

Review Essay



RECENT RESEARCH AND FUTURE ADVANCES IN THE ANALYSIS OF POLYNESIAN CEREMONIAL ARCHITECTURE: A REVIEW ESSAY

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Ceremonial Stone Structures. The Archaeology and Ethnohistory of the Marae Complex in the Society Islands, French Polynesia. Paul Wallin. Uppsala: Aun 18. 1993. 178 pp.; 134 figures (includes tables), bibliography, appendices, softcover.

Ahu—The Ceremonial Stone Structures of Easter Island. Analyses of Variation and Interpretation of Meanings. Helene Martinsson-Wallin. Uppsala: Aun 19. 1994. 188 pp.; 94 figures (includes tables), bibliography, appendices, softcover.

SOCIAL-SETTLEMENT ANALYSES AND POLYNESIAN ARCHITECTURE

Since the beginning of archaeology in the Pacific, monumental stone architecture has been repeatedly examined to help answer the enduring questions of Polynesian history: what are the origins of various peoples, how did Polynesian voyaging change in extent and intensity, what past contacts influenced cultural development, and what developments were internal? Stone structures throughout much of Polynesia, for example, the *heiau*, *marae*, *tohua*, and *ahu moai*, display similarities that have long been recognized to reflect shared history (e.g., Emory 1943; Fornanader 1969; Bellwood 1970), but they may also reflect similar past activities. Ubiquitous in Polynesia, specific sets of ceremonial architecture (e.g., *heiau*) are often defined in reference to the oral-traditional and ethnohistoric records of various groups (Cachola-Abad 1996). Definitions of ceremonial architecture may also be linked to particular explanatory goals, or they may be implicit. Recent attempts at constructing a definition applicable to multiple sets of architecture (Graves and Sweeney 1993; Graves and Ladefoged 1995) suggest that ceremonial architecture consists of an outlined court that is sometimes raised from the ground surface. Some form of altar is often placed on the court and may incorporate anything from upright slabs to small platforms or monolithic sculpture. Features that indicate domestic activities are rarely found within the bound-

aries of the court. Even using such a general characterization, ceremonial architecture bears direct evidence on the complex past of both Polynesia as a whole, and the individual cultural histories of many Polynesian islands.

With only a few exceptions (e.g., Emory 1970; Graves and Ladefoged 1995; Kirch 1990), archaeologists have consistently used ceremonial architecture to examine specific cultural patterns and cultural change in single archipelagos and islands, or even at smaller spatial scales. In a phrase, social-settlement analysis, captures the goals of this research. There are three general goals of social-settlement analyses of ceremonial architecture: (1) archaeologists examine the distribution of architectural types to describe relationships between past social groups; (2) where ceremonial and domestic architecture co-occur, the settlement patterns of different social groups are described; and (3) social-settlement analyses propose temporal relationships between different types of ceremonial architecture. Not all social-settlement analyses address all of these goals; some address only one, or a combination.

Ceremonial architecture, as much if not more than any other aspect of the Polynesian archaeological record, may reflect the activities and/or intentions of different groups in society. The long-standing research programs begun by Green and Sinoto (both working from Emory's [1933] impressive base) in the Society Islands are exemplary social-settlement analyses. Green, along with his colleagues and students (Descantes 1990, 1993; Green 1961, 1996; Green et al. 1967), has examined different kinds of *marae* architecture, from complex *ahu*-bearing *marae* to simpler forms or shrines in the 'Opunohu Valley on Mo'orea. The distribution of different kinds of *marae* represents relationships within and between elite, and small family social groups, respectively. The spatial and temporal distributions of different kinds of *marae* are also evidence of changes in the settlement patterns of different social strata. The research program directed by Sinoto, including his colleagues and students as well (Sinoto 1969, 1996; Sinoto and McCoy 1975; Sinoto and Komori 1988), focused on the past settlement of Mata'ire Hill on Huahine. Sinoto interpreted the distribution of *marae* structures and domestic architecture as an elite residence area where religious, agricultural, and habitation activities were tightly integrated. Based on his findings over the years at Mata'ire Hill, Sinoto (1996) also proposed a general temporal sequence of *marae* types for the Society Islands.

Like other frameworks in archaeology, social-settlement research exploits the general proposition that interaction and relatedness between human groups generates aspects of artifact similarity. This is an old idea in American anthropology and archaeology (e.g., Kidder 1917; Kroeber 1920; Wissler 1926). Culture historical archaeologists, for example, traced the temporal developments and spatial relationships of different cultural groups by examining decorative similarities in pottery. Two basic methodological insights of culture historical work should not be lost on contemporary archaeologists (see Lyman et al. 1997), including those engaged in social-settlement research on Polynesian ceremonial architecture. First, artifact descriptions (e.g., classes of ceremonial architecture) affect the ability to differentiate interaction-derived similarity, or homology, from similarity explained by matching environmental (both cultural and natural) parameters, in other words, analogy. Second, interaction, to varying degrees, occurs simultaneously through time and across space. Any framework that examines interaction

between human groups must include methodological tools to reliably distinguish homologous and analogous similarity, as well as temporal and spatial interaction.

Social-settlement analysis of ceremonial architecture, as exemplified by Green and Sinoto's work in the Society Islands, has influenced almost all subsequent research on ceremonial architecture in Polynesia. Two recent monographs focusing on east Polynesian ceremonial architecture expand on social-settlement analyses. In their research on Society Islands' *marae*, and the *ahu* of Rapa Nui, respectively, Wallin (1993a) and Martinsson-Wallin (1994) compare structures to examine changes in the indigenous meanings of ceremonial structures through time and across space. They emphasize the social aspect of ceremonial architecture and explain its distribution using interpretive algorithms that derive from post-processual and cognitive theories (e.g., Hodder 1986). These monographs on ceremonial architecture incorporate some of the analytical strengths of social-settlement analyses; they focus on large comparative data sets and they attempt to describe architectural similarity in terms of interaction. The analyses presented by Wallin and Martinsson-Wallin also display recognized, and unrecognized, problems associated with classification and the methodological separation of temporal and spatial variability. Future research on ceremonial architecture will benefit by identifying both the methodological strengths and weakness of their work in the following review.

THE *MARAE* OF THE SOCIETY ISLANDS

Ceremonial Stone Structures is the published version of Paul Wallin's (1993a) doctoral dissertation presented at Uppsala University, Sweden. Wallin describes his research in fifteen chapters divided into three sections. The first section comprises five chapters where Wallin outlines the goals of his study, the natural environment of the Society Islands, and the major ethnohistorical and archaeological work in the archipelago. Wallin's goals are far-reaching. He sets out to not only "create an overall view of the earlier research and discuss its starting points and results" (p. 17), but to interpret *marae* variation in relation to the ethnohistoric record and the cognitive events that lead to the building of *marae*. Because variation among *marae* represents variation in their emic meaning, Wallin proposes a cognitive interpretation where he will search for the basic significance of different *marae* as they exist in a complex web of associations with *Ma'ohi* (the indigenous inhabitants of the Society Islands) society (see Hodder 1986: 139).

Before generating any interpretations of artifact variation, distributional research should address regional geology and geography, including the locations of natural resources. In Chapters 2 and 3 Wallin summarizes the natural environment of the Society Islands, noting the general difference in stone materials between the leeward islands of Huahine, Raiatea, Taha'a, and Borabora, and the windward islands of Tahiti, Mo'orea, and Me'etia. He also summarizes the flora and fauna present in the large windward valleys and other ecological zones of all islands. The spatial distribution of *marae* may be correlated with the distribution of natural resources, a point made by Wallin in reference to the location of fresh water sources (p. 26). Fresh water was important in the religious ceremonies surrounding *marae* and its ready access may have influenced the placement of various *marae* across the island landscapes.

To expand on Wallin's point, the correlation of *marae* locations and the distribution of natural resources is a methodological problem for social-settlement analyses of ceremonial architecture. To interpret the distribution of ceremonial architecture, or variation among pieces of architecture, possible environmental effects on artifactual similarity should be investigated. Emory (1933:5), for example, notes that some differences in the construction of *marae* may be attributed to the different stone resources available on the windward and leeward islands. Other researchers have suggested that variation in environmental productivity may generally predict the distribution of ceremonial architecture (e.g., Graves and Ladefoged 1995; Kirch 1994; see also Dunnell 1989). Although there is current debate (e.g., Cannon et al. 1998; Graves and Ladefoged 1995; Neiman 1997) over the mechanisms that relate environmental productivity and the distribution of apparently "wasteful" behavior (e.g., ceremonial architecture), in an evolutionary sense, the core methodological problem involves distinguishing between analogous and homologous similarity. Does environmental productivity substantially affect the distribution of, for example, large *marae*, or is their distribution a result of shared ideas (i.e., interaction) about *marae* meaning with respect to location? Continuing research on *marae* and other forms of ceremonial architecture will have to address this question.

In Chapters 4 and 5, Wallin discusses the history and substantive results of Society Islands archaeology. He also reviews the content, derivation, and interpretation of ethnohistorical sources. Ethnohistorically documented meanings of various types of *marae* are important for Wallin's final interpretations of *marae* variability. The accounts of some of the first European visitors to the Society Islands are "the most informative sources regarding social and religious organization, [and] description of *marae* structures and ceremonies" (p. 29). On his third visit to the islands, James Cook, for example, made very detailed descriptions of the ceremonies at *marae* structures on Tahiti (Cook 1955–1974). These descriptions aid in later interpretations of the religious meaning of *marae*, but as Wallin notes (p. 29), the bulk of the ethnohistoric record comes from observations made on Tahiti. It may be difficult to uncritically apply these observations to *marae* meanings throughout the Society Islands. Additionally, ethnohistoric accounts have a relevance of unknown time-depth and are increasingly difficult to use in archaeological contexts of the more distant past.

In Chapter 5, the last chapter in the introductory first section, Wallin analyzes previous archaeological work in the Society Islands. He concentrates on research focused on *marae* and draws two basic conclusions. First, Wallin contends that Emory's (1933:23–38) original type definitions are not useful for combined chronological and spatial studies (p. 36) and he suggests that not only the passage of time (as assumed by Emory [1933:38–41]) caused changes in *marae* forms; past relationships between social groups are also evident in the diversity of *marae* forms (an idea formulated by Green et al. [1967:162–163] and alluded to in the *marae* type descriptions of Henry [1928:119–148]). In his discussion of Emory's classification, Wallin has uncovered another problem confronted in any social-settlement explanation. Interaction occurs simultaneously through time (generation to generation) and space (between individuals and social groups), thus classifications of artifacts should be linked to methods that can reliably distinguish variability in these two dimensions.

Wallin's second conclusion also concerns previous classificatory work. After reviewing the efforts of Green and his students (Green 1961; Green et al. 1967; Descantes 1990), Wallin suggests that while it is more precise than Emory's classification, ambiguities still remain in the Green-Descantes system. Specifically, Wallin notes the ambiguous criteria for some classes (e.g., type IXa and type III *marae* in Descantes [1990:82]) and the use of "default" categories for heterogeneous sets of *marae* that do not fit other class definitions. Wallin suggests that if there are *marae* that do not fit into any of the defined classes, the classification should be redesigned (p. 40). Wallin has identified, although he does not discuss it in these terms, a general problem encountered in grouping any set of phenomena for study. When group definitions (e.g., classes of ceremonial architecture) are described post hoc by the attributes of selected group members, the necessary and sufficient criteria for group membership remain ambiguous. The relationship of any new member added to the existing members of the group is uncertain. When groups are constructed from the empirical descriptions of the investigator, default categories may arise because some aspects of variability are initially ignored, while other areas are considered more important (e.g., *ahu* construction in the case of Wallin's *marae* classification, see below). Statistical grouping methods may offer only an apparent solution to this problem because the relationship between group definitions and the testing of hypotheses with those groups is not always justified (Dunnell 1986; Vierra 1982).

Wallin rejects the Green-Descantes classifications on the basis of ambiguity and their local orientation. Green, however, states that the classifications developed by Descantes and him (Descantes 1990; Green 1961; Green and Descantes 1989) are specifically designed "to analyze all the types from a single locality so as to abstract some information on the social and religious organization they reflect" (Green et al. 1967:163; quoted in Green 1996:42-43). Thus, Green argues (Green 1996:43), Wallin's large-scale analysis of *marae* from across the Society Islands will necessarily require a different classification than the one he and Descantes developed.

In the second section of *Ceremonial Stone Structures*, Wallin describes his analysis in four related chapters and begins with his own description of *marae* variability. The three remaining chapters in this section deal with *marae* type divisions, chronological studies, and spatial analysis. In Chapter 6, Wallin gives a thorough and easily understood presentation of the incredible array of *marae* diversity. Fifteen main construction variables are used to describe 444 *marae* from across the Society Islands. The main construction variables (pp. 49-50) include *ahu* (or altar) construction, *ahu* appearance, *ahu* location, courtyard, wall enclosure, terrace in connection with *marae*, platform in connection with *marae*, upright stones, the mean height of upright stones, house (structure associated with the *marae*), other *marae*-connected construction details, other observations on or around the *marae*, dimensions of *marae*, and distance from the sea. Several of these variables are noted for their presence or absence, or they define metric measurements. Eight of the fifteen variables (*ahu* construction, *ahu* appearance, *ahu* location, the courtyard, wall enclosure, upright stones, *marae*-connected construction details, and observations on or around the *marae*) are then divided into more precise presence/absence categories. "*Ahu* appearance," for example (p. 49), is divided into six presence/absence variables and three metric measurements. Examples of pres-

ence/absence categories in “*ahu* appearance” are “upright vertical stone facing,” “vener facing of thin pieces of coral placed on edge,” and “facing with worked oblong and rounded stones placed on edge” (p. 49). Examples of presence/absence categories in “*ahu* construction” are “enclosure with stone filling, lower than 1.2 m,” “platform, higher than 0.5 m,” and “stepped in more than three steps.” For the *ahu* construction, appearance, and location variables, and the courtyard and wall enclosure variables the constituent categories are exhaustive and mutually exclusive. A presence in the category “stepped in more than three steps,” for example, indicates that no other categories of “*ahu* construction” are present. Wallin also summarizes the frequency distribution of categories present on *marae* across the Society Islands with multiple bar charts and tables (pp. 51–58).

The 444 *marae* analyzed by Wallin are listed in Appendix I (pp. 137–147), where each *marae* is fully described by noting the presence of applicable construction variables, categories in construction variables, and metric measurements. Appendix II (pp. 148–168) contains 178 line drawings of *marae* structures. This monumental data presentation is a great asset of Wallin’s work. While this data presentation does not outshine his analyses, Wallin’s compilation of his own and others’ data on *marae* is an incredible resource for future substantive research (e.g., Cochrane 1998, forthcoming), and for the generation of hypotheses prior to fieldwork. (See Green and Descartes [1989] for similar data.)

Like any descriptive effort, however, there are indistinct categories in Wallin’s construction variables. Some of his categories are ambiguous and do not convey a distinct *marae* property to the reader. The construction variable “wall enclosure,” for example, does not clearly state if the constituent category “of rounded or in other ways worked stones” includes a wall that completely or only partially surrounds the *marae*. These ambiguities are minor in Wallin’s analysis, although they might increase in number given an expanded treatment of *marae*. Wallin did not use all identified *marae* in his analysis, leaving out over 90 percent of the 214 *marae* classified by Green and Descartes (1989) in the ‘Opunohu Valley, Mo‘orea. Green (personal communication 1998) has suggested that most of the *marae* he and Descartes classified could not be effectively described with Wallin’s construction variables. Wallin’s conclusions therefore must be only tentatively applied to the abundant *marae* of the ‘Opunohu Valley.

In closing chapter 6, Wallin defines four size groups for *marae* based on their total area, and he also suggests that “*ahu* construction has . . . the most prominent *marae* type specifying elements. The change of the *ahu* is probably not due to environmental factors, but is rather of ideological character” (pp. 58–59). Furthermore, Wallin believes that any useful type division must begin with a variable that predominantly structures the distribution of other variables. He believes that the variables *ahu* appearance and *ahu* location are dependent on *ahu* construction (p. 59). The resulting type division in Chapter 7 is based on *ahu* construction categories and the height of the *ahu*. Ten types are defined (p. 66) using the presence/absence variables of *ahu* construction and height categories. Type 0 *marae* have undefined *ahu*. Type 1:1 *marae* have no *ahu*, but upright stones. Type 2:1 *marae* have an *ahu* outlined in the surface of the courtyard. Type 3:1 *marae* have platform *ahu* that are from 0.2 to 0.5 m tall. Type 3:2 *marae* have platform *ahu* taller than 0.5 m. Type 4:1 *marae* have enclosure *ahu* lower than 1.5 m. Type

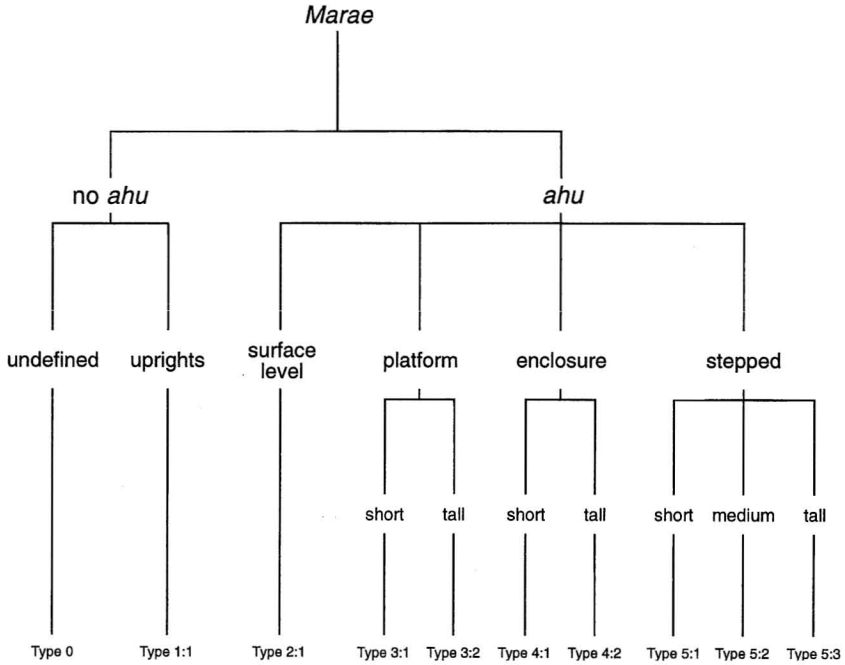


Fig. 1. A taxonomy of Wallin's (1993a) *marae* types identifies the presence of the *ahu* as the most inclusive criterion for type membership. Thereafter, the necessary and sufficient criteria for type membership are unequal across types. Each type is listed across the bottom of the taxonomy. Criteria for membership are presented within the taxonomy.

4:2 *marae* have enclosure *ahu* 1.5 m or taller. Type 5:1 *marae* have stepped *ahu* with two steps. Type 5:2 *marae* have stepped *ahu* with three steps and type 5:3 *marae* have stepped *ahu* with more than three steps. Examples of *marae* representing each type (except type 0) are depicted graphically and with photographs (pp. 61–66).

This grouping of *marae* has a taxonomic structure (Fig. 1) where the definitional criteria across classes are not comparable. While taxonomies are elegant structures, that is, every object is placed in one and only one group and all groups have members, they impart a specific structure to the arrangement of phenomena, a structure that should be treated as a hypothesis. With this taxonomy, Wallin argues that *ahu* construction is the most important variable associated with *marae* meaning. Because this taxonomy is a hypothesis about empirical structure, Wallin's types may have only limited applicability for later researchers and different questions. Similar problems with taxonomies have been noted by archaeologists in Polynesia (e.g., Allen 1996; Moniz et al. forthcoming; Field 1997) and North America (e.g., Dunnell 1986).

The heart of Wallin's analysis begins with the chronological studies described in Chapter 8. The chronology of *marae* construction is a largely unanswered question in Society Islands research. In other archipelagos with ceremonial stone architecture, similar questions remain as well. Unfortunately, there are only a few radiocarbon age estimations of *marae*, and absolute dating alone may prove to be

an inefficient method if age determinations for a majority of structures are necessary. Wallin points out in this chapter, however, that even a general comparison of all radiocarbon dates shows that the *marae* complex is a later addition to the material culture of the Society Islands; *marae* building may have begun up to 700 years after initial settlement of the archipelago (p. 70).

Before discussing possible temporal relationships among *marae*, Wallin performs chi-square analyses (pp. 71–73) on groups of *marae* to test for associations between various category combinations (e.g., different categories of the construction variable wall enclosure) against the *marae* types defined in Chapter 7. In the windward islands almost all categories of *marae* construction variables are not random with respect to type (i.e., different *marae* types generally display different categories). Wallin speculates that “temporal variation may be indicated by the pattern, which show [*sic*] that certain variables are tied to different types” (p. 73). In the leeward islands, however, *marae* types and other construction variables are randomly distributed. “This pattern, [*sic*] may indicate stability or reproduction of one and the same concept. The time trend is thereby difficult to indicate” (p. 73). Here, Wallin notes the potential analytical difficulties that arise with the conflation of interaction in both space and time.

To discern potentially relevant temporal associations of *marae* types, Wallin performs a correspondence analysis. He uses 188 *marae* for which the presence/absence data of forty-eight construction variables are available. Correspondence analysis derives statistical relationships simultaneously between multiple variables. Each axis in a correspondence analysis has a different significance to the representation of relationships between all variables included. A rank order of *marae* construction variables based on axis 1 of Wallin’s correspondence analysis (p. 74) indicates the degree to which specific variables are associated; variables close together in the variable rank are more closely associated. Wallin describes this rank order as a hypothesis about the chronological associations of different variables and suggests a general temporal trend in construction variables (p. 75). To examine the correspondence analysis results more closely, Wallin constructs a scattergram of construction variables and *marae* by plotting first and second axes against each other (p. 76). The scattergram shows four clusters of *marae* structures and variables. One cluster contains type 2 and 3 *marae*, the other clusters each contain *marae* of a single type. Wallin states that the scattergram “clearly shows that the archaeological defined types [his *marae* types] generally coincide with the results of the [correspondence] analysis” (p. 75). Thus, combining the results of the variable rankings and the scattergrams, *marae* types should have general chronological validity. Type 5 is the most recent form of construction and the types in descending numerical order are associated with progressively earlier time periods.

Two problems warrant only a cautioned use of this chronology to make substantive claims about temporal changes in *marae* construction. First, as Wallin recognizes, sociocultural relationships may be reflected in the correspondence analysis and obfuscate the chronology of *marae* construction (p. 74). Indeed, because interaction is continuous through time and space, spatial variability must be represented in the *marae* types to an unknown degree. An obvious result of spatial variability is found in *marae* type 4, made up of structures almost solely from the leeward islands. Second, the correspondence analysis included only 188 (42.3

percent) of Wallin's entire set of 444 *marae*. Thus any generalizations about *marae* types and time apply only to this subset of *marae*.

To close his chapter on chronology, Wallin notes that there may also be temporal relationships among variables within types. *Marae* size, for example, appears to progress from the smaller size groups, found in *marae* types 1, 2, and 3, to the type 4 and 5 *marae*, which are generally the largest sizes. Finally, Wallin presents a hypothetical development model (p. 78) that traces the phylogeny of *marae* types and indicates that several types likely coexisted. While Wallin has convincingly demonstrated the nonrandom associations among many variables and *marae* types, he has produced a chronology where one would be hard-pressed to assign different *marae* even relative temporal positions.

Wallin begins Chapter 9 on *marae* spatial analysis with an important assumption: "The spatial distribution of the *marae* reflects an expression of a certain tradition" (p. 80). If variation in *ahu* construction is related to the emic meanings of *marae*, then differences in meaning, and, Wallin suggests, ideology, can be tracked across different social groups and through time. In a series of figures and pie charts (pp. 81–90), Wallin presents the spatial distribution and relative abundances of both *marae* types and the four size groups for each island in the Society archipelago. He documents a pronounced spatial difference in the distribution of *marae* types from the windward and leeward islands. Type 4, with one exception on Tahiti, is found only on the leeward islands and type 2 occurs only on Tahiti. Furthermore, on Tahiti, type 5 *marae* are predominantly situated on the coast. The spatial distribution of values for *marae* in correspondence axis 1 (see Appendix III) displays a pattern of negative values (supposedly early *marae*) located inland and positive values (supposedly late *marae*) occurring predominantly on the coast. Wallin interprets these spatial differences as a reflection of the different ideological or social structures that existed on different islands (p. 85).

In the third section of his monograph, Wallin includes four chapters of interpretation and a final summary chapter. As a prelude to this final section, Wallin presents his interpretive goals: "My intention is to interpret the ceremonial *marae* in a contextual way. In order to obtain insight, a deeper understanding, and to reach a likely interpretation of the results of the archaeological analysis, it is necessary to use the ethnohistorical source material" (p. 97). In Chapter 11 Wallin again emphasizes the differential distribution of variables and *marae* types in windward and leeward islands. In the leeward islands there is a clear predominance of certain variables, while in the windward islands, *marae* construction is more variable. Wallin suggests that these differences reflect different social patterns in the windward and leeward groups, arguing that there was a greater degree of social stability in the leeward islands while more complex social relationships were played out in the windward islands (p. 99). This important conclusion regarding past social complexity exemplifies the potential of large-scale social-settlement analyses. Similar large-scale analyses of social complexity throughout Polynesia would undoubtedly produce equally interesting results. Additionally, with a common framework, the regional integration of results may generate new, unanticipated questions of Polynesian social complexity and interaction.

Writing that "each *marae* constitutes a complex unity with multiple meaning

contents" (p. 99), Wallin argues that the archaeologically defined types should correspond to ethnohistorical types. The main activity associated with type 5 *marae* consisted of worship of the god 'Oro and associated human sacrifice. On the leeward islands, type 4 dominates all *marae* distributions and Wallin suggests that size differences within type 4 *marae* are each associated with the worship of different gods. Type 1, 2, and 3 *marae* are simpler constructions and cannot be associated with particular social segments, but may be considered as Descantes' (1990, 1993) ancestral or family *marae*.

The relationships between *marae* types, ethnohistory, and time are discussed in Chapter 12. First, Wallin investigates the identification of individual *marae* with specific generations as indicated in oral-traditional genealogies. *Marae* related to particular genealogies may extend back forty generations, and some *marae* considered to be original in the islands are simple, low *marae* of types 2 and 3. According to the genealogical evidence, the earliest *marae* are from the leeward island of Raiatea and may be a simple type with only upright stones.

While genealogical evidence may indicate a temporal trend in the development of *marae* architecture, ethnohistorical records attest to the contemporaneous use of different kinds of *marae*. This, of course, makes temporal assignments with Wallin's types (which he suggests mirror ethnohistoric types) extremely difficult. The complex chronological model (pp. 113–114), Wallin's last, contains the most reasonable assumptions about the relationships between *marae* types and time. The complex chronological models displays different types emerging within particular time periods, but there is continuous use and potential modification of structures over time. The characteristics of the complex chronological model make Wallin's *marae* types poor indicators of chronology.

In chapter 13 Wallin discusses several possible, but not competing, interpretations of the spatial distributions of *marae*. He notes the different "kinds" of *marae* listed by Henry (1928: 119–148) and the different activities associated with various *marae*, from the "canoe builders' *marae*" to the "national" or "royal *marae*" and the "family" or "ancestral *marae*." If there is a necessary and sufficient set of criteria for determining the material correlates of ethnohistoric types, then the different activities associated with these types can be studied. Although Wallin does not proceed with this kind of analysis (this would probably be another monograph itself), the results might demonstrate the spatial and economic integration of social groups, craftsperson groups, and elite segments of Ma'ohi society. Wallin's research suggests that a closer look at the socioeconomic integration of the Society Islands, using *marae* as a potential data source, may be well worth the effort.

Wallin also investigates the "outer spatial context" (p. 123) as a possible source of variation among *marae*. He posits that the most plausible origin of *marae* is in eastern Polynesia, specifically Rapa Nui. Here, Wallin argues from the relatively few early radiocarbon ages associated with the ceremonial stone architecture of Rapa Nui, pointing out that they are, in general, associated with earlier dates than the Society Islands' *marae*. Carson (1998) has reached a similar conclusion at a larger scale concerning east Polynesian influence in west Polynesia. Carson's seriation analysis of ceremonial architecture in the Phoenix group documents the homologous similarity of some of the first Phoenix island *marae* with the well-developed *marae* of the Society Islands. Wallin remarks that the east-to-west spread of ceremonial architecture questions Eddowes' (1991) thesis that common

concepts of ceremonial architecture were held by east Polynesian peoples, but that each architectural tradition developed independently.

Wallin offers a final interpretation of the significance of *marae* types and type variations in Chapter 14. The typical Polynesian chiefdom (derived primarily from Sahlins [1958]) displays regular relationships between different segments of society and between society and the gods. Wallin uses this structure to interpret *marae* variation. Large *marae*, according to Wallin, reflect some form of chiefly competition and the appearance of type 4 and 5 *marae* on Tahiti may be a direct result of leeward chiefs exerting their dominance on the chiefs of Tahiti. Tahitian chiefs would have these *marae* built to demonstrate their own authority in the face of leeward competition. Other archaeologists (e.g., Boone 1997; Neiman 1997) have explained similar phenomena, the conversion of energy into a display of power and wealth, as a result of “costly signaling” within a framework of scientific evolution. Neiman (1997) argues that, regardless of the proximate reasons for an individual’s investment of energy into “wasteful advertising,” a mechanistic explanation grounded in evolution produces hypotheses that are empirically testable with the archaeological record of long-term change. Such an approach warrants further exploration by archaeologists interested in the diachronic processes of change that shaped Polynesian history (cf. Kirch 1990; Trigger 1990).

Finally, *marae* are places of worship; they are links between the earthly and spiritual realms. Wallin couples the hypothetical changes from one *marae* type to another to changes in the relative importance of gods in the *Ma’ohi* religious pantheon. Variable changes within types, however, may reflect changes in the chiefly hierarchy. As chiefs struggle against one another, some attain newly dominant positions in the social order. A newly dominant chief, being the earthly representative of the gods, must demonstrate his connection with the gods by reconsecrating, and thus changing slightly, the *marae*.

Wallin summarizes his monograph in Chapter 15. This is a welcome addition to a complex work; archaeologists interested in ceremonial architecture would do well to read this chapter first to understand the central ideas, analyses, and interpretations presented throughout the monograph. A reading of Wallin’s summary highlights some of the important contributions of his research and the potential methodological and substantive topics for future work. As Wallin’s analysis makes abundantly clear, rich descriptions of artifactual variability provide numerous inroads to analysis. The presentation of data also renders archaeological conclusions open to reinterpretation by other researchers, a necessity for building our knowledge of the past. The concept of interaction (described in spatial and social terms) is also prominent in Wallin’s work and is fundamental to our understanding of ceremonial architecture and Polynesian history in general. Better methodological tools, however, are necessary before substantial passage toward this goal can be made. Specifically, archaeologists must be able to reliably separate spatial and temporal interaction (initially in terms of artifact chronologies). Theory-driven and problem-oriented classifications will provide invaluable help.

CEREMONIAL ARCHITECTURE OF RAPA NUI

In *Ahu—The Ceremonial Stone Structures of Easter Island*, Helene Martinsson-Wallin (1994) also attempts to leap these methodological hurdles. In this mono-

graph, the published form of her dissertation presented at Uppsala University, Sweden, Martinsson-Wallin investigates the variability in *ahu* to interpret the "origin and development of the *ahu* and the culture of Easter Island" (p. 17). This social-settlement analysis of ceremonial architecture and the shared goals in both monographs (again emphasizing "social") emerge from the authors' previous jointly and separately authored works (e.g., Martinsson-Wallin and Wallin 1986; Martinsson-Wallin 1992, 1993; Wallin 1993*a*, 1993*b*; Wallin and Martinsson 1987, 1988*a*, 1988*b*). "*Ahu*," in the work on Rapa Nui (Easter Island), refers to the island's ceremonial stone architecture and denotes the entire structure, altar, and, when it is present, the courtyard. In the Society Islands, *ahu* refers only to the altar of the *marae*. Martinsson-Wallin's monograph is divided into ten chapters of background, analysis, and interpretation, with a summary chapter included at the end. The first chapter sets the tone for the volume, where Martinsson-Wallin also discusses the importance of a structural interpretation (Tilley 1990) applied to the emic meanings of *ahu*. She uses various methods "to search for different relations of meaning" (p. 17) in material culture variability.

In Chapter 2, Martinsson-Wallin outlines the environmental history and geography of Rapa Nui. Martinsson-Wallin presents a thorough summary of the floral and faunal communities, past and present, on Rapa Nui and notes the drastic changes that have occurred during this island's history. Her review may be complemented by Flenley's (1993) concurrent research on this issue. The distribution of geological resources is also important in any interpretation of the megalithic stone statues or *moai* that populate the landscape. The isolation of Rapa Nui also makes all explanations of material culture variation inherently more interesting.

Previous ethnohistorical and archaeological work is the subject of Chapter 3. Martinsson-Wallin discusses previous research to lay the foundation for her own archaeological analyses and ethnohistorical interpretations. Ethnohistorical texts document major changes in Rapa Nui culture from initial western contact in 1772. Subsequent visitors stayed only for very short periods, some never disembarking from their anchored ships, and documented the continual impoverishment of the land and the destruction of the *moai*. Used in an interpretive fashion, these early accounts must be treated with caution as there are few first-hand observations and almost no extended visits until 1864. Ethnological research in the second half of the nineteenth century provides a less-biased view of Rapa Nui culture, although by this time the relationship between the contemporary culture and the pre-Contact culture was tenuous.

Archaeological research on Rapa Nui has also changed over the past century. Speculative research in the late 1800s and early 1900s led to focused, large-scale research projects beginning in the 1950s (e.g., Heyerdahl and Ferdon 1961, 1965 and chapters therein; McCoy 1976). These projects documented *ahu* sequences, settlement patterns, and other aspects of cultural change. Almost all archaeologists, past and present, have debated the origin of the *moai*. The documentation of the "earliest" statues is an alluring goal, but may be fruitless given the difficulties of reliably and precisely dating sculpture. More recently, archaeologists have examined *ahu* using different interpretive frameworks. Beardsley (1990, 1996), for example, analyzed *ahu* in relation to territorial units and Van Tilburg (1986) examined the cognitive processes reflected in *ahu* style.

Chapter 4 is an interesting addition to the volume, presenting in a good

amount of detail “an example of extensive investigations of an *ahu* and its [sic] surrounding area” (p. 48). Martinsson-Wallin’s synopsis of excavations at Anakena and *ahu* Nau Nau gives the unfamiliar reader a sense of the relationship between excavation data and the interpretation of *ahu* construction and development. The earliest cultural deposits on Rapa Nui are located at Anakena on the north coast of the island. The earliest accepted date is in the A.D. 700–1000 range (A.D. cal. 643–1174 at 2 s.d.) and is derived, apparently, from aggregate charcoal removed from the base of a cultural layer (see also Skjølsvold 1993). The Anakena excavations also uncovered two previous *ahu* constructions, Nau Nau I and Nau Nau II, beneath the *ahu* at the present surface, *ahu* Nau Nau III.

In Chapter 5, Martinsson-Wallin presents an overview of pre-Contact social and economic organization as well as the religious beliefs of the Rapa Nui people. Knowledge of past social organization and religion is critical to her structural emic interpretations discussed later. These reconstructions are approximations at best, because of the highly disruptive effects of Western contact, and the possibly radical pre-Contact shifts in Rapa Nui social structure (p. 49). By piecing together ethnology and ethnohistory, McCall (1976:29–32) has described the social structure of pre-Contact Rapa Nui culture. Rapa Nui was divided into two confederations, and each of these contained several lineage groups called *mata*. *Mata*, and their subdivisions called *kainga*, were linked to specific territories (p. 51). There is even less known about ancient Rapa Nui religion. The *moai* may, however, personify dead chiefs or some other aspect of religion, or they may represent segments of ancient society.

Chapter 6 begins to integrate the background material discussed in the previous chapters. Here, Martinsson-Wallin outlines her analytical description of Rapa Nui *ahu* and *moai*. She limits analysis and thus her descriptive variables to 164 image *ahu* or *ahu moai*. Image *ahu* have megalithic stone statues incorporated in their construction. The subsequent “analysis may form a foundation for a more extensive type division, and furthermore be used to examine if social, temporal and spatial variations occur. Finally, it is important to try to interpret the meanings behind the variations” (p. 53).

Fourteen different general construction variables are used to describe *ahu moai* and, similar to Wallin’s (1993a) descriptive protocol, each general construction variable has several detailed variables within it (pp. 53–55). The fourteen general variables are *ahu* (metric measurements of the entire structure), shape of central platform, construction and appearance of central platform, location of central platform, construction of ramp, appearance of ramp, construction and location of wings, appearance of the wings, construction and appearance of plaza, statues, *pukao* (topknots), crematorium, human skeletal remains, and distance to the coastline. A selection of the detailed (presence/absence) variables of the general variable “construction and appearance of plaza” include enclosed by a stone wall, enclosed by an earth wall, and partly paved. The presence/absence variables within a general construction variable are exhaustive but not mutually exclusive. The detailed variables for some general construction variables (e.g., *ahu*) are metric measurements. The presences and absences as well as the metric measurements for each structure in the total assemblage of 313 *ahu* are listed in Appendix 1 (pp. 151–162). Additionally, sixty-seven photographs of at least fifty-nine *ahu* are presented in Appendix 2 (pp. 163–172). Like Wallin (1993a), Martinsson-

Wallin's data presentation is an invaluable resource for future analyses and has been useful to other researchers in their own analyses of *ahu* chronology and change (Allen, personal communication 1998).

Unfortunately, taphonomy has taken a heavy toll on the image *ahu*. The table in fig. 21 (p. 56) shows that of the 164 image *ahu*, many have variables that remain undefined, ranging up to a high of 89 percent of image *ahu* for which the construction and appearance of plaza is undetermined. Martinsson-Wallin recognizes this problem and adjusts the definitional criteria of her types accordingly (see below). To be applicable to a larger range of structures, any future research on *ahu* may profit from using classifications that require the least problematic attribute observations.

Martinsson-Wallin constructs four different size groups with a box and whisker analysis of length variables. By looking at the variance in the variables *ahu*, platform, ramp, and wing lengths, she defines three to four size groups in each variable, respectively. Martinsson-Wallin also displays several diagrams comparing the width and length of the same *ahu* construction elements. Interestingly, most *ahu* are elongated rectangles, while most Society Islands' *marae* are square in plan. Histograms of the distribution of occurrences across ninety-seven detailed construction variables are also presented (pp. 58–60).

Chi-square analyses determine the associations between detailed construction variables and the size groups earlier defined. Martinsson-Wallin also tests various construction variables against each other (Appendix 3, pp. 177–182). The chi-square analyses of construction variables and size groups indicates that rear-wall appearance is nonrandomly distributed across size groups. This analysis only applies to 114 (80 percent) of the 164 image *ahu* since this variable could not be observed on fifty structures. Ramp appearance is also nonrandomly distributed across size groups. In this test, however, almost 70 percent of the 164 image *ahu* cannot be included (p. 62).

Martinsson-Wallin's research examines, in part, the "meanings behind the variations" (p. 53) of types, therefore the lack of any variable may significantly affect analysis. For example, a detailed variable in the "shape of central platform" construction variable indicates an "uncertain" observation (p. 54). This uncertainty applies to 59.1 percent of the 164 cases (p. 56, fig. 21). Martinsson-Wallin, accordingly, does not use the general variable "shape of central platform" in her ensuing type division. There is, however, the chance that this is an important variable in the construction of meaning for past Rapa Nui inhabitants. Given that the central platform is important in several respects (it holds the *moai*, and is, in a sense, an altar), this may indeed be an important variable. This highlights a general problem encountered in "search and discovery" (Teltser 1995) research programs. When there is no direct relationship between explanatory theory and formal or classificatory theory, analysts are often forced to rely on statistical methods that group phenomena through the nonrandom association of objects or object attributes (Cowgill 1982). The choice of which attributes are important for a particular research problem, however, should be guided by the particular explanatory theory imposed (e.g., fracture mechanics in lithic production, or ecology in settlement system analysis). This necessary relationship between theory and classification has long been recognized by some Americanist archaeologists

(e.g., Brew 1946; Binford 1987; Dunnell 1982), and a few European scholars as well (e.g., Clarke 1973).

After examining variables for nonrandom associations, Martinsson-Wallin presents two correspondence analyses, one using thirty-seven image *ahu* and forty-three variables, the other consisting of eighty-three image *ahu* and nineteen variables. The number of structures in each analysis is indirectly proportional to the number of variables since when more structures are used, a greater number of variables across these structures displays uncertain values and cannot be used. Her goal is to discover if different groupings of *ahu* share characteristic variables (e.g., rear-wall type). The mechanics of analysis are the same as described for Wallin (1993a) above. Two scattergrams (pp. 64–65) are presented plotting axis 1 against axis 2 for two tests. Martinsson-Wallin notes that both tests show relatively similar, homogenous clusters and that “the cluster[s] may indicate the original or classical type of *ahu* . . . a structure with a well dressed high platform rear wall and a well dressed front wall with a red lintel. Its platform projects towards the rear and a stepped ramp or level pavement is situated in front of the platform. The structure is large and have [*sic*] wings, crematorium and several statues” (p. 66). While this may describe a classical *ahu* (an early structure, see p. 137), this *ahu* type may also be a function of differential taphonomic processes across *ahu* as only as much as half of the total image *ahu* assemblage is used in either one of the correspondence analyses.

To close her chapter on construction analyses, Martinsson-Wallin states that while the correspondence analysis indicated the rather homogenous nature of image *ahu*, the chi-square analysis suggests the opposite, namely, “that additional weight should be give to the variables concerning the appearance of the rear wall of the central platform when performing a type division” (p. 68). Martinsson-Wallin presents four types for limited use: type 1, image *ahu* with well dressed rear walls; type 2, image *ahu* with worked rear walls; type 3, image *ahu* with partly worked rear walls; and type 4, image *ahu* with nonworked rear walls (p. 70).

In Chapter 7 Martinsson-Wallin outlines chronological relationships between image *ahu* types and variables. First, she presents two ranked value axes from her correspondence analysis (variables and values for four axes are described in Appendix 4, pp. 183–188). Variables that are more closely ranked in the axis are more often associated in *ahu*. Martinsson-Wallin uses the ranked axis from the first correspondence test (p. 72) as a general indicator of temporal relationships among variables. The variables at one end of the axis are considered early and those at the other end are considered late based on chronological associations documented through excavation and other analyses. Again, there is the problem of conflating social, spatial, and temporal relationships in this order. Martinsson-Wallin recognizes this problem as well (p. 73), but still suggests that *ahu* types 1 and 2 may be early given their associated construction variables (which includes a large structure and many statues).

Martinsson-Wallin presents limited excavation and genealogical evidence associated with *ahu* to buttress her temporal arguments, but the ^{14}C datings will prove decisive for many archaeologists. There are thirty-five ^{14}C dates for image *ahu* (eleven of these are from the Gakushuin laboratory and may be unreliable, so they are not considered here). Figure 51 (pp. 78–79) is an excellent survey of the

¹⁴C record for Rapa Nui. Both the Vinapu and Nau Nau image *ahu* have been dated. Vinapu 1 is a type 1 (early) image *ahu* according to Martinsson-Wallin's criteria (p. 70). Two ¹⁴C samples (pp. 78–79, fig. 51, nos. 12 and 13) date the structure to A.D. cal. 1324–1782 and A.D. cal. 1439–1945, respectively, at 2 s.d. Vinapu 2 is a type 2 image *ahu* (early) and dates to A.D. cal. 589–1273 at 2 s.d. (pp. 78–79, fig. 51, no. 15). This sample, because of its stratigraphic context, may not date the *ahu* (p. 82). *Ahu* Nau Nau III is a type 2 image *ahu* (early) and dates to A.D. cal. 1273–1467 at 2 s.d. (pp. 78–79, fig. 51, no. 54). While these are all supposedly early *ahu*, only Vinapu 2 dates to Martinsson-Wallin's predicted earliest period of image *ahu* construction. Considering the suite of Rapa Nui ¹⁴C dates, Martinsson-Wallin argues that humans probably had settled on Rapa Nui by ca. A.D. 600 (maybe as early as A.D. 300) and that substantial construction of *ahu* did not begin until ca. A.D. 800. Future research should concentrate on recovering archaeological samples that provide early and relevant ¹⁴C dates to substantiate the earliest part of the *ahu* sequence that is now covered mostly by samples analyzed at the Gakushuin laboratory. Martinsson-Wallin describes the chronological problem: "since the structures were used and re-built over an extended period of time different temporal, spatial, and social relationships may be incorporated in the same structure. This makes temporal relationships difficult to interpret" (p. 84).

Turning from temporal to spatial variability, Martinsson-Wallin begins Chapter 8 with a simple goal. "The purpose of the spatial analysis is to ascertain the spatial distribution of *ahu* and their construction details" (p. 85). For the analysis to be relevant Martinsson-Wallin argues that archaeological analyses must match emic views of space. Ethnohistory and ethnology become important interpretive tools. According to ethnohistory and ethnology (see McCall 1976; Métraux 1971) *mata* and *kainga* social groups had associated land units. Martinsson-Wallin makes the important observation that agglomerations of *ahu* may either be centrally located in *mata/kainga* land units or define borders between units. The conflation of space and time in Martinsson-Wallin's *ahu* types makes it difficult to judge the contemporaneity of structures in a group. After future work on *ahu* chronology is complete, research on the spatial relationships of *ahu* and land divisions will be more fruitful (see also Beardsley [1990, 1996] for similar concerns).

In a series of variable density and distribution maps (pp. 86–102) Martinsson-Wallin displays an interesting and wide range of spatial data. The distribution of *ahu avanga*, a type of *ahu* identified by Englert (1974), is particularly noticeable. *Ahu avanga* are small structures containing a small stone cist for burials (p. 36). They have a clumped distribution, occurring mainly on the southeast coast (p. 94). Such a clumped distribution of similar structures suggests that some variable similarities may be related to spatial proximity and not chronology, but this is a matter for future chronology building.

Most construction variables are evenly distributed across the island, although some have more restricted distributions. Rear walls of undressed blocks of basaltic stone (defining type 4) are predominantly located on the southern coast. Rear walls made of three layers of horizontal stone are found predominantly on the northern coast. Both of these distributions demonstrate the possibility of spatial relationships among variables and types. Future analyses may consider tracking the spatial and temporal distribution of attributes of *ahu* and not *ahu* types. *Ahu*

attributes are often more easily defined and thus they are more easily analyzed in spatial terms, as Martinsson-Wallin's data make clear. Furthermore, because different construction variables were likely added to, and removed from, *ahu* over time (p. 84), *ahu* types that disregard this variability will be inefficient analytical devices for chronological and spatial studies.

In Chapter 9 Martinsson-Wallin discusses the origin of Rapa Nui culture. Martinsson-Wallin asks a series of questions that have always interested students of Rapa Nui's past: "where did the population originally come from? Which customs and conventions did they bring with them? How did these continue to develop? [And] have there been external contacts since the initial settlement or has the development been entirely internal?" (p. 108). Martinsson-Wallin begins her discussion by outlining east Polynesian prehistory, following Kirch (1984, 1986). Next, she develops a comparative study looking at material culture traits of ancient Peru, Rapa Nui, and Polynesia. Martinsson-Wallin examines the distribution of architectural forms, bird motifs, and artifacts, as well as the results of experimental voyaging analyses, the distribution of the sweet potato, and linguistic evidence. Martinsson-Wallin generates an impressive amount of evidence, and anyone must reach the conclusion that there may very well have been some degree of pre-Contact interaction between the people of Rapa Nui and South America.

The issue of the degree of interaction may be overshadowed by Martinsson-Wallin's question of origins. To discover the origins of Rapa Nui culture suggests that culture is a specific thing with definite temporal and spatial boundaries, i.e., Rapa Nui culture began at a certain point and it came from a certain place. If we are to understand and explain the history of Rapa Nui culture, all interaction beyond and within the island's borders and through time may impinge on our analyses. The interaction that resulted in material culture change on Rapa Nui will be most important, as well as those processes (e.g., subsistence activities, procreation) that engender similar changes across various islands in the Pacific.

In the final substantive chapter, Martinsson-Wallin posits several interpretive possibilities of *ahu* variation. She notes that worked stones throughout Polynesia are linked to ideas about *mana*. Generally, worked stones are special in religious and social realms and are containers for *mana*. Worked stones are found in certain house structures, they are evident as stone fishhooks, and they are distributed across different types of *ahu* and in association with different construction variables. Martinsson-Wallin also interprets the *ahu* in terms of lineage-based land claims, as well as chiefly and religious power. The variation in *ahu* across districts may be related to differences in the power and status between lineages in these land units. If there is a consistent relationship between *ahu* and chiefly authority, Martinsson-Wallin's answer to the mystery of Rapa Nui is intriguing: "the leading segment of society could not maintain the power through their structures and their tabu regulations. The only way to obtain more *mana* was to ruin and destroy another group's statues and structures" (p. 135). This resulted in the observations of those fascinated explorers who first saw Rapa Nui's deteriorating ceremonial architecture.

Chapter 11 is a concise and thorough synopsis of the preceding ten chapters. It is divided into sections that summarize the introductory chapters (1–5), the analytical chapters (6–9), and the final interpretation in chapter ten. It is recom-

mended reading for any archaeologist wanting a quick picture of Martinsson-Wallin's research.

Martinsson-Wallin's work represents a first attempt at producing a grand synthesis of nearly all Rapa Nui image *ahu*, the statues that have fascinated archaeologist and layperson alike for over 200 years. As a grand synthesis it provides interesting interpretations of both *ahu* meaning and variation and their removal from the active generation of material culture by the Rapa Nui people. Her work also uncovers the holes in our knowledge of the Rapa Nui past. Particularly apparent is the need to produce reliable and accurate chronologies for the majority of ceremonial architecture, and other archaeological features as well. The Rapa Nui statues are portable artifacts, albeit heavy ones, and this is an important fact to consider. Archaeologists may find answers to the chronological problems of *ahu* by treating *ahu* and *moai* as separate artifacts and developing chronologies for each. This may lead, as well, to interesting new questions about the duration of construction of particular *ahu* and builds upon a suggestion made earlier that construction variables, not *ahu* types, may be better indicators of chronological and spatial change. Regardless, differentiating spatial and temporal change in architectural variability is a difficult but necessary task if Rapa Nui archaeology is to continue moving forward.

SEPARATING SPACE AND TIME IN POLYNESIA'S PAST

It is important to revisit the fundamental principle of social-settlement analyses of ceremonial architecture. The work of Martinsson-Wallin, Wallin, Green, Sinoto, and others is founded upon the notion that similarity equals interaction and relatedness. This similarity is homologous similarity and must be separated from affinities due to other processes. This separation is often implicit and thus underdeveloped in archaeological analysis. Explanatory frameworks that incorporate this distinction and contain methods for separating homology from analogy, style from function, may improve the application of interaction analyses. Additional tools are required to differentiate spatial and temporal interaction or the transmission of material culture traits in these dimensions. Seriation is a method linked through general theory to the analysis of homologous variation and the generation of empirically testable hypotheses (Lipo et al. 1997, forthcoming; Teltser 1995). As a tool, seriation, combined with absolute dating techniques, may help to separate temporal and spatial variation in the archaeological record. The large data sets and interesting hypotheses presented in the monographs of Martinsson-Wallin and Wallin are excellent foundations for this future work.

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