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‘The Dolphin and the sextant’: Traditional knowledge and modernity in Polynesian navigation.

Abstract:

This paper provides an introductory account of the differing ontologies of Polynesian and European navigation techniques in the Pacific. The subject of the contrast between traditional knowledge and modernity is examined from the perspectives of humanistic and scientific navigational techniques used in the Pacific in the Eighteenth Century. Commentary is also made on the problems of knowledge accessibility and transmission and the difficulties of inter-cultural representation of navigational knowledge.

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Polynesians who were descended from kinship groups in south-east Asia discovered new islands in the Pacific in the Holocene period, up to 5000 calendar years before the present day (Anderson et al, 2006, 3). The European voyages of discovery in the Pacific from the Eighteenth Century, in the Anthropocene era, brought Polynesian and European cultures together, resulting in social and economic exchanges that threw their cross-cultural differences into relief. The inter-cultural exchanges in early encounters in the Pacific also brought into consideration the navigational skills of Polynesians and Europeans. As Bernard Smith explains: “The scientific examination of the Pacific, by its very nature, depended on the level reached by the art of navigation” (Smith, 1985, 2). In the Eighteenth century Pacific, two quite different cultural systems, with different navigational practices, began to interact. Their varied cultural ontologies were based on different views of society, science, religion, history, narrative, and beliefs about the world.

Polynesian navigators and their ocean-going craft -- outrigger canoes called Vaka Tou’ua, or the double-hulled ‘Pahi’ or ‘Wa’a Kaulua’ -- engaged with the Pacific environment in what Europeans would call humanistic, metaphysical and phenomenological modes of experience. These involved frames of reference in mentalistic and physical space which were of an oceanic, single-axis type involving long-term memory as well as intrinsic perceptions (Bennardo, 2002, 392, 405). That these navigational techniques were effective in negotiating passage between the islands of the South Pacific diaspora is evident in historical accounts from the eighteenth century, in ethnographic interviews and records from the late-twentieth century and from European and Polynesian attempts since the 1960s to recreate the voyages of Polynesian ancestors and the complex histories of cultural interaction and exchange. Despite the navigational techniques of modernity, at the time of the

European eighteenth century voyages of exploration, travel between Pacific Islands was faster aboard Polynesian outrigger vessels, 'Pahi' could be navigated at 16 knots compared with the European Bark and Clipper's stately 2-6 knots.

Polynesian navigators traversed the complex island network of the Pacific steering their ocean-going craft by celestial navigation, knowledge of wind and wave patterns and other environmental reference points such as the locations of islands and habitats of marine mammals, 'navigator birds', and by submarine phosphorescences.



Model Pappao (Outrigger canoe)

European systems of navigation were recorded in maps, charts, and logs. Navigators used compass readings which along with calculation of the ship's speed and allowances of leeway for current directions could determine courses charted by 'dead reckoning'. Sextant readings of the sun at noon were used to determine position and latitude by calculation of the sun's declination. Chronological time was kept on board European vessels, notably the Harrison Chronometer on Captain Cook's second (1772-1775) and third voyages (1776-1779), which taken into account along with calculations of geo-rotation from the Greenwich Prime Meridian in conjunction with knowledge of the sun's orbit relative to the ship's position, could be used to determine longitude.

Whilst these techniques were mathematically calculated and used as 'long-range-distance' navigational methods, they were at the same time scientifically reductive and worked on abstracted representations of ships' positions that internalised specific and universalistic knowledge regimes derived from the empiricism of European enlightenment and early European modernity. As John Law

has stated: “Mobility, durability, capacity to exert force, ability to return — these seem indispensable if remote control is to be attempted. Indeed, they may be seen as specifications of a yet more general requirement: that there be no degeneration in communication between centre and periphery” (Law, 1986, 241).

Being representational, European techniques required less direct immersion in the environment than did Polynesian navigational techniques. Knowledge of ships’ positions was tied inextricably with co-ordinates and measurements from field instruments such as the compass, chronometer, and sextant. The measurements were recorded in charts and logs, enabling calculations of positions to be fixed. These techniques resulted in a system of position finding which, being representational and ship-bound, could be made at a remove from direct experience of the maritime environment. The abstracted remoteness of these methods, coupled with the overwhelming economic advantage of the Europeans in the Pacific from the nineteenth century, resulted in the gradual occlusion of Polynesian navigational knowledge.

English scientific South Pacific maritime encounters began with Captain Wallis’ discovery of Tahiti on board *The Dolphin* in 1767. Wallis named his Oceanic island discovery, King George’s Island. Upon informing the Royal Society of this jewel of the Society Islands after returning to London following his circumnavigation of the world, the Royal Society planned a further expedition to the South Pacific positing that Tahiti should be used as one of the geographical reference points from which to observe the transit of Venus across the sun’s surface which would inform the calculation of the solar unit.

European maritime advances in the Pacific were based on economic advantage, technological differences, and access to natural resources, including metal

technologies, which drove European industry. Implicit within Eighteenth Century European cartography was the centralised viewpoint of the modern subject; the cartographic perspective went hand-in-hand with the voyages of discovery. As the various cultures – Dutch, British, French, and Polynesian -- began to contest inhabitancy, trade within, and governance of the territories of the Pacific, this led to cultural occlusions in the early meetings and exchanges; intercultural abrasions and misunderstandings; and ultimately to erosions of indigenous knowledge as well as to cultural adaptations and appropriations by Polynesians.

Salmond suggests that the Tahitian's whom Wallis and Cook encountered were themselves in a period of maritime expansion during the Eighteenth Century, a fact that is overlooked in many Eurocentric accounts of Pacific history (Salmond cited in Howe, 2006, 254). Salmond also suggests that Polynesian voyaging had a religious status; a network of travel, trade and communication throughout the middle-Pacific was symbolically tied to the Temple of Taputapuatea positioned on the beach at Opoa in the Society Islands.

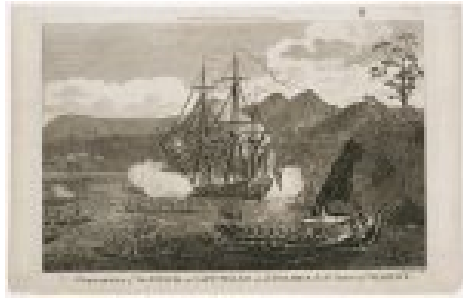
The Temple of Taputapuatea marae was regarded as tapu – as a site of Te Po, a realm of conflict dedicated to the war-god Oro. The Oro cult was led by the Ariori, Priest-figures of famed prowess who were also skilled navigators. From the Eighteenth Century and an invasion of inter-tribal conflict with a neighbouring war-party from Boroboro, only a decade before the voyages of Wallis and Cook, the Tahitian's had a prophecy announced by a priest named Vaita that they might be discovered by visitors from a distant land. This prophecy was partially fulfilled by the advent of Wallis and Cook. (Salmond, 2003, 39-40)

The religious basis to Polynesian society which informed many strata of communal knowledge, including knowledge of maritime voyaging, differed from the

scientific approach of European voyaging. European and Polynesian cultures had different cultural systems and social hierarchies that reflected basic ontological differences in their world-views. Where Polynesian culture was rooted in custom, tribal lore and a form of kinship -- socialisation of a shared ecosystem -- Europeans brought with them the knowledge of surveying and legal title. Thus there were ostensibly two very different senses of 'ownership' of physical space in place in the Eighteenth Century Pacific, one tribal and collective with porous boundaries, the other prescribed and with the European notion of individual title but with equally ritualised customs. However, despite the fact that both European common law and Pacific Island communalism shared a belief in the rights of succession in ownership, the two cultural typologies did not easily transpose or graft on to one another.

With the exception of Cook's visit to Tahiti on board *Endeavour* to observe the transit of Venus in 1769, the history of the exploration of Polynesia by Europeans from the seventeenth century, also tended to overlook the fact that many of the Pacific Islands were already populated by cultures possessing complex kinship organisations. Both the earlier discoveries in the Pacific, by Dutch explorer Abel Tasman (1642), and by Wallis, were marred by violent encounters -- peaceable cross-cultural exchange in Polynesia before and during the eighteenth century were never to be assumed without negotiations between discoverers and inhabitants.

Whilst Captain Cook's three voyages of discovery in the Pacific between 1769 and 1779, following closely after Wallis's circumnavigation, were proscribed by instructions from the Admiralty and the Royal Society in Britain, with special regard to respecting Polynesian persons and property, earlier and subsequent voyages were not. Salmond records that during Wallis's visit, the crew of the *Dolphin* were attacked with stones and muskets before retaliating with fatal canon fire (Salmond, 1993, 114).



Michael Angelo Rooker. 1784. *A representation of the attack on Captain Wallis in the Dolphin, by the natives of Otaheite.* (Permission of the Alexander Turnbull Library, Wellington, New Zealand, must be obtained before any re-use of this image)

Subsequently, the Royal Society went so far as to instruct Cook that the Tahitian Islanders enjoyed a form of territorial possession equivalent to legal occupancy, and thus any consideration of European economic advantage should not result in harm to them. However, Cook was also under orders from the British Admiralty to assess the Pacific for imperial gain, territorial ownership was on the British agenda.

From the voyages of exploration onward, the European discoverers brought both knowledge of population superiority and material advantage to the Pacific. The differences in cultural understandings between European and Polynesian cultures in the opening up of the Pacific and the ontologies underpinning them need to be assessed in postcolonial discourse in the attempt to understand the conflict between traditional knowledge and modernity in the navigation of Polynesia.

In his book *East is a Big Bird* (1979) Thomas Gladwin claims that the heuristic problem-solving strategies of Polynesian navigation are similar to those employed in ordinary aspects of modern life. The comparison Gladwin makes is

between Polynesian nautical navigation and the tasks performed by an ‘experienced driver’ in Western culture, which he describes as ‘routine’ (Gladwin, 1979, 224).

While Gladwin’s notion that abstract thinking is involved in the cognitive strategies of Polynesian navigation is accurate, that thinking is not of the same ontological order as the more remote representational thinking of European navigation, and is far removed from the mechanical procedures involved in driving a car. As Bennardo’s discussion in ‘Map Drawing in Tonga, Polynesia: Accessing Mental Representations of Space’ has shown, Polynesian mental representations of space were variously of the relative, intrinsic and absolute types (Bennardo, 2002, 392). A single-axis oceanic and intrinsic frame of reference system, which is centred on an object even when the speaker or object moves, was predominant in Polynesian marine navigation and used in combination with the relative (person-centred) and absolute (fixed-point) types.

Whilst Polynesian navigation techniques have regard for every possible physical contingency through the maritime journeying, it is through a form of immersion or direct and familiar inhabitancy in the phenomenological realm of the Pacific maritime environment that they differ from both comparative European navigational techniques or the tasks engaged in by a modern automobile driver, unlike Gladwin’s analogy from *East is a Big Bird*.

Polynesian navigational understanding was premised on a much deeper or ‘embedded’ engagement with the phenomenological world and a much more complex series of mentalistic referents than Gladwin seemingly allows. Similarly, this paper will take issue with the notion of a divide between ‘primitive’ and ‘modern’ in discussing Polynesian and European cultures that is based on anything other than the historical and geographic accident of access to, and ability to refine, differing geographical distributions of material resources. (Diamond, 2005).

Knowledge of the Polynesian navigation system is today largely available through the interpretation of records and narratives recorded in the language of the coloniser or settler-invader as to the Polynesian form of archipelagoic kinship inhabitancy, although indigenous beliefs and practices remain inter-threaded in these cross-cultural records of European and Polynesian cultural memory. European and Polynesian cultures may be drawn to one another in the attempt to enhance their own and each other's cultural understandings, to gain new insights concerning ontological differences between navigation techniques, and also to problematise the politics of cultural occlusion in the attempt to recapture lost knowledge.

As Wallis and Cook discovered in their dealings with the Ariori in the eighteenth century, navigational knowledge in Polynesian culture was traditionally the province of *orio* or navigation priests and was transmitted in a selective way through oral teaching and learning. Such teachings penetrated the narratives of Polynesian cultural memory with few instruments used to support this knowledge, (although *etak* dead-reckoning charts and maps representing island locations and currents were fashioned from available timbers, twine and shells).

In the attempt to record and recapture Polynesian navigation methods and to examine ontological differences between the Polynesian and European thinking that produced them, both cultures may be aware of complex issues concerning identity and representation that arise from cross-cultural exchanges and appropriations. The researcher attempts to interpret a discursive space in which agency is negotiated between both cultures frequently with no formal mutually understood terms of reference. There is no easy way around this inter-cultural dilemma other than to attempt to place the historical validity of Polynesian navigational knowledge in the foreground and to attempt to elucidate the historical and textual conditions under

which such knowledge became known to Western culture. In so doing one needs to ensure the cultural freight of this textual traffic is not one-way. Analyses of post-contact literatures reveal the adaptive and appropriative nature of cross-cultural exchange and in so doing may offer to renegotiate the politics of cultural identity.

For Polynesian culture, texts published in a European context may remain “alive to the risk of using a colonial or globalising medium to express indigenous content” as Phillip Armstrong has put it (Armstrong, 2003, 22). However, code-switching between languages, and issues of appropriation, have been occurring with cultural and language changes in the Pacific since the eighteenth century narratives of encounter. Polynesian culture inhabited a dramaturgical space parallel to European time. However, entry into modernity meant Pacific culture was increasingly governed by the chronological narratives of European history and the mythical structure of indigenous narratives that became entangled with those of European historicity.

The exchange of cultural knowledge in the Pacific necessitated the adoption of European communicative practices; however cultural knowledge is intrinsically involved in issues of identity in which the medium of expression exists in a suspended state of oscillation between cultural referents which may influence the form of the material communicated. Examples of this ontological difference are illustrated by the concepts of mana and tapu. Cultural lore may circumscribe the recording of cultural knowledge in one or other medium. For example, in the present day the publishing of Polynesian whakapapa or genealogical trees on the internet is problematic. The Polynesian view is that such knowledge should be handed down in person. This problem is explored by Robert Sullivan in his poem ‘54 waka rorohiko’, for example:

54 waka rorohiko

I heard it at Awataha Marae
in te reo – waka rorohiko –
'computer waka', about a data base
containing whakapapa. Some tapu
information, not for publication.
A dilemma for the library culture
of access for all, no matter who, how,
why. A big Western principle stressing
egalitarianism. My respects.
However, Maori knowledge brings many
together to share their passed down wisdom
in person to verify their inheritance;
without this unity our collective knowledge
dissipates into cults of personality (Sullivan, 1999, 59).

Sullivan's poem addresses the idea that knowledge of Maori whakapapa is tapu and person-centred; spiritual qualities cannot be captured in digitalised form, which regardless of whether they are accessible to all. The democratic publishing instrument of the internet is challenged by the notion of human 'sanctity' expressed in the oral transmission of Maori knowledge. Sullivan's argument iterates that knowledge has a provenance that is bound up with an ontology or with kinship ties and qualities of personhood which may be ignored by the abstracted representational form of digital culture.

A further example in the eighteenth century context is given by Salmond of a Polynesian prophecy involving the European 'discovery' of Tahiti which became known to Europeans subsequent to the arrival of the *Dolphin*. The prophecy had its origins in an earlier raid in 1760 on the island of Ra'iatea by a party of warriors from Borabora an outlining island of the archipelago. The raid established the prominence

of the high priest navigator Tupaia who would later accompany Cook south on board the *Endeavour*, navigating him through the Society Islands. Salmond's account describes how the raiding warriors from Borabora had destroyed a tree which sheltered the Marae at Taputapuatea, and lifted the shadow from the Temple of Taputapuatea. Entering a trance, the Priest Vaita fortold of the ominous arrival of a people with 'different body' who would arrive in a 'canoe without an outrigger'.

Salmond's source is Driessen:

The glorious offspring of Te Tumu
Will come and see this forest at Taputapuatea
Their body is different, our body is different
We are one species only from Te Tumu.
And this land will be taken by them
The old rules destroyed
And sacred birds of the land and sea
Will also arrive here, will come and lament
Over that which lopped this tree has to teach
They are coming up on a canoe without an outrigger
(Driessen cited in Salmond, 2006, 255)

The destruction of the 'old rules' pertaining to inhabitancy captures neatly the anticipation of change in cultural interaction brought by maritime voyaging in the Pacific. However, what form might destruction of these 'old rules' take beyond the taboo of tapu-breaking?

One of the main differences in forms of cultural knowledge between Polynesian and European navigational systems is expressed in terms of 'ontological immediacy' and direct inhabitancy of the natural or phenomenological world. European representational techniques of navigation since the early modern period had

worked on successive refinements that enabled ‘long-distance control’ involving forms of record and representation different from Polynesian methods derived from that involved star-lore and narrative recall. They were thus also atypical of Polynesian representations of space. While this enabled a form of technical universalism for the European it also represented a form of detachment from aspects of the phenomenological environment better known to Polynesians. Arguably the phenomenological qualities of the Polynesian navigational visual field made it richer, more detailed and localised than Europeans required – with few mnemonic devices the Polynesians were able to retain complex mentalistic narratives in long-term memory.

Polynesian navigational systems required knowledge and ordering of the natural world. Polynesians had direct access to their marine environment and its archipelagos, unmediated by forms of representation such as the maps, charts and logs kept by the European. European systems of representation and long-distance control enabled a selective engagement, which internalised the exterior environment on board their vessels through measurements which demarcated physical geography and the marine environment according to chronological time in co-ordinates of latitude and longitude. Thus a path could be steered through the seas by Polynesians without the need to refer to any but the phenomenological forms of the ocean around them: star patterns, sea-swell and current patterns, bird, fish and marine-mammal sightings, wind directions, incidences of submarine phosphorescence.



Vaka (Canoe) Tauhunu Circa 1900

Concomitant with this scientific engagement with the environment, there were concerted efforts from naturalists, including Joseph Banks and George Forster, who

accompanied Cook, to classify the flora and fauna they encountered in the Pacific in the taxonomic style of Linnaeus. However this was done against a static background of scientific categorisation and display, rather than the evolving natural world of the Pacific. Indigenous flora and fauna was re-contextualised into the display cases of Europe and had ultimately little to do with ocean navigation.

Other forms of natural ocean referents such as homing birds, the presence of marine animals, submarine phosphorescence, and swell deflections, which were important to Polynesian navigation, were regarded as largely peripheral and incidental to the European technique. Whereas Cook recorded the positions of *Endeavour* in his journal from plots on charts and maps as was the European norm, and Joseph Banks kept extensive records of marine life and native flora and fauna in the Pacific, Polynesian navigators relied on memory, the night sky and the patterns of wind and sea-swells, a form of phenomenological engagement involving mentalistic algorithm and manipulation of physical referents augmented within ancestral narratives.

European technology mediated in representational terms between knowledge of the marine environment and peoples' place within it, in an attempt to render, from a central viewpoint, three dimensions into two under the civilising gaze of the modern European subject. However, these two dimensions were prioritised at the expense of a form of relational knowledge of the phenomenological environment. There was no such ship-bound internalisation for the Polynesian navigator except island and wind charts made of latticed shields and gourds. Understanding of Polynesian navigation requires an ontological cultural adjustment involving a suspension of the reductive representational aspects of European navigational techniques. It necessitates understanding of the oceanic environment and 'faith' in its ability to provide the

signal referents in ecological terms that can be interpreted both to determine position and to provide passage from one Pacific island region to another.

A problem remains: If accessing different cultural practices is a matter of selectivity and textual construction, the discursive medium is inherently culturally political. While descriptive agency may be wrested from the world of living agency into the textual domain, in doing so the political economy of cultural exchange must also be recognised and negotiated.

While European navigational techniques involved abstract two-dimensional representational forms, Polynesian techniques were not ship-bound. The navigator did not distinguish between the modern sense of self and the environment in an abstracted sense. The success of European navigational techniques was premised on the ability to make volume two dimensional; to reduce the complexity of the phenomenological world along the reductive axes of space and time into mathematical co-ordinates on maps and charts. To accomplish this, the reductive properties of magnetism were employed, as well as the regulatory principles involved in the production of mechanical time, with its linear referents that were only partly based on cosmic ordering. The centralised viewpoint of the European system was relative to ship-bound representation. As Anne Salmond puts it in *Two Worlds*: “While Polynesian navigators relied essentially on the oral transmission of sailing directions and navigational information, European navigators communicated more commonly by means of documents— texts, tables and charts— that recorded the cumulative results of astronomical observation, mathematical calculation and experience at sea” (Salmond, 1993, 69).

Polynesian navigational techniques were based on a complex system of physical signs, markers and symbols, a system founded on *a priori* and *a posteori*

assumptions from the inhabitancy of the phenomenological world. The Polynesian system was also one in which past, present and future were inter-connected in narratives of creation and transformation, rather than the suspension of time in a synchronic present deferred between chronological notions of past and future as was European practice.

Polynesian navigation in the deep oceanic basin was based on fixed and contingent spatial knowledge of the Pacific environment, the sea and the sky. It relied on few external instruments, needing only the navigator's knowledge of the phenomenological world and stick charts representing island positions and sea-swells. There were at least eight kinds of sea-swell in the Pacific (Addis, 2004).

Although accounts of early modern European navigation techniques that preceded the Harrison chronometer, and of Polynesian star-compass methods, show they shared an affinity, the latter has historically suffered displacement and occlusion. However, Polynesian navigational practices were retained in one form or another, in Mace Island and Pullulate Atoll, for example, in preference to European techniques, until from the 1960s there has been European interest in their revival.

Polynesian accounts of pre-European navigation may be pieced together as a mosaic. It is inherently problematical to provide a definitive or comprehensive account of Polynesian navigation, because Polynesian knowledge is traditionally oral in transmission and contained in the heads of those privileged with it, rather than in written documents.

Most records of Polynesian oral explanations of their culture of navigation have been made by Europeans; important ontological complexities may be overlooked in the translation because of European narrative conventions. However, the efficacy of Polynesian navigational techniques is recorded in early ethnographical writings

about the experiences of the explorers of the Pacific; and in historical anthropological accounts. They have been tested on various voyages since the 1960s by resourceful educators, navigational practitioners and sailors such as David Lewis and Ben Finney, who, working with keepers of traditional Polynesian navigational lore, made reconstructed journeys in the Pacific using Polynesian navigational techniques.

Inherent also in any cross-cultural encounter are the complexities derived from cultural differences, which may be conceptual in nature. The attempt to translate, record, and communicate such knowledge changes it. Various adaptations were made by Polynesians to European techniques and culture. Apart from the design of native instruments, such as star charts, Polynesian knowledge was transmitted through oral lore, whereas the European knowledge-system was bound in physical documentation and representational form in maps and logs. Apart from their intrinsic worth as navigational records, this democratised navigational knowledge, making it less selective and occult. The European system was universal insofar as anyone with sufficient time and materials could learn it.

If there are three devices of European technology responsible for the occlusion of Polynesian navigational techniques, they are the Harrison chronometer, which gave more accurate measures of time, thus enabling longitudinal measurements to be made more precisely; the compass, which works using the laws of magnetism to fix a position relative to true north; and the sextant which allowed the azimuth of celestial bodies to be measured which could then be used to determine a position of latitude.

The chronometer, compass and sextant were largely instrumental in eclipsing Polynesian navigational knowledge because they universalised navigational knowledge and enabled knowledge of the Pacific to be represented in abstract modern European terms. If there was some similarity between traditional Polynesian

navigational techniques and those of Europeans before the late eighteenth century, the introduction of the Harrison chronometer (of which *Endeavour* carried four versions) on Cook's second voyage enabled a more accurate measurement of time passed from the Greenwich Meridian which enabled the calculation of the ship's longitude, which further increased European 'progress'. Cook referred to the watch as: "Our faithful guide through all the vicissitudes of climates" (Sobel, 1995, 50). So it was the ability to record the passage of time accurately and to use it to calculate speed and distance travelled, as well as the translation from three dimensions into two, which would put "the phenomenal world, in all its thick rotundity . . . under the sway of . . . sovereign geometrical vision" (Armstrong, 1995, 2).

Modern European population pressure overwhelmed Polynesia economically. European instrumentation, cartographic techniques and documentation were readily reproduced and could be exchanged independent of Polynesian knowledge of the phenomenological world. Salmond has noted the different 'fields of action' within the Pacific and the European systems of 'long-distance control'. She has also commented on the two-dimensionality and reductiveness of the European approach:

. . . as they sailed through the Society islands, the sailors exercised another kind of power, charting the islands and surrounding ocean, transmuting them into gridded lines of latitude and longitude, stripped of substance and emptied of people. This alchemy was effective, because as successive European crews visited the archipelago, raising flags, conducting ceremonies of possession and giving new names to the islands and settlements, they often seemed unaware that they were in seas traversed for centuries by others, "discovering" and claiming places that had long been inhabited (Salmond, 1993, 69).

Knowledge of Polynesian migration in the Pacific is gathered from oral history and ethnographic accounts pieced together from human archaeology and biotic data – the piecing together of fragments of knowledge. It is complicated by cultural

differences among Polynesians descended from Micronesia and South East Asia living in the complex scattering of island archipelagos.

In the context of the journeying to and settlement of Aotearoa, navigational techniques of Maori may have become less practiced as they became acclimatised to Aotearoa after the CE Twelfth Century. Settlement brought cultural refinement over time but altered the kinds of knowledge stored in cultural memory. Sustained settlement had obviated the need for constant updating of navigational knowledge among Maori, with narratives of journeying and discovery taking priority over accounts which related the succession of knowledge of navigational lore in the Pacific. Knowledge of near-coastal fishing grounds replaced that of long-distance voyaging. As Salmond puts it in *Two Worlds*: “Very little is known about early Maori deep-sea navigational techniques, and perhaps our best chance of understanding their seafaring methods comes from Polynesian voyaging, and the studies of navigational systems in Micronesia, where related traditional techniques have continued to be used into modern times” (Salmond, 1993, 69). However, Polynesians who were part of the archipelagoic diaspora of the Pacific of necessity retained elements of their pre-European navigational techniques until after the advent of modern European culture.

Furthermore, Polynesian navigational techniques could be described as ‘deep sky’ as much as ‘deep sea’. Maori creation myths contain elements of each in the stories of Kupe, Kawariki, Maui, Tawhirimatea (god of storms and winds), Tangaroa (god of the sea), Punga, Ikatere (father of fish), and Tu-te-wehiwehi (ancestor of reptiles). Maori knowledge of fishing grounds of necessity became extensive following the settlement of Aotearoa. Maori fishing techniques involved near-ocean journeying in waka, but long-range oceanic voyages were remembered in ancestral

storytelling and became part of the narratives of settlement, celebrating the mana of the ancestors or of their eventual passing and return to Hawaiki.

However, after approximately half a millennium of inhabitancy, when Tasman and Cook encountered Maori on the voyages of European discovery, Maori did not know which of their own myths to connect them to. As Salmond puts it in *Two Worlds*:

When the first European ships arrived in the islands, these strange craft provoked wild speculation. Some people thought that they had sailed down from the sky, or from beyond the arched heavens which encircled the islands. Others thought that these were floating islands, impelled by ancestral power, or vessels from Te Po, the realm of ancestors, the past and the future (Salmond, 1993, 69).

Ancestral power and the succession of knowledge could be both subjective (and based also on genealogical knowledge) and objective (based on mnemonic device and representational instrumentation). There is little evidence, however, that either Europeans or Polynesians attempted to discover or record each other's systems in early encounters. European navigation was internal to the ship's working. However, in Polynesian culture navigation was person-dependent, and the boundaries between self and environment were less defined. There was, however, a limited form of exchange between cultures.

Any account of navigation in the Pacific will say that many narratives of navigational techniques have been 'lost'. Even within Polynesian culture, navigational techniques were exclusive. Despite the compass being more readily available to them by the twentieth century, many Islanders chose to navigate by the stars, and did so well into the twentieth century even after the introduction of the outboard motor.

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Unknown. Circa 1900. Photograph. Vaka (Canoe) Tauhunu.
Museum of New Zealand Te Papa Tongarewa, photograph # FE010421

Unknown. Date Unknown. Photograph. Model Paopao (Outrigger Canoe)
Museum of New Zealand Te Papa Tongarewa, photograph # FE011984