ALIGNING THE ANCESTORS:  
THE ORIENTATION OF MEETING HOUSES IN NEW ZEALAND

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Abstract This article addresses the overarching research question of whether there is any uniformity in the pointing of meeting houses on marae in New Zealand, and it commences from an initial hypothesis that meeting houses are oriented towards the Taputapuātea marae on Riaatea, in the Society Islands in French Polynesia. Methods employed included the use Google Earth, spherical trigonometry calculations and a limited fieldwork campaign of forty meeting houses. A conclusion of the research is that there is a slightly higher chance of meeting houses being oriented towards the Taputapuātea marae on Riaatea, but that the hypothesis is not adequately supported by the provisional fieldwork done for this article. It is concluded that a number of other symbolic and practical considerations are important when orienting meeting houses, and that some of these considerations may overshadow orientation preference.

Keywords Meeting house orientation, marae, Polynesian navigation, home-based reference systems.

INTRODUCTION AND RESEARCH QUESTION

This article was set in motion by a remark that some Māori meeting houses (wharenui, or whare rūnanga) in New Zealand might be oriented towards a sacred marae on the island of Riaatea. The speaker was Professor Paul Tapsell, co-founder of the Te Potiki National Trust and at the time Dean of Te Tumu, the School of Māori, Pacific and Indigenous Studies at the University of Otago. At the time, Te Potiki had relatively recently begun a Māori map project whose aim was to document marae in New Zealand, and about 170 marae had been recorded, all on the North Island and concentrated in the far north (Scoop 2011). Although these made a rather small and skewed sample on which to pin any real hope, they raised the question of whether it might be worth checking a better distributed sample to test the hypothesis that meeting houses really are parallel with one another, pointing to a small island about 200km northwest of Tahiti, or even converging measurably from Cape Reinga to Bluff.

The first task was to see what the literature said. A quick search showed some support for at least a symbolic orientation of meeting houses to Hawaiki, mythical homeland of Māori. For example, Michael Linzey states that "The ridge pole also points to Hawaiki and New Zealand (as directions in front and behind in cosmological space)" (Linzey 2004: 160), and Amoamo et al. (1984: 27) emphasise the symbolic significance of directing the tāhu (ridgepole) towards the sea and Hawaiki. Continuing to sift through the literature, it was soon apparent that other writers held divergent views, and that both practical constraints (e.g. space limitations of urban land parcels) and other symbolism were also factors when considering the orientation of meeting houses.

But did orientation only operate on a symbolic level or was there any basis in fact? There has probably never been a better time to carry out an exploratory look into marae orientation, using the powerful new tools Google Earth has made available to surveyors and anthropologists alike. An overarching research question was posed for the research, namely whether there is any uniformity in the pointing of meeting houses on marae in New Zealand, with an initial hypothesis that meeting houses are oriented towards the Taputapuātea marae on Riaatea, in the Society Islands in French Polynesia. Specific objectives stemming from the research question and hypothesis were first, to obtain a latitude and longitude of a number of meeting houses (wharenui) in both North and South Island, New Zealand; second, to use spherical trigonometry to calculate the azimuth from there to the Taputapuātea marae; third, to obtain an azimuth of the ridge or sides of the meeting houses; and fourth, to make a comparison between the calculated and actual azimuths, together with an estimate of precision.

BACKGROUND AND THE LITERATURE

Raiatea (or Rai’atea, Rangīatea) appears regularly in Māori and Polynesian literature in connection with the homeland of Māori. In fact, Hava’i or Hawaiki is Raiatea’s ancient name (Hiroa 1964: 68, 76). Rai’atea “was the sacred island of the homeland” (Reed 2006: 243), and a saying of the descendants of Turi, of the Aotea canoe, is: ‘He kakano i ruiruia mai i Rangitanea, which refers to the daring and enterprise of ancestral stock from Rangīatea. Tahiti was a centre of Polynesian voyaging, and the great marae of Taputapuātea on nearby Raiatea was a principal cultural and political centre (Taonui 2006: 45). Legend
encompasses "pilgrimages from across Polynesia to the temple of Taputapuātea ..." (Finney 2006a: 145), and elsewhere Finney relates a tale told in around 1830 to a British missionary that "for many generations, 'priests, scholars and warriors' ... periodically set sail from their respective islands to meet at Taputapuātea and celebrate 'great religious observances and international deliberations'" (Finney 2000: 309,310). It seemed as if Raiaetea could indeed be sufficiently important to account for meeting houses on other islands being oriented in its direction, but were they in fact?

Orientation in general has attracted some discussion in the literature. Considerable mythology is associated with the sun (Best 1922: 13-20), and in Māori ritual performances priests faced east. Tapsell recounts how "instead of orienting themselves to sit to the south of the map, the old people would often take their station to the west so that they might face the rising sun, subtly acknowledging the leeward sea-path of origin by which their Polynesian ancestors travelled some 20 plus generations ago to arrive in Aotearoa" (Tapsell 2009: 93).

Narrowing down to the orientation of meeting houses in particular, Joan Metge notes a frequently expressed opinion that these should be oriented to the rising sun, but dismisses this, saying that "many meeting-houses in fact face other directions." She quotes architect Michael Austin as suggesting that "marae ... are almost invariably placed with hills or forest at their backs and open country in front, facing the direction from which visitors come, whether by road, river or sea." (Metge 1976: 235). Austin (1976: 233) himself, while noting variations and exceptions in both current and excavated sites, identifies "facing openness" to be the general rule. Amoamo et al. (1984: 29) turn Austin's statement around to argue that, rather than being dictated to by the landscape, the meeting house in fact "defines the directions of the landscape ... as 'front' and 'rear'. Without the meeting-house at the focus of the landscape pointing out where is 'front' and 'rear', the notions of enclosure and openness would have little cultural significance". The authors stress the importance of the meeting house as a mediator, for example between "inland bush and Hawaiki-related ocean, between autochthonous land-based ancestors, and ancestors who arrived in the Matauaa migration canoe from Hawaiki across the Pacific." This is illustrated by Figure 1 below:

Where a meeting house is situated up against a hill, Austin's words ring true; entrances tend to face the open country rather than into hillsides. A typical instance is the marae overlooking Lake Omapere, back to the mountains (35° 17' 16".7 S, 173° 39' 09".5 E). Both an oblique view on Google Earth and also a street view show a wharenui that backs up against the mountains, looking across river and plain, with the meeting house angled welcomingly to face the road along which most visitors could be expected to approach the marae (Figure 2). The message seems clear: visitors are more likely to approach on paths or roads over relatively level ground, and these visitors can be welcomed more conveniently and comfortably in flat, open areas than on steep hillsides.

![Figure 2: An oblique view in Google Earth, showing the Piki Te Aroha marae NW of Okaiahu](image-url)

Other symbolism is also employed in meeting house orientation, and practical considerations clearly play a part, as Anne Salmond reminds us:

"...East Coast meeting-houses are faced east to the rising sun, and in Northland it is said they are faced north to Cape Reinga, the mythological jumping-off place of spirits. Other factors such as orientation to the road are also important today, however, and often receive priority" (Salmond 1994: 68).

Dave Simmons' study of decorative pare (lintels) also reminds us of the wealth of other symbolism associated with meeting houses:

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**Figure 1:** Tūrāmure meeting house, Ōmarumutu marae, Ōpōtiki (From Amoana et al. 1984: 31).
"The pare is an important boundary between the world outside the meeting house and the world inside. It marks a tapu threshold into what is often called te pohoh, or the body of the ancestor who is te whare tipuna, the ancestor house. For the tribe and their visitors, to enter the house is to go into the body and, symbolically, to change ones state. The pare above the only entrance has an important role to play in that tapu threshold" (Simmons, 2001: 9).

Before proceeding further, two questions should be considered. First, is the idea of pilgrimages to and from Raiatea over thousands of kilometres of ocean credible? This question touches on a debate about deliberate versus accidental Polynesian voyaging that has undergone pendulum swings for several centuries. Indeed, Captain James Cook personally oscillated from, in 1769, fully supporting the idea of deliberate voyaging by the Raiateans to where, less than a decade later, he adopted "conclusions wholly at variance with his previous observations", perhaps influenced by a strong lobby that found it difficult to believe that untutored savages had long ago accomplished feats "scarcely yet attained" by European sailors and navigators (Parsonson 1972: 15). Today, the majority of scholarly opinion, coupled with an increasing number of voyage re-enactments (Finney 2006b), overwhelmingly supports the deliberate voyaging view (Golson 1972; Howe 2006; Evans 1998).

Second, bearing in mind that Polynesian navigators used a smorgasbord of techniques, some as approximate as the general direction of ocean swells and the flight of birds (Lewis 1994; Evans 1998: 30), is it fanciful to suppose that Māori could have known the direction of an island some four thousand kilometres distant with any degree of precision? However, the idea does not appear farfetched if we consider that Tupāia, the high priest navigator from Taputapuātea, impressed sailors on the Endeavour "by always being able to point accurately towards Tahitī..." (Salmond 2006: 265; Lewis 1994: 168). Best (1922) adds to this the assertion that "all natives knew the principal stars, and ... some made a close study of them" (p73), and that stars serve as a link with the past (p4) and are "Shining Ones" that "tie them to the long-lost but ever-loved home-land – that hidden home-land to which their spirits return ..." (pp74, 75). Thus, although it is now many centuries since Māori settled in New Zealand, and today it is probably fair to say that only a minority of Māori or indeed Pākehā have a close knowledge of stars and could reliably estimate the direction of Raiatea if pressed, it is probably not unreasonable to suppose that meeting houses might in the first instance have been oriented "correctly" by expert navigators and subsequent buildings erected with the same orientation even when an everyday working knowledge of stars had been lost. Looking ahead, the research for this article found a greater than random chance of meeting houses being oriented within twenty degrees of Taputapuātea, with two cases of wharenui oriented to within a few degrees of the correct bearing. For these and similar cases it might be interesting to seek for oral tradition concerning any custom about maintaining the orientation of wharenui for any rebuilds. Even for wharenui not oriented toward Raiatea it might be interesting to ask whether there was any rationale for this orientation or if their sitting was merely expedient.

Before moving on from the literature, a final question that should be addressed is whether there is likely to be better orientation of meeting houses at places in New Zealand near to where canoes landed in the mists of history? In other words, would early navigators, their recent voyages still uppermost in their minds, have been more likely to orient wharenui back towards whence they had recently come and still have had the knowledge to accomplish this? And is it fair to suppose that the importance of this requirement might have attenuated as Māori spread out over the country and epic land migrations assumed dominance in people's thoughts? In order to answer this question, we need to consider what canoes might have arrived and where they landed. Davis argues for the likelihood of the first settlers arriving between 600 and 800 AD, followed by a fleet of canoes arriving more or less together in 1350, with several of these tarrying awhile off Whangaparaoa (NE of Whakatane) before dispersing all around New Zealand (Davis 1990: 4, 5; Evans 1998: 27-29). Other writers contest the multiple canoe paradigm, pointing instead to a more complex marrying of both historical and symbolic elements in migratory traditions, and to the difficulty of decoding such traditions (Taonui 2006: 35, 36). Taonui believes the "seven canoe" myth to be conclusively debunked, arguing for a far more complex picture with at least forty human first-arrival traditions among Māori and over three hundred other canoes (p48). In that case it would be difficult to say with any confidence where exactly canoes of migrants landed, and in any case unlikely that better orientation could be demonstrated.

METHODS

The Māori maps database was consulted in the first instance, and proved helpful both in locating marae and in many cases providing photographs of them. The latter were sometimes necessary in ascertaining which one of a group of buildings was the meeting house, as opposed to an eating hall (wharekai) or any other building. The street view facility in Google Earth proved similarly useful, and had the advantage of covering the whole of New Zealand not just parts of the North Island. Photographs also furnished additional details about marae in a non-invasive manner, such as whether or not meeting houses had an exposed tāhu.

Owing to budget constraints and the exploratory nature of this research, only forty wharenui were considered, of which thirty five were considered admissible. Selection was largely opportunistic, and comprised eleven marae visited in the course of a different research project (in February 2012) together with others chosen at random. Those marae that
were rejected either lacked a wharenui or this was still under construction, or else the meeting house was ambiguous and not visible from the road so was unable to be identified using the street view in Google Earth. Because the Māori map project only covered part of the North Island, and because the parallel research project was located there, only one South Island marae was visited (Otaikou), and an attempt made to check the orientation of only six other South Island meeting houses using Google Earth. Two of these were among those that had to be discounted, with one still being under construction and the other not visible in the Google street view and unable to be identified with certainty.

For each meeting house identifiable on Google Earth, the bearing (or "heading") of the ridge or one or other edge of the roof was determined using the "Ruler" tool. Between three and five determinations were made for each linear feature and a standard deviation calculated to obtain a sense of the precision of determinations. The roof length was also measured in case it was found that roofs below a certain length were insufficiently accurate, though this fear proved unfounded since even short roofs gave an acceptable standard deviation. Standard deviations of the bearings were always less than a degree, ranging from 0.14° to a maximum of 0.99°, with a mean of 0.47°.

In order to check that Google Earth yielded suitable azimuths, a single comparison was made between a Google Earth heading and a surveyed bearing of the School of Surveying (SoS) at the University of Otago. The ends of the SoS parapet were surveyed by RTK GPS and a meridian convergence correction applied to convert the NZGD2000 geodetic bearing to a true azimuth. This azimuth agreed with the Google Earth heading to within 0.02°, which was well within the standard deviation of 0.18° for the Google headings determined for the parapet. There seemed no reason to suppose that other Google headings would be any less accurate, so this was the only verification carried out.

Prismatic compass bearings were obtained for twelve whare at the eleven marae visited in the course of the North Island fieldwork campaign mentioned above (both a church and a wharenui were observed on one marae). The compass observations were taken partly to see if these were comparable with Google Earth, partly to identify any complicating issues visible on the ground that might remain unnoticed with Google Earth, and partly to calculate a magnetic declination in case there were instances where only magnetic bearings could be obtained, for example where cloud obscured a Google Earth image. In every case the compass was lined up by eye on one or other of the roof edges of wharenui, or in one instance of the church adjoining a meeting house. Between two and five compass readings were taken facing the whare, and 180° added to the mean. The mean between the magnetic bearings and Google headings proved to be -16.7° with a standard deviation of 3.5°. This mean, of -16.7°, compares tolerably well with the mean magnetic deviation for the sites observed which, according to government figures is -18.6° for the mean Northland position (GNS Science 2012). Although the standard deviation appears to be on the large side, it is probably all that can realistically be expected from a magnetic compass and sightings to estimated roof lines, some of them quite short. The accuracy is good enough to suggest that, for future marae visits as part of the Ethnos Māori mapping project (Ethnos 2012), a compass bearing might be a worthwhile addition for at least two purposes. First, the bearing could give an approximate orientation of meeting houses whose roofs were not visible on Google Earth owing to cloud, and second, the approximate orientation of all marae could be obtained without the time investment required to measure headings in Google Earth. An approximate knowledge of orientation could help to screen out randomly oriented marae and highlight those oriented within a few degrees of Taputapuatea. The latter may be worth investigating further, including measuring a more accurate heading using Google Earth and perhaps also collecting oral tradition concerning the orientation of earlier marae on the site and whether there are any known reasons for such orientations.

A spherical triangle formula was used to compute, in Excel, an azimuth between the Google Earth latitude and longitude of the end of the ridgepole of wharenui in New Zealand and those of the Taputapuatea marae on Raiatea (16° 50' 11" S; 151° 21' 33" W). The spherical triangle and formula used are shown in Figures 3 and 4 below:

![Figure 3: Spherical triangle](image)

To give just one numerical example, the Te Tii, Te Tiriti O Waitangi meeting house in Paihia has a latitude of 35° 16' 26.7" S, longitude 174° 04' 46.2" E, making "t" (Figure 3) = 360° - (174° 04' 46.2" E + 151° 21' 33" W) = 34° 33' 40.8". Using the above formula, and making South latitudes negative, Az = 68°

Four parts formula

\[ \cos (90° - \Phi_{\text{North}}) \cos (t) = \sin (90° - \Phi_{\text{South}}) \cotan (90° - \Phi_{\text{Taputapuatea}}) - \sin (t) \cotan (Az) \]

**Figure 4: Four Parts formula**
03°32" which, compared with a mean Google heading of 68.7°, yields a difference of -0.6°. This is outside of the mean standard deviation of 0.47° for bearings, but nonetheless we can say that this important meeting house is approximately oriented towards the Taputapuātea marae on Raiatea.

**FINDINGS**

On the basis of the thirty-five wharenui used in the research (see Appendix), only two of those investigated are within 5° of the Azimuth to Taputapuātea, with a further four being within 15° either side of the correct bearing, bringing the total to six (Figure 5). Extending the band width, eight meeting houses were found to be within 20° either side of the Taputapuātea orientation. Since about four meeting houses out of a sample of 35 could be expected in an interval of 40° out of 360° if orientation was completely random, eight is appreciably higher.

The rest of the orientations appear to be randomly distributed with the exception of a group of six whare falling within 60-75°, which raises the question of there being any significance in the two most pronounced peaks being approximately 90° apart. For example, is it likely that the same footprint and foundations were ever retained but the building changed from being parallel to the street to facing it? However, explanations are at best tenuous, and the only conclusion possible for the provisional sample of 35 meeting houses is that there is a slightly higher probability of their being oriented to within twenty degrees of Taputapuātea. Further data would be needed to support or refute this, and further work needed to investigate other factors, such as possible significance of the rising of Matariki (the Pleiades) and the direction of sunrise in mid-winter and of the important star Canopus.

Of the two meeting houses within 5° of Raiatea, one is the Te Tii, Te Tiriti O Waitangi marae in Paihia which, as seen above, faces closely towards Taputapuātea. The other, in Ahipara, is about three and a half degrees away from the true azimuth. However, in Paihia the wharenui faces the road and is roughly parallel with the section sides, and in Ahipara it is roughly parallel with the mean road direction, meaning that both could have been sited for convenience. In both cases it would be interesting to try to delve into oral tradition to see (a) whether any earlier meeting houses existed on the same site (and if so whether the same orientation was preserved for subsequent buildings), and (b) whether any knowledge has survived about significance attached to the orientation. However, before speaking to anyone at the respective marae, cultural protocols would need to be observed. First, lwi administrative offices would need to be contacted or newsletters such as Ngai Tahu’s “te panui runaka” searched for contact details of rūnanga (assemblies, local councils). It would then be courteous to telephone or email these rūnanga to explain the purpose of the research and to request permission to speak with kaumātua (elders) about stories, karakia and waiata (prayers and songs) that have anything to say about orientation (Evans 1998: 46). A good starting point could be to begin, at least, with those wharenui aligned to Raiatea.

One meeting house that does not face Taputapuātea but whose orientation may nonetheless hold significance is Te Whare Rūnanga, the meeting house at Waitangi. Its foundation stone was laid in 1934 and the building completed in 1940 to commemorate the centennial of the signing of the Treaty of Waitangi. The meeting house embodies ‘not an ancestor but the Treaty itself’ (Waka Māori 2012). The meeting house faces the area where the Treaty of Waitangi was signed, and appears to hold powerful symbolism, namely that the old history of the Māori people, important as it continues to be, has been added to by a significant new location at which the realities of two peoples concatenated and continued together. This could be the kind of thing Linzey was referring to when he wrote, “A vital part of the significance of meeting houses ... seems to require their physical presence in a particular place and the symbolic transformation of the place that is achieved through this presence, pointing to local features, shaping the symbolic landscape, standing on the land as a symbol ...” (Linzey 2004: 14).

Of the remaining marae in the study, both pragmatism and personal preference are apparent. Oral evidence volunteered at one marae suggests that orientation is often arbitrary, with
some meeting houses being moved or rebuilt over the years for a variety of reasons, or perhaps relinquished in favour of more suitable existing buildings without the luxury of being purpose designed. On the face of it, the function of a wharenui in enabling people to meet together appears to trump considerations of orientation where these fall short of being ideal. In Metge’s words, “Function, not appearance, is what distinguishes a meeting-house from a hall in the final analysis” (Metge 1976: 230).

CONCLUSIONS AND FURTHER WORK

The hypothesis that a significant proportion of meeting houses in New Zealand are oriented towards the Taputapuātea marae on Raiatea is not supported by the provisional fieldwork done for this article, although there is sufficient congruence to warrant further work. As to the overarching research question of whether there is any other basis for the orientation of meeting houses, a number of considerations were found to be significant. For a start, as the world population burgeons, practical imperatives as well as broad symbolic parameters play an increasing role in siting buildings, especially in urban centres where most meeting houses have to be aligned with their boundaries; in order to build a decent sized footprint on a finite parcel, canny positioning is imperative. One conclusion seems to be that people are pragmatic as well as aesthetically aware. If something can only work in one way, we square our consciences somehow.

The research also showed that any predilection by Māori for orientation has had to be balanced against other traditions, such as that of welcoming visitors to the marae. Indeed, welcoming ceremonies are hugely significant, and at some point in the research I began looking on Google Earth not only for evidence of orientation but also of traditions governing the approach to wharenui. It was soon apparent that often provision is made for parking, and that some form of covered gateway frequently marks the start of a well defined path to the wharenui. It has to be concluded that the tradition of a fitting karanga (welcome) may have endured better than any tradition of orienting the wharenui in sympathy with a place of origin, or at least may dovetail better with today’s planning laws and premium on space.

Regarding future work, it would be interesting to extend the work done in this research to further meeting houses, distributed more evenly over the North and South Island and also balanced with respect to East and West coasts. As mentioned above, it would also be of interest to investigate any possible significance of the rising of Matariki (the Pleiades), the direction of sunrise in mid-winter, and of the important star Canopus. It is recommended that, for the remainder of marae visited in the course of the Māori map project, a WGS84 coordinate be taken with a handheld GPS at the wharenui entrance, preferably under the ridgepole, and a compass bearing observed to one or other edges of the roof or the ridgeline. This could be a way of painlessly identifying provisional groupings of possible significance. For any hopefuls, a more accurate Google Earth bearing could be observed and oral tradition sought (Has the wharenui always faced this way? Why? Any stories, karakia, waiaia?).

There are also wider, philosophical points of interest. Gatty writes of early peoples maintaining a “home reference system” as they ventured away from home (i.e. always being aware of where “home” was), and of modern man’s contrasting tendency towards a “self-reference system” (Gatty 1958: 45-47; see Figure 6).

Although paucity of data may well be an insurmountable issue, in concept it would certainly be interesting to try and trace the orientation of wharenui back over the years and see whether there is a decline in orientation towards Taputapuātea (or anywhere else) that might indicate a “home-centre” reference system evolving to a more self-referenced system in New Zealand. A sense of place is a consideration in the lives of human beings in general, and an emphasis on orientation of buildings holds significance in traditions other than those of Māori. English churches have traditionally been oriented towards Jerusalem (easily confirmed by even a cursory test on Google Earth), the Old Testament specifies that the travelling tabernacle be oriented in a certain way (e.g. Exodus 27:13, 38:13, Leviticus 1:16 etc.), and surveyors are surprisingly often called upon to orient Mosques towards Mecca. Was it merely coincidence that, on
the marae where a church was observed, it was oriented far closer to Taputapuātea than the wharenui?

On a more figurative level, Tuan writes, "We are, most of the time, at ease in our part of the world. ... Above all, we are oriented" (Tuan 1977: 199), and it might even be of interest to correlate social pathologies among Māori with perceived strength of turangawaewae connections to Māori freehold land (Knight 2007). One thing is certain: orientation remains an important and sometimes undervalued dimension of human existence.

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APPENDIX

Meeting houses used in the research
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**NOTES**

1 Turangawaewae: a standing place for the feet.