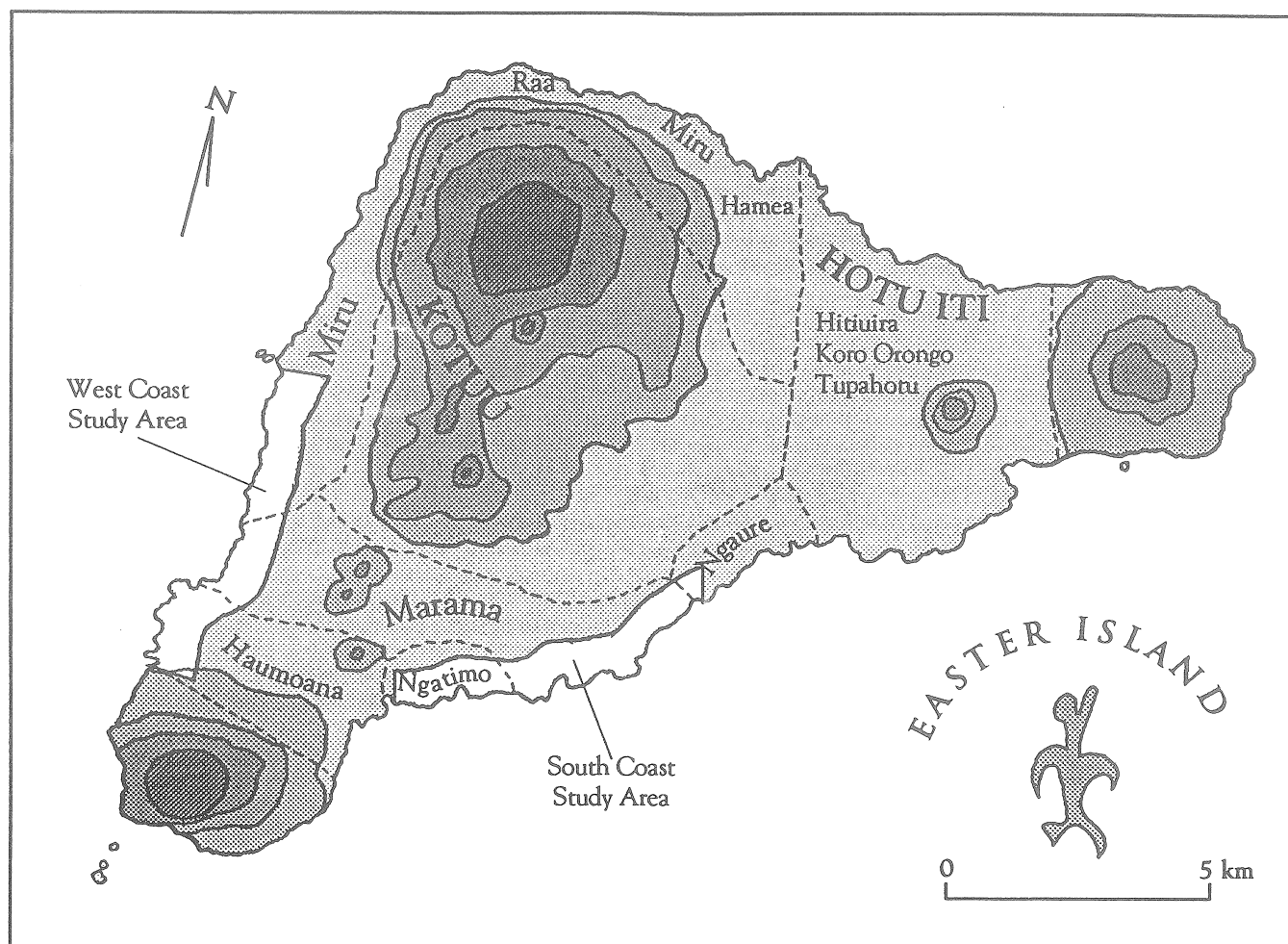
Figure 2: Distribution of the ten mata *on Easter Island*

were based on the principle of primogeniture. Accordingly, the boundaries of these lineage based territories would have been maintained over time; although they may have been somewhat blurred and ill-defined, at least their general locations as expanding and contracting zones would have remained stable. Just as territorial boundaries would have fluctuated over time, membership in a *mata* would be expected also to have fluctuated through the agencies of marriage, adoption and the movement of members of one *mata* into the territory of another. Yet the basic identity of the *mata* would have remained constant; its long historical continuity with the original lineage maintained by a core kin group. Platform *ahu,* as the major architectural feature dedicated to the ancestors of the *mata,* are presumed to have been placed

in prominent, fixed locations within the lineage territory. As communal constructions they were, by extension, the material expressions of complex social interactions - the mediums through which the social and political worlds were produced and reproduced (Hodder 1985; Renfrew 1982; Kirch 1989), including rivalries and competitions with neighbouring *mata* (an assumption that is well founded in the Polynesian cultural character; Handy 1927; Bennett 1931; Emory 1933, 1934, 1947; Goldman 1970).

In the late prehistoric period, according to ethnohistoric information recorded in the late 19th and early 20th centuries, the island was divided into discrete territories, each maintained by one of ten *mata* (Figure 2). The information on island divisions is confined to the coastal region of the island but the inland extension of these

territories, though not indicated in Figure 2, is assumed and in keeping with Polynesian tradition (Cordy and Kaschko 1980). Further, the extension of this level of organisation into the earlier prehistoric period and its archaeological correlate is unknown but assumed. It is assumed too, that these discrete island divisions and their boundaries can be recognised by the distinct material culture elements produced by the *mata*, especially collective constructions like the monumental architecture of platform *ahu*. It has been suggested that the island divisions were once defined by a very specific type of boundary marker - the *pipi horeko* or rock cairn (McCoy 1973, 1979; Stevenson 1986; van Tilburg 1987; Jose Tucki P., pers. comm.; Edmundo Pont C., pers. comm.) - that was often used in conjunction with low stone or earthen mound alignments. However, tracing the distribution of these simple structures has become increasingly difficult because many have been dismantled for building materials (Rapu 1990), while still others are appearing anew across the island with a growing interest in reclaiming ancestral lands. Unfortunately, knowledge of the original territorial boundaries has long since disappeared, so that newly erected *pipi horeko* are not necessarily being placed on the original land divisions.

By concentrating on larger, more permanent structures associated with specific *mata* rather than simple rock cairns that can be easily dismantled or moved, it is assumed that a higher degree of reliability will be the result in the identification of *mata* boundaries. Platform *ahu* were selected for this reason. But how were they used? What features of the *ahu* would carry information unique to the identity of the *mata?*

All platform *ahu* share a common core of generic features. Each has a platform and plaza; each is located on a promontory, usually a slope break or cliff edge; and each is constructed parallel to the coastline and positioned with its rear wall facing the sea and its plaza stretching inland from the platform. Naturally, there are exceptions to this type of orientation and arrangement, especially with inland *ahu;* however, these inland complexes are not discussed here. The recognition of differences in the physical properties and feature design of each *ahu,* as a means of identifying discrete *mata,* then becomes a search for regularity within variation, a search for the physical and visual fabric on which the conscious statement of a group's identity can be reproduced. But as not all *ahu* possess the same features, the search for variation and regularity must be confined to some comparable base by which every *ahu* can be assigned to a specific *mata;* in other words, the same feature(s) must

be present at each *ahu.* The most productive grounds for such a comparison are found on the platform itself.

At its simplest, the platform is constructed of four retaining walls which encase a rubble fill. It can be square to rectangular in shape and range in length from about 4 m to greater than 10 m; it can be constructed on the ground surface, raised on a mound of rubble, or placed on top of a rock outcrop; the rear wall can tower above the level of the platform and inland retaining wall, or both inland and rear walls can be built to the same height; and the platform can be paved or not, with a ramp that descends to the plaza or wings that extend outward from the sides. In short, the platform offers fertile ground into which the construction and design conventions dictated by a *mata* can be woven. This includes the shape and size of the stone used in the construction, its arrangement into single or multiple courses, the degree of finishing work on the stone face, the addition of a stone veneer or decorative cornice, and the type and colour of stone selected for use in the retaining wall construction. The range of possibilities is restricted only by *mata* conventions, the availability of raw materials, and the quality of that raw material.

Today, the one component most consistently visible in the *ahu* platform is the rear wall; in fact, it is most often the only element that remains visible when the rest of the *ahu* has either been covered with rubble or dismantled by scavengers. It presents a broad palate on which the collective behaviour of a *mata* can be displayed through the selection and arrangement of building stone, and as such it provides a key to sorting and studying the variation between *ahu.* The only conditions of design to which the *mata* must adhere are maintenance of the structural integrity of the retaining walls, retention of the fundamental framework necessary to maintain the strength and stability of the construction, and whatever cultural conventions have been dictated on an island-wide basis. Any attribute or embellishment in excess of structural needs and island-wide conventions is considered a potential design element, a possible kernel of style that represents a deliberate choice or selection on the part of the *mata.*

STATISTICS

The two statistical techniques selected for application to the *ahu* data as related to *mata* territories and territorial boundaries are a nearest neighbour locational statistic and a cluster analysis for analysing style. Both techniques are commonly used in distributional or spatial analyses, but they are often used separately in archaeological contexts to generate valid statements about a

a)	n	Number of points.
b)	N	Number of distance measurements taken in the observed population.
c)	r	Distance from a given point to its nearest neighbor.
d)	Σr	Summation of nearest neighbor distances.
e)	$\bar{r}_O$	Mean nearest neighbor distance observed.
f)	$n_O = \{(s_x + s_y)[(n - 1)^{1/2}] / 3(A^{1/2})\} - 1/12$	Correction for edge effects, expected number of points to have severed connections with its nearest neighbor.*
g)	$d = (n - 1 - n_O)/A$	Corrected density.*
h)	$\bar{r}_e = 1/[1.67(d^{1/2})]$	Mean nearest neighbor distance expected.**
i)	$R = \bar{r}_O/\bar{r}_e$	Degree to which observed distances departs from random expectation with respect to nearest neighbor distance. R =O, maximum aggregation; R = 1, random distribution; R = 2.1491, uniform distribution.
j)	$s = 0.631/N^{1/2}$	Significance test using a Pearson type III distribution. As s approaches 0 from 0.631, the level of significance increases, and the null hypothesis is rejected.

*   from McNutt (1981)
**   from Cottam and Curtis (1956)

Table 1: The nearest neighbour method

specific set of samples. Here the two are combined, applied to the same set of sites in a two-fold effort to describe territorial boundaries and begin addressing the more complex questions of social interaction patterns in the prehistoric era, and to verify or modify the ethnohistoric information on the social and political organisation of the island.

Each technique relies on disparate information from each site. The nearest neighbour statistic relies solely on the spatial patterning of points or site locations. It provides an assessment of the degree to which a point pattern either approaches or departs from a random distribution by very simply comparing the average distance between a series of points and their nearest neighbours to a random pattern based on the Poisson distribution (Wilson and Melnick 1990). No assumptions are made about hierarchical organisation, size, relative placement, or orientation within a given area, nor is the analysis limited to a specific geometrically-shaped area such as a square or circle (Carr 1984).

The specific details of the nearest neighbour statistic are outlined in Table 1. They are a compilation of vari-

ous elements derived from a number of first order nearest neighbour applications, with refinements by McNutt (1981) and Cottam and Curtis (1956). While three different levels of analysis are offered by the nearest neighbour statistic - a first order nearest neighbour, an Nth order nearest neighbour, and a linear nearest neighbour - the first order nearest neighbour was selected over the other two techniques after an initial evaluation of all three using *ahu* distribution maps created by Father Sebastian Englert in the 1940s (Englert 1974). The Nth order nearest neighbour method (Thompson 1956) tended to blur point density clusters and create one large group; the linear nearest neighbour (Stark and Young 1981), on the other hand, was discarded because it lacked a developed and formalised method as well as a means to evaluate the results. Only the first order nearest neighbour statistic provided the most promising results in the preliminary evaluation because it generated discrete point clusters.

The nearest neighbour statistic (R) is expressed as the ratio between the mean observed distance and the expected mean distance. The expected mean distance is determined by a compound series of factors that are meant to accommodate the density of points within the system as well as correct for the boundary effect, where the nearest neighbour of a point within an area may in fact lie directly outside the area boundaries. If the expected mean nearest neighbour distance is equal to the mean observed distance, then R would be equal to 1. In other words, the observed points are distributed in a Poisson random manner. If the point distribution is tightly clustered, achieving a maximum aggregation, then R would be lower, approaching 0. If the distribution were highly regular with uniform spacing, the mean observed distance would be higher than the mean expected distance and R would then be higher than 1, approaching a maximum of 2.1491 (Clark and Evans 1954).

Once R has been calculated, there are several methods for assessing its significance, including comparison with a Pearson Type III distribution, comparison with a normal distribution, and application of the chi squared statistic (Wilson and Melnick 1990). The test statistic used here is the Pearson Type III distribution, owing to the number of points included in the current study. According to Clark and Evans (1954), if the number of points is less than 100, the results of significance tests based on the normal curve will be skewed; use of the Pearson Type III was suggested as an appropriate alternative. For this statistic, the results range from 0, indicating a non-random occurrence, to 0.631, indicating a random occurrence.

The cluster analysis selected for application to the *ahu* sample was a hierarchical agglomerative method that examines the similarities between entities *(ahu)* by comparing one entity with all the others in the sampling universe. It generates a series of groups or classes of similar entities based on this comparison, which in turn is based on a set of characters or attributes prescribed specifically for this study. The end result is a two dimensional dendrogram, which quite simply is the visual display of the hierarchy in the similarity matrix. Each branch of the tree diagram joins two similar entities, creating a sub-group; this branching and joining process continues until all subgroups are gathered into one large group. At each stage of the clustering process a new similarity matrix must be calculated, so that each level of calculation treats the newly formed clusters as new entities with the ensuing sub-groups built upon the union of two smaller subgroups. The point at which one can draw a line separating one group from another to form discrete clusters within the dendrogram is one of the unsolved problems in cluster analysis (Aldenderfer and Blashfield 1987; Sokal and Sneath 1963). Because there is no mathematical definition of a cluster, determination of cluster group limits becomes discretionary, based on the initial expectation of the cluster analysis results and the original research questions.

There is also no rigorous test to validate the significance of the clusters generated by the cluster analysis (Sneath 1969). At best, they can be compared with the raw data matrix or coded list of attributes, because the results of any clustering are tied to some advance notion of the affinities between final groups (Crawford 1969). Any group of entities can be clustered; cluster analysis techniques can generate clusters even when applied to random data, which means that in the final interpretation cluster results become a matter of intuition and insight.

APPLICATION AND RESULTS

A total of 44 platform *ahu* distributed across five *mata* (as defined by Routledge 1919) were examined in a 6.5 sq km area divided evenly between the west and south coasts of the island. Each coastal segment represented a swath of land 6.5 km long and 500 m wide, and together included nearly 22 percent of the island's platform *ahu* inventory. On the west coast the study area extended from Mataveri to Motu Tautara and crossed the territories of the Miru, Marama and Haumoana *mata;* on the south coast it extended from Hanga Hahave to Akahanga and crossed the Ngatimo and Marama *mata,* and possibly the Ngaure *mata* (Figures 1 and 2).

The first task was to sort through and synthesise the existing survey data for the *ahu* within the study area (Thomson 1889; Englert 1974; Ayres 1973, 1979; McCoy 1973, 1979; Stevenson 1986; Cristino *et al.* 1981), followed by a rigorous field examination of each *ahu* to check recorded locations, supplement the existing survey records and collect information specific to possible *mata* identification. All recorded platform *ahu* locations were transferred on to a single base map; each *ahu* was then systematically examined in the field, with its location checked against the recorded location on the base map, and the appropriate corrections made. They were photographed, sketched, measured, and described; compass bearings were taken along the principal axis of each to determine if any structure radically departed from the generally parallel orientation to the coastline; and the rear wall of each was examined in detail with measured drawings and photographs produced. This information was then transferred to distribution maps and an attribute list generated for the *ahu* rear or seaward walls (Table 2).

The results of the nearest neighbour statistic are summarised in Table 3; they are listed for each coastal strip in the study area. The observed mean distance between points in both study area segments is 0.2 km, with an expected mean distance of 0.4 km on the south coast and 0.5 km on the west coast. In both segments, R, the nearest neighbour statistic, is below 0.5, indicating that the point patterns tend to be closer to an aggregated pattern of distribution than a random pattern. This pattern, it turns out, is statistically significant, and suggests that the point patterns are the product of deliberate, conscious selection of location, rather than the result of chance.

But, how can this information be applied to the reconstruction of prehistoric political arrangements and the identification of discrete *mata* territories? This means transferring the nearest neighbour results on to base distribution maps and forming point clusters that would presumably indicate broad, barren zones between *mata*. These would have been the *mata* boundaries.

Both the observed mean distance (0.2 km) and the expected mean distance (0.45 km, the average of both coastal segments) were used as radii for circles drawn around each point on the two maps (Figures 3 and 4). Those points whose circles overlapped were then grouped together as a single cluster. The 0.2 km radius produced discrete groups within each coastal segment; the 0.45 km radius, on the other hand, provided an ambiguous pattern of point association in which all points were assigned to a single group.

The point clusters developed through application of the observed mean distance were subjected to a second series of clustering, using circles with the larger mean expected distance (0.45 km) as the radius. This second level of clustering was intended to refine and further define the initial point clusters, and resulted in clusters that tended to form independent groups with little or no overlap between them, reinforcing the initial point clusters and forming distinct boundaries or barren zones between the groups.

Three boundaries or barren zones, identified by the absence of platform *ahu*, were observed. These boundaries are areas in which no overlapping circles occur and which have a width greater than 0.2 km as measured from the edges of the nearest clustering circles. Two coincided with the oral history descriptions of *mata* boundaries; the third did not. On the south coast, one major boundary was identified, which was coincident with an ethnohistorically described location separating the Ngatimo and Marama *mata*. On the west coast, two major boundaries were indicated - one located just south of Hanga Roa and coincident with a *mata* boundary described in oral history accounts; the second located to the south, in the area of Hanga Ohio, south of Hanga Piko. This latter boundary has no counterpart in the ethnohistoric accounts.

For the south coast, the nearest neighbour statistic confirmed the ethnohistorically defined *mata* boundary. The west coast boundary locations, however, suggest that the oral history accounts should be revisited. Here, the boundary locations should be shifted to the south - instead of being located at Tahai and Hanga Roa as described in the ethnohistoric accounts, they should be located at Hanga Roa and Hanga Ohio respectively, separating from north to south the Miru, Marama and Haumoana *mata*. This is, in effect, the same boundary pattern described in oral history accounts, just shifted to the south. The point clusters also support this southern shift. To the north of the Hanga Roa boundary, the general tendency of the nearest neighbour point clusters suggests a single territorial unit - the Miru *mata*. To the south, the point pattern also forms a single discrete territorial unit - the Marama *mata* - different from the territory to the north. The same pattern of distinct, discrete point clusters is seen to the north and south of the nearest neighbour boundary at Hanga Ohio, separating the Marama and Haumoana *mata* respectively.

The results of the cluster analysis, expressed in the form of a dendrogram (Fig. 5), were produced from the attribute matrix generated from a review of the rear walls of the platform *ahu*. Eight style groups were created from a Pearson R similarity matrix generated under the JOIN application in the SYSTAT program. Group membership

Ahu	A	B	C D E F	G	H I J	K	L M N	O	P	Q R S T U V
3- 32	1	1	0 0 1 0	0	0 0 1	1	0 0 1	1	1	1 0 0 0 0 0
3- 70	1	1	- - - -	-	- - -	-	- - -	0	0	0 1 0 0 0 0
3- 79	1	1	0 0 1 0	0	0 0 1	1	0 0 1	0	-	0 0 0 0 1 0
3- 83	1	1	0 0 1 0	1	0 1 0	1	0 0 1	1	0	1 0 0 0 0 0
3- 90	-	1	- - - -	-	- - -	-	- - -	0	-	0 1 0 0 0 0
3- 122	1	1	1 1 1 0	1	1 0 0	0	1 0 0	0	0	1 0 0 0 0 0
3- 131*	1	1	1 0 1 0	1	0 1 0	1	0 1 0	0	1	1 0 0 0 0 0
8- 1*	1	1	1 0 1 0	1	0 1 0	1	0 1 0	0	0	0 1 0 0 0 0
8- 2*	1	1	1 0 1 0	1	0 1 0	1	0 1 0	0	0	0 1 0 0 0 0
8- 3*	1	1	1 0 1 0	1	0 1 0	1	0 1 0	0	0	1 0 0 0 0 0
8- 134	0	0	0 1 0 0	1	0 0 1	1	0 0 1	0	0	0 0 0 0 0 1
8- 167	1	1	1 0 1 0	1	0 1 0	1	0 1 0	1	1	0 0 1 0 0 0
8- 268*	1	1	0 0 1 0	1	0 1 0	1	0 1 0	0	0	1 0 0 0 0 0
8- 273	1	-	- - - -	-	- - -	-	- - -	1	-	1 0 0 0 0 0
8- 312	0	1	0 1 1 0	0	0 0 1	1	0 0 1	0	0	0 1 0 0 0 0
8- 325	1	1	1 1 1 1	1	0 0 1	1	0 0 1	0	1	0 0 1 0 0 0
8- 374	1	1	1 0 1 0	1	1 0 0	1	1 0 0	0	1	0 1 0 0 0 0
5- 76	1	1	- - - -	-	- - -	-	- - -	0	0	0 1 0 0 0 0
5- 78	1	1	1 1 1 0	0	1 0 0	1	1 0 0	0	1	0 0 0 1 0 0
5- 79	1	0	1 1 1 1	1	1 0 0	1	1 0 0	0	0	0 0 0 1 0 0
5- 101	0	1	0 1 1 0	1	0 0 1	1	0 1 0	0	0	0 0 0 1 0 0
5- 109	1	1	0 1 0 0	0	1 0 0	1	1 0 0	0	0	0 0 0 1 0 0
6- 1	1	1	1 1 1 0	1	1 0 0	0	1 0 0	0	1	0 1 0 0 0 0
6- 2	1	1	1 1 1 0	1	1 0 0	0	1 0 0	0	1	0 1 0 0 0 0
6- 191	1	1	1 0 1 0	1	1 0 0	1	1 0 0	0	0	1 0 0 0 0 0
6- 192	0	1	0 0 1 0	0	0 0 1	1	0 0 1	0	0	1 0 0 0 0 0
6- 204	0	1	0 1 0 0	1	0 0 1	1	0 0 1	0	0	0 1 0 0 0 0
6- 253	-	1	- - - -	-	- - -	-	- - -	0	-	1 0 0 0 0 0
6- 255	1	1	1 0 1 0	0	1 0 0	0	1 0 0	0	1	1 0 0 0 0 0
7- 2	1	1	0 0 1 0	1	1 0 0	1	1 0 0	0	0	0 0 1 0 0 0
7- 32	1	1	1 1 1 0	1	1 0 0	1	1 0 0	0	1	1 0 0 0 0 0
7- 121	1	1	1 1 1 0	1	1 0 0	1	1 0 0	0	1	0 1 0 0 0 0
7- 123	0	0	1 0 1 0	1	0 1 0	1	0 1 0	0	0	0 0 1 0 0 0
7- 220	1	1	1 1 1 1	1	1 0 0	1	1 0 0	0	1	0 1 0 0 0 0
7- 231	1	1	0 0 1 0	0	0 1 0	1	0 1 0	0	0	0 0 0 1 0 0
7- 288	0	0	0 1 1 0	1	0 1 0	1	0 1 0	0	1	0 0 1 0 0 0
7- 388	0	0	0 0 1 0	1	1 0 0	1	1 0 0	0	0	0 0 0 1 0 0
7- 530	1	1	1 1 1 1	0	1 0 0	1	1 0 0	0	1	0 0 0 0 1 0
7- 575	1	1	1 0 1 0	1	1 0 0	1	1 0 0	0	1	1 0 0 0 0 0
7- 577	1	0	0 0 1 0	0	0 0 1	1	0 0 1	0	0	0 1 0 0 0 0
7- 581	1	1	1 0 1 0	0	1 0 0	1	1 0 0	0	0	1 0 0 0 0 0
7- 584	1	1	1 0 1 0	1	1 0 0	1	1 0 0	0	1	1 0 0 0 0 0

A: Rear Wall—Front Wall
B: Statue Presence
C: Single or Multiple Coursed
D: Orthostats
E: Squared, Rectangular Blocks
F: Post-and-Panel
G: Setting Stones
H: Finely Shaped
I: Roughly Shaped
J: Not Shaped
K: Interstitial Fill

L: Finely Faced
M: Roughly Faced
N: Not Faced
O: Hillock
P: Length
Q: Distance O to 30
R: Distance 30 to 90
S: Distance 90 to 150
T: Distance 150 to 250
U: Distance 250 to 350
V: Distance 350 to 500   * Reconstructed

Table 2: Matrix of ahu *characteristics*

	South Coast	West Coast
n	23	21
N	23	22
$\sum r^*$	4.165	5.064
$\bar{r}_o^*$	0.181	0.230
n_o	3.93	3.74
d	1.85	1.67
$\bar{r}_e^*$	0.441	0.463
R	0.411	0.497
s	0.132	0.135

Table 3: Nearest neighbour results for the west and south survey areas

was discriminant, with at least two thirds of the attributes of one entity shared by a second entity before membership was assigned to a specific group; membership similarity averaged about 80 percent or above. The dendrogram produced a bilateral distribution that effectively separated the majority of south coast *ahu* from the west coast *ahu,* with the south coast *ahu* assigned to one of two groups - the Marama *mata* or the Ngatimo *mata* - which confirms not only the oral history accounts but also the nearest neighbour analysis regarding the boundaries and locations of these two *mata.*

In regard to the overall distribution of style groups, most remained confined to the specific *mata* territories described in oral history accounts (Figures 6 and 7). Some anomalous locations were observed, such as members of one group found well within the territory of another group; however, this arrangement can likely be
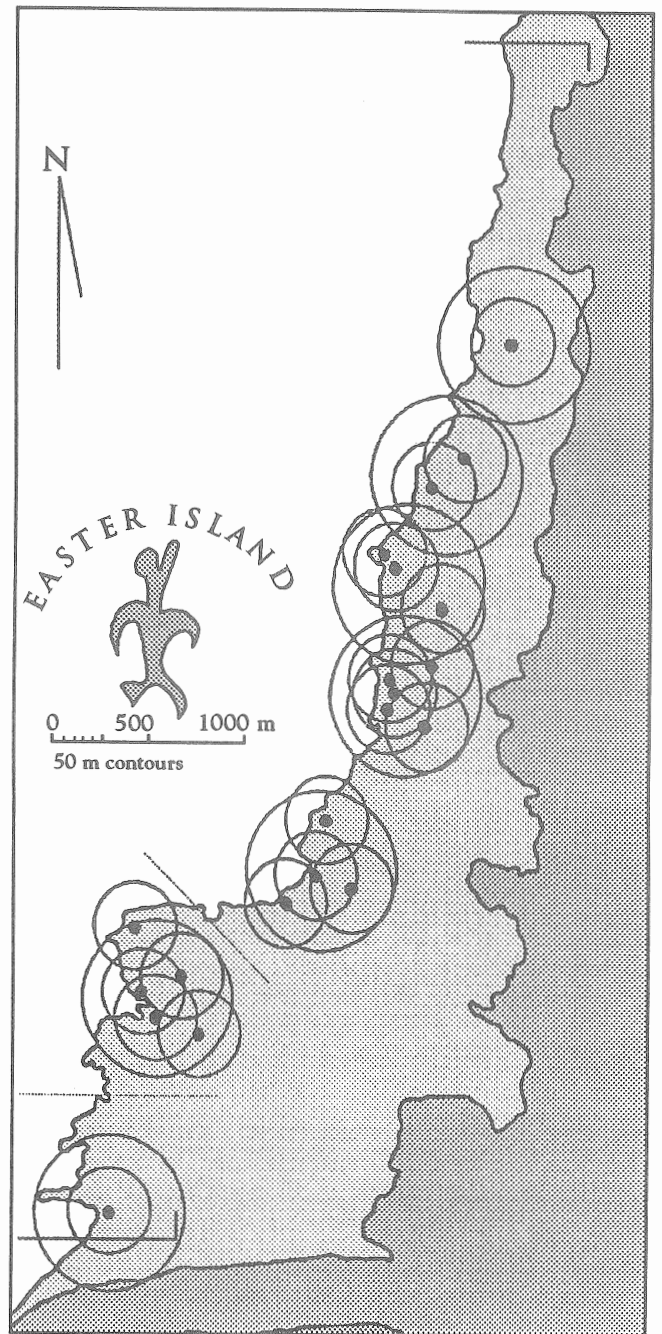

Figure 3: Results of the nearest neighbour analysis on the west coast of easter Island

resolved through recovery of additional information, especially chronometric data.
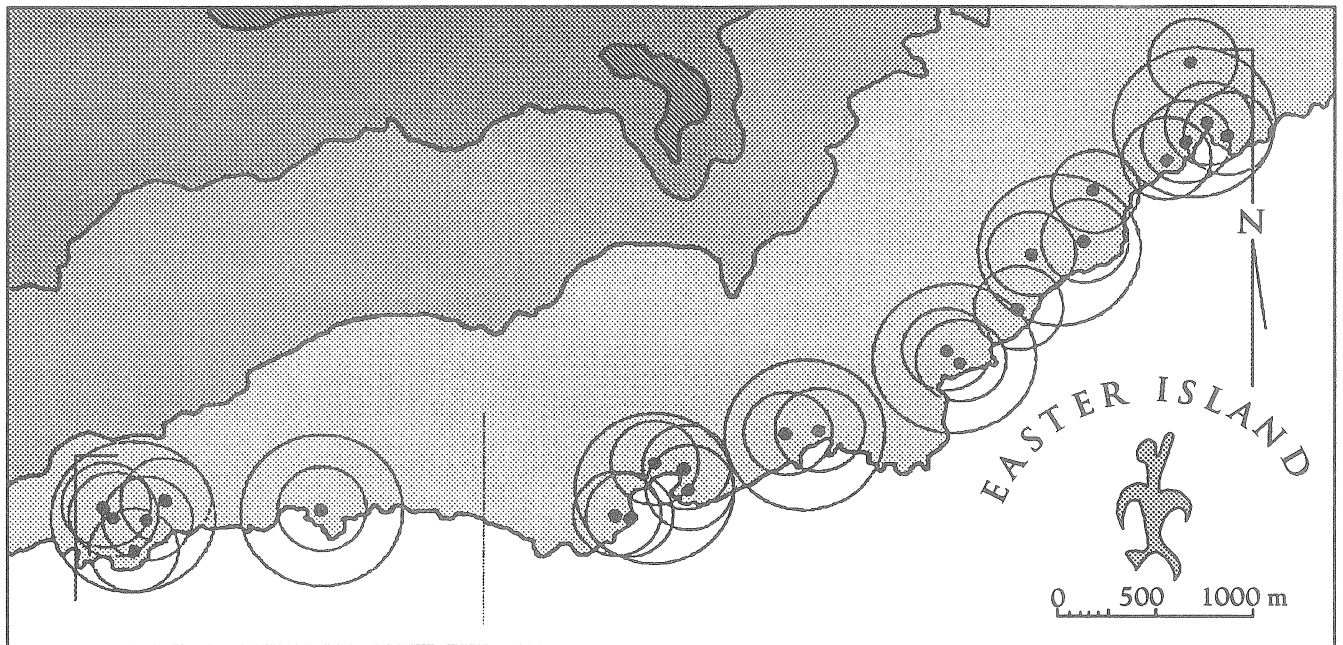
Figure 4: Results of the nearest neighbour analysis on the south coast of Easter Island

Finally, the results of the cluster analysis suggest that the sole use of style groups to define territorial boundaries is not particularly useful, unless accompanied by other information, such as chronometric data. The style groups cross the boundary zones defined by the nearest neighbour analysis and in oral history accounts, and reinforce the notion of boundary fluctuation. On the west coast, for example, the Hanga Roa boundary zone between the Marama and Miru *mata* is a fluctuating boundary, according to the style group distributions. This boundary shows an overlap between the two groups that extends from Hanga Roa to Hanga Piko. As for the boundary in the area of Hanga Ohio, it does not appear in the cluster analysis.

CONCLUDING REMARKS

It should be readily apparent that neither the nearest neighbour analysis nor the cluster analysis should be used alone in the determination of major territorial areas, specifically *mata* territories. Each method has its own limitations. The nearest neighbour analysis can only provide information based on point distributions; it cannot discern subtle differences in style. The cluster analysis, on the other hand, can only paint a broad picture of *ahu* dis-

tribution based on selected physical attributes; it cannot identify discrete boundaries, but it can suggest their presence through overlapping groups or zones.

The nearest neighbour analysis, for example, defined four major territories in the study area, which correspond to the ethnohistorically defined Miru, Marama and Haumoana *mata* on the west coast, and the Marama and Ngatimo *mata* on the south coast. The cluster analysis, by contrast, identified only three groups; the Miru and Marama *mata* on the west coast and the Marama and Ngatimo *mata* on the south coast, although it was able to link both the west and south coast Marama territories. Among the limitations to the methods are the inability of the nearest neighbour analysis to link the Marama on the west coast with the Marama on the south coast, and the inability of the cluster analysis to identify the southernmost territorial boundary on the west coast, in the vicinity of Hanga Ohio.

In concert, however, the applications provide a strong tool for the identification of the territories or boundary zones between *mata.* Together, they provide an archaeological correlate to the major social and political divisions described in oral history accounts. They not only confirm and verify the overall territorial divisions, but
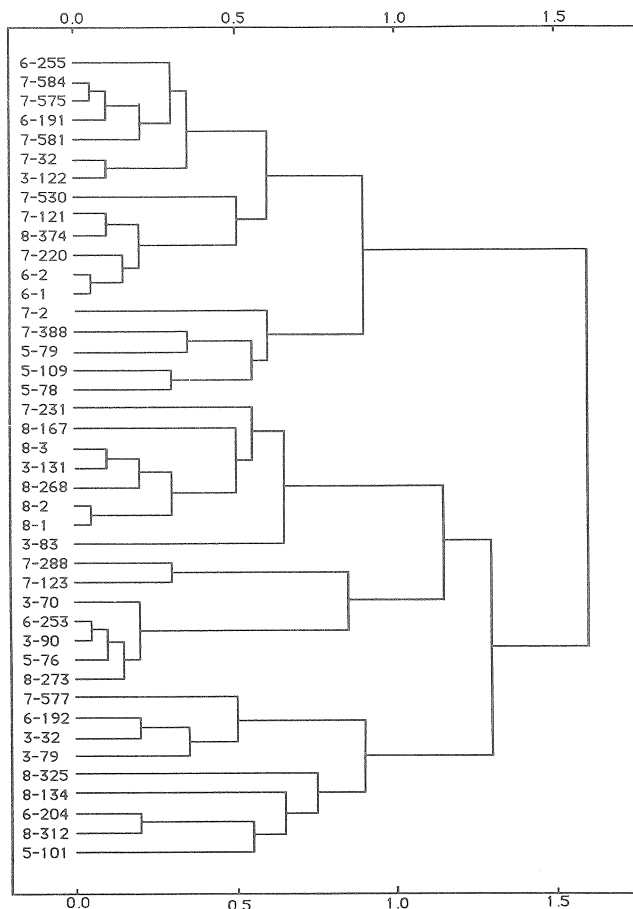
Figure 5: Results of cluster/style analysis of ahu *in the form of a dendrogram*

they also assist in refining the extent of the discrete territories and can be used to extend the coastal boundaries into the interior of the island in conformity with the traditional Polynesian method of island division. By extension, this approach has the potential for reconstructing the prehistoric social and political landscapes of other areas, especially in central and eastern Polynesia and possibly other island and/or continental nations (e.g. Southeast Asia), through the location and style of monumental architecture.

DIRECTION OF FUTURE RESEARCH

Like any research project, more questions are raised than answered. The next step for this project is an extension of the combined application to the remainder of the platform *ahu* on the island, both coastal and inland. This will
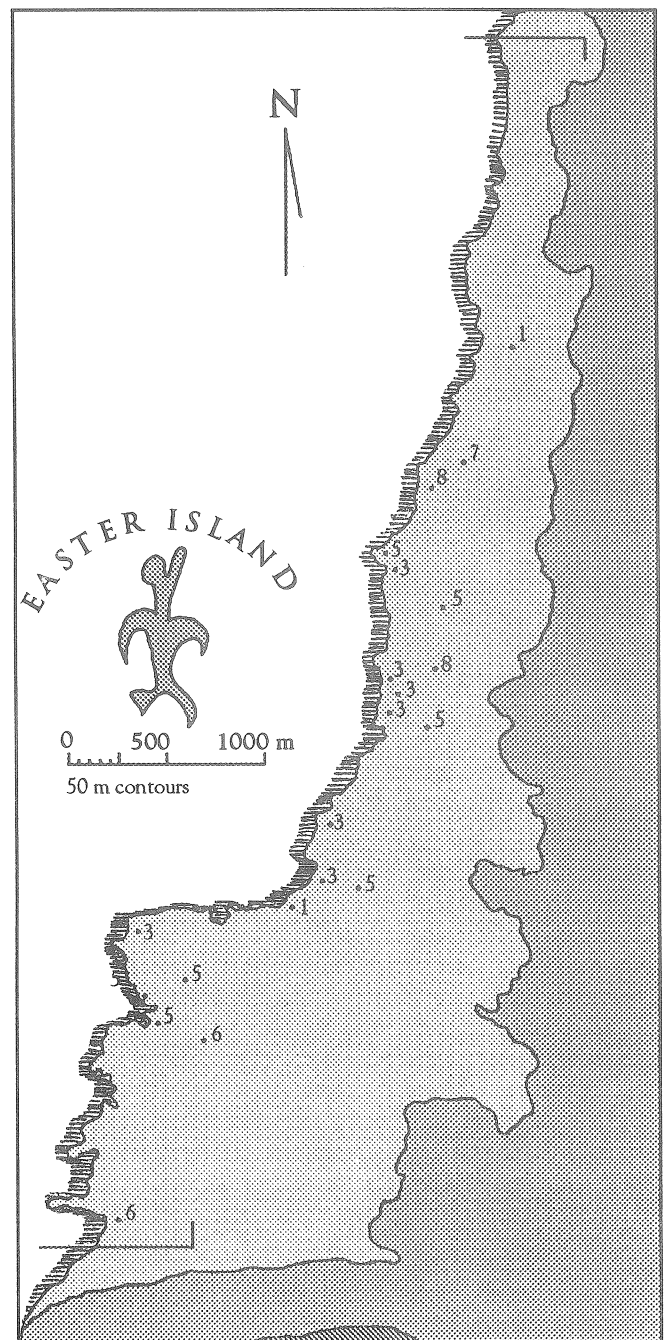

Figure 6: The distribution of ahu *style groups 1 to 8 on the west coast of Easter Island*

naturally require on-site visits to each *ahu* in order to complete the necessary field inspections, but most espe-
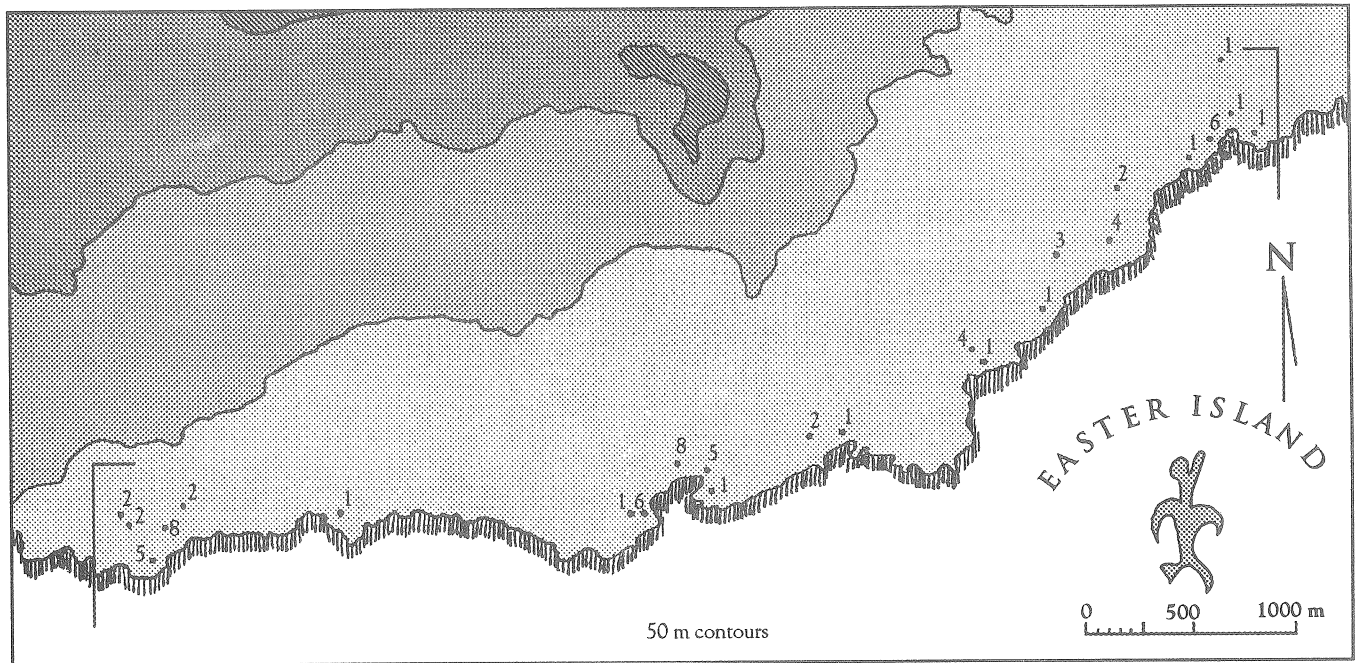
Figure 7: The distribution of ahu *style groups 1 to 8 on the east coast of Easter Island*

cially to record the stylistic attributes of the rear walls that are central to the cluster/stylistic analysis. Among some of the more general questions to which some resolution might be offered are possible distinctions between the two major confederacies on the island - the Kotuu and the Hotu Iti - as well as the locations of the other *mata* boundaries.

An examination of the distribution maps generated by both the nearest neighbour and cluster analyses in this stage of the work suggest a number of directed problems of chronology, as follows:

1) Are inland *ahu* (between about 200 to 500 m from the shoreline) older than coastal *ahu*, i.e. is there a pattern of *ahu* location such that, over time, locations shift toward the coast with increased pressures from the population, more intensive use of land especially on the southern coastal plain, or some unknown factor(s)?

2) Are those ahu assigned to style group 8 older than any of the other defined groups? The Group 8 *ahu* tend to be farther from the coast than nearly all the other *ahu;* they are generally smaller with little or no evidence of reconstruction; they are the only group of *ahu* that

exhibit an exclusive use of orthostats in the rear walls together with the general lack of statues, much like the relatively early *marae* in east Polynesia (Emory 1933; 1934).

3) How can the presence of *ahu* styles directly associated with the Miru and Ngatimo *mata* be explained deep within Marama territory on the south coast? Are these simply alternative styles adopted by specific lineages in the Marama *mata,* or are these perhaps earlier structures of another *mata* subsequently absorbed in the larger Marama *mata,* but left with a contracted core territorial unit (e.g. the Ngatimo).

The final test of the applicability and validity of the combined spatial/stylistic method presented here is its use with other sets of data, especially from central and eastern Polynesia. In theory, it should produce comparable results, confirming ethnohistoric information on the island divisions, pointing to possible refinements or corrections needed for the archaeological extension of that information, or perhaps indicating trends in site distribution not immediately evident in other analyses. However, the practical application and ensuing results of this method, at least with respect to settings beyond Easter

34

Island, must await that adventurous soul willing to explore the possibilities within a regional or island-wide site sample.

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