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Māori Orality and Extended Cognition: a cognitive approach to memory and oral tradition in the Pacific

By
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A thesis submitted to the Victoria University of Wellington in fulfillment of the requirements for the degree of Doctor of Philosophy

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Though philosophers have long held that interpretive anthropology and the cognitive science of religion (CSR) are opposed, this thesis offers an extended empirical assessment of the issues surrounding the implications of utilizing ethnographic material within a cognitive study of religious transmission. Using case studies from the Pacific, I consider a core question arising in both interpretative and cognitive disciplines, namely: how have oral cultures been able to preserve and transmit bodies of sacred knowledge cross-generationally without any external administrative tools (i.e. text)? First, I focus on the historical and ethnographic details of traditional Māori orality. I look at how orally transmitted knowledge was managed through the external cognitive resources associated with religious ritual. Here I find evidence within Pacific oral traditions that the problem of managing knowledge was overcome through tools and strategies that augmented memory and oral skill. I give special attention to the traditional Māori structuring of learning environments. Next I consider how macro-spatial tools – such as landmarks, and place names - helped support working memory and information management, and show that orientations to landscape are vital to ensuring collective memory. This thesis also demonstrates how culturally learned tools and strategies support the stability of religious cultural transmission. The use of external cognitive resources implies the complexity of managing and organizing sacred knowledge. Put simply, focusing on the historical accounts from the Pacific reveals a rich suite of culturally evolved tools and strategies for the transmission of religious knowledge. I show that tools such as ritual, myth, mnemonic techniques, and artifacts enable and stabilise such transmission. I hold, that such cultural environments constitute cognitive tools that are meaningfully described as cultural cognitive systems. Thus, combining descriptive accounts with the theoretical orientations of the cognitive sciences motivates what I call a ‘cognitive ecological’ model of mind. I argue that the cognitive ecological model is important because it orients researchers to the role that culturally evolved tools play in: (1) dramatically extending the human brain’s power to reckon with its surroundings and: (2) coordinating such knowledge across social groups and over time. The cognitive ecological model of mind I propose in this study is important for three reasons: First, it challenges the received view within the CSR – what I call the ‘Standard Internal Model’ (SiM) – which holds that the transmission of religious representations carries low cognitive demands (i.e. it is cognitively optimal). In contrast to SiM, the Pacific materials discussed here suggest that the oral transmission of sacred knowledge is cognitively demanding, culturally costly, and locally contingent. Second, my thesis demonstrates that historical and ethnographic evidence contains information that is vital for progress in the CSR since qualitative resources document how niche specific cultural practices often facilitate the acquisition and coordination of the complex knowledge resources over time. The ethnographic data supports the local optimality contention. Third, my thesis reveals that formulating tractable models for cultural transmission within the CSR is benefitted by an interdisciplinary approach. Such a prospect, I urge, is vital for intellectual progress between the humanities and the CSR. As such, and contrary to received opinion, my thesis shows how the CSR and the cultural anthropology of religion share a common intellectual fate.
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INTRODUCTION

0.1 The Aim of the Thesis.

Many authors within the cognitive science of religion claim that the frequency and content of religious representations are causally related to innate features of our evolved cognitive architecture (Barrett 2000; Boyer 1994b; 2001; Boyer and Ramble 2001; McCauley 2000; Pyysiäinen 2001; Sperber 1996). Within the received view of religious cognition, non-religious features of our cognitive architecture determine the prevalence and type of religious representations within cultures. Attributes that are causally related to religious behavior are similar cross-culturally because of the way in which our cognitive hardware biases information processing. What I will call the ‘Standard Internal Model’ (SiM) of religious cognition claims that the fidelity and shape of religious representations is connected to content-rich features of our cognitive architecture (Barrett 2007; Jensen 2009; Whitehouse 2004). SiM purports that religion is a naturally occurring phenomenon, derived from intuitive information processing constraints. The observation that there are noticeable likenesses in the way in which religious activity is expressed across various traditions subsequently leads to the assumption that the uniformity of religious expression is correlated to fixed and universal psychological traits (Powell and Clarke 2012).

In regards to cultural transmission, SiM purports that our cognitive architecture functions as a natural stabilizing mechanism for the spread of religious representations. Religiosity is therefore conceived to be an emergent probabilistic byproduct of our innate psychological systems, as these systems encounter certain types of socially transmitted information. It is assumed that because cognition functions predictably across cultural contexts, it is possible to explain the abundance of religious representations across cultures by understanding why
universal features of the human mind find religious concepts compelling (Boyer 2001; Boyer and Ramble 2001). SiM relies on the assumption that how people think about religion is subject to inferential constraints generated by innate cognitive algorithms (Boyer 2001). Put simply, our cognitive architecture influences the way in which data is received and transmitted. SiM holds that the invariant human predisposition to receive and transmit cognitively optimal information determines the spread and popularity of religious representations. Optimality describes our propensity to be attracted to cultural representations, while the ease by which religious themes are learned ensures tractable comprehension. The *cognitive optimum* predicts that religious representations will be exciting without putting too much computational burden on our cognitive systems. On this view, religious explanations for natural phenomena are plausibly a default response to environmental cues, derived from cognitive constraints (McCauley 2000.) The proliferation of religious traits across cultures (their ubiquity and similarity) is due primarily to our natural tendency to find religious representations both exciting and easy to acquire.

I will argue in later chapters that there are many related casual connections between regional diversity within oral traditions and the variables that comprise the informational character of these environments. Cultural niches are often the consequence of unpredictable variables, while any data that clarifies the conditions of certain stable forces – such as socio-ecological influences – can give us some inferential reliability for an examination of cultural patterns (e.g. resource acquisition activities relative to a local ecology). However, religious traditions are noticeably diverse, and any causal explanation for these differences cross-culturally is not always evident. I argue that this is an important problem for the CSR, since the primary focus of its research has been motivated by the scope of universal trends in religiosity. This thesis does sympathize with this position: cognitive regularities are a
determining factor in influencing religious-cultural patterns. Nevertheless, I contend that important connections can be made between the cognitive functionality of external cultural properties and their significance in religious traditions. I argue that an important dimensional quality that can be at least moderately associated with external religious properties – e.g. artifacts, ritual and other symbolic tools – is their potential to support memory and information fidelity. The functional purposes of external religious properties are not always obvious, but this is plausibly due to the multivalent qualities associated with religious things: a religious artifact can be both the focus of worship and commitment, while being an orienting device for theological recollection (i.e. a tool for communication and memory).

My aim in this thesis is to evaluate, and challenge, the proposition that SiM is adequate for explaining the spread and transmission of religious concepts. The literature on religious cognition and memory will also be the primary foundation for orienting my own investigation into Pacific orality. I will look specifically at memory and speech within early Māori oral tradition in order to test the optimal relationships between cultural learning environments and cognitive expertise. I claim that the stability and fidelity of religious representations relies less upon innate features of our cognitive architecture, and more upon cultural-externally developed technologies for information management. My main job, then, will be to evaluate - on balance - those theories, concepts and methodologies that are applied within the CSR. I argue that the external-ecological cultural modes by which oral cultures preserve and transmit their religious corpus remains poorly described by SiM. The preservation and stability of sacred knowledge within many Pacific cultures would have depended more upon the access and nurtured capability to employ tools and strategies for enhancing transmission (Day 2004a, 2004b; Geertz 2010a).
This claim comes from the observation that the means by which sacred knowledge is transmitted is more cognitively demanding than is assumed by SiM. Information sharing within a religious context is not cheap. For example, oral cultures have utilized methods for learning that amplify transmission fidelity, and I argue that there has been a rational course for information management within oral cultures that has led to the development of specific cognitive devices (e.g. such as the logical structure of mythic narratives, as well as the purposeful use of geographical markers [e.g. landmarks, and place names] within storytelling). These anchors serve a purpose for enhancing memory, and transmission fidelity.

In light of the costs associated with information management – relative to the proximate demands of religious activity - we should be able to some predictions regarding the optimality of religious transmission. I argue here, however, that the modes of religious transmission are locally contingent, and this includes the determinants of optimality. In the chapters on Pacific oral traditions discussed below, I will look specifically at how these contingencies are relatively sensitive to engineered niche conditions. In particular, I argue that the burden of memory within oral traditions is relieved through certain tools and strategies employed for information storage and retrieval.

To clarify this idea better, I will put the problem of information management into a historical context, by looking at methods used in Māori oral tradition for memory and transmission. I will look closely at the cognitive function of geographical locations within traditional Māori myth, and the impact of sacred conventions on the modes of transmission. Mnemonic devices, such as geographic landmarks, constitute features of a cognitive map for organizing information. However, social learning constrains the channels of information
through controlled mediums, while subsequently supporting the fidelity of oral transmission. The descriptive material on Māori oral culture discussed in the chapters below will illustrate how certain social and technological methods – such as mnemonic devices - were causally relevant in the transmission of a mythic corpus.

Something that is also overlooked by SiM is the level of complexity and costs involved in the intergenerational transmission of religious beliefs and practices. The educational methods that are used within religious traditions, for instance, to enhance both the stability and fidelity of information transmission, often demands an accepted standard of dedication to a craft, coordination within a socially complex environment, and the necessary expenditure of resources. The descriptive material on Māori oral tradition discussed here will look at how the stability and fidelity of religious-cultural transmission greatly depended upon skills associated with memory retention and the verbal arts. However, I will also look at the various methods my which individual memory constraints may have been eased through the use of material anchors, such as landmarks and place naming. The conceptual organization of the landscape through myth and place naming further supports the coordination of knowledge into an accessible epistemic framework within Māori oral tradition. Physical structures function as mental anchors for memory. As shall be argued further, SiM’s assumptions regarding the optimality of religious motivations are insufficient to explain these investments in transmitting religious knowledge.

Before proceeding, it is important that I first explain what is meant by the terms ‘stability’ and ‘fidelity’:
1) **Stability:** the preservation and maintenance of informational resources is critical for effective cultural transmission. The cross-generational transmission of cultural beliefs and practices is dependent upon the stable reproduction of these properties over space and time. Memory constraints impose limitations upon how this stability is maintained, and information is prone to distortion and alteration. The conservative and static features of religious traditions require explanation, and this can be better described by examining the various tools and strategies that are employed by cultures to preserve (i.e. stabilize) their traditions.

2) **Fidelity:** cultural stability requires the faithful reproduction of cultural beliefs and practices across individuals. Cultural inheritance is therefore dependent upon a ‘copying’ process, of sorts (to the extent that any cultural information can be replicated). Individuals and groups must be able to duplicate the content of information from one generation to the next. Fidelity is of significant interest to cognitivist theories of mind since information processing constraints determine the frequency and content of cultural transmission (more on this in Chapter 1). However, I argue here that fidelity can be augmented through the use of external cognitive resources. Cultural tools and strategies enhance fidelity by supporting key cognitive functions when the complexity and volume of information increases (and this is best characterised by the use of symbolic technologies, such as writing and literacy).

In contrast to SiM, I argue that the stability and fidelity of transmitting religious representations is expensive and costly, mainly because many features of religious information sharing are informationally complex and broad. This problem of managing
information necessitates culturally evolved tools and strategies in order to support memory and transmission.

0.2 Cognitive Ecology and Māori Oral Tradition.

My thesis focuses on the work into extended or distributed theories of cognition. The literature on externalist models of cognition suggests that certain mental burdens are eased through an interface between agents and their cultural environments (Clark 1998; Clark and Chalmers 1998; Cole and Engeström 1993; Hutchins 1991, 1995; Kaptelinin et al 2003; Nardi 1996; Sutton 2006). Authors who endorse extended-distributed cognition argue that internal cognitive theories are not sufficient to describe how information is managed through external cultural properties and processes (Hutchins 2006; Sutton 2006; Wilson 2005). External-distributed cognitive models typically attempt to describe the functional interactions between cultural actors, and those specific features of the environment that enhance mental processes.

Andy Clark (1997), for instance, points out that a large proportion of cognitive processes and properties exist outside the skull, with culturally evolved tools functioning as essential tools for cognitive expertise. Writing tools, computers and calendars can therefore be viewed as cognitive tools that are in concert with the computational constraints of our basic brain. Since our everyday intelligence is enhanced through the use of external tools and strategies, external cognitive resources can be classed as epistemic devices that support mental processes (Dennett 2000; Sterelny 2004).

Similarly to Clark, Edwin Hutchins (1995a) also observes that a large portion of our cognitive functioning is supported through external artifacts and social networking. For
instance, Hutchins in his book, *Cognition In The Wild* (1995) explores the operational features of a naval vessel in order to show how the burden of epistemic complexity is unloaded on to the various tools and specialized crewmen upon the vessel (more on this in Chapter 5). A naval vessel is run by a divisible number of individuals, but its operation is also the sum of a cooperating collective – in conjunction with the learned strategies and tools necessary for navigation. It could be argued, then, that this organized conglomerate of hardware and division of labor constitutes a cognitive system. Within a distributed cognition model, all interfacing properties and processes matter to a study of cognition ‘at work’ in a structured environment.

External-distributed cognition models also emphasize the role that agents play in the shaping of their environments for cognitive purposes, and the impact these engineered environments have on cognition and behavior (Clark 1997; Clark and Chalmers 1998; Donald 1991; Hutchins 1995a, 1995b). The capacity to engineer our environments is critical to the externalist models of cognition, since it is assumed that the relationship between agents and their environments are the result of unique adaptive strategies. Technological innovation and the manufacturing of tools has been a salient feature in the evolutionary story of *hominins*. Humans have managed to establish ecological niches in a wide range of conditions due to the capacity to engineer their environments successfully.

We not only engineer our technological domains, but also the informational character of our environment (Sterelny 2003, 2004). While biological niche construction describes the way in which organisms have modified their environments for their own ends, and how these changes have led to significant effects upon the organism and their ecology (Laland and Odling-Smee 2000; Odling-Smee and Laland et al 2003), *epistemic niche construction*
describes how environments have been structured within a cooperative milieu for information transmission. The adaptive benefits of niche construction have been one of the more obvious features of human activity throughout history, and the received view within archaeology presumes a functional relationship between technological innovation and human economy (Trigger 2006). The capacity to adapt to a variety of environments, while at the same time coordinating epistemic resources, has enabled large-scale regional specialization for humans (however, ENC activity is noticeably preconditioned by extensive cooperation, language ability, cognitive flexibility and technological innovation [Sterelny 2003]).

The capacity for structured social learning is a key factor in the development of rich epistemic environments. Humans do not merely learn through imitation, but through structured interactions with our peers (Sterelny 2003, 2011, 2012). Teachers, and more experienced individuals actively engage with other agents for the purposes of passing on skill and knowledge (Sterelny 2011, 2012). In addition, social learning and technology has been critical in enhancing the fidelity of information. Institutionalized means for passing on skills to downstream generations has been vastly beneficial for the preservation of knowledge, whilst the development of symbolic storage (e.g. text, and other symbolic artifacts) has allowed for the outsourcing of memory (Donald 1991). Similarly to distributed-external cognition models, ENC recognizes the importance of cultural environments for supporting cognitive expertise.

In what follows, I will broadly utilise the term cognitive ecology to refer to extended-distributed cognitive models, as well as ENC. A cognitive ecological model describes how mental processes are distributed across a wide range of modalities – including social, physical and individual cognitive domains (Hutchins 2010; see also Gibson 1966). As
Hutchins states: “Cognitive ecology is the study of cognitive phenomena in context” (Hutchins 2010: 705). A cognitive ecological model views the mind as being connected to various features of the environment as supportive mechanisms for basic brain function, by further underscoring the ways in which environments matter to mental processes.

I first I make the observation that cognitive ecological models assume the importance of cultural variation since the interface between individuals and their environments are typically subtle and distinctive. Ethnographers recognise that cultural practices are peculiar to a local milieu. Cognitive ecological models similarly presume that these interactions can be better observed in context, since cultural practices are uniquely relevant and serve an important cognitive function within a niche environment. The history of ethnographic research on oral traditions in the Pacific assumes cultural diffusion, and not universalism. Unlike the SiM, the means by which oral traditions are sustained are locally contingent and varied (Finnegan 1995). Similarly, cognitive ecological models assume that cultural variation is obvious since a culture’s cognitive resources are regionally specific, and historically embedded. Cultures look different because the development of tools and strategies within a niche environment are frequently determined by a variety of contributing factors (including geography, climate, demographic pressures, and so forth).

Second, a cognitive ecological approach recognises the variables associated with the methods employed for learning development. The socio-cultural environment is recognised as being important to epistemic worlds of agents, and the resources that are utilised for supporting cognition are locally contingent (i.e. context specific). Third, an ecological approach acknowledges the complexity of religious systems by emphasising the cumulative effects of cultural transmission. Cultural environments are engineered by previous
generations and inherited cross-generationally, with certain conditions (e.g. such as demographic changes and technological innovation) influencing long-term changes to the informational character of the environment.

Much of the historical and ethnographic data on Pacific oral traditions in this dissertation will center on Māori orality and memory. For instance, I will look at how land and myth are interweaved into the traditional Māori epistemological framework for the purposes of information management. Without the use of administrative systems such as text, oral cultures would have relied on other – less symbolically external - methods for managing their informational resources. The traditional Māori mythic narratives evaluated below incorporate geographical locations into storytelling for various reasons (e.g. the spiritual and historical significance). However, I will consider how physical landmarks and myths assist in organizing knowledge resources.

I argue that an ecological model can better describe the use of physical things – such as geographical locations - for mnemonic purposes, which further points to a wider cognitive system at play in the memory and transmission of sacred knowledge. In light of this, I present a case study demonstrating how the organization of geographical locations within Māori myth serves a cognitive function by structuring narratives and utilizing mnemonic cues associated with the landscape. For instance, a group of landmarks on a map establishes pathways for tracking the structure of a narrative within a story, and the journey of a character through progressive scenes are related to significant geographical locations on a map because they anchor the story to a real pattern of actions, with real physical places. Narratives are richly connected to geographical locations and support working memory.
These networks also scaffold the retrieval and storage of information, since both narratives and place are coordinated in such a way to act as an oral library system.

Landmarks, for instance, act as mental anchors for the purposes of structuring and organizing information, and the historical research on mnemotechnics by both Frances Yates (1966) and Mary Carruthers (1990, 1998) will play a key role in this study for the purposes of expanding upon the functional relationships between memory, mythic narratives and macro-spatial conceptual structures. Both Yates and Carruthers claim that mentally organized spatial mnemonic devices – such as the method of loci - have been a historically salient mental strategy for memory used by orators (most notably in their work on Classical, Medieval, and Renaissance oratory practices). The method of loci as a mental technique involves the visualization of various points or images on a building layout that are prearranged in a way to provide cues for recollection. By placing images, or points on a mentally constructed plan of a building or geographical space, orators need only imagine moving from place-to-place in order cue a memory resource (Yates 1966). Recollection is therefore structured into an artificial, mentally imagined space.

Similarly, Frances Harwood (1976), in her paper "Myth, memory, and the oral tradition: Cicero in the Trobriands" has expanded upon this idea, that spatial memory is more efficacious in organizing knowledge and supporting oral memory. In the paper, she claims that the Trobriandic people of the New Guinea archipelago utilized place names, landmarks and myth to coordinate their epistemic resources. For instance, she observes that the Trobriandic people utilized geographical locations into their mythic corpus for the purposes of cueing historical and mythic knowledge. Some stories, for instance, involved a narrative of an ancestor who would travel to certain points on the map in the region. These points,
associated with historically significant places for a village, were subsequently incorporated into the myth. Harwood points out that these landmarks functioned as mnemonic devices for historical information, in addition to the structural benefits they provided for the narrative. Like the method of loci, the Trobriandic people employed spatial memory strategies for managing their mythic corpus.

Pathways and spatial memory will be important to my own research on Māori oral traditions. Similarly to Harwood, I claim that geographic locations have played a functional role for managing informational resources. Cognitive pathways, memory and myth will be examined further in light of Hutchins’ work on distributed cognition, and Hutchins’ (2005) application of conceptual blending research investigates the significance of combining internal representations and externally associated physical properties - in order to communicate more complex, multi-layered concepts (Fauconnier and Turner 2002; Hutchins 2005). Conceptual coordination between working memory and learned concepts can be managed better, he argues, by anchoring concepts to physical structures. Spatial memory techniques, such as the method of loci, for example, are an effective mental strategy for memory because integrate complex conceptual structures with a physical layout. Hutchins argues that conceptual structures are purposefully mapped onto physical properties because they function as anchors for complex mental processes.

I will argue, also, that oral maps (i.e. the structured relationship between myths and landmarks) adhere to similar coordinates and structures. Landmarks and pathways – once integrated into narratives – function as concrete anchors for working memory for storytelling, as well as a way to memorize geographical space. I contend that this kind of analysis is
pertinent for research on traditional Māori storytelling, since many mythic narratives entail salient connections between historical information, myth and landscape.

In addition, a recurring theme throughout this study on oral cultures is that costly investments in religious cultural transmission are associated with managing knowledge stores, and I argue that this has not been emphasized enough by SiM (see also Bulbulia 2004, 2009; Sosis et al 2007, for a functional examination of religious costs). Innate cognitive regularities do indeed operate on certain cultural outputs. However, many cultural strategies and tools for learning have been developed for the purposes of supporting the fidelity of transmission. These resources exist outside the nervous system, but nevertheless support key cognitive functions in the processing and communication of religious information. The case study on Pacific oral traditions discussed in this thesis will emphasize the techniques employed within Māori oral tradition and the costs associated with managing sacred knowledge.

0.3 Oral Traditions: some conceptual disclaimers.

In this thesis, while I mainly discuss the functional properties associated with the management of information within oral traditions, there has been some warranted controversy surrounding the term ‘tradition’ and whether or not this terminology can be evaluated from modern scholarship. For instance, one of the many problems for anthropological studies on the Pacific has been the contemporary reading of ‘traditional’ practices that are interpreted under the umbrella of colonialism and the Western influence on the perspectives of tradition (Hanson 1989; Linnekin 1992). It cannot be presupposed, then, that concepts such as ‘tradition’ can readily accepted terms applied within a historical analysis since the assumptions regarding historical authenticity have been directly or
indirectly fabricated by colonial interaction. Consequently, in the latter part of the 20th century there has been a push within anthropological circles to reconceptualize the term ‘tradition’ when discussing Pacific oral cultures.

It is argued that the label ‘tradition’ tends to imply an unbroken chain of knowledge that is passed down from previous generations to the present (Linnekin 1992). Earlier anthropologists who studied the Pacific initially thought that any insight into the history of Pacific peoples could be garnered from the orally transmitted knowledge of the locals in the present. However, it has been claimed, that the concept of ‘tradition’ cannot be defined as a bounded system of knowledge that has remained historically intact from generation to the next (Linnekin 1992; Finnegan 1995). Instead, culture and tradition – particularly within post-modern anthropological circles - is recognized as something that is “constructed in the present” and not a history that is “passively ‘passed down’ from generation to another” (Linnekin 1992:251). We cannot have a window into the past based on what we know about orally transmitted knowledge in the present, and culture cannot be assumed to be a “bounded object” that is readily available for “scientific study” (Linnekin 1992:251).

This also throws into question some of the terminology used by the SiM to describe cultural transmission, because tradition is shifting and context specific - not just the product of psychological uniformity. Linnekin’s own work in the Pacific, particularly in the Hawaiian context, indicates that ‘culture’ and ‘tradition’ is a fluid construction pertaining to a specific socio-historical context (Linnekin 1983). She argues that interpretations of a pre-contact Pacific history are polluted by European influence, due in part to the enormous impact that European contact has had on Pacific cultures. A distinction, therefore, could be made between what is considered to be an authentic and constructed history:
“The conventional scholarly concepts of culture and tradition ... have in common an essentialist project: they both rely on and advance the proposition that a core or essence of customs and values is handed down from one generation to another, and that this core defines a group’s distinctive cultural identity. Cultural construction implies instead that tradition is a selective representation of the past, fashioned in the present, responsive to contemporary priorities and agendas, and politically instrumental” (Linnekin 1992:251).

One of the more well known articles that demonstrates this push for academic self-reflection is Allan Hanson’s (1989) paper “The Making of the Māori: Cultural Invention and its Logic”. In his paper, Hanson criticizes current conceptions of Māori ‘tradition’ as being a constructed history invented by early colonial anthropologists. Early ethnographers, Hanson argues, misrepresented key themes within Māori myths and legends in order to represent a model of the culture that satisfied theoretical trends within anthropology at the time. One of the many theories considered within anthropological circles at the time was the idea that Māori were direct descendents of an Aryan culture (Hanson 1989).

Hanson’s criticism of these early ethnographic encounters is coherent with a view of Māori history that was invented to fit with the political agenda of the era, and further facilitate “race relations and nation building” in New Zealand by an attempt to fit Māori culture into a received historical framework that was coherent with the scholarship (Hanson 1989:893):

“The earlier vision was to create one culture, European in form, into which Māori’s would be successfully assimilated. To promote this goal it was necessary to identify similarities between Māori and European. As we have seen, the invention of the Māori culture promulgated by Percy Smith and his contemporaries did just that by using the Io cult as evidence for the Māori capacity for sophisticated thought and the Great Fleet to demonstrate the mettle of Māori ancestors and even to identify them as fellow Aryans” (Hanson 1989:894).

However, Hanson does not want anyone to perpetuate the normative view that an invented culture is somehow dishonest, despite the ethical implications. Instead, Hanson
argues that the concept of ‘tradition’ as an invention cannot be avoided. Similarly to Linnekin’s claims above, Hanson argues that cultural invention – despite its lack of authenticity – remains a normal part of social activity.

“...The fact that culture is an invention, and anthropology one of the inventing agents, should not engender suspicion or despair that anthropological accounts do not qualify as knowledge about cultural reality. Inventions are precisely the stuff that cultural reality is made of” (Hanson 1989:898).

Hanson seems to be neutral on whether-or-not culture invention is part of an explicit political agenda, or just a tacit product of socio-cultural development and interactions. Nevertheless, both Linnekin and Hanson argue that previous assumptions about the definition of ‘tradition’ were automatically based on the conception that a bounded set of customs and beliefs were being passed-on intact from one generation to another.

It could, however, be argued that the term ‘tradition’ could be treated with a little less distrust than this, by merely acknowledging the term as a conceptual interpretation of the past (Sissons 1998; see Linnekin 1990). Even Linneken sates that it may be more helpful for anthropologists to consider the term ‘tradition’ as simply a helpful heuristic tool for describing the historical embeddedness of cultural attitudes and actions. So despite the challenges to scientific models, Linnekin states that researchers should treat the term tradition as an operationalized term that is functionally relevant for maintaining a dialogue within the social sciences. Put plainly, it is argued, that we must be careful not to overly deconstruct the concepts and terms that are helpful for operational purposes, otherwise we could be left with “no acceptable vocabulary” to work with (Linnekin 1992:261):

“Logically, all social-science concepts are equally vulnerable to the anti-essentialist challenge. Unlimited deconstruction has the potential to leave us with no acceptable vocabulary, only a critique. Terms such as 'culture' and 'society' are indeed heuristic tools rather than things, Western categories rather than enduring naturalistic phenomena, but they are eminently useful tools” (Linnekin 1992:261).
Similarly, Ruth Finnegan (1995) argues that the term tradition can be controversial, but not overtly dysfunctional (Finnegan 1995:12-24). For her own ethnographic work on oral traditions in the Pacific she states that the individuals she encountered within cultures typically perceived oral performances as a connection to their own past. Finnegan states that individuals were usually conscious of both traditional themes associated with the past, and subsequently the contemporary influences on their oral corpus. For instance, she says that individuals are often intentionally playful when mixing traditional or older themes with more contemporary formulaic expressions. Indeed, modern alterations comprise vital historical relationships, by connecting the past with the present. Like Finnegan, I argue that the presumptions regarding the inability to separate traditional elements with more modern influences can be a shortsighted reading on a culture’s capacity to organize conceptual reasoning and knowledge sources.

So while anthropologists should be critical of modern influences on oral traditions, it should also be recognized that the term ‘tradition’ is a useful heuristic tool when discussing the contemporary interpretations of the past (for both academics and living cultures). In this thesis, I will also operationalize the term ‘tradition’ to mean: the viability of culturally relevant historical information in the present. Cultural inheritance is the product of transmission and the reproduction of structured environments, while cultural context and the perceptions of tradition further shapes the epistemic framework of cultural actors in the present.

Nevertheless, the content (or meaning) of a culture’s tradition will not be the focus here in this dissertation. Instead this thesis will concentrate more on the various modes of transmission and memory (over meaning and content). This thesis argues, then, that the
modes of transmission are just as critical to study of oral cultures as the semantic content of cultural practices. While the content of the knowledge is important to the study of oral traditions, so are the methods that are employed for managing informational resources. The strategies and tools used in the transmission of knowledge within oral cultures will be the focus of my own work. Put simply, this thesis will provide an examination of the functional processes associated with information management within oral traditions outside the interpretation of meaning.

0.4 The Structure of the Thesis.

In this thesis I will test SiM against the descriptive material from research on oral traditions. I argue here that the scope and breadth of managing religious knowledge requires culturally evolved mechanisms for stabilizing transmission, and this can be underscored by an interdisciplinary approach to religious cognition. The presence of information management strategies and tools (e.g. such as external symbols) alludes to the complexity and volume of informational resources that are managed by cultures. Information management and technological innovation are causally related, and the costs of managing information within religious traditions point to the demands of transmission. As far as oral traditions are concerned, information management systems are the product of tools and strategies that have been innovated of the course of a culture’s history for enhancing fidelity. The use of geographical locations within traditional Māori oral myth, for example, may serve a variety of functions, but I will highlight their effectiveness as tools for organizing knowledge. These kinds of cognitive strategies suggest the fundamental connections between cultural actors and their engineered environment, but they are also indicators that there are
costs involved in coordinating religious transmission. Cognitive optimality does not articulate these costs sufficiently.

Chapter 1 will provide an overview of cognitivist models and background on SiM. As stated above, SiM contends that innate psychological characteristics contribute to the cross-cultural expression of religious beliefs and practices. There is something basic to human cognitive architecture that shapes the components of religiosity. The theories and methods underpinning SiM have emerged largely from research within evolutionary psychology (EP) and cognitive anthropology (see Sperber 1996). Researchers within EP claim that domain specific features of our intelligence are the products of an evolutionary history that selected for functional-adaptive purposes. As a result, many psychological traits that constitute human behavior are adaptations that have evolved to respond a variety of environmental contingencies. These evolved psychological adaptations also shape cultural behavior, and the proliferation of certain universal cultural patterns is the product of these genetically entrenched cognitive systems.

Similarly, the general aim of the CSR is to assemble testable research methods that reflect these recurrent patterns for religiosity. The epidemiological model that will be discussed in this chapter describes how the frequency and content of religious representations is the product of information processing constraints in the brain (Sperber 1996; Boyer 2001). Innate features of our cognitive architecture therefore determine both the proliferation and content of religious representations. These predictions are based on the idea that religious beliefs and practices are transmitted at a cognitive optimum (Boyer and Ramble 2001). That is, the content of religious representations makes them both salient and memorable to our cognitive engines and this in turn determines their frequency. The minimally counterintuitive
characteristics of supernatural representations ensure their spread and universality of religious traits. Thus, on SiM view, innate cognitive biases naturally determine the shape and cognitive profile of religiosity.

SiM assumes that the recurrent and stable features of human culture can be attributed to the native (i.e. innate) features of our intelligence. Modular theories have shaped many of the methodological approaches within the CSR, particularly the SiM. For instance, the basic tenet of SiM is that innate features of our cognitive architecture have a considerable influence on religious behavioral outputs (particularly the frequency and content of religious representations [Barrett 2007; Boyer 1994b, 2001]). Subsequently, internal cognitive constraints plausibly determine the underlying motivations for religiosity. This has been the impetus for Boyer’s claim that the expression of religion happens at a cognitive optimum and in his book Explaining Religion (2001), Boyer covers a range of contributions from research within evolutionary psychology pointing to the theory that religion is both exciting to our deeper ontological instincts about the world (i.e. natural perceptions that are fixed by cognitive hardware), while being easy to comprehend at a computational level (see also Boyer 1994a; Boyer and Ramble 2001). Religious beliefs and practices are the byproduct of cognitive functionality.

In the same way the Sperber (1996) predicts that internal cognitive constraints lead to the prevalence of same cultural patterns over others, Boyer states that common traits and themes within religious systems cannot be attributed to specific internal modalities associated with

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1 Cognitivist/modular models often point to explanations for language as an example of this native intelligence. Noam Chomsky’s (1955/1975; 1988) work in universal grammar, in particular, has been influential in this field. Chomsky argues that while semantic features of language are learned, the structural features of our linguistic capabilities appear to be innate. In other words, we learn ‘meaning’ through conditioning and enculturation, but seem to possess native algorithms for generating syntactical structures and arrangements. The proficiency in which children are able to pick up language skills points to a predisposition for linguistic competency (more on this Chapter 1).
intuitive intelligence (Boyer 1998; Boyer and Barrett 2005). Stable features of religious transmission can therefore be attributed to how the spread of information is limited by the range of cognitive processing constraints. According to Boyer (1994b, 2001) and others (Guthrie 1995; Barrett and Keil 1996; Barrett 2000; McCauley 2000) a basin of attraction exists (also called the cognitive optimum [Whitehouse 2004]) that steers the expression of religiosity in a very predictable way. This includes – amongst other things – the expression of deities as anthropomorphic beings (Barrett and Keil 1996), and explanatory constraints on real-world phenomena (McCauley 2000).

The final stages of the chapter will turn its attention Harvey Whitehouse’s (2004) ritual modes theory. Like my own thesis, Whitehouse states that the ethnographic data on religiosity often reflects the complex and costly features of ritualized beliefs and actions and this should be underscored. Whitehouse proposes, then, that constraints on memory and the prevalence of certain types of ritual are more causally relevant in the transmission of religious representations than domain-specific cognitive systems. Whitehouse claims that his ritual modes theory presents a suitable challenge to SiM thesis, since it focuses on those unique features of a cultural environment that influence the expression of religious ritual, and the political social structures associated with these practices. Whitehouse states that religious systems are regionally diverse because they are primarily shaped by both internal cognitive regularities (i.e. intuitive systems and memory), and the socio-ecological conditions that influence ritual patterns. The subtle complexities inherent within religious systems thus ensure their cross-cultural diversity.

Whitehouse also takes the view that the stability of religious-cultural transmission is not satisfied by the theory of cognitive optimality. He argues instead that religious memory is
facilitated by differing religious ritual modes. Certain rituals support the memorization and transmission of religious systems. The niche environment matters to the way in which religious belief systems are expressed, as socio-ecological conditions play a role in determining the mode and expression of ritual. Context matters to Whitehouse’s ‘ritual modes theory’ and it is attempt to account for specific patterns of religious activity by surveying the socio-ecological conditions as well as the cognitive constraints of memory. His is an ecological examination of religious transmission. Religious memory is reinforced through different ritual modes that exploit semantic and imagistic memory systems. Doctrinal ritual modes – comprised of routinized, low arousal actions – are performed to activate semantic memory systems and structure implicit knowledge. While imagistic ritual modes – comprised of low frequency, high arousal actions – activate imagistic memory and shape the explicit recall of salient experiences. On Whitehouse’s view, ritualized actions are socially distributed with memory being spread out across a population of individuals.

Chapter 2 will provide an overview for some of the historical and ethnographic literature on memory and oral traditions. The first section in the chapter will focus on the research by Frances Yates (1966) and other researchers within the field of historical mnemotechnics (Carruthers 1990; Harwood 1976) who have observed the common use of artificial memory strategies within oral cultures for organizing knowledge. The method of loci is recognized as one of the more well-documented and effective mnemonic strategies for organizing information for orators. Against this background I look at research on Melanesian and Polynesian cultures that have applied mnemotechnical analysis to myth and landscape. The authors’ discussed in this chapter suggest that landmarks and spatial imagery provide a means for organizing knowledge and a general cognitive orientation within oral cultures for remembering. The incorporation of myth and landscape for preserving an oral corpus
suggests that the problem of memory and the transmission of informational resources were consciously or unconsciously overcome through mnemonic tools and strategies. It is argued that here we find some common trends within oral cultures for organizing knowledge, and that macrospatial templates within mythic narratives correlate well with artificial memory techniques found with previous studies on mnemotechnics.

Frances Harwood (1976) states in her study of the Trobriand people that some connections can be made between the Classical use of the method of loci and the way in which the landscape was mentally and linguistically organized through myth for the purposes of preserving and communicating a cosmology. Harwood (1976) takes the problem of cultural stabilization seriously, and argues that the means by which knowledge is organized within oral cultures is a commonly overlooked feature in the ethnographic literature. Myths provide an epistemic framework for social institutions, but Harwood states that the oral transmission of a mythic corpus is preconditioned by instability since oral transmission is prone to distortions over time. She states that without the use of symbolic technologies, oral cultures would have depended on other means for organizing and stabilizing information. Harwood argues that the common usage of macrospatial memory strategies (similar to the method of loci) and landmarks have been critical to this process. This chapter will introduce a comparative approach that will be more obvious later in the thesis (Chapters 4 and 5), whereby associations are established between cultural practices and how these conventions relate to some of the psychological data associated memory and communication (Rubin 1996). Chapter 2 will therefore examine some of the literature on oral cultures and the methods by which information transmission is stabilized through mnemonic strategies.
Chapter 3 will expand upon the previous chapter by focusing specifically on Māori myth and epistemology. First, I look at some of the traditional attitudes to knowledge sharing, and the means by which knowledge was passed on within a traditional Māori context. Since knowledge was passed on orally, it was perceived as a protected object that could not be widely disseminated through other mediums (e.g. such as text). By presenting knowledge in a medium that enabled a wider reading meant the potential contamination of the knowledge source and its tapu status. The introduction of text by Europeans, and the general distrust of this medium by early Māori, demonstrates how conventions shape cultural attitudes towards the mode by which information is transmitted. This background on the epistemic taboos relating to information sharing will be relevant later in Chapter 5 when I examine how cultural perceptions and practices influence the structuring of information channels and methods by which knowledge is preserved. Environments are structured in a way to support the transmission of knowledge, but accessibility of information is not necessarily cheap. Learning environments and the informational character of cultural niches are constrained by rules and customs associated with the sacred, and I will argue that these conventions affect the perceptions of memory and communication also.

Later in Chapter 3 I will look at some of the ways in which traditional Māori organized and transmitted these informational resources. A common theme that runs through the study of Māori oral tradition is the idea that traditional Māori pedagogy maintained a holistic approach to education. Myths, genealogy and landscape were all interweaved into a larger system of knowledge sharing. For instance, tribal identity and historical knowledge is founded upon both familial relations (i.e. whakapapa [genealogy]) and place (i.e. whenua [land]), and Mere Roberts (2012) suggests that there is a cognitive dimension to this. She argues that there are functional qualities associated with the memorization of whakapapa and
that its systemization – alongside mythic narratives - served as a cognitive map or library system for recalling knowledge (Roberts 2012). In addition, myths are intertwined with genealogical knowledge and subsequently inform a cosmogonical system that is the foundation for traditional Māori epistemology (Roberts and Wills 2001).

Chapter 3 will further describe how place names and landmarks have played a similar role in the organization of knowledge, and I argue that there are strong correlations between the material discussed in Chapter 2 on macrospatial memory and the structure of myths that use place names. Similarly to Roberts’ claim that whakapapa functions as a cognitive map (Roberts 2012), I argue that significant geographical locations, intertwined with myth, had a mnemonic utility for organizing knowledge. It is argued that the incorporation of landmarks and place names into mythic narratives provide a means for coordinating cues for working memory when recounting mythic history. In addition, cartographic knowledge was incorporated into myths and provided a means for memorizing information about the landscape. Myths functioned as a kind of oral map, and later in this chapter I look at two stories that demonstrate the functional relationship between narratives and geography within the traditional Māori oral corpus (Wilson 1990). Mythic narratives were functional as they were structured in a way to recount the routes on a map to resourceful locations, such as stone quarries.

Chapters 4 and 5 will cover the material on cognitive ecological models that will be the central to this thesis. Both these chapters test the utility of cognitive ecological models alongside some of the ethnographic and historical material on Māori oral tradition. Chapter 4 discusses the background on niche construction models and its application to human cognition and learning. Because this ecological model has been applicable to cultural
transmission and the structuring of learning environments it is also defined as **epistemic niche construction** (ENC) (Sterelny 2003). The basis of this model illustrates the human capacity for engineering their cultural environments for cognitive purposes. We are born and raised in environments that are rich in informational resources, and the cooperative social learning and technological innovations within cultural niches enable the distribution of cognitive expertise. The ENC model emphasizes the environmental properties and processes that support the cross-generational transmission of skills and knowledge.

The second half of Chapter 4 will examine the ENC model in light of the research on traditional Māori pedagogy and orality. Here the focus will be on two features of Māori pedagogy: a) how religious norms and customs shape the epistemic environment; and b) how religious knowledge is passed on through structured learning practices. First, it will be argued that conventions relating to the tapu (sacred) act as regulatory measure on the flow of information. Epistemic conventions such as the oral preservation and supervision of knowledge sharing have played a considerable role in the cross-generational transmission of sacred knowledge. Second, religious conventions additionally influence pedagogy and the rules governing educational methods. Within a traditional Māori context religious norms emphasized the accurate retention of scared knowledge. Mnemonic and oral skills would have been an essential component in the education of those who were responsible for preserving and transmitting tapu knowledge.

My examination here will demonstrate that religious-cultural transmission is far from optimal. Religious conventions influence the mode of transmission and this suggests a degree of complexity that has not been explained sufficiently by SiM. The stability and fidelity of cultural transmission within oral cultures is maintained through structured pedagogical
methods and the ENC model supports this premise. This challenges SiM theory that stable and fixed features of our cognitive architecture are the primary constraint on the transmission of religious representations. Optimality presumes a lack of cognitive support for transmission, while ENC describes a wide array of supportive mechanisms recruited for the transmission of religious knowledge. Methods for learning are locally contingent, locally optimal and historically embedded within the niche environment.

Chapter 5 returns to the material on Māori oral maps first discussed in chapters 3 and 4. Here the discussion revisits the use of spatial imagery and location within myths. In chapters 3 and 4 it was argued that geographical locations within myths serve a cognitive function for structuring narratives and organizing knowledge. This chapter expands on this idea further with an examination of distributed (or extended) cognition models (Hutchins 1995a; Clark 1998; Clark and Chalmers 1998). It will be argued here that physical structures – such as landmarks - not only assist in supporting memory, but they also act as cognitive inputs for conceptual reasoning (Hutchins 2005). In other words, physical structures act as material anchors for mental processes. In the first section of the chapter, I raise some concerns over the methodological uncertainty of an extended mind approach, by elaborating on some of the subtle differences within the extended-distributed cognition project. John Sutton (2010) evaluates some of the conceptual assumptions that have drawn criticism towards externalist models (see Grush 2003). Previous criticisms of cognitive ecological models have focused on Andy Clark’s ‘parity principle’ that makes the more ambitious claim that minds are commensurate with environments (Clark and Chalmers 1998). While Edwin Hutchins’ (1996) distributed cognition model is more moderate in its description of agent-environment interactions. Distributive cognition describes how environments are merely supportive of cognitive processes. While the parity principle underscores the functional similarities
between minds and environments, Sutton claims that the distributed cognition model makes a clearer distinction between internal and external cognitive resources. External resources merely compliment minds, according to this view.

In the second part of the chapter I provide a more detailed description of how minds and physical properties interact, especially in relation to the organization of oral maps. In his paper on conceptual blending, Hutchins describes how physical structures are recruited as cognitive inputs for both conceptual reasoning and working memory (Hutchins 2005). Conceptual blending describes the unconscious practice of coordinating a group of concepts into a blended arrangement so as to create other more complex conceptual structures (see Fauconnier and Turner 2002). Since the process structuring conceptual blends is complex and unstable, Hutchins claims that informational instability can be managed through the recruitment of physical structures, as they are effective as fixed supports. Hutchins argues that the projection of a material structure into conceptual models help stabilize reasoning processes since we naturally lean on external-physical structures as a necessary constraint for complex mental reasoning (Hutchins 2005). Conceptual blending is applicable to further discussions on traditional oral maps. Physical structures, and the sequencing of place names is the product of coordinating external and internal cognitive resources. Physical markers provide a cognitive anchor for this process, while linguistic devices – such as myths and place names – are structural inputs that assist in the organization of informational resources through the tractable division of geographical space.

Subsequently, the rest of the chapter will look at the methods by which early Māori cartographic practices were enabled through oral myths and landmarks. It is argued that myths and place names mutually benefitted the mnemonic retention of crucial knowledge
about the landscape. One of the ways in which early Māori navigators remembered the landscape was through sequential pathways that were structured in accordance with the order of place names. These sequences were also present in the myths that conveyed information about the physical terrain, the proper route for travel and a general spatial image of the physical geography.

Oral maps are an example of how conceptual blending functions for supporting working memory. This kind of interfacing between minds and environment also demonstrates how physical structures are important for constructing complex conceptual models such as narratives and myth. In sum, Chapter 5 makes two key points: a) physical structures can be recruited to support the integration of complex conceptual structures. Oral maps and landmarks, in conjunction with mythic narratives, are viewed here as the product of this capacity to coordinate a variety of conceptual and physical structures to support working memory. Stabilizing mechanisms can exist outside the skull and a distributed cognition model demonstrates our unique capacity to integrate a wide array of modalities for the purposes of organizing knowledge. And: b) SiM undervalues this capacity to recruit external cognitive resources for stabilizing the transmission of sacred knowledge. The investment and costs associated with the storage and retrieval of sacred knowledge points to the complexity and volume associated with the managing of sacred knowledge. SiM claims that the informational character of religious transmission is determined by internal processing constraints (Boyer 2001; Sperber 1996). A cognitive ecological model, on the other hand, suggests information channels are shaped by a variety of cultural conventions, tools and strategies. Religious-cultural transmission is, therefore, the product of these culturally evolved networks. Therefore, our dependence on external cognitive resources for religious
transmission does not support an optimality prediction, but instead points to the extensive and complex workings of religious traditions.

Cognitive ecological models offer a potential challenge to the current state-of-play within the cognitive science of religion and have emerged from a general dissatisfaction with individualist psychological accounts for religious behavior. Cognitive ecological models show that individuals are not divorced from their environments, but actively engaged in culturally evolved structures that support cognition. I argue that religious systems are elaborate and complex networks that are not easy to reproduce and transmit through intra-individual transmission. This implies a level of cost and commitment in the transmission of sacred knowledge across generations. While the cognitive optimality thesis goes some way to explaining the prevalence of less complex and intuitive supernatural representations, it does not sufficiently describe the elaborate networks and structures – such as socio-political structures, the use of artifacts and the level of investment involved in transmitting sacred knowledge – that constitute a religious system (Whitehouse 2008). I argue that environments are structured in a way to support the large-scale transmission of these systems. The limitation on individual memory suggests that the structured engagement with external cognitive resources is critical to the supporting the transmission of religious knowledge. In addition, by understanding these systems better through both ethnographic and historical methods, researchers can develop cognitive models that are better matched to account for both the mental processes and uniquely contextual factors that shape the religious mind.
CHAPTER ONE

1.1 Introduction.

For the purposes of my examination of the CSR, the theoretical and methodological differences between modular and externalism demands closer attention in regards to the cultural and historical details of cultural transmission. Firstly, the material discussed on cognitivism and modularity here in Chapter 1 is intended to provide a general background on the theoretical development of the Standard Internal Model’ (SiM), and the model’s primary theoretical/methodological directions. Boyer (1994b, 2001) in particular argues that religious-cultural transmission is constrained by deeply entrenched features of our cognitive architecture. He cites causal explanations within an evolutionary framework for religion being as a natural predisposition, since certain features of our cognitive architecture are predetermined by our biological heritage, and while these functional adaptations are beneficial in their natural domains, they are sensitive to religious information also.

Modular theories of mind are models that describe the specialized functional features of the mind-brain that operate naturally to deal with the informational demands of our environment (Cosmides and Tooby 1987, 1989, 1994; Barkow, and Cosmides, et al. 1995). This is underpinned by the idea that human behavioral characteristics are derived from the discrete operational features of our cognitive architecture. Evolutionary Psychology (EP), for instance, claims that these psychological adaptations are domain-specific in their scope, because they are adapted to respond effectively to a specific class of problem-solving activity. Within EP, it has been claimed that these psychological mechanisms operate on
cultural information also, leading to constraints on the processing, and transmission cultural representations (Sperber 1996; Sperber and Hirschfeld 2004).

The first part of this chapter characterizes a causal approach to cognition and culture as represented by modular models of mind. Here, I look specifically at how evolved and specialized systems in our cognitive architecture shape information processing - and its output - in terms of three main clusters of innate domain-specific skills - folk psychology, folk biology and folk physics (Boyer 2001). The first portion of the chapter looks at these clusters and how they relate to an epidemiological model of cultural transmission (Sperber 1996). I complicate this account by showing how cultural factors interact with these biological constraints and drivers of our cognition. In particular, I will outline Sperber’s epidemiological model that states that these cognitive constraints regulate information transmission and ultimately shape the frequency cultural representations. The general claim is that we have a representational mind-brain that processes data from the external world in predetermined ways. Thus, a ‘cognitivist’ approach to culture has traditionally focused on how mental representations reflect external phenomena. This is why this approach has sometimes been called an ‘internalist’ or computational theory of mind (Putnam 1975; Fodor 1983).

Dan Sperber (1996) and Boyer (2001) recognize that the frequency and content of cultural representations can be traced to how information is governed by cognitive constraints, which act as biases in the regulation of information flow. Functional-adaptive features of our mind-brain play a strong role in the expression of adaptive, or adaptively neutral cultural activity (Sperber and Hirschfeld 2006). Against this background, I outline some of the more prominent theories within SiM, which are motivated by the premise that religious concepts
strike a cognitive optimum between these constraints on cultural transmission and the supernatural. Cognitive optimality, on SiM view, describes how the motivations for religiosity are established by both the supernatural qualities of religious concepts, as well as their comprehensible foundation in natural categories (Boyer and Ramble 2001). Put simply, religious representations are both exciting and easy to acquire. It is claimed that the native properties of human cognition must have an influence on religious-cultural patterns. SiM, therefore, makes predictions about ‘common traits’ in the expression of religiosity, claiming a cross-cultural universality that underlies religious diversity. On this view, religions are fundamentally composed of the same ingredients, and shaped by inborn psychological biases. Religious representations are the by-product of non-religious cognitive systems, and the frequency and content of religious activity is shaped by a cognitively optimal basin of attraction (Whitehouse 2004).

1.2 The Cognitive Revolution: a computational theory of mind.

Psychological approaches to the study of human culture have shifted away from the traditional behaviourist methods in psychology, which viewed the individual learner as being shaped by external/environmental conditions. Instead cognitivist approaches claim, that a significant proportion of our learning is supported by innate competencies that regulate environmental inputs. This section will focus more upon research that has emerged from the evolutionary biological sciences and its application to psychology. The basis for evolutionary psychology (EP), in particular, is that our cognitive architecture is constituted by a set of collection of specialised systems that have evolved to function for individual cognitive tasks (Cosmoses and Toby 1992; Hirschfield and Gellman 1994; Pinker 1999).
EP often claims Noam Chomsky’s work in linguistics, and generative grammar, as their theoretical forebear (see Chomsky 1955/1975; 1988). The observation that a child’s ability to generate a variety of combinatorial associations with words and sentence structures, without being exposed to the necessary linguistic patterns, suggests a capability for language learning that is developmentally innate. Put simply, while words and sentences are learned - to a certain degree - it does not explain the intricacy in which children, can combine and recombine patterns of words and sentences without the necessary exposure to these linguistic assemblies under impoverished learning conditions.

The *poverty of the stimulus* argument supports the theory that we are born with innate capabilities for linguistic expression. Chomsky argues that language is structurally dependent, in that words and sentences conform to grammatical rules associated with the learner’s language (see Hirshfeld and Gelman 1994). The grammatical rules for linguistic expression are not explicitly taught to the learner or infant. Though a child may learn the semantic association for words, they are not deliberately told how to form a sentence within logical structures. Chomsky (1988) and Steven Pinker (1995), in particular, have argued that the reason why the computationally demanding task of language learning appears to be so easy is that we are somehow bio-psychologically endowed with innate content-rich resources for linguistic competence.

Pinker (1995) has argued that we possess a kind of content-rich language ‘mental organ’, or a specialised cognitive system for acquiring our language skills. The idea that there are innate features of our intelligence that have evolved for specialized functions – like language learning – has also formed the theoretical foundation for EP. Chomsky’s work, in addition to Jerry Fodor’s book *Modularity of Mind* (1983), in particular, has been influential in shaping
EP’s theoretical position regarding specialized cognitive systems. Fodor argues that the mind-brain consists of modules, which he called ‘input systems’, describing these as specialised domains for processing information (such as colour, shapes, edge-detection and so forth [see Hirschfeld and Gelman 1994]). Fodor claims that there is an asymmetric relationship between perceptual systems (input systems) and conceptual systems (central systems) (see Sperber 1996: 119-120 for discussion). Perceptual systems are peripheral and can inform conceptual systems, but conceptual systems cannot alter the way in which perceptual systems process information. Vision is somewhat uniform in the sensory data it provides, conceptual systems are much more flexible. So while input systems are modular, according Fodor, the central/conceptual systems are not. According to Fodor’s modular model, information about the world is represented in specific, individual systems. We cannot infer anything other than what these sensory modalities tell us about our world. Modules have a functional autonomy, and are function for a specific purpose (hence their speed and encapsulation).

We should remember that both Chomsky and Fodor identified something crucial to human development: that we are biologically endowed with specialized cognitive systems that enable predictable learning strategies. On the one hand, Chomsky’s language model is content-rich – it suggests that a language organ possesses innately bound information about

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2 This sensory data is then formatted for processing in a ‘central processor’ which means Fodor did not think that our cognitive architecture was all together massively modular, instead some of our ‘higher processes’ are non-modular. The central processor instead is a subsystem in the cognitive architecture in which information from other, more encapsulated modalities becomes integrated; this is where conscious thought is processed. Higher processes are usually considered to be “reasoning, inference, judgement and decision-making, semantic processing and so on” (Barrett and Kurzban 2006). That is why Fodor is careful to assume the fixidity associated with other sensory modules in the brain with the flexibility of the central system - where other explicit cognitive routines occur (Fodor 1983, 2001).

3 The simplified characteristics of a mental module include these features (Fodor quoted from Schneider 2008:3):“(1) Informationally encapsulated—the algorithms that characterize computations in the modules only have access to proprietary information (namely, the information in the module’s domain); (2) Fast—modules are able to perform a particular function very quickly; (3) Domain Specific—modules are only concerned with a very narrow kind of input; (4) Mandatory—the algorithms that the modules compute are automatically applied.”
linguistic structures (a language algorithm specialised for this purpose). On the other hand, Fodor’s modules, or input systems, are specialised information processing devices. They receive sensory input from the world, process information, and then send this formatted data to the central processor.

The modularity of mind thesis has been influential for EP’s concept of domain-specific functions (specialised and encapsulated sub-computers). EP claims that the mind-brain must be comprised of domain specific systems that have evolved to be specialists for certain tasks, as a kind of cognitive division of labour. However, instead of underscoring the relative openness associated with Fodor’s central processor, those within the field of evolutionary psychology take a massively modular view of cognitive architecture, arguing that all of our cognitive systems are domain-specific (Cosmides & Tooby, 1994; Pinker, 1997; Sperber, 1994). EP takes this massively modular approach seriously, by arguing that our mind-brain is constituted primarily by content-rich specialised systems that are adapted to solve a variety of specialized problems causally connected to an ancestral environment (See Barkow, Cosmides and Tooby 1992; Pinker 1997 for overview).

Further, the argument for domain-specific psychological mechanisms versus a ‘general purpose’ problem-solving system is that human agents tend to be very adept at a restricted class of tasks under certain conditions. A brain with domain specific systems has the luxury of being able to routinely activate innately bound algorithms when confronted with a specific class of problems. Cosmides and Tooby (1987; 1994) suggest that a domain general system would be too computationally sluggish in any given task domain. A domain-general system would be burdened with having to evaluate all alternatives potentially available to a problem

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solving class. Indeed a domain general cognitive system lacks the capacity to respond effectively to specific environmental cues. One of the broader adaptive functions for a specialised system is the fidelity of information available to the agent, thus information must be relatively stable, transparent and bounded:

“A domain-general evolved architecture is defined by what it lacks: It lacks any content, either in the form of domain-specific knowledge or domain specific procedures that can guide it towards the solution of an adaptive problem” (1994: p. 94).

Informational complexity within dynamic environments can be fatal when computational burdens generate errors or intractability (Sterelny 2003:206). EP claims, then, that adaptive decision-making must be relatively fast and optimal for a cognitive system. Organisms need to respond to their environments efficiently, and specialised cognitive engines are adapted to ignore redundancy and provide relevant information for effective responses. The breadth of decision-making abilities may be low, depending on the complexity of information that the cognitive system can manage. But if the information provided to the control system were appropriate, then the computational burden is lowered. Specialised systems assist in the navigation of complex environments in cases where complexity can cripple a system with too many variables. Perception and decision-making should be guided by a set of cognitive rules.

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5 A good case for the modularity of mind model is level redundancy involved in everyday cognitive processes. It would be crippling for a system to consciously evaluate all incoming stimuli. Without a cognitive division of labour, domain general systems are required to process ‘real-world’ complexities on their own; without innate specialisation the mind-brain is a constant novice having to process all incoming external stimuli without any cognitive support. As complexity increases from the alternative inferences that a domain general system is required to evaluate on its own, the further the system becomes paralysed.

6 Without specialised systems to organise the information coming from external stimuli, the cognitivist paradigm argues that our experiences become very noisy indeed. Predictable outcomes for a domain-general cognitive system are computational intractability. The frame problem is an excellent example of how computational intractability can lead to a combinatorial explosion within domain general systems (Dennett 1984; Cosmides and Tooby 1994; Samuels 1998, 2005). The frame problem is often highlighted by the famous travelling salesman example (see Sterelny 2003:205-206). When a travelling salesman has to plan the most efficient route to the various cities he is required to visit, the issue of tractability is manageable when the list of stops on the list is rather low. However, as the list of stops increases so does the number of possible routes the salesman has to consider. The computational burden of processing variable inferences all at once can, as stated, paralyse the system. Inferential domains that are specialised do not run the risk of intractability. Redundant information can be readily filtered out and so too can error propagation (Cosmides and Tooby 2000).
(or algorithms) that enable the organism to coordinate strategic decision-making effectively without too much environmental noise.

Putting the cognitivist paradigm within an evolutionary context has provided a more robust explanatory account for some of the innate or ‘native’ capacities associated with human cognition. We are hardwired for certain capabilities – such as language – and it is argued that this goes a long way to explaining common behavioural traits that can be found cross-culturally (Sperber 1996). Evolutionary psychologists like Leda Cosmides and John Tooby (1992) have emphasized the importance in reconstructing ancestral environments from what we know about our developmentally common cognitive traits, and our behavioural responses to a modern environment. This kind of modelling stresses that the modern environment is not the environment in which the brain has adapted to function. Instead, we have a suite of evolved psychological mechanisms that have been adapted to certain selection pressures preset to an ancestral environment. The environment of evolutionary adaptedness (or EEA) is conceived as a statistically probable time and environment that our ancestors were adapted to under very specific conditions. These conditions were determinant in our cognitive evolution and the causal relevancy of this environment (and time) constitutes an ultimate explanation for our cognitive profile.

So EP emphasizes 3 important theoretical and methodological concepts (Laland and Brown 2002:157-158):

1) The adaptive features of human cognitive architecture, or evolved psychological mechanisms;
2) A commitment to the claim that these cognitive adaptations are the result of specific selection pressures – the *environment of evolutionary adaptedness* (EEA);

3) The importance of *domain-specific* mental organs or modules in the mind-brain that have evolved to serve an adaptive purpose.

One of the more promising contributions EP has made to the field of anthropology is that despite the apparent variability of cultures there are the stable and recurrent features underlying cultural activity that are shaped by universal cognitive traits. Put simply, individuals learn and adopt cultural preferences in very uniform ways. EP argues that inputs are regulated by domain-specific systems in the mind-brain, and so we should be able to identify predictable patterns of behaviour. EP states that domain specific features of our cognitive architecture have evolved as psychological adaptations to respond to a restricted class of problem solving. These encapsulated cognitive systems have a bearing on the recurrent patterns of human culture also since they also govern the processing of publicly shared information (Sperber 1996).

The next section will examine three functional adaptations of our cognitive architecture that influence human perception and behaviour. These systems also have a bearing on cultural transmission. EP claims that we possess native ontological perceptions that are constrained by specific cognitive adaptations. These systems naturally respond to the

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8 The argument EP proposes is a kind of context-independent argument. We have a stone-age mind, but it just happens to function in a modern, technologically advanced environment (Laland and Brown 2003). This matters to the internalist argument because the mind-brain has standard operational features that should function in habitual ways, despite variables in context or cultural circumstances.
informational complexity of the environment, while humans have particularly sophisticated native psychological engines for dealing with social, biological and physical conditions. In addition, these ontological cognitive systems determine cultural outputs (i.e. patterns of culture) since they are recruited in a variety of domains outside of their functional purposes (more on this below).

These fixed features of our intelligence will feature prominently in the section on SiM. But first I will present some of the background literature associated with the research on innate ontological systems. These have often been called folk or naïve intelligences, since EP often views them as developmentally similar to linguistic competence in their operational capacity. Similarly to language, ontological cognitive systems (i.e. folk psychology, folk biology and folk physics) are viewed as functionally effective competencies, despite the lack of environmental exposure to the necessary informational resources. These cognitive systems also shape the content and frequency of cultural transmitted representations, since they are noticeably influential in biasing information processing outside of their functional domains. Put simply, processing constraints govern how cultural representations are transmitted, and this is relevant to SiM’s methodological direction in modelling the frequency and content of religious transmission (Sperber 1996; Boyer 2001).

1.3 Habits of Mind.

This section will look specifically at the proximate function of domain-specific psychological adaptations, and how – EP claims - these innate features of our cognitive architecture play a critical role in our abilities to navigate informational complexity. EP has identified something fundamental to the psychological basis of human adaptive behaviour:
we are social beings; ecologically intelligent; and technologically innovative. EP argues that these three proficiencies allude to the presence of innately bound cognitive systems that are highly responsive and effectual to these specific domains. Our social, biological and physical intelligences, it is argued, are adaptations to particular selective forces emerging from the conditions of our ancestral environment. Human folk cognitive systems respond quickly and are able generate flexible behavioural responses to complex problem solving tasks. These three folk systems are listed below, including a brief description outlining how they are considered rich features of our intelligence:

**Social Intelligence:** Humans are group animals that develop and form strong social bonds. These traits are preconditioned by our capacity to be a highly cooperative species that function within informationally complex environments. Since we are adept at navigating social domains that are highly dynamic and complex, EP argues that we must be naturally predisposed to strategic social exchanges (Cosmides and Tooby 1989). Tracking political alliances and valuable social bonds with others’ would have provided an adaptive advantage, especially since the identification of friends, enemies and freeloaders are not always obvious (Sterelny 2003). Alongside the computational burden of navigating a socially political landscape, with our capacity to respond quickly to social complexity, EP suggests that the evolution of specialised cognitive systems for social intelligence would have been critical for living in groups.

**Biological Intelligence:** Humans are very good and classifying and processing information about our organic worlds (Atran 1993, 1998). Scott
Atran (1998) notes a remarkable consistency in the ways in which cultures rank taxonomies within their local ecologies. This includes an intuitive hierarchical arrangement of species and living things versus non-living organic materials.

*Physical Intelligence:* We perceive our physical world within the scope of a biased set of conditions that conform to intuitive rules of logic (Proffit and Gilden, 1989). For instance, the way in which we perceive motion, solidity, mass, distance and space is developmentally consistent. But we are also highly adept at technological problem solving within our physical world. Being able to successfully make predictions about physical dynamics in our world provides us with the capacity for technological innovation. For example, an intuitive sense of distance provides us with the relevant information required to manufacture and propel projectiles (e.g. from cricket balls to spears). Physical intelligence is also the foundation for our capacity to be technologically innovative, since most tools are functionally sensitive to the logical scope of our reasoning as purposeful devices (i.e. our capacity to evaluate the utility of the tool in a particular problem-solving task).

EP argues that these natural and stable competencies point to the existence of domain-specific systems that are adapted to respond to environmental contingencies. Cross-cultural biases towards a set of behavioural outputs suggest that we may have an innately bound: 1) *folk psychology* system; 2) *folk biology* system; and 3) *folk physics* system (Boyer 1994b, 1998; Baron-Cohen et al 1997; Duchaine, Cosmides and Tooby 2001).
In the case of folk psychology, for instance, it is argued that any casual explanation for human sociality will no doubt be attributed to some cognitive predisposition for navigating social exchanges. This may also suggest a rich evolutionary history involving group living (Dunbar 1996). It is argued by EP that the complexity of our rich social worlds would normally require a stored database of social knowledge that would be far too computationally demanding as a domain-general system. Tracking behaviour within a complex socio-political environment comes with higher cognitive demands, suggesting computational intractability for managing social exchanges without a specialised cognitive system. Others elsewhere have discussed the memory demands associated with tracking social worlds and this is causally relevant to our social intelligence (Dunbar 1996; Byrne and Whiten 1988). Tracking strategic information within our social worlds is complicated further by the additional task of navigating cultural norms and conventions (Sperber and Hirschfeld 2004).

A specialised computational device that functions optimally in social exchanges should be commensurate with informational complexity – both necessary for tracking complexity, while enhancing it also. The case for domain specific social cognition is relevant when you consider the developmental trajectory of social skills in children. It has been argued that our capacity to be social is sufficiently explained by a capacity to predict the intentions of others, or a Theory of Mind (ToM) module (Baron-Cohen 1989, 1995; Whiten 1991). ToM ability seems to typically emerge in children after the age of 4 with signs of increased social skills in normal development and further into maturity (Baron-Cohen 1985; Perner, Leekam, & Wimmer 1987; Leslie and Frith 1988). This developmental course has been tested in false belief tasks amongst children who are able to recognise the mental objectives and attitudes of

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9 However, it is still unclear as to whether we can classify our ToM abilities as a computational module, or as a domain specific set of abilities (Samuels 2000:38).
others’ after a certain age.\textsuperscript{10} False belief tasks like these are used to demonstrate the universal constraints on inferential reasoning within social exchanges.\textsuperscript{11} The ability to attribute beliefs and desires to other agents is viewed as developmentally predictable amongst children, since we begin – at an early age - to tacitly acknowledge the intentional qualities of other minds, and use these inferences to navigate a social world.

As mindreaders we can generate logical predictions about the mental states of others and respond to these cues within social exchanges. Various explanations for ToM suggest that being prosocial requires that we are good at predicting the intentional states of others (Baron-Cohen 1988; Tomasello 1995). We can therefore be conditional co-operators: formulate strategic and adaptive decision-making based on the social information available to us (maintaining friendships, while being cautious with foes) (Nichols 2001). EP argues then that the research should be able to establish a causal connection between the political dynamic of \textit{hominin} social worlds and our capacity to predict the behaviour of others. According to this view, being able to read the intentional states of others’ has enabled human prosociality and intra-individual cooperation since we are better able to establish alliances, for example, and track the complexity of the political landscape. We cannot help but be prolific in our interpretations of others’ psychological states since we are a group living species, and these practices bear upon our inherent interest in the social actions of others within a cultural context also (hence gossip and norms governing social behaviour).

\textsuperscript{10}“Versions of false belief tests differ, but the most common one consists of a child observer watching someone (let’s call her Sally), putting a doll inside of a box. When Sally leaves the room, however, someone else (let’s call her Ann) enters and moves the doll from the box to the cupboard. When Sally re-enters the room the child observer is asked where they think Sally thinks the doll is. Children under the age of 4 usually answer that Sally \textit{thinks} the doll is where it was moved to last – the cupboard – while more mature children between the ages of 4-5 recognize that Sally thinks the doll is still in the box (excerpt taken from Murphy 2009; see Baron-Cohen et al 1985; Leslie 1987; Leslie and Frith 1988; Scholl and Leslie 1999; Baron-Cohen, et al 2000; Perner, Leekam, & Wimmer 1987).

\textsuperscript{11} This experiment has been conducted on mature autistics as well, who show similar dissociative behaviour as the children who are underdeveloped with ToM (Baron-Cohen et al 1985; Leslie and Frith 1988). The autistic cases reveal that despite normal intelligence in other domains, social intelligence or ToM abilities remained impaired.
In regards to folk biological intelligence, cognitive psychologists have argued that we employ intuitive inferences when making sense of biological categories – e.g. animals, plants etc - in our world (Berlin 1971, 1992; Atran 1993, 1998). It is suggested that all cultures are naturally inclined to classify and order taxonomic groups into analogous classes and hierarchies. Scott Atran (1998) argues that internal cognitive resources support this potential to be natural classifiers. Atran says that agents predictably structure their biological worlds into “taxonomies composed of essence-based, species-like groups and the ranking species into lower- and higher-order groups” (Atran 1998:547). He claims that this capacity to order our world into folk taxonomic categories is causally related to a specialised cognitive system for processing information about our ecology. This logical framework for classification is in part due to the capacity to recognise similarities and differences between species.12 Broad speciation ability is a product of mental perception governed by specific cognitive regularities that have evolved to allow for the tractable organisation of our environment.13 Since this capacity is innate, we should expect to find this structurally dependent mode of

12 There are four standard ways in which our cognitive systems make these inferences about biological properties in the world (Atran 1998:547-548): (1) People order plants and animals into species-like groups, which Atran calls generic-species. For instance, noticeable morphological similarities and differences allow for the ordering of different types of animal species into certain groups. Commonalities within generic species are therefore grouped as consistencies. (2) People infer an essence-based quality to these species. There is a basic assumption that there is an underlying causal linkage between a kind metaphysical essence and the outward appearance of a particular animal or plant. For example, we have the capacity track the maturing of a particular animal despite the differences in appearance from youth to adulthood. Atran gives the example of a being able to track morphological changes of a tadpole to a frog – we assume they are the same essence-based creature, despite their heterogeneous appearances. (3) People classify species hierarchically from general to specific groupings. Therefore we often class birds and fish as being in two broader categories, yet under these general categories we infer narrower types of classifications. Therefore a general order of classification maybe: birds – warblers - bush warblers. (4) This framework allows for individuals to make inductive inferences regarding the properties shared by certain species. For instance, Atran gives the example of diseases amongst bird species. If we can deduce that a particular disease is prevalent within a population of robins, we are therefore warranted in assuming that this disease may be contractible by other birds, than by other non-bird species.

13 Therefore, Atran argues that our natural history expertise is structure-dependent, in the similar way that language is, though unlike the Chomskian module that is considered to be innate and restrictive in its information flow (Samuels 2000:18). Atran argues that unlike input modules, which are similarly restrictive in the way in which information is processed, a folk biological system can be classified as a core module, with the ability to make “use of one another’s inputs and outputs, although each module favours the processing of a different predetermined range of stimuli” (Atran 1998:555).
inferences cross-culturally (and we do).\textsuperscript{14} In other words, the ubiquity in which we find the capacity for ordering our organic world into categories suggests a domain-specific area of our intelligence that has evolved as a functional quality of our cognitive architecture.

Another feature of our basic perceptual toolkit is our ability to make intuitive inferences about physical dynamics in our world. We have the capacity to distinguish physical causalities, and at a very young age we are able to detect cause-and-effect dynamics with physical properties in real time (Leslie and Keeble 1987). Infants also recognise the solidity of objects and perceive objects as rigid and spatially continuous (Spelke 1990).\textsuperscript{15} The case for a folk physics cognitive system is convincing if you consider the predictable development of this perceptual category. Renee Baillargeon (1994) and colleagues have shown that infants have an intuitive awareness of physical dynamics in the world (Baillargeon 1994; Baillargeon, Kotovsky & Needham, 1995), and in experiments that violate these intuitions, Baillargeon et al have found that children have intuitive expectations about physical causality, solidity and spatial awareness. Children intuitively recognise that you cannot breach physical constraints:

“For example, infants aged 2.5 to 3.5 months are aware that objects continue to exist when masked by other objects, that objects cannot remain stable without support, that objects move along spatially continuous paths, and that objects

\textsuperscript{14} It must be noted that folk physics, folk psychology and folk biology are considered to be core modules. Though information processing is constrained, core modules aren’t as encapsulated as input modules. See Samuels (2000) and Atran (1998) for discussion. In short, core modules are much more flexible and capable of sharing information across different domains.

\textsuperscript{15} Elizabeth Spelke argues that infants have a core knowledge system for physical principles (Spelke and Kinzler 2007). This core knowledge centres on the spatio-temporal principles of cohesion (objects move as connected and bounded wholes), continuity (objects move on connected, unobstructed paths), and contact (objects do not interact at a distance)” (Spelke et al 2007:89). Consider the ability to catch a ball in motion. The catcher has to quickly calculate their distance from the thrower, register the movement and trajectory of the projectile and position themselves at the calculated distance in order to receive it. If there is a wall in the way, the catcher is not surprised when the ball doesn’t reach her. However, if the ball continued along the same path despite the obstruction, this would be a natural violation of a physical expectation. Core knowledge of these physical dynamics is the foundation for such an activity. While Spelke is sceptical that there exists a single-purpose cognitive system for processing this kind information, others’ have argued that a domain-specific mechanism for folk physics exists for processing information unique to this domain (Sperber and Hirschfeld 2004, 2006; Duchaine, Cosmides and Tooby 2001; Boyer 1998; Baron-Cohen 2000).
cannot move through the space occupied by other objects” (Baillargeon 1994:133).

Daniel Povinelli et al (2000) have observed how human juveniles are better than non-human primates at solving problems within the physical domain since human primates have a broader capacity to make causal connections between physical dynamics and goal-oriented tasks. Tool-making abilities amongst humans are more purposeful due to our capacity to make causally relevant connections between the physical world, strategic inferences and technological innovation. This seems to suggest a cognitive system adapted to these causal processes. According to EP, the uniformity of development for these traits (i.e. folk psychology, folk biology and folk physics) suggests a massively modular mind comprised of content rich cognitive systems for adaptive specialization.\(^{16}\)

The next section will look specifically at how these psychological adaptations motivate and constrain the transmission of cultural representations. It has been argued that our cognitive systems are developmentally stable, while the communication and processing of cultural representations are regulated by inferential biases (Sperber 1996). These biases influence both the frequency and content of cultural representations. Subsequently, according to SiM, the reason why there is a general appearance of common cultural themes within religions may be due to primarily to the constraints and motivations of cognitive function. Folk (naïve or intuitive) capacities constitute what is called an intuitive ontology (see Boyer 1994b, 2001a, 2005), and later the social, biological and physical intelligences discussed above will have a significant bearing for the discussions on SiM research, and the cognitive optimality thesis.

\(^{16}\) Again, EP would argue that a folk physics system is a core module, however. Information from this system is available to other domains within the cognitive architecture.
1.4 Epidemiology of Representations.

Cognitive anthropologist Dan Sperber (1996) claims that these inborn cognitive constraints have special bearings on the distribution and frequency of cultural representations. So while these cognitive systems (i.e. folk psychology, folk biology and folk physics) function as innate heuristic devices, they also regulate and determine cultural patterns. Sperber’s naturalistic approach to anthropology has been significant for the cognitive science of religion, and other fields where naturalistic explanations for cultural phenomena have been the focus. Sperber is especially interested in why some cultural representations are more prevalent than others within societies. We may assume that some cultural traits have a specific utilitarian purpose; hence their proliferation is derived from their functional corollaries (e.g. the construction of early bifacial hand axes remained fairly stable due to their salient utility). The economic benefits of certain tools will be salient, and motivate the prevalence of intergenerational replication.

But this does not account for the frequency and content of all cultural traits, according to Sperber (1996). Even if a culturally ascribed behavioral trait is functional, that does not fully account for its transmission, as its functional value cannot explain how people are able to learn and pass on these skills. Sperber is interested in how skills and cultural representations are faithfully replicated. According to Sperber the frequency and content of cultural traits (or representations) are determined more by entrenched psychological features of our evolved cognitive architecture. Certain cultural representations remain fairly stable over time with some representations being more prominent than others’.
While most anthropologists would argue that this is a product of enculturation (i.e. cultural conditioning), Sperber is less convinced. For Sperber, the spread of cultural representations emerges from an interaction between cognitive (internal) and cultural (environmental) factors. Sperber’s stance on cultural transmission is inherently skeptical of a high-fidelity copying process. Unlike genes (which are viewed as replicating units of selection [Dawkins 1976]), cultural information is a form of low-fidelity transmission. Sperber argues, our cognitive machinery reconstructs the information inferentially from one mind to the next, and these inferences are subject to cognitive regularities.

Subsequently, Sperber claims that cultural transmission should be viewed as analogous to epidemiological patterns. Like any epidemiological model, certain infections are better understood through knowledge of host susceptibility. Indeed, Sperber is interested in how public (external) representations become mental representations (and vice versa). Subsequently, on Sperber’s view, cognitive constraints shape the large-scale diffusion of cultural representations within a population. This is not merely a copying process (from one mind to another), and Sperber does not think that public representations are accurately formed as mental representations. Instead, transmission processes are always subject to native cognitive biases, or inferential regularities, and the constraints on cognitive processing further determines our susceptibility to certain cultural representations.

Subsequently, the frequency, or spread, of cultural representations will depend upon the inferential stability of the information being transmitted. If our inferential engines cannot successfully generate a mental representation that is accurate enough, then that information may be lost or become distorted over time. Default cognitive biases sway the appeal, and comprehension of cultural representations.
For Sperber, there should be two separable, yet complimentary domains of interest for cognitive anthropology: the public, and the individual-mental:

“… we should distinguish two kinds of representations: internal, or mental representations – for example, memories, which are patterns in the brain and which represent something for the owner of that brain – and external, or public representations – for example, utterances, which are material phenomena in the environment of people and which represent something for people who perceive and interpret them” (Sperber 1996:78).

Sperber argues that more established forms of anthropological scholarship have oversold the significance of enculturation while ignoring the psychological constraints that operate on publicly represented data. The meaning-making profile of mentally representing public data exists through the interaction of internal and external modalities. Cognitive systems reconstruct representations of the outside world, and so the semantic properties of mental representations have a “‘meaning’ of their own” that are subject to fixed perceptual categories (Sperber 1996:80).

This claim is coherent when one recognizes that not all mental representations are the result of publicly represented data (e.g. such as personal thoughts, memories, planning, and imagination etc) (Sperber 1996:78-79). For instance, Sperber and Deirdre Wilson argue that human communication is based on a “degree of resemblance” between individuals (Sperber 1996:83; Sperber and Wilson 1986), and that cultural representations (public data) are transformed and reconstructed in the minds of others:

“A process of communication is basically one of transformation. The degree of transformation may vary between two extremes: duplication and total loss of information. Only those representations which are repeatedly communicated and

17 Sperber (1996) argues that most cognitive psychologists see mental representations as more basic. In other words, public representations cannot really be representations without the cognitive machinery to decode the information. Mental representations precede and therefore shape public representations. Whereas cultural anthropologists argue that public representations shape mental representations, hence external- cultural information – or public representations – shapes mental representations.
minimally transformed in the process will end up belonging to the culture” (Sperber 1996:83).

Sperber’s epidemiological model describes the frequency, accuracy, and content of cultural transmission as patterns that correspond with psychological regularities. Some cultural representations may be more prevalent than others within a population - and therefore similar across all minds – but determined more by the innate representational abilities of individuals. Greater exposure to certain types of representations means that the fidelity of information transmission is higher. Similarly, even though Sperber argues that accurate replication is not a factor in cultural transmission, the fidelity of information being transmitted will depend upon a transformation process (i.e. the inferences made by minds when interpreting public representations). So while exposure is important, inferential biases will play a crucial role in the frequency (i.e. prevalence) of a particular representation.

The constraints and uniformity of expression generated by cognitive systems also suggests an evolutionary story. According to Sperber: a “cognitive module is an evolved mechanism with a distinct phylogenetic history” (Sperber 1996:123-124). The proper domain of a particular module constitutes the environmental conditions under which it was selected (and the functional purpose of the modules suggest an evolutionary explanation), while the actual domain describes the operationally relevant environment in which the module functions (i.e. a contemporary environment).

Modules have been explained by EP to have a functional purpose, and are normally recruited in their actual domain, despite being adapted to an ancestral environment (see Sperber 1996: 134-138). Sperber argues, then, that there are mismatches with actual and proper domains. Apart from proper modules being recruited for other tasks, Sperber claims
that certain modules can be ‘excited’ by conditions that exploit proper domains. For instance, facial recognition modules are excited by the aesthetic exaggeration of physical features in artistic representations (e.g. abstract paintings of faces) (see Sperber and Hirschfeld 2004). The actual domain registers this as ‘superstimuli’, and facial pattern stimuli excite cognitive systems for facial recognition within actual domains (Sperber et al 2004).

First, Sperber argues that our native cognitive systems regulate the stability and frequency of cultural representations, which ensures that we have a natural cognitive bias to particular cultural themes over others. This ‘susceptibility’ may be due to the memorability or learnability of cultural representations that our cognitive systems are better adapted to register. Second, modules maybe aroused or excited by particular stimuli when they are recruited in actual processing domains. Some cultural representations may stimulate cognitive systems in the actual domain when confronted with cues that excite these systems. Cultural properties, such as the supernatural or artistic representations, stimulate perceptual categories when they are violations of registering natural categories. This model predicts that when intuitive domains are contravened by cultural concepts it motivates memory and transmission (see Boyer 2001a; 2001b). Because our mind-brain is naturally biased towards certain information in the world, Sperber argues that you can predict the regularity of cultural representations based on what we know about the operational constraints of native cognitive systems.

18 A good analogy for this ‘attractiveness’ to certain cultural representations over others’ is our natural predilection for sugars. Our taste buds are attracted to certain flavours since our bodies are commonly adapted to seek out high-carbohydrate food sources, due to scarcity. In an environment where there is an abundance of food, this overactive allure becomes indulgence (leading to diabetes, heart disease and other pathologies). It is argued that the same is true for certain cognitive systems – we are psychologically adapted to track certain features of our environment, so we are genetically primed to pay attention to certain cultural representations.
1.5 The Standard Cognitive Model of Religious Cognition.

Against the background on EP and cognitive psychology, this section will provide a brief overview of the explanatory models provided by the cognitive science of religion (CSR) and religious-cultural transmission. Like Sperber (1996), research methods within the cognitive science of religion (CSR) have typically focused on the recurrent themes and patterns associated with religiosity by identifying the perennial or universal cognitive themes that underlie beliefs and practices. These universals – or stable patterns of religiosity - suggest that our cognitive machinery has a deeply entrenched role to play in how we process religious information.

For instance, the received view within the CSR – what I call the Standard Internal Model (SiM) - argues that religion is not only a universal feature of human behavior, but that there are certain universal traits within religions that are common and classifiable cross-culturally (see Boyer 2001b; Whitehouse 2004; Jensen 2009). The received view has been that religious information is governed by our secular brain: the same cognitive machinery that deals with the more functional characteristics of everyday informational processing is also recruited in the processing of religious information. The non-religious brain generates religious beliefs and practices.

Nevertheless, SiM recognizes that content rich features of our cognitive architecture shape the processing religious representations – both the representational constraints and motivations, and the uniformity of cultural distribution. Religious behavior is therefore seen as a by-product of innately bound cognitive systems - systems that have evolved to function in other domains (i.e. proper domains). On SiM view, the cognitive profile for religiosity is
not specialized (i.e. there is no specialized modular system for being religious). Nevertheless our cognitive architecture has a variety of functional systems that are naturally susceptible to religious concepts (Boyer 1994b, 2001; Boyer and Ramble 2001; Barrett 1998; Barrett and Keil 1996; McCauley 2000). Our ability to process religious concepts will therefore depend on the kind of information being transmitted, and SiM recognizes a salient correspondence between the frequency and content of representations common in all religions.

As a disclaimer, a lot of what we learn is context-dependent. Or example, our prejudices are product of our cultural upbringing. The cultural knowledge we acquire is normally associated with developmental conditioning, and the currency information that is functionally relevant is locally contingent. The same is true for our religious education. We develop our theological beliefs and habits within a cultural milieu that reinforces certain norms and attitudes. Due to the conditional relationship between regional influence and religious behavior, practices appear to vary greatly in their expression, and the ethnographic literature on religious activity emphasizes this cross-cultural divergence.

However, the epidemiological model proposed by Sperber above proposes that despite these variations, there are universal themes within religions across cultures (see Sperber 1996). Native cognitive constraints establish recognizable historical trends towards certain representations over others. Despite religions’ apparent diversity, there are analogous characteristics cross-culturally that have an innate psychological underpinning.

Some of the research undertaken within the CSR elaborates on these similarities of religious expression by looking at the regularities of cognitive systems and how they govern cultural transmission. Stable features of our cognitive architecture subsequently determine the
shape and frequency of religious representations. For instance, SiM is mainly interested in the frequency and content of religious representations and how fixed features of our cognition determine religious expression.

Similar to Sperber’s thesis on the epidemiological model, SiM contends that the innate cognitive systems are stabilizing mechanisms that generate predictable religious patterns. SiM researchers argue that: a) religious knowledge is computationally undemanding, ensuring its coherency (religious representations are simple enough to process), while being b) motivationally salient, or exciting enough to stimulate individuals to remember and pass on the representations to others. These two qualities ensure the ‘learnability’ of religious information and its ease of transmission. The first condition ‘(a)’ assumes that religious knowledge is computationally tractable and therefore optimal to our native cognition (more on this below in the following sections). The second condition ‘(b)’ suggests that the salience of religious representations excites native psychological mechanisms (see Sperber 1996).

Justin Barrett (2007) sums up two “theoretical commitments” that the SiM is motivated by: the concept of theological correctness (TC) and the theory of minimal counterintuitiveness (MCI) in relation cultural transmission [more on these terms below] (Barrett 2007:769). Both of these theoretical commitments underpin the SiM and the optimality of religious transmission. Explicit religious representations – the theological concepts we can describe - inform the theologically correct position any one person may have in regards to their beliefs and practices (Barrett 1999). So, for example, a worshipper maybe able to rationally express a committed belief to a religious idea, such as the Holy Trinity, while implicit representations (i.e. any subconscious processing of conceptual structures) can often depart significantly from the theologically correct position by adhering to natural
categories (instead of supernatural descriptions). There is a kind of syntactical regularity to the way in which certain representations are mentally inferred, while the semantic content of a belief may diverge significantly from the online representation that correspond to conventional (folk-intuitive) structures. Predetermined cognitive rules, SiM claims, shape the uniformity of religious expression.

An example of ‘theological incorrectness’ (and the difference between implicit and explicit beliefs) has been outlined in experiments by Justin Barrett and Frank C. Keil (Barrett and Keil 1996; see also Barrett 1998): they argue that there is evidence to support the claim that people intuitively process information about supernatural concepts differently online, to the offline explicit versions of the ‘theologically correct’ representation. When participants in the experiments were asked about the qualities attributed to ‘God’, most respondents expressed their belief in an omniscient being. They were clear about the distinction between normal-everyday persons and the ‘super’ normal qualities associated with the God in question. In other words, they explicitly recognized the difference between natural and non-natural (or supernatural) qualities in their questionnaire.

However, when presented with a short narrative in which a God plays an intervening role, responses to the narrative seemed to suggest that individuals processed God concepts as a normal agent, with a fixed temporal location. A typical narrative used in the experiments went like this:

“A boy was swimming alone in a swift and rocky river. The boy got his left leg caught between two large, gray rocks and couldn’t get out. Branches of trees kept bumping into him as they hurried past. He thought he was going to drown and so he began to struggle and pray. Though God was answering another prayer in another part of the world when the boy started praying, before long God responded by
participants in the experiment often expressed no discontinuity between the logical order of God’s actions and his omniscience. However, if God were indeed omnipotent then he would be capable of attending to two prayers at once. Barrett and Keil (1996), therefore, argue that despite our capacity to explicitly articulate the supernatural description of a god, we nevertheless fall back upon processing constraints that generate inferences about natural categories. There is a cognitive bias to how we represent religious representations, and supernatural beings are not afforded any special ontological status when processed on an intuitive level.

When we make the distinction between explicit and implicit beliefs, D. Jason Slone (2004) argues that TC beliefs are explicit and communicated through offline cognitive processes, while the mental representations that conform to specific processing constraints (the theologically incorrect concepts) are processed online (through stable internal representational systems). Barrett and Keil argue, then, that individuals may express theologically correct beliefs offline, while conforming to intuitive representations online. Offline conceptual reasoning may include ideas about a god’s omniscience. However, these concepts become computationally demanding when specific cues prompt an intuitive response from participants in the experiment. While offline reasoning is considered to be much more reflective - and slower as a result – online reasoning is faster and biased towards predictable responses.\(^{19}\)

\(^{19}\) It is argued then that online reasoning pertains to the range of domain specific cognitive systems that are innately bound and automatic. Concepts of a god as a person or anthropomorphic entity may have something to do with a psychological mechanism for social interactions (Boyer 1998, 2001a, 2001b) or for detecting agency
This natural pull towards processing information is articulated further in the next section on the cognitive optimality of religious representations. Sperber’s epidemiological model (Sperber 1996), and the section on native ontologies (i.e. folk psychology, folk biology, and folk physics) will be relevant as the discussion turns to how fixed features of our cognitive architecture determine the cultural spread of religious representations. As outlined by the profile of theological correctness, the cognitive optimality thesis shows that the cognitive constraints on information processing establish certain defaults for the expression of religious representations. Pascal Boyer (1994) argues below that religious representations conform to certain cognitive rules, and that these rules shape how we process religious information.

1.5.1 Boyer’s Cognitive Optimum.

According to the epidemiological model of cultural transmission we can establish causal explanations for why and how religions look the way that they do based on what we know about our representational machinery. Pascal Boyer (1994a, 1994b, 2001) utilizes Sperber’s epidemiological model to describe how innate cognitive biases influence the frequency and content religious representations. Boyer’s view of cultural-religious transmission is appealing to the scholarship on the psychology of religion since he observes the related features underlying all religious systems, and these comparable traits are causally related to innate psychological biases.

(Guthrie 1995). Stewart Guthrie (1995) for instance argues that our cognitive systems are over-active in the domain for agency detection. Cognitive adaptations for detecting agency were probably helpful during the EEA (environment of evolutionary adaptedness) as a strategy for responding to false-positives in the wild. Put simply, it is better to assume threats in nature, than to be inattentive to hazardous cues. Guthrie argues then that humans overemphasize agency in nature as a default inference because it is safer to do so. Hence our overactive tendency to perceive agency, also enters into the production supernatural representations.
Boyer argues that we possess innate cognitive traits that govern inferential biases when tracking cultural information. The adaptive utility of our folk intelligence (see above) is salient, especially since we can establish: a) the relationship between development and cognitive proficiency; and b) causally related evolutionary explanations for their function.

The above section on ‘intuitive ontologies’ discussed the innate competencies that are relevant to Boyer’s work on religious activity (i.e. folk psychology, folk biology, folk physics). Boyer claims that religious behaviour is not an adaptive trait. However, certain evolved cognitive functions – like our folk intelligences – ensures our susceptibility to religious beliefs and practices since they are prone to stimulus from certain cultural inputs. Put simply, Boyer argues that our innate perceptual categories also make us susceptible to religious concepts, since certain violating cultural concepts – like supernatural concepts - motivate these systems. Religious concepts contravene natural categories, and are therefore stimulate our ontological algorithms.

Let us consider how religious representations are counterintuitive on this view. First, Boyer argues that religious representations violate our intuitions about the social world. For instance, Boyer argues that many supernatural agents – such as omniscient gods - appear to be “Full Access Strategic Agents”, in that they are perceived to be present in the social lives of religious adherents (Boyer 2001: 137-202). The gods can monitor sinful actions and wield punishments, for example. They are supernaturally accessible agents in a socially bound sense, since they oversee social norms and the behaviour of individuals. Psychic powers, for example, violate our natural intuitions about social interactions. Second, religious representations run counter to biological intuitions:
supernatural qualities often violate our expectations of the natural history domain. For example, the gods are immortal, some deities heal the sick, and the ancestors inhabit an afterlife. Third, religious representations run counter to our intuitions about the physical world. Supernatural entities often defy the laws of physics and are attractive to our cognition because they can, for example, be omniscient or walk through solid objects.

However, while supernatural representations are counterintuitive, and especially appealing to our innate perceptual categories, there is a threshold of processing comprehension when managing counterintuitive information. Boyer argues, then, that religious representations are minimally counterintuitive to the extent that they are attractive, yet cognitively tractable since they are still anchored to some natural categories. A minimally counterintuitive (MCI) concept conforms to both a violation of expectations – i.e. the supernatural - while adhering to a natural ontology, and this establishes its coherency with real-world phenomena (Boyer and Ramble 2001). For example, ghosts may be counterintuitive in the sense that they can walk through walls, and are animated after death (they violate both physical and biological categories), yet they still conform to an agency profile - they have people properties (non-violated assumptions).

Boyer argues that this is why gods have balanced anthropomorphic and supernatural qualities across cultures. The gods are often immortal, human-like beings that can read minds, while possessing super-normal powers within the physical world. Supernatural representations, according to Boyer, conform to natural categories with an arousing costume. This recipe of balanced properties within religious representation ensures the similarity of expression cross-culturally.
According to Boyer, MCI concepts are constituted by: (1) minor *breaches* of intuitive knowledge, and/or (2) the *transfer* of intuitive domains. For example, supernatural entities may breach knowledge domains by being immortal, while also being conceived as human-like agents. Ghosts, for example, are people yet they breach the intuitive domain of physics by being able to walk through walls. Breaches straddle both natural and non-natural domains that make them both salient to memory and computationally tractable.

Transfers, however, are defined by a conversion of intuitive ontologies into a blended concept. This is why, Boyer argues, sacred artefacts possess intentional qualities (and intentions are analogous to human psychological qualities), but they remain a physical property also. Subsequently, there is a transfer of secondary ontological qualities with the real-world natural property. Being a physical property provides the material anchor for comprehension, while the perception of the object’s magical qualities motivate belief.

Both of these conditions suggest a cross-cultural template for religious representations, and Boyer and Ramble (2001) has performed experiments involving stories containing counterintuitive concepts that have been observed as more memorable by their subjects. From these experiments, Boyer and Ramble developed a model that predicts the basic memorability of supernatural representations. For Boyer and Ramble, the parameters associated with this model suggest a universal template in supernatural concepts (Boyer and Ramble 2001:537):
[1] A pointer to a particular domain or concept
[2] An explicit representation of a violation of intuitive expectations either:
  [2a] *A breach of relevant expectations for the category, or*
  [2b] *A transfer of expectations associated with another category;*

As shown above: [1] could be a pointer to an agent-like entity, such as a ghost. Or [1] could be a pointer to a sacred object like a magic wand. But the pointer is further conditioned by the violation of intuitive expectations [2], while the representation is further linked to a non-violated expectation [3]. For example: God [1] is immortal [2a] and listens to your prayers [3]; and the sacred stone [1] will grant you luck [2b] if you carry it close to your chest [3]. The ‘God’ example demonstrates the breach of an intuitive category – the God is immortal and violates assumptions about biological categories. The ‘sacred stone’ has intentional qualities, in that it takes an interest in another’s wellbeing – it grants luck - while still conforming to the properties associated with a physical object.

However, Boyer and Ramble go onto say that cultural concepts are more specific than the templates for supernatural representations. Further, in order to explain the variables that ensure cross-cultural diversity in religious concepts, they say that contextual or culturally specific information adorn the templates and establishes a more culturally coherent version of the supernatural representation. Hence there is further:

[4] a slot for additional encyclopedic information;
Contextual information such as [4] ‘the ancestors inhabit artifacts’ (which is valid in some, but not all religions) is further contextualized through the [5] name of the concept. Boyer and Ramble argue that this explains why religions appear to be so diverse, despite these culturally specific religious concepts adhering recurrent themes. [4] and [5] are merely surface features of a representation (associated with offline processing [Barrett 2007])

These universal qualities underpinning religious representations suggest that the transmission of religious representations is consistent with a cognitive optimum. This is largely due to the claim that religious representations are attractive yet computationally undemanding for our cognitive systems. They are optimal precisely because they meet the criteria for MCI concepts:

“In this framework, a religious idea would be described as cognitive & optimal if (i) it contains an explicit violation of commonsense thinking and (ii) it makes implicit use of the intuitive principles of commonsense knowledge” (Boyer 1992:45).

Elaborating on the concept of cognitive optimality, Robert McCauley (2000) has made a similar claim by stating that religious beliefs provide an explanatory model of the world that is coherent with our perceptual biases. McCauley contrasts scientific explanations with religious explanations by claiming that our naked brains are more suited for believing in supernatural explanations, while in contrast our intuitive cognitive systems become more encumbered with scientific explanations for natural phenomena. Our default processing, then, is to be biased towards information that is computationally less demanding. The logical conclusion – based on the prevalence of religious explanations for natural phenomena within cultures - is that the intellectual bias towards supernatural causality is the standard cognitive default in the absence of scientific explanatory accounts.
Here, McCauley compares our tendency to be religious with that of our language learning ability, since both appear to be developmentally predictable features of our cognitive architecture.

“Like natural language, religion exploits cognitive dispositions, which seem to arise early in human development. Because so many pivotal religious conceptions have so little theoretical depth, possessing everyday concepts prepares people for the acquisition of religion in a way that does not prepare them for the acquisition of science” (McCauley 2000:80).

McCauley demonstrates this by comparing the technological and theoretical complexity of the scientific tradition with religious traditions. On this view, scientific explanations are framed as maximally counterintuitive due to their computational demands.

Both Boyer and McCauley would agree, then, that religion is far more successful and culturally ubiquitous because of its cognitively optimal qualities.\(^{20}\) The cognitive optimality thesis contends that we can explain the frequency and spread of religious representations by way of our inferential biases that constrain our conceptual reasoning. SiM predicts that religious traditions are thematically consistent within religions cross-culturally, due to the motivationally salient structure of religious representations.

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\(^{20}\) As stated, intuitive ontology “provides a basic structure for concepts” (Barrett 1998:610). These basic structures, or intuitions, enable inferences about things in the world. Boyer calls these basic structures “causal schemata” (Boyer 1994a; cited from Barrett 1998). For instance, we automatically assume from our intuitive inferences that a goat is a living thing (i.e. our intuitive or folk biology). Yet there are non-schematic features specific to the species that are learned, such as the goat can climb steep inclines. Religious representations are constituted by non-schematic properties that violate expectations. These are only minimal violations of these causal schemas however. MCI concepts are more prevalent within cultures because they include both intuitive and counterintuitive properties that ensure their memorability. The popularity of religious concepts cross-culturally is explained but by a natural attraction alone, but additionally by our ability to process this information without a degree of effort.
1.6 Whitehouse and the Ritual Modes Theory.

Unlike SiM, I argue that the transmission of religious information is more cognitively demanding and cultural systems vary in their approach to the methods employed in the transmission of sacred knowledge. Similarly, cognitive anthropologist and ethnographer Harvey Whitehouse (2004) has proposed model that potentially facilitates a more comprehensive description of the environmental and the psychological relationship that shapes religious activity. Whitehouse has previously criticized the cognitive optimality thesis and SiM for its over-simplified explanations for religious behavior (Whitehouse 2004, 2008). He is more concerned that the received views within the CSR do not take into account the costs of transmission (i.e. the investment in ritual), and the environmental conditions that are deeply interconnected with religious behavior.  

For instance, the cognitive optimality thesis assumes that religious transmission involves reduced computational demands, while other institutionalized bodies of knowledge – like science – encompass more structured methods of learning (McCauley 2000). This view suggests that since we are all naturally attracted to supernatural ideas, and that a religious education is fairly cheap, (Barrett 2000; McCauley 2000).

Whitehouse (2004) argues that this conception of religious transmission falls short of explaining what he sees in his own ethnographic research and other first-hand literature on religious traditions. First, religion is not easy. Beliefs and practices are often psychologically and physically demanding, with many rituals involving a high level of physical and mental determination on the part of the adherent (e.g. fasting, tattooing, abstinence, prayer and

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21 I have called these ‘Standard Internal Model’ [SiM] definitions of religious behaviour.
meditation etc). In addition, complex cosmogony and theology is often difficult to learn (e.g. the memorization of a religious corpus). There are costs to engaging in religious activity at various levels, and this suggests that transmission is far from optimal (see also Bulbulia 2004, 2009).

*Second,* religious cultures are comprised of socio-political systems constituted by norms and customs. These systems are often comprised of social inequalities and hierarchies – with religious norms determining the distribution of wealth and gender divisions (Whitehouse 2004, 2008). Whitehouse would argue then that the cognitive optimality thesis fails to capture the perpetuation of these social complexities within religious systems:

“Explaining religion it is not a matter of accounting for a single trait; it involves explaining a very complex and interconnected repertoire of patterns of thinking and behavior” (Whitehouse 2008:35).

The complexity and variation of religious systems are sensitive to regional conditions, according to Whitehouse. Diversity is relatively coherent with the environmental contingencies of a cultural niche. For example, marriage customs are a part of deeply entrenched social norms, and appear to be recurrent form of ritual across all cultures. However, the rituals within these customs display subtle variations in their expression (despite their apparent similarities). Likewise, socio-political arrangements are structurally similar but vary within religious systems, while social ranking is often associated with the conventional norms of a religious system (e.g. hierarchies, kingships, and priest classes).

Whitehouse argues that the dynamic between environments and ritual are not sufficiently framed by the cognitive optimality thesis. Whitehouse knows that the social and ecological conditions within cultures are diverse and these determine the *modes* of religious ritual. This ethnographic diversity is key to Whitehouse’s argument, and he maintains that the cognitive
optimality thesis is unsuccessful in explaining the relationship between ritual and socio-ecological conditions across cultures (see Whitehouse 2004: Chapter 3, 2008):

“A major limitation with CSR research has been its somewhat narrow emphasis on the issue of how universal cognitive biases shape and constrain patterns of religious transmission. Although that is clearly a valuable starting point, it only helps to explain variations on a theme. That is, it may help us to explain why certain features of religious thinking and behavior are especially widespread and may even help us to explain why some aspects of the universal repertoire are more heavily emphasized in one place rather than another... But religious traditions are much more than just the sum of various universal themes. Some religions involve highly elaborated and distinctive cosmologies, for example. Others incorporate extensive ethical systems that run against the grain of intuitive moral reasoning” (Whitehouse 2008:41; emphasis added).

Again, Whitehouse is concerned that the CSR has characterized ‘religion’ as being comprised of universally identifiable traits. However, religions are diverse and often run counter to any kind of optimal behavioral patterns.

Matthew Day (2004a; 2004b; 2005; 2009) has made similar criticisms towards SiM as Whitehouse. However, in many ways, Day has dismissed the cognitivist approach to the study of religion as a methodological failure while subsequently critiquing the CSR for overlooking the external features of religiosity, while overselling internal regularities (i.e. domain specific cognitive systems) as the primary causal explanation for religious transmission:

“The research program thus far has tended to treat the broad spectrum of rituals, music, relics, scriptures, ceremonies, and physical representations typically associated with religious traditions as features that are more or less irrelevant for a biologically fixed human cognitive system” (Day 2009:721).

According to both Whitehouse and Day, the external socio-cultural environment should be factored into a cognitive model of the religious mind. Whitehouse states, however, that the purpose of the CSR is not to provide an overarching explanation for religious activity, but instead to “fractionate religion into numerous different traits, each of which must be
explained on its own account” (Whitehouse 2008:35). The CSR – especially SiM – has previously argued that it can explain the recurrent and universal features of religious systems. However, Whitehouse claims that while we find consistent features within cultures (that may indeed be related to internal cognitive constraints), we are also obliged to account for cultural variation and the subtle patterns inherent within a niche environment:

“Valuable as the contributions of the CSR have been, it should be acknowledged that they constitute only a modest starting point in explaining religion. For the field to mature it must expand its horizons to take into account the role of ecological variables in processes of religious evolution” (Whitehouse 2008:35; emphasis added).

The ecological variables that Whitehouse highlights are of interest to this thesis since religious systems are regionally diverse. Whitehouse is convinced that the expression of religious beliefs and practices are dependent upon are locally contingent factors in addition to cognitive constraints. For example, socio-ecological features, such as demographic conditions are causally relevant factors that shape the expression of religious activity since population size can influence social structures and the way in which ritual is organized. Subsequently, Whitehouse suggests that: “there is much more to explain about religion than a set of statistically recurrent features” (Whitehouse 2008:37). In other words, ecological variables count towards a cognitive explanation for religious activity just as much as internal psychological traits can.

However, despite this skepticism towards SiM, Whitehouse argues that cultural transmission is constrained by internal cognitive processes (see Sperber 1996; Boyer 1998, 2001). He also claims that it is shortsighted to assume that there is going to be a predictable uniformity of expression within religious systems. Indeed, ethnographic diversity suggests that it is hard to infer a narrow set of properties associated with any one pattern of religious behavior:
“Epidemiological approaches to the study of cognition and culture have tended to assume that invariable features of cognitive processing make some religious representations inherently more likely to be remembered than others, and thus more likely to become culturally widespread. The frequency hypothesis, however, suggests that what makes something memorable is *always* a combination of cognitive capacities and socially regulated transmissive cycles.” (Whitehouse 2001:179).

According to Whitehouse, SiM overemphasizes the internal cognitive constraints that regulate religious representations. While there are indeed minimally counterintuitive concepts present in religions (e.g. agents with supernatural qualities), cultures also value and are deeply committed to concepts that are more complex and thus *maximally* counterintuitive (Whitehouse 2004). For instance, I will argue that the volume of sacred knowledge necessitates specific tools and strategies in order to support the fidelity of transmission. Oral cultures lean on culturally evolved tools and strategies to support the means for transmission. This includes both structured pedagogy (i.e. niche environments for learning), and artificial memory (i.e. mnemonic devices).

These methods for augmenting the fidelity of transmission suggests that a mythic corpus can be computationally complex and demanding – to transmit and preserve – and so SiM’s cognitive optimality thesis falls short of accounting for informational complexity. In light of this complexity Whitehouse proposes that both memory constraints and the transmissive frequency of cultural practices are more causally relevant in the transmission of religious representations than domain specific cognitive engines:

“Religion, like any cultural domain, is a distributed phenomenon. That is to say, it consists not merely of the thoughts and feelings of an individual devotee, but of the recognizably similar or complementary thoughts and feelings of a population of religious adherents” (Whitehouse 2001:169).

The presence of religious knowledge will depend upon psychological features as well as the activities associated with the social distribution of information. However, Whitehouse is careful not to discount the causal relevancy of domain-specific cognitive engines in his own
model of religious transmission. Though he still regards domain-specific mechanisms as being important to the causal qualities of intuitive religious representations (i.e. such as MCI representations), he also suggests that researchers should take into account the computational burden in the transmission of knowledge intensive religious beliefs and practices. I argue that Whitehouse’s modes theory is compatible with the cognitive ecological models discussed below (in Chapters 4 and 5) since the modes theory recognizes the constraints of memory, and how cultural environments are both an intervening factor on religious activity and constitute supportive properties in its transmission.

Whitehouse argues that certain rituals exploit *semantic* and *episodic* memory systems for the purpose of transmission (Whitehouse 2004). Semantic memory systems are part of our declarative memory and are generally considered to be supportive of implicit conceptual knowledge. For example, the recognition of a common animal – like a horse – is part of semantic memory. The same is true, for general knowledge about religious beliefs and practices, which is stored in semantic memory systems and shapes our implicit understanding of the sacred, according to Whitehouse. While, episodic memory systems are closer associated with autobiographical memory and memories of specific (often emotionally salient events) in our lives. Within a religious context, the emotional – sometime traumatic - rituals often ensure the salience, and conscious recollection of the events and experiences. For example, a wedding ceremony is structured in a way to ensure some emotional resonance the participators. The ritual is designed to be a spectacle of emotional significance, and episodic memory systems support the recollection and structuring of these autobiographical events.

Edward Tulving (1972) first made this distinction between semantic and episodic memory by conceiving the two information processing systems as: 1) information retrieval
mechanisms 2) informational retention systems 3) information transmission systems, but with
differing conditions on: “(a) the nature of stored information, (b) autobiographical versus
cognitive reference, (c) conditions and consequences of retrieval... (d) their vulnerability to
interference resulting in transformation and erasure of stored information, and (e) their
dependence upon each other” (Tulving 1972:385). For clarification Tulving states here:

“Episodic memory receives and stores information about temporally dated episodes or events, and temporal-spatial relations among these events. A perceptual event can be stored in the episodic system solely in terms of its perceptible properties or attributes, and it is always stored in terms of autobiographical reference to the already existing contents of the episodic memory store... The system is probably quite susceptible to transformation and loss of information... Semantic memory is necessary for the use of language. It is a mental thesaurus, organized knowledge a person possesses about words and other verbal symbols, their meaning and referents, about relations among them, and about rules, formulas, and algorithms for the manipulation of these symbols, concepts and relations. Semantic memory does not register perceptible properties of inputs, but rather cognitive referents of input signals... The semantic system is probably much less susceptible to involuntary transformation and loss of information that the episodic system” (Tulving 1972: 385-386).

Again, Tulving argues that episodic systems store information about specific autobiographical incidents and events. The explicit details of an experience is often stored in episodic memory and can also be related specifically the sensual characteristics of the ritual (e.g. the feelings, moods, and physical sensations of the ritual).

On the other hand, Tulving states that semantic memory stores structurally implicit knowledge inputted over the course of an individual’s epistemic development. This constitutes implicit knowledge about the world that is not necessarily relatable to specific experiences, but does inform our conceptual attitudes. Whitehouse states that semantic systems are critical for the cultural transmission of doctrinal religious knowledge. Semantic memory enables our capacity to recall and conceptualize the more general features of theological knowledge.
Whitehouse argues that religions overcome the problem of memory limitations, and the transmission of complex religious knowledge, by establishing ritual modes that exploit these two memory systems. Whitehouse has observed, in his own ethnographic fieldwork, that religious rituals generally conform to two types of modes: doctrinal and imagistic modes (Whitehouse 2004). These two modes function to embed certain experiences and memories into both semantic and episodic systems. *Doctrinal modes*, Whitehouse explains, are usually comprised of high frequency, regular forms of ritual that elicit low simulative effects. Doctrinal modes are subsequently routine and expected to be performed regularly enough – over time – to entrench a mental template. An example of this is maybe liturgical routines or social practices that adhere to particular everyday cultural norms (e.g. such as food taboos). Doctrinal rituals are not intended to produce strong emotional responses in the practitioner, and because they are practiced regularly become embedded in our semantic memory systems. Theological concepts are commonly derived from semantic memory systems.

On a socio-political level, doctrinal modes are normally found in large-scale societies with well-established, complex political and economic institutions. Doctrinal rituals are more frequent when informational resources are widely distributed within a larger population. For example, social patterns are more manageable through the use of socio-political hierarchies as populations become larger and more diffuse. The methods for managing populations through top-down methods of organization emerge from the demographic pressures which in turn influence the shape of religious patterns. Doctrinal ritual modes establish entrenched customs and norms that are the result of regular ritual patterns.
*Imagistic modes* on the other hand are low frequency rituals (i.e. irregular) that are performed specifically to prompt high arousal responses from the practitioner. These rituals are performed less-often and exploit episodic memory systems through the use of methods that illicit a strong emotional impact (e.g. tattooing, initiation rituals, trances etc). These may involve physically painful or psychologically shocking practices so as to leave an indelible mark upon the individual’s memory.

At a socio-political level, Whitehouse argues that the use of imagistic rituals is normally more prevalent within small-scale societies. Small-scale communities lack the resources available for a highly politicized social structure, and so imagistic rituals play a role in reinforcing social cohesion, while eliciting strong emotional responses from individual practitioners. There are no requirements for entrenched political institutions within smaller scale social arrangements, while information is easily distributed within the population. Small communities depend upon these high-arousal rituals for religious transmission due to the lack of large-scale institutional practices.

Whitehouse argues that both the imagistic modes and doctrinal modes will not be found exclusively in any one social structure. Instead you often find that religious systems utilize *both* ritual modes to varying degrees. But Whitehouse predicts that socio-ecological conditions will determine the common frequency of one ritual mode over the other. Therefore socio-ecological constraints in any one culture will influence the more conventional use of either doctrinal or imagistic modes. Social complexity, found in larger scale communities, will often generate rituals that lean towards the doctrinal mode, whereas more socially transparent (i.e. smaller populations) communities will typically employ of imagistic modes of ritual.
Whitehouse’s model is appealing its non-conformity for a definition or causal explanation for religiosity. It is moderate in its explanatory account. Whitehouse views the content of ritual is not the focus of examination, but the structure of rituals, and their relationship with other features of the socio-ecology. Subsequently, Whitehouse’s modes theory takes into account the context for religious practices, and his model is sensitive to the informational qualities that are unique to any one cultural milieu. Fig. 1 shows these conditions and their relationship to the differing ritual modes:

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>DOCTRINAL</th>
<th>IMAGISTIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Transmissive frequency</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>2. Level of arousal</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>3. Principal memory system</td>
<td>Semantic schemas &amp; implicit scripts</td>
<td>Episodic/ flashbulb memory</td>
</tr>
<tr>
<td>4. Ritual meaning</td>
<td>Learned/acquired</td>
<td>Internally generated</td>
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<tr>
<td>5. Techniques of revelation</td>
<td>Rhetoric, logical integration, narrativity</td>
<td>Iconicity, multivocality/ multivalence</td>
</tr>
<tr>
<td>6. Social cohesion</td>
<td>Diffuse</td>
<td>Intense</td>
</tr>
<tr>
<td>7. Leadership</td>
<td>Dynamic</td>
<td>Passive/absent</td>
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<td>8. Inclusivity/exclusivity</td>
<td>Inclusive</td>
<td>Exclusive</td>
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<tr>
<td>9. Spread</td>
<td>Rapid, efficient</td>
<td>Slow, inefficient</td>
</tr>
<tr>
<td>10. Scale</td>
<td>Large-scale</td>
<td>Small-scale</td>
</tr>
<tr>
<td>11. Degree of uniformity</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>12. Structure</td>
<td>Centralized</td>
<td>Non-centralized</td>
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Fig. 1 shows the variety of predictions that the modes theory makes about the dynamics of both doctrinal and imagistic modes. It pertinent to note here that Whitehouse does not discount the cognitive optimality thesis, however, the more cognitively optimal representations fall in the imagistic category (listed above). Rituals like these are
associated with the more intuitive cognitive biases, while doctrinal modes necessitate more structured methods of learning. As a result, Whitehouse urges that any cognitive account for religion should consider the more challenging (i.e. costly) aspects of religious transmission:

“Religious systems, as such, are not particularly catchy and, indeed, are often extremely difficult to acquire... Thus, although religion has recurrent and intuitive features it also encompasses ideas that are extremely hard to learn and pass on. And it is in the complex balance between these two sets of features that we must look if we want to understand the evolution of religious systems” (Whitehouse 2008:41)

Doctrinal features of a religious system may include the learning of complex theological knowledge or cosmological systems through various means (i.e. such as text or ritual repetition). Due to the complexity of these informational sources the demands for the transmission of doctrine is high (and not cognitively optimal). Whitehouse argues then that cultures have developed the means and methods for transmitting conceptually rich bodies of religious knowledge through ritual. He states that while intuitive representational systems are applicable to the transmission of religious concepts with low demands on working memory, cultures develop cultural technologies for supporting the transmission of computationally heavy religious concepts through doctrinal methods such as rehearsal and repetition (Whitehouse 2008).

Whitehouse’s own ethnographic research reflects this tendency in oral cultures to faithfully preserve oral sources of religious knowledge, and in his own interactions with the Pomio Kivung in Melanesia, Whitehouse observed that there was orthodoxy to the way in which sacred knowledge was remembered and communicated (Whitehouse 2007). However,

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22 Whitehouse likens this mechanism for cultural innovation to Michael Tomasello’s (1999) ‘ratchet effect’ in cultural evolutionary processes (Whitehouse 2008:41). As discussed in the chapter on epistemic niche construction (see Chapter 4) cumulative cultural evolution requires that a stable platform exist in order to develop further technological innovation. The current generation learns skills from the previous generation and further expands upon them. So in some ways religious activity remains unchanging, but as complexity increases so does the demand for no innovative ways to manage and transmit this complexity.
this was not the kind of knowledge that was recited verbatim from memory. Instead, the Kivung’s cosmogony formed a mental schema that provided a reliable cognitive orientation for communication and memory. While there was flexibility and creativity involved in speeches, for example, orators still adhered to certain doctrinal structures. Semantic memory stores meant that orators always had a cognitive template in which to work from:

“What the orators knew, long before I came to know it as well, was that the cosmology and doctrine of their religious tradition formed an integrated network of connections that could be explored in speech, often in genuinely creative ways, but only by traversing well-worn tracks between the component concepts and networks of concepts. What gave these tracks their relative fixity was, as with a real track, the fact that people went over them time and again rather than randomly deviating and criss-crossing them. In the Kivung, unauthorized innovation on matters of doctrine and narrative was socially sanctioned. And heresy could not be committed inadvertently since regular reiteration of the orthodox canon ensured that innovations would always be noticed (Whitehouse 2007:270).

Whitehouse argues, then, that semantic memory “evolved as a means of domain-general information storage” and this enables our capacity to integrate a wide variety of concepts and structures as cognitive inputs (Whitehouse 2007:270). The Pomio Kivung example above shows that doctrinal structures remain fundamental to the orthodoxy of their religious system and Whitehouse argues that this orthodoxy is maintained through the frequency of performance. The regularity of practice ensures its imprinting on memory systems, but Whitehouse also states that semantic memory stores are responsible for the unique features of ritual peculiar to a religious system. Cultures are historically embedded traditions and semantic memory stores would have been fundamental to the cumulative development of doctrinal systems. As Whitehouse states here:

“The case of Kivung religion shows, even when we focus only on one type of ritual performed in one of its temples, that nuclear and global connection systems shape and constrain what people say and do at every turn. But no matter how closely we focus on those systems they will never enable us to explain why the Kivung tradition embraces particular configurations of systems and outputs while another tradition elsewhere embraces another. What is it that gives religious traditions their local and historical particularity, even
though their members are all equipped with the same cognitive toolkits? The answer lies in the operations of global storage systems like semantic memory that impose a degree of fixity on particular configurations of representations, resulting from cumulative past experiences” (Whitehouse 2007:270; emphasis added).

Whitehouse argues then that learning strategies are a crucial component in the transmission of religious traditions. However, culturally evolved methods of transmission are innovated to cope with the demands of managing the informational complexity of a religious system. As discussed later in this thesis (in Chapters 4 and 5), traditional Māori oral tradition developed structured pedagogical methods to ensure the stability and fidelity of cross-generational transmission. These were institutionalized methods developed for reproducing environments that sustained informational fidelity. Doctrinal modes, such as the repetition of oral history and genealogical sources, as well the use of mnemonic devices, have been critical for supporting transmission.

Whitehouse argues that the innovation for informational technologies allowed for the cumulative evolution of religious traditions since many “...religious concepts require considerable cognitive, social, and technological resources to create, remember, and pass on” (Whitehouse 2008:44), and without ritualized rehearsal within religion traditions, the more cognitively demanding aspects of religious transmission would be lost (Whitehouse 2008:42):

“The doctrinal mode provided, for the first time in human history, the mnemonic scaffolding (based around regular public reiteration of religious creeds) for the transformation of imagistic revelations into more standardized bodies of doctrine” (Whitehouse 2008:44).

Of course, symbolic artifacts have played a key role in the preservation of religious knowledge, but so have social learning strategies. Structured learning interactions - without the use of symbolic artifacts – within oral traditions have been critical to the organization of
knowledge. Whitehouse suggests also that individuals learn alongside teachers and their peers, while constant exposure ensures the retention of sacred knowledge. Structured learning within a ritual context means that individuals can be closely monitored for correction and further improvement:

“While much of the information in semantic memory would be gathered informally through everyday experience, expert knowledge must be built up through long-term study involving regular review and rehearsal of the information acquired” (Whitehouse 2007:267).

Subsequently, being immersed in a culture is critical for religious conditioning, and structured pedagogical techniques increase fidelity. Doctrinal methods typically reinforce the stability and conservative features of a theological system. Semantic memory stores, then, constitute the epistemic basis for complex theological knowledge. It is argued that these stores form the template for our basic knowledge of a theological system (Whitehouse 2007:269).

When discussing traditions, we can assume that the resources available to a culture for information storage and retrieval will determine how a religious system is structured. As this thesis will argue, the storage and retrieval of informational resources has been evolutionarily significant for the accumulation of cognitive capital, and has been strongly preconditioned by two underlying characteristics: 1) the evolution of social coordination (i.e. the cooperative sharing - and regulation - of information and learning); 2) the cultural evolution of technological resources (i.e. the types of methods and tools employed in cultural transmission). So while we do indeed possess input connections to a variety of behavioral outputs, the human cognitive profile is unique in its capacity to exploit external cultural resources to extend its working memory capabilities (Sterelny 2003).
I will argue that while internal memory constraints are critical to understanding how religious knowledge is preserved within oral cultures, we should also consider how these cognitive constraints interact with culturally evolved features of the environment. Whitehouse argues that one of the ways in which we can model the storage and retrieval of sacred/religious knowledge is through the distribution of memory resources within ritual. Similarly, I will argue that religious enculturation is the result of the large-scale distribution of knowledge entailing both internal and external cognitive resources.

1.7 Discussion.

The cognitivist paradigm, and specifically evolutionary psychology, manages to frame human behavior as being governed by a set of inborn competences. Internal cognitive machinery regulates the flow of information between individuals and the environment. Some of these constraints emerge from content-rich mechanisms that have been adapted to track our environments reliably. This chapter has provided a general background on how human intelligence is partly constituted by developmentally specialized cognitive systems. It may come as no surprise to many scholars within the CSR that this chapter has focused on three cognitive domains that are commonly associated with the ontological foundations for supernatural representations (i.e. social intelligence, biological intelligence and physical [technical] intelligence), since they are the common focus of minimally counterintuitive theories on religious transmission. These characteristics are associated with the human cognitive profile, and play a large role in shaping the content and frequency of religious information. Inferential constraints operate on how religious representations are transmitted.
The SiM, and Sperber, show that there are common cultural traits across cultures that are associated with innate psychological biases; and that these recurrent cultural patterns are predictable. SiM argues that these psychological processes have significant role to play in the common themes that are recognizable within all religions. Subsequently, the cognitive optimum expects that the frequency and content of supernatural representations will look something like a bell-curve forecast: MCI concepts excite our innate ontological systems (by contravening natural perceptions), while anchored in natural categories. Excitement and tractability are ingredients that constitute the cognitive optimality thesis.

Later I looked at Whitehouse (2004) and his ritual modes theory. Whitehouse’s modes theory accomplishes three things that are relevant to this thesis: 1) it accounts for the complexity and variation of religious traditions; 2) it is compatible with ethnographic data; 3) it shows how transmission is maintained through culturally evolved tools and strategies, despite the constraints on memory. Whitehouse’s modes theory also accounts for the transmission of religious beliefs and practices outside of theories related to SiM. Whitehouse argues that general cognitive systems such as memory have a role to play (alongside domain-specific systems) in the expression of religious behavior. Memory constraints plus socio-ecological conditions, according to Whitehouse, determines shape of a religious system. The details regarding religious memory can be subtle and complex. However, this chapter has endeavored to show how the cognitive resources for memory are distributed across social-learning and technological domains.

A valuable insight for further research from the modes theory is the idea that religious systems are part of a composite cultural network that cannot be reduced to either just innate features of the mind-brain, or basic common traits associated with religiosity. On
Whitehouse’s view the frequency and content of religious representations is determined by both cognitive constraints and socio-ecological conditions. Whitehouse does not discount the contributions made by SiM. However, Whitehouse’s model suggests that the cognitive optimality thesis has been oversold in SiM’s causal explanation. The idea that domain-specific features of our cognitive architecture are the basis for religious cognition is insufficient, according to Whitehouse. In reality, there are a variety of factors including ritual modes and external cognitive devices that determine the cognitive profile associated with religious activity. Indeed, I argue that many features of a culture’s religious corpus are far more cognitively demanding than is assumed by a cognitive optimality model.23

The modes of religious transmission are also locally contingent (i.e. culturally specific). This means that the ethnographic and historical data necessary to interpret cultural practices can be relevant to a cognitive examination. These details matter since the rituals unique to a cultural milieu tell us how knowledge is managed and preserved. According to Whitehouse, researchers cannot make clear the mechanisms of transmission without the relevant ethnographic data, since cultures develop specific ritual modes relative to local conditions. An understanding of cognitive regularities is critical to understanding religious transmission. However, environmental constraints and structures are also pertinent to a comprehensive understanding of how the components of information management within religious traditions are organized. This thesis will endeavor to make this point clear: some predictions about the interface between minds and environments are plausible because the literature reflects the causal relationship between cognitive regularities and religiosity. However, I will also argue...

23 For example, since a culture’s mythic corpus maybe crucial to the foundation of its cosmogony and social structure, its faithful transmission from one generation to the next is essential. Within some oral cultures the fine-tuning of skills for memory and eloquence has therefore been a critical part of the transmission process. The doctrinal mode of ritual discussed in this chapter highlights the importance of regular rehearsal. For instance, complex theological knowledge may be preserved through the frequency of practice and the repetition of performance.
that there is a strong case for a stable connection between culturally evolved properties and these regularities.

The SiM poorly conceives cultural variation as epiphenomenal. I argue, instead, that the ornaments of religious activity are constitutive of religious cognition. The connection properties that matter to the expression of religiosity are causally varied. In other words, any kind of cognitive description for religious activity – especially when it comes to oral traditions - should be responsive to the subtle features that constitute both the learning strategies that support intergenerational transmission and the means by which knowledge is organized.

For the CSR, it is important to acknowledge cognitive methods that employ interpretive descriptions or participatory observational methods since the cognitive activities related to transmitting religious information is often niche specific. While SiM offers a valuable methodological platform in order to demonstrate some of the common trends associated with religious expression, this thesis will show that there are many limitations to this approach. Subsequently, externalist, ecological or embodied approaches to religion are in many ways critical responses to the cognitivist paradigm and SiM, since these models underscore both the costs of transmission, as well as the variables associated with the presence of external tools and strategies for managing religious information (see Geertz 2010a).
CHAPTER TWO

2.1 Introduction.

In this chapter I will look more closely some the ethnographic and historical material on oral traditions and memory. Recent research on Pacific oral traditions has focused on the context and performance of a myth (Finnegan 1992, 1995; Rubin 1996). However, practices for knowledge preservation have not been uniform across all Pacific cultures, and many oral traditions have developed a variety of tools and strategies that are regionally unique. For instance, anthropologist Ruth Finnegan (1992, 1995), whose area of ethnographic reporting has been on Pacific oral traditions, argues that the problem with scientific approaches to understanding memorization within oral traditions is that mnemonic techniques differ across cultures (Finnegan 1992:114-116). The memorization, and strategies that support oral transmission, are typically unique to a culture and region.

Finnegan further argues that the means by which traditions are preserved and transmitted typically fall out side of the scope of any comparative generalization. However, I argue, that there are also marked similarities in the way in which information has been managed within some Pacific cultures through oral means. For instance, the use of landmarks and place names for epistemic and mnemonic purposes appears to be a common trend within some cultures (Harwood 1976; Campbell 2006; Kahn 1990; Rubin 1996). And while there are clear differences in the subtle methods of learning within different oral cultures, there are also noticeable parallels between the use geography and myth that further suggests some optimal relationship between macrospatial properties and memory (Rubin 1995). These similarities,
such as the use of spatial imagery within storytelling, may be suggestive of some cognitive pull towards memory systems being commensurate with spatial dynamics (Rubin 1995).

This chapter will examine some of the literature on the use of mnemonic devices within oral cultures, but it will also look at how oral knowledge is managed. Orality and memorization has a significant part to play in the transmission of knowledge and I will look at how landmarks, used in conjunction with myths, can be viewed as cognitive orienting devices. The first part of this chapter will provide an overview of the research in the field of historical mnemotechnics. Authors in this area typically apply historical methods to an examination of mnemonic techniques used by orators for recollective purposes (Yates 1966; Carruthers 1990, 1998). Frances Yates in her book *The Art of Memory* (1966), for instance, looks at the use of mnemonic devices, such as the method of loci, and earlier on her book she discusses its common usage as an effective memory tool during the Classical period. In short, the method of loci requires that an adept be taught how to mentally construct the layout of a building or area (e.g. a street map) with different images located at certain points on the schema for cueing specific information. In order to memorize a topic for oratory, the individual only had to imagine walking to that particular location on the layout to cue an image associated with a knowledge source (e.g. an image may have a particular connection to a body of oral text that the orator was required to recite). The imagined layout of a courtyard, for example, can be arranged in such a way that specific locations activated memory resources (and more on this below).

Later in this thesis I will claim that there are correlations between spatial memory strategies like these and the use of landmarks for the storage and retrieval of information (in Chapter 3 and Chapter 5). This chapter will look closely at how spatial imagery has been
incorporated into mythic narratives for mnemonic purposes, and the way in which organized geographical concepts – such as sacred/historical locations – were organized as coordinated information management systems. I will claim here that the stability of information transmission depended greatly upon the way in which oral cultures were able to recruit physical features of the landscape for conceptual purposes. This has relevance later, since a significant proportion of my analysis on Māori oral tradition in later chapters will focus on the use of landmarks as cognitive cueing structures for organizing knowledge.

### 2.2 Mnemotechnics: an overview.

Before proceeding towards this examination of geography and memory, it will be necessary to provide some background into the study of mnemotechnics and its application. This particular field will have more bearing in later chapters on cognitive ecological models since mnemotechnics is predominantly a study of artificial memory, and mnemonic strategies will be the focus of my examination of Māori orality and memory. Yates’ book *The Art of Memory* (1966) provides one of the more comprehensive historical treatments of mnemotechnical research and has been a broader influence on the study of oral traditions and memory. Yates argues that the development of mnemonic strategies were critical for the transmission of rhetorical techniques and oratory during classical period of around 4th century BC to the Renaissance. She claims that during the classical period orators were required to memorise and recall large bodies of information while being flexible enough to respond to inquiry during public speeches.

Yates argues that it is crucial to recognise, then, the historical development of mnemonic skills within cultures since verbatim memory – i.e. the exact recitation of an
oral text - would not have been effective enough for these purposes. Instead orators were expected to be flexible and inventive, while retaining knowledge on the subject matter. In addition, memory was of particular importance to rhetoric because skilled orators were expected to speak without the aid of cues or notes.

*Memoria*, Yates claims, was not a verbatim method, but a skill that allowed flexibility as well as retention. Yates claims that a great deal of what is known about these rhetorical techniques comes from Marcus Cicero’s recording of these techniques in the *Rhetorica Ad Herennium* (from around 90 BC). Memory was a skill that had to be exercised, and there were a variety of techniques that were available to students of rhetoric that were used to strengthen mnemonic abilities. Yates’ claim is that the method of loci (see above) functioned as a mentally structured information storage and retrieval system. Importantly, memory cues on this ‘cognitive map’ are both spatial and visual, and the method of loci was designed to reinforce and strengthen natural memory. Hence, the techniques themselves were considered to be a form of *artificial memory*.

In both of her books *The Memory Book* (1990) and *The Craft of Thought* (1998) Carruthers claims that Medieval monastic groups placed a great deal of emphasis on memorization and oratory, since the preservation of sacred knowledge assumed to be a pious activity. It was common to use architectural structures as layouts for cognitive mapping, with memorable images being placed as cues at various points (Carruthers 1990, 1998). Carruthers looks specifically at liturgies within ritual spaces that combined movement and the display of iconographic imagery. The blending of space and ritual served a function for both the direction and flow of the liturgical procession and recollection of specific knowledge stores or narratives (Carruthers 1998:266-267).
Rituals usually included the locational tools for memory – i.e. a place of worship of *(locus)*; the direction and sequence *(ductus)* - i.e. the map in which the practitioner moves; and visual imagery *(imagines)*. Carruthers argues that monastics of the period utilized actual space, architecture and images as an artificial memory source in the same way that the method of loci was used a purely mental representational tool for mnemonic purposes. Subsequently, Carruthers makes strong correlations between both psychological and analogue systems for memory by focusing on the functional characteristics of space, image and memory.

Cicero’s manuscript also points out the importance of visual mnemonic cues over other sensory stimuli (such as aural cues, for instance) within mnemonic strategies. Instead of remembering through verbatim alone, Cicero argues that people learn and retain information more accurately when verbal skills are matched with visual cues:

“It has been sagaciously discerned by Simonides or else discovered by some other person, that the most complete pictures are formed in our minds of the things that have been conveyed to them and imprinted on them by the senses, but that the keenest of all our senses is the sense of sight, and that consequently our perceptions received by the ears or by reflexion can be most easily retained in the mind if they are also conveyed to our minds by the medium of the eyes, with the result that things not seen and not lying within the field of discernment are earmarked by a sort of outline and image and shape so that we keep hold as if it were by an act of sight things that we can scarcely embrace by an act of thought. But these forms and bodies, like all the things that come under our view require an abode, inasmuch as a material object without a locality is inconceivable” (1942: De Oratore, II. lxxvii, 357-358).

But the *Ad Herennium* is also concerned with the emotional impact of images as memory devices. So while the *Ad Herennium* endorses the ordering of images in space as important for memory, there is importance placed upon the ‘energy’ of the images also. Cicero observes that the supernaturalness or emotional impact of images has served as a mnemonic also:
‘When we see in everyday life things that are petty, ordinary, and banal, we generally fail to remember them, because the mind is not being stirred by anything novel or marvellous. But if we see or hear something base, dishonourable, extraordinary, great, unbelievable, or laughable, that we are likely to remember for a long time... Ordinary things easily slip from the memory while the striking and novel stay longer in the mind. A sunrise, the sun’s course, a sunset are marvellous to no one because they occur daily. But solar eclipses are a source of wonder because they occur more seldom, and indeed are more marvellous than lunar eclipses, because these are more frequent. Thus nature shows that she is not aroused by the common ordinary event, but is moved by a new or striking occurrence.’ (1954: Ad Herennium, 3. 35-36)

The ‘bizarreness’ of images has an activating resonance for memory:

“We ought, then, to set up images of a kind that can adhere longest in the memory. And we shall do so if we establish likenesses as striking as possible; if we set up images that are not many or vague, but active; if we assign to them exceptional beauty or singular ugliness; if we ornament some of them, as with crowns or purple cloaks, so that the likeness may be more distinct to us; or if we somehow disfigure them, as by introducing one stained with blood or soiled with mud or smeared with red paint, so that its form is more striking, or by assigning certain comic effects to our images, for that, too, will ensure our remembering them more readily. The things we easily remember when they are real we likewise remember without difficulty when they are figments, if they have been carefully delineated” (1954: Ad Herennium, 3. 37)

Yates (1966) also emphasizes the importance of imagery as a mnemonic strategy. Yates claims that effective artificial memory strategies were often nurtured through the use of loci strategies (spaces), in conjunction with striking imagines (images), with mythological or monstrous figures being used in text for their active qualities:

“It is as a concession to human weakness, to the nature of the soul, which will take easily and remember images of gross and sensible things but which cannot remember ‘subtle and spiritual things’ without an image” (Yates 1966:82).

The impact of emotional images are not only significant for rhetoric, but for ritual and exegesis also. Carruthers (1990) points to the mnemonic value of images in Medieval Christian rituals. She says that there is a mistaken popular perception that religious imagery during this period was used solely for iconic worship. Instead, religious images, and the
structuring of space, performed a mnemonic function for monastic groups during ritual and for the retention of a sacred corpus (Carruthers 1990: 221-222). Carruthers states that visual literacy was functionally relevant for a monastic education as a means for strengthening memory (see Carruthers 1998:116-170):

“The monastic practice of meditation notably involved making mental images or cognitive 'pictures' for thinking and composing... The emphasis upon the need for human beings to 'see' their thoughts in their minds as organized schemata of images, or 'pictures', and then to use these for further thinking, is a striking and continuous feature of medieval monastic rhetoric, with significant interest for our own contemporary understanding of the role of images in thinking. And the monks' 'mixed' use of verbal and visual media is a quality of medieval aesthetic practice that was also given a major impetus by the tools of monastic work” (Carruthers 1998:3).

Carruthers (1990) and Evelyn Tribble (2005b, 2011) have explored the mnemotechnical strategies and tools employed within Christian traditions. Carruthers (1998) in her book The Craft of Thought makes comparative links between Christian and Buddhist groups and their orthopractical methods (Carruthers 1998:1-2). Monastic groups in both traditions, in particular, seek to cultivate – through the use of rituals, texts, and artifacts etc – sacred habits for experiencing knowledge. Carruthers states that an ‘orthodoxy’ is merely the learning and transmission of doctrine, whereas an orthopraxis “emphasizes a set of experiences and techniques, conceived as a ‘way’ to be followed, leading one to relive the founder’s path to enlightenment” (Carruthers 1998:1). Put simply, a monastic education resembles a craft

24 A more recent approach to mnemotechnics has been applied to a study of Elizabethan theatre by researcher Evelyn Tribble (2005). Tribble has looked at how actors at the Globe were able to learn the many plays (in some cases upwards of 70 roles) required for performance within such a short space of time. Tribble does some historical detective work here by investigating the strategies employed for memorization by the players. She says that instead of the actors just learning their lines verbatim, mnemonic strategies were built into the plays and theatre for active recall. She discusses the rhyming structures of the plays themselves (the tempo and rhythm of the prose), the design of the theatre, as well as apprenticeship systems for learning. But she also points to a particular mystery during at the Globe theatre, in particular an explanation for the use of large folio sized pieces of paper called ‘plots’. These plots contained sparse information about the entrances, music cues, and casting etc. Tribble suggests that the plots were hung up behind the stage and “functioned as a two-dimensional map of the play designed to be grafted onto the three-dimensional space of the stage by the actors. Since players did not have the full text, this document allowed them to see and to chart the play, particularly to understand the rhythm of the scenes.” (Tribble 2005:146; see also Sutton 2006). The tools for learning the plays quickly were active in the performance of the play itself.
(analogous to that of any guild), which depends upon apprentices learning a specialized set of skills (Carruthers 1998:2).

This approach, Carruthers argues, differs somewhat from the more traditional psychological models that focus on the individual-experiential aspects of religious practices. Instead, she points out that a religious education is dependent upon being taught and guided within a structured learning environment. A craft is not nurtured in isolation, nor are the experiences of an adept a purely individual conception. Instead, an immersive religious education involves the structured interactions between teachers and peers.

Carruthers argues that the deliberate use of mnemonic devices within monastic instruction were intended to assist the practitioner in their capacity to memorize a corpus of knowledge, and the next section will look at how a comparative mnemotechnical approach can be a used as a practical heuristic for examining other oral traditions. Some of the anthropological and historical literature on Melanesian and Pacific oral cultures has focused on the problem of memory and transmission by examining the tools and strategies used for organizing knowledge (Harwood 1976; Kahn 1990; Campbell 2006). These authors discuss the use of myth and landscape as mutually beneficial structures for information management and cultural memory.

I will argue later that this approach to artificial memory is relevant to a study of Māori myth and oral culture (in Chapter 3), as traditional Māori storytelling commonly incorporated place names and landmarks into narratives for structural purposes (i.e. the organization of information) (Wilson 1990). However, I will focus here in this chapter on Frances Harwood’s (1976) mnemotechnical examination of the Trobriand people from the Milne Bay Province of
Papua New Guinea, and their common blending of geography and myth. Harwood claims in her paper that there are strong correlations between the Western mnemonic strategies – such as the method of loci - and the use of landmarks for organizing knowledge. Harwood suggests that while the Trobriand strategy for memorization differs to the method of loci, comparisons can be drawn between the use of spatial imagery for oratory, and epistemic organization.

2.3 Spatial Imagery, Mnemotechnics and Storytelling.

In her paper “Myth, Memory and Oral Tradition: Cicero in the Trobriand” (1976), Harwood attempts to describe the relationship between memory and the traditional oral practices associated with landmarks and myth. Harwood argues that connections can be made between the Western Classical methods of artificial memory, and the use of landmarks in Trobriand narratives. However, Harwood is interested in the connections between memory, myth and social institutions, particularly how social institutions are stabilized through the use of myth. Since myths establish a critical dialectic between actors and their social institutions, the stability of myths through mnemonic organization, according to Harwood, should be a considerable focus of research for anthropologists. For instance, Harwood argues that myths reinforce the epistemic legitimacy of social norms and customs. This is more apparent in the normative actions of religious ritual, whereby customs are meaningfully articulated through myth. However, Harwood argues that the preservation and transmission of myth within oral cultures would inevitably require some form of information management system. According to Harwood, the stability of a mythic corpus is a relevant problem without access to robust administrative systems for storage and retrieval. Preliterate societies like the Trobriands were without the means for outsourcing of informational resources through external symbolic
artifacts, and oral practices are naturally unstable by themselves since individual memory is fallible. Harwood argues that this is where landmarks and place names are relevant as memory devices, since physical structures functioned as concrete markers on a conceptually organized landscape.

Harwood first reviews Malinowski’s ethnographic material conducted on the Trobriand people, focusing primarily on Malinowski’s interpretation of myth as ‘social charters’. Malinowski argued that myths are functional in legitimizing social institutions since they reinforce norms, customs and a general epistemic framework. Through myth, social institutions are given an “aura of rightness” (Harwood 1976:785). For Harwood, Malinowski’s work remains valuable to the study of the oral traditions, not just for its ethnographic details, but also for Malinowski’s explication on the social function of myth. Instead of seeing the value in interpreting the meaning of myth, Malinowski was more interested in how myth “enhances and codifies belief”, while also vouching “for the efficacy of ritual” and the normative attitudes towards customs and morality (Malinowski 1948:101; from Harwood 1976:785):

“For Malinowski the meaning of a myth is to be equated with its use; it is not what members of a culture say about a myth, but what they do with it which is important” (Harwood: 1976:785).

Malinowski’s interest was in identifying the various institutions that constitute a cultural network. His analysis was an attempt to draw causal links between myth and social institutions. According to Malinowski, institutions like kinship, family, and political rank are concepts and experiences that are articulated through the use of myth (Harwood 1976:785). Myths act as meaningful conduits between these institutions and members of society.
However, Harwood claims that Malinowski’s theory is missing a crucial component. She argues that while a culture’s myths help to organize and demarcate social institutions, anthropologists often fail to describe how myths are stabilized within oral traditions. If myths support the stability of social institutions, then what mechanisms, she asks, are in place to ensure the stability of myth? Without access to text-based media, myths within oral traditions are prone to distortion and change over time. Individual memory and communication is fragile, and if the premise is relevant - that the stabilization of myth is causally connected social structures - researchers on oral cultures should examine the means by which knowledge is organized within preliterate societies:

“Malinowski’s fieldwork procedure consisted of drawing up a list of institutions such as gardening, fishing, and the kula trade. He was then faced with the problem of articulating the relations between these institutions, and solved the puzzle by introducing the theoretical framework of functionalism in which every institution is seen as being linked with and supportive of every other institution in a reverberating ring, such that a change in any one institution sets off a wave of repercussions affecting all other institutions. Malinowski, however, neglected to indicate the mechanisms by which the institutions are perceived, distinguished, and linked together in the minds of the Trobrianders themselves. It is at this point that the cognitive aspects of mythological charters come into play” (Harwood 1976:785; emphasis added).

Harwood argues that oral cultures have developed various means by which to organize and preserve knowledge, and that the use of geography in the Trobriandic culture may be relevant to the stability of their mythic framework. The Trobriandic people interlaced many of their mythic narratives with geographical locations on the island and these points acted as important physical anchors for the memorization of myth and ancestral history. Geographical locations can be thought of, then, as markers for memory. Harwood goes so far as to say that within all non-literate cultures you will find the use of mnemonic strategies for supporting the transmission of myth, and in addition to these networks the Trobrianders utilized ‘structural devices’ within their myths for reinforcing memory (Harwood 1976:785). Harwood not only sees landmarks within Trobriand culture as memory markers, but the use of geographical
locations in narratives also served as a way of cognitively organizing these myths into ‘thinkable units’ (Harwood 1976).

According to Harwood, the management of information requires that a mythic corpus be arranged into discrete components in order to ensure the tractability of knowledge, and demarcation of social institutions. This has cognitive benefits because it facilitates the organization and outsourcing of memory to physical things in the world:

“Given the premise that each mythical charter is tied to an institution and that it is myth itself which serves to demarcate the boundaries between one institution and another, the puzzle arises as to the means by which myths are kept separate so as to prevent the boundaries of the myths from blurring, and to keep myths from running together and coalescing. The mechanisms must be found which divides a corpus of myth into separate thinkable units” (Harwood 1976:786).

Harwood says that the “axes of time and space” on the landscape functions as an organizational strategy to separate the boundaries of myth within a tradition (Harwood 1976:786). For instance, mythic narratives can be associated with the historical (temporal qualities) significance of a location (the spatial property), thus further ensuring its epistemic legitimacy. However, as a consequence, spatial properties – such as geographical locations – provide a fixed relationship between myth and history. Places were tied to the historical relationships that were articulated through myth. Harwood observes, that within Trobriand culture myths were commonly bound to actual things in the world – such as places – and these places were also a means to establish connections with a history. Thus, space and time were seen as connected.

By using Malinowski’s initial field research Harwood points out that the conceptual integration of mythic narratives and history are closely associated with the landscape within the region. The people of the Trobriands assign knowledge stores to specific locations on the
landscape for retrieval through the use of narrative. This, Harwood argues, further ensures the organization of the corpus into manageable units:

“Linking myths to particular localities would appear to be one means of dividing a corpus of myth into cognitively distinct segments. This mnemonic of location ties each portion of the corpus to a separate node on a geographical grid. Thus modifications or elaborations of one mythical charter tend to be prevented from setting up repercussions on other mythical charters and their linked social institutions” (Harwood 1976:788).

Attaching mythic narratives to significant geographical locations serves both a mnemonic purpose – for organizing knowledge – and an epistemic purpose a functioning a frame-of-reference within a larger cosmological system. First, within the Trobriand culture, mythic narratives are ranked in order of “logical precedence” (Harwood 1976:787). This structure follows a type of creation myth all the way down to role real-world activities and properties. For example, a particular animal may be associated with a supernatural genealogy that explains its creation and purpose in the natural realm. An animal may have a purpose in the world that can be explained through a particular myth. Consequently, the gods are typically associated with the creation of a real-world thing, organic material or process (e.g. an animal, a type of food or custom). So while a society’s cosmological system can be organized into discrete and separate units, myths create the foundation for integrating each section of the hierarchy:

“(a) first emergence and the origin of man; (b) loss of immortality, the cycle of death and rebirth, the origin of witchcraft; (c) the origin of agriculture and the Kula trade, various types of magic, etc” (Harwood: 1976:787).

Harwood argues that this mythical organizational structure, coupled with oral storytelling, provides a mnemonic support for remembering valuable informational resources. Social institutions are given their legitimating strength through myth. However, Harwood states that each myth associated with a particular event in the Trobriand cosmogony is also tied to a specific geographical location in order to ensure the stability of transmission. Each story may
follow the route of an ancestor to specific points on a map, and further retell the deeds performed at these significant locations. From this Harwood contends that it is “possible to construct a mythical geography of the Trobriands” from their storytelling (Harwood 1976:787).

Harwood describes locations as ‘structural markers’ for ensuring that the corpus of myth is “separated into separate cognitive units” so as to serve as a “mnemonic for recall” (Harwood 1976:791). In addition, locations organize “the totality of a Trobriand mythology along a temporal axis of logical precedence which is coextensive with the spatial axis of the sequence of locations” (Harwood 1976:791). Stories are attached to actual places. Therefore a storyteller need only follow a particular sequence of locations in order to cue a narrative (and as an analogy, Harwood states that Trobriand myths being attached to geographic locations are comparable to the Christian use of mnemonics - e.g. such as rosary beads and the Stations of the Cross - whereby ritual action and artifacts support theological memory [Harwood 1976:787]).

Understanding the preservation and organization of myth is key to Harwood’s research. As stated, for oral traditions there is always the risk of myths being distorted through intergenerational transmission. According to Harwood, the landscape provides a reliable and concrete platform upon which myths can be organized into areas (or units). Harwood recognizes that the cognitive organization of mythical narratives requires that an oral culture organize their stories into their own divisions as separate locations on a map. Since the myths can be traced to a specific location on the island, the “spatial bracketing” acts as cognitive device for locating that myth within the larger corpus of mythic narratives (Harwood 1976:789):
“Myth, I maintain, has built-in stabilizing mechanisms which prevent dramatic upheavals at least in the majority of instances. One mechanism, that of bracketing a myth and its associated social practices by tying it to a specific location, serves to insulate a myth from the rest of the corpus. Changes rung on the structural possibilities of any one myth are constrained from having a domino effect upon other myths, but they allow for a more gentle osmosis in which the mythical corpus and its associated social correlates move toward coherence through a long term process of accommodation” (1976:790).

Harwood concludes her examination by underscoring correlations between the structure and organization of myths within the Trobriands and Classical mnemonic techniques. According to Harwood, parallels can be drawn between Trobriandic organization of knowledge on the landscape, and the method of loci mnemonic discussed above (by Yates [1966] and Cicero [1954]). Since spatial location and imagery is a notable feature of storytelling amongst the Trobriands, Harwood concludes that geographical locations can be viewed as serving a similar function to macrospatial mnemonic strategies like the method of loci (for coordinating the storage and retrieval of information on an imagined landscape):

“The Greek mnemonic of location may be a residual form of an aide mimoire which serves to structure the myths and legends of non-literate societies in all parts of the globe. Furthermore, I contend that the mnemonic device not only serves as a remembrance of things past, but is also a source of living tradition which informs, modifies, and is modified by systems of ongoing social relations. That is to say, location as a structural marker has both cognitive and instrumental functions.” (Harwood 1976:783)

Harwood is interested in the use and efficacy of artificial memory within oral cultures, in general. She argues that there are common underlying features with early Western artificial memory techniques and Trobriand oral tradition. This is not to say, however, that there is some direct relationship between the techniques used by the Classical mnemonists and the Trobrianders, only that the similarities seem to point to cognitive predisposition for utilizing spatially organized properties as artificial memory devices.
Similarly to Harwood, Miriam Kahn (1990) has observed from her fieldwork with the Wamira people in Papua New Guinea, that the locals utilize the landscape to express historical relationships and memory with mythical narratives. For instance, Kahn argues that there are strong epistemic differences between the Western and traditional Melanesian concepts of time and space. Instead of time being transcendent of place, the Wamira people consider landmarks and geography to be representative of their temporal world. In other words, land is not only associated with place, it expresses something temporal to the Waimieran people also:

“In Melanesian societies, mythological events are often articulated with places in the landscape. Various aspects of a people’s past are perceived, recorded, and experienced spatially in terms of geographical features” (Kahn 1990:51).

In addition, Kahn argues that aside from the epistemic nature of landmarks they also function as a means for recording the past. For the Waimerans, a way of relating to the past is to view the passage of time as physical markers on a map. Temporality is, therefore, linked indelibly to space and place. Specific events are remembered and subsequently ‘anchored’ to places on the landscape. Instead of considering time in relation to particular events (like Western contemporary conception of history), Melanesians comprehend time as spatial relations (Kahn 1990:52):

“The past is often anchored to recognized, tangible, and named forms in the landscape. In rendering geography sacred, people are able to reap the harvest of the historical relationship in their contemporary lives. Geographical features are instrumental as sources of living tradition that inform, modify, and are modified by ongoing relations. Moreover, such physical markers of the past may serve as mnemonic devices for individuals and groups, thus helping to establish their identity” (Kahn 1990:52).

While Harwood looks at mainly geographical locations, Kahn’s paper focuses on the use of stones as epistemic markers. Kahn notes that a large proportion of the Waimieran mythic corpus is recorded and cued through the use of stone markers on the landscape. Stones play
an important role in denoting areas of significance as well as being mnemonic cues whereby spatial relations overlap with mythical knowledge about the region:

“Of the places I visited on the northeast coast, Boianai is the village with the most fascinating stone memorials to its past. One cannot walk more than a few paces without encountering an important stone or group of stones… In Waimera, some 30 kilometers further east along the coast, mythologically significant stones, while slightly less numerous than in Boianai, are viewed in equally important light. As in Boianai, these stones anchor mythological narratives to the land. Some serve the additional purpose of being charters for proper social behavior. For example, in one myth two women, named Maradiudiva and Marakwadiveta, turned into stones; the stones presence today reminds Waimierans about the proper etiquette for sharing food” (Kahn 1990:55).

Kahn states that stones are anchored to areas where ancestral figures were believed to have traveled, and these stones were subsequently named for the sacred status. Myths encompass a history as well as an identity for the Waimieran people (Kahn 1990:59), and Kahn states that myths are structured in conjunction with the routes traveled by mythological figures (or ancestors). Myths are retold with the characters in the narrative moving from one area on the landscape to the next. Like Harwood’s case study, the landscape serves a unique function in supporting in organizing knowledge.

Similarly, in Matthew Campbell’s (2006) paper “Memory and Monumentality in the Rarotongan Landscape”, Campbell provides an archaeological examination of an existing road in Raratonga called the Ara Metua that circles the island, which used to be a link to the various marae systems plotted around the island. The maraes, it is said, were originally linked to the original road and built by the ancestor Tangi’ia Nui who left the areas to guardians that eventually became ancestors of the chiefly class.

The Ara Metua can be seen today within its modern context with chunks of the pre-contact circuit having been almost destroyed or replaced by the current roading system. Campbell
says that in its day the road would have been an economic lifeline for the various maraes, traveling and trade. Various stories describe Tangi’ia who traveled the circuit bestowing titles to the leaders of each marae, subsequently the road acted as an ancestral connection to the social structure of each marae.

In addition, Campbell states also that the route acted as a mnemonic system for remembering the stories associated with Tangi’ia:

“The inscription of a cosmological principle on the landscape through the physical construction of the road and its associated marae allowed Rarotongans to control it. The road represents the controlling powers of the universe, and allowed the Rarotongan elite in turn to direct and control those powers. A ritual procession along the road replicates the route of Tangi'ia, so it is also an act of remembrance, akin to the performance of oral tradition. The link with Tangi'ia is genealogical, he was the founding ancestor, and first gave the ancestors of the mata'ipao and priests their titles. The road and the memory it embodies can be strategically employed to reinforce the socio-political system” (Campbell 2006:107).

Though it is important to emphasize the mnemonic aspects of orally transmitted genealogical maps, Campbell states that the purpose of the road is to validate a historical sense of identity amongst Rarotongans. Genealogy connects people to their history and place (Campbell 2006:109-110). Subsequently, making claims to areas of land depends upon a person’s status or family connection and this is further is legitimated through genealogy:

“Genealogy legitimizes status relationships between people, and consequently legitimizes relationships between people and resources, in the case of the Land Courts to land, but also social resources. The explicatory and mnemonic aspects of genealogy are of interest to us here, but these are peripheral to its primary function” (Campbell 2006:109).

Campbell also looks at concepts of time and space within Rarotongan culture and the relationship between a cosmology and the landscape. Broadly the paper investigates how Pacific societies may have understood conceptions of the past through the landscape and how “these memories could be conditioned by strategic actions in the present” (Campbell
2006:102). From an archaeological point of view Campbell says that the construction of monuments for representing the past is an interactive property that shapes meaning in the present.

2.4 Macrospatial Knowledge, Orality and Cognition.

The research discussed here looks at some of the methods used for organizing knowledge with oral cultures, by focusing on the mnemonic techniques associated with myth. The fidelity of cultural transmission within oral cultures is a just one focus of this thesis, and so it will be necessary to underscore the means by which orally taught knowledge is preserved and passed on. The cultural practices surrounding oral transmission may be better described through the anthropological and historical literature, but the goal of this thesis is to see if these descriptions can be is framed within a cognitive model. As an example, David C. Rubin’s book *Memory and Oral Traditions* (1995) examines how the structural elements within oral storytelling are formulated to make them salient to memory systems. Rubin looks at three aspects of this formulaic structure within oral storytelling: thematic, imagistic and rhythmic strategies, and there are noticeable correlations between the experimental evidence for narrative mnemonics and the characteristics associated imagery and location. Firstly, Rubin argues that imagery is an analogue system that is quite distinct from language abilities because it recruits our visual sensory modalities for representational purposes (Rubin 1995:41-46). He observes that there is strong relationship between imagery representational abilities and visual perception. The mental recollection of spatial imagery, for instance, recruits our visual systems for structuring representations.
But Rubin presents compelling experimental evidence demonstrating the optimal connections between spatial imagery and working memory (Rubin 1995:46-48; see Paivio 1969, 1971; Bower 1970; Rubin 1978). For example, in experiments performed with the method of loci technique, Rubin points out that the use of mental imagery paired with locational cues yielded convincing results as a mnemonic strategy. Noticeably, imagery and macrospatial methods appeared to be better than verbal recall or verbatim. He states that the use of ‘paths’ – that is, the mental recollection of traveling to locations within a space – for recollective purposes was easier to coordinate than lists, and our memory systems are well suited for tracking spatial information when prompted. While language is better at maintaining the order of more rigid sequences in a verbal composition, spatial imagery is more salient to our memory systems and easier to recall (Rubin 1995:49-50; see Paivio 1971, 1975):

“The method of loci involves instructions (1) to form integrated images in which the items to be remembered interact with their loci an (2) to use, or transform the material to be learned into, easily imagainable items. Both of these factors have been shown to aid memory in controlled laboratory research. First, the instructions to produce an image in which the items to be learned are interacting produces superior memory than instructions either to produce an image in which the items are separate or to use various verbal methods such as repetition and association… Second, when no instructions are given to college undergraduates, it is routinely found that words that are easiest to image are easiest to recall” (Rubin 1995:47).

He says that the use of pathways – like in the method of loci – is also effective in supporting narrative sequences. Subjects were noticeably better at their representational capacity to recall the spatial qualities of maps and routes, than linguistic cues. Rubin argues that this could be why stories within oral cultures make use of spatial imagery and movement. Characters usually move from one scene (or location) to another where a particular activity or section of the story is recounted. The location of a story can initiate the recollection of a story’s details, while implicitly facilitating the structural components of a narrative.
Spatial information such as location and movement seems to be an important aspect of storytelling and memory according to Rubin (1995:51). He cites evidence for spatial cognition and the reading of text performed in experiments by subjects who were asked to remember the relative locations of places mentioned (Johnson-Laird 1983; Perrig and Kintsch 1985; Taylor and Tversky 1992; citations from Rubin 1995:51-52). In the experiments, subjects were read a narrative describing either a bird’s eye view of a spatial area, or the description of a traveled route. The data suggests that subjects were able to mentally represent spatial maps and make relatively precise inferences about certain locations based on what was read to them. Rubin concludes that spatial cognition must be imagery based, or at the very least we are highly adept at understanding spatial imagery through narrative:

“It is likely, given the importance of spatial information in oral traditions, that audiences and singers also construct relatively stable spatial models of the world described in a genre or piece and use them to understand and remember” (Rubin 1995:52).

Rubin argues that oral traditions are often unable to successfully transmit abstract concepts without the use of concrete imagery as a mental anchor for memory. Without the use of text, it is argued that abstract or heavy theoretical concepts pose significant demands on memory and are therefore typically absent from orally transmitted myths (see also Havelock 1963, 1978 – citation from Rubin 1995:60). Thus, stories use archetypal mythical characters (e.g. heroes and monsters) as concrete representations for abstract concepts:

“… Heroes and gods often symbolize or take the place of a particular group of people that would be difficult to image otherwise… Characters, or character types, in oral traditions often serve a mnemonic rile similar to that of the Greek heroes and gods. Each character has an expected image and an expected role to play that exemplifies some more abstract, not easily imageable concept” (Rubin 1995:61).

The goal of an orally transmitted education was to successfully exploit memory biases by cloaking hard-to-learn concepts in easily memorable forms. By utilizing both spatial relations
and affective imagery, oral traditions were able to better store and transmit bodies of knowledge with the minimal use of external memory aids. The use of space and location in oral storytelling as way of cueing sections of a narrative appears to be a common feature in most oral epics (Rubin 1995).

Pathways as sequences within a story bring order to a narrative, while salient imagery helps to ensure the comprehensibility of conceptually rich ideas. Rubin’s research suggests that there are recurrent trends within oral cultures, which may additionally point to a cognitive bias towards thematic structures within oral myths. In particular, Rubin states that there are correlations between the ‘method of loci’ systems for artificial memory and other forms of mnemonic devices used within oral storytelling. Spatial imagery and verbal recall appears to be a noticeable trend within the studies done on memory. As stated above, geographic landmarks are used as representational devices for cuing memory and this suggests that there is a robust causal connection between spatial imagery and memory.

The claim by Rubin that there are strategic resemblances between the Classical method of loci system and other formulaic structures in oral storytelling should not lead us to a comparative analysis suggestive of any historical connection between divergent cultures. However, we may be able to infer some optimal relationship between minds and the innovative development of narrative. In the above case studies from Melanesia and Polynesia the authors specifically discussed the use of spatial imagery in conjunction with myth in for supporting oral methods of knowledge transmission. I argue that this suggests two important recurrent features within oral cultures: (a) that the problem of memory and information management within preliterate societies was socially and technologically constrained; and (b) the common characteristics associated mnemonic devices cross-culturally may be indicative
of a feedback relationship between the modalities associated with optimal working memory, and the technological development of narrative structure. Granted, one could make the broader conclusion that by underscoring certain structural commonalities we could make some subtle nod in the direction of universalism. I argue that these commonalities motivate a cognitive examination, however the locally contingent variables that ensure recognizable divergence should not be treated as marginal. Optimality and informational fidelity is still effectively the product of resource contingencies, and the informational character of any niche environment cannot be uniformly characterized. The resources utilized for information transmission – whether they are social or technological – are often the historically entrenched consequences emerging from a variety of conditional determinants (e.g. including demography, ecological factors, economic activity, technological innovation etc). In short, niche diversity is still relevant to a cognitive examination of the tools and strategies employed in oral cultures for transmission fidelity.
CHAPTER THREE

3.1 Introduction.

By focusing primarily on traditional Māori methods of orality this chapter will examine how physical properties and learning strategies have been critical for oral memory and communication. I will provide a general overview of the data related to Māori oral tradition and epistemology, and in chapters 4 and 5 this descriptive material will be the evaluative focus for my discussion on cognitive ecological models. The comparative literature on the history of Māori oral tradition, below, describes how traditional cultural norms informed the attitudes towards knowledge sharing, and the mediums by which information is disseminated. First, this chapter focuses on Māori epistemology and the supportive learning methods for the oral transmission of knowledge. It will provide an overview of the functional role that whakapapa (genealogy) and whenua (place) have played in the management and preservation of informational resources. The psychological function of Whakapapa and ‘place names’ are seen here as learned mental schema – or cognitive maps – for organizing and transmitting knowledge. In the second portion of this chapter, however, I will look at how this concept of cognitive mapping is relevant to the conceptual organization of the landscape as a means for organizing knowledge.

3.2 Text and Talk: Māori epistemology and oral tradition.

In his article “Some Māori Attitudes to Documents”, Michael King (1978) discusses some of the cultural differences between Māori and Pakeha regarding their attitudes to recording knowledge through text. King states that there has been tendency in the West to
overemphasize written and textual methods as the most effective method for preserving information, while overlooking the cultural norms associated with orally transmitted knowledge in other cultures. Textual methods for transmission has enabled the deregulation of knowledge, leading to the wider reading of previously guarded informational resources. King states that this mode of transmission ran counter to the tikanga (customs) within Māori oral tradition. Standards of conduct were instilled so that tapu knowledge could be preserved and passed on faithfully, and the problem with text is that knowledge would be more accessible, thus diluting its sacredness.

Due to the cultural conventions surrounding the oral transmission of knowledge, King argues that Māori viewed memory skills as a particularly valuable skill. As a result, there was a great deal of importance placed upon the means by which sacred knowledge was passed. But unlike text, King points out orally transmitted knowledge requires mnemonic support for preservation:

“Traditional Māori learning did employ memory aids: there were rakau papatupuna, for example, notched sticks to assist in the recitation of genealogies; there were instructions that could be made on knotted cords; there were boundary markers; and, sometimes, there was the preservation of personal or family tattoo patterns in carving and rafter patterns… But, by and large, the great body of personal tribal information that people needed to know to establish and retain their identity, and to help them survive physically, and to be committed to memory” (King 1978:11).

Oral methods for learning meant that there was closer attention placed upon the accuracy of transmission. The reliability of transmission required learning methods that often emphasized repetition and strategies for memorization. Strict codes of conduct for retention was achieved through cultural norms connected to the observance of tapu (sacredness), as well as mana (prestige), and mauri (aura or life force) (King 1978:11-12). Sacred knowledge was (and is), therefore, a feature of Māori ritual of oral transmission guided by specific social conventions. Mana, however, is accorded to those who possess status and were charged with
the duty of protecting knowledge. Communicators of sacred knowledge accordingly held a special status within the tribe.

King states that traditional Māori epistemology considers knowledge as a ‘thing’, with its own life force, or ‘mauri’. As a result, certain individuals acted as the keepers of tapu knowledge. Subsequently, there was a strict code of conduct associated with the passing on of knowledge. According to King interpretation was never left to the reader, but monitored through the method of transmission (i.e. from teacher to student). King states, then, that any attempts to put tapu knowledge into a text format would have been seen as a profane. The regulation of knowledge ensured that it was passed down accurately, but it also meant that it could be safeguarded.

Similarly to King, historian and anthropologist Anne Salmond (1982) argues that epistemic values informed the way in which knowledge was perceived, while further shaping the attitudes towards sharing knowledge within Māori oral tradition. Salmond (1982) examines the epistemological metaphors within traditional Māori culture by looking at the differences between English and Māori conceptions of knowledge. Salmond states that English metaphors of knowledge seem to imply an inexhaustible and mutable resource that is open and always changing (Salmond 1982:82). However, Salmond says that Māori epistemology framed knowledge as a tangible commodity. Subsequently, due to the perception by Māori that knowledge was an exhaustible resource, the frivolous sharing of these resources could result in the weakened power of the individuals who possessed it:

“The Māori metaphors of knowledge… draw upon notions of oranga (necessity for life) and taonga (cultural wealth), and here knowledge is depicted as above all exhaustible and destructible, a scarce resource, conserved within the group, guarded by chosen individuals and never to be squandered” (Salmond 1982:82).
This conception of knowledge as a tangible object is closely tied to the myth of Tāne and his quest for the three baskets (kete) of knowledge. In the story of the baskets of knowledge, Tāne ascended to the heavens and brought back with him three baskets of wisdom to be given to man:

"Tāne was again purea at the ahurewa of the house Rangiatea at the time when the wananga and sacred stones were produced. Here are the names of the wānanga and of the treasured stones: (1) The kete tuauri; (2) the kete tuatea; (3) the kete aronui. These are the baskets [receptacles] of the wānanga given to Tāne-wananga.

"The kete tuauri is the basket of ritual chants pertaining to the conduct of all matters connected with Rangi-nui and Papa-tuanuka, as also of the control of all things desired to be performed by the offspring of Papa-tuanuku.

"The kete tuatea is the basket of evil, of all things evil, no matter what it be. All evil things are found in this basket, all things practised by the offspring, or by Rangi-nui, or by Papa-tuanuku, by the sun, by the moon, by the stars, by the wind, by the rain, by water, by trees, by stones, by all things. That is the basket exposing their evil acts, dissensions, strife among men and gods, all are found there.

"The kete aronui is the basket of love, sympathy, compassion, of peace-making, of the condition known as permanent peace, and of all actions pertaining to the knowledge of arts by means of which are benefited men, land, trees, water, earth, herbage, food-supplies, animals, birds, fish, insects, and all other things seen by man" (Best 1924: 103).

The story here underpins the Māori conception of knowledge as being fixed and bounded. There is a clear epistemic divergence from modern conceptions of knowledge here. Within Māori cosmology, knowledge is viewed as something that is tangible and immutable, while the modern Western conception knowledge is conceived as an intangible body of data that is open and given to change.

This conception of knowledge as having an autonomous reality is relatable to King’s observation that the indiscriminate sharing of knowledge further deteriorates its sacred
power. According to Salmond (1982), this is why importance was placed upon the correct management and recitation of knowledge (Salmond 1982:84):

“Once knowledge (including valued technologies) comes into a man’s possession however, from elders, ancestors and gods, the task is to pass it down to succeeding generations, and to keep its sacred power intact by ensuring that the conditions of transmission are tika or correct” (Salmond 1982:83).

King and Salmond have cornered a key issue that will be important to this thesis in coming chapters: that cultural conventions shape both the epistemic framework of a culture and the means by which knowledge is transmitted. Religious norms and conventions play a significant role in the way in which individuals treat knowledge and the way in which it is passed on. But King’s article also explicates on the importance of memory and the preservation of knowledge resources, and in the next section I will look at how cultural conventions inform the cognitive aspects of transmission and the way in which mnemonic strategies support Māori oral tradition. Against this background on the epistemic values surrounding knowledge sharing, the next section will look at how knowledge is organized and managed with traditional Māori oral tradition. I look at how the mapping and organization of Whakapapa (genealogy) has played a role in the management of information relevant to both tribal/kinship structure and the memorization of a mythic corpus. The discussion on orally taught mnemonic strategies in the next section will be more relevant to later sections on the mnemonic value of landmarks and place names.

3.3 Whakapapa as a Cognitive Map.

The sacred conventions associated with Māori oral tradition reflect this need to preserve knowledge and this is further bolstered through the accuracy of retention. Achieving high fidelity information transmission through oral means alone has its own problems, and one of
the major constraints to the preservation of knowledge within oral traditions is individual memory. Without the modern use of administrative tools, such as text, the faithful transmission of knowledge requires the use of mnemonic tools and strategies for preservation. Because pedagogical techniques within Māori culture were traditionally bound by oral customs, it has been suggested that Māori used mnemonic techniques that better enabled preservation and transmission (Best 1921; Haami 2004).

One of the methods by which an oral history was preserved within Polynesian cultures was through the structuring of myths and genealogical records. Authors on traditional Māori culture have claimed that a whakapapa (or genealogy) functioned as an information storage device for maintaining and tracking a people’s history and cosmology. Since Māori political structures were based on kinship, managing information was closely connected to genealogy and was critical to the functioning of the social structure. However, these complex ‘family trees’ that tracked descent lines (often from the atua [gods]), also contained valuable historical, social and ecological information connected to a larger mythic corpus.

For instance, Bradford Haami (2004) states that whakapapa acted like an extensive list that communicated crucial data about the local ecology, familial and political relationships as well as associations to land and territory:

“Whakapapa (genealogy) was essential to the preservation and recitation of oral history. Whakapapa remains the ‘skeletal framework’ which validates traditional history. Genealogy formed the basis for the order of life and acted as a marker in tabulating the chronology of human history, and that of the universe… The creation of the universe, the formation of the earth and its elements, the emergence of biodiversity, the source of knowledge, the creation of humans, the arrival of people in Aotearoa, and their subsequent travels, were all remembered through genealogies” (Haami 2004:15).
Essentially, whakapapa functioned as an information storage device, and as a virtual reference library for transmitting an oral history. As an informational resource the structure of a whakapapa provides a multivalent function: it primarily communicates familial knowledge, but it also acts as a kind of epistemic charter for organizing information and legitimizing socio-political institutions. Because social structures were founded upon myths, and a specific cosmological understanding of the world, whakapapa validated tribal identity and customs associated with familial rank.

The diagram below in Fig 2 is a visual representation of a genealogical chart showing the whakapapa from Tamatea-Ariki-nui:
Due to the value of whakapapa, Haami states: “Great effort was taken to ensure that whakapapa were memorized correctly” (Haami 2004:16). Similarly, in “Mind Maps of the Māori” (Roberts 2012), Mere Roberts offers some insight into the methods used within oral traditions for memorization. Roberts (2012) focuses particularly on the use of whakapapa as a cognitive support for memory and oral transmission. She states that within Polynesian cultures the more conventional template upon which the universe is organized is with the use of genealogical maps, like whakapapa. Roberts (2012) suggests that myth and utilitarian knowledge go hand-in-hand and like all preliterate societies Māori had to devise ingenious methods for preserving valuable information about their ecology, economy and geography.

Whakapapa is commonly known as a map for tracing familial descent within Polynesian culture. By definition, familial relationships are ‘layered’ on top of one another, and the recitation of a person’s whakapapa required the memorization of how these descent lines were ordered:

“[By] using genealogy as a cognitive template the origins and history of all things can be spatially arranged in hierarchical order, a format which facilitates memorizing and retrieval… Known as whakapapa, literally meaning ‘to place in layers’, this framework is most commonly used to record human descent lines and relationships in which the lineages connect each papa or layer (a metaphorical reference to each generation of a family). While detailed cosmogonical accounts were regarded as esoteric knowledge and restricted to a select few, all other whakapapa of things of this world were common and essential ‘everyday’ knowledge” (Roberts 2012:2-3)

First, Roberts first discusses the navigational skills that were important to Polynesian and Micronesian voyaging. All cartographic skills were memorized by oral means and experience. Without the use physical maps navigators had to rely on star guides that were committed solely to memory (see Turnbull 1991).
However, Roberts claims that this ability to memorize and recall real world knowledge (such as navigation) was aided through the recitation of mythic narratives also (Roberts 2012). For instance, the supernatural world, and the natural history of a particular region were typically integrated into myths in order to epistemic frame of reference. Stories often conveyed strategic information about the environment. She states that while whakapapa acted as a template for recalling myths and familial relationships, it also extended into the natural world and Māori would have used whakapapa as a record of information about their ecology.

Second, Roberts (2012) sees the whakapapa template as an epistemic framework whereby knowledge is organized into a workable structure. Put simply, whakapapa acts as library system for organizing the natural world and distinguishing ecological properties, such as species and fauna. The memorization of a whakapapa structure provides more than a genealogical library. Indeed, Roberts says that: “whakapapa act as cognitive maps, delineating spatial and temporal discontinuities within a particular environment” (Roberts 2012:743-744). Whakapapa organized the environment into an accessible library that conveyed information about how animals, resources and geography interrelate.

For example, Roberts uses the kumara (sweet potato) as an example of how cosmogony, myth and the natural world are intertwined within Māori oral tradition. She argues that the whakapapa structure coincides with narratives to support the memorization of information on the kumara and its ecology (Roberts 2012: 744-746; see also Roberts et al 2004). Roberts provides an abbreviated version of the mythical narrative associated with the kumara here:

“It tells of how a folk-hero, Rongo-maui, climbs to the heavens to obtain some of the kumara tubers from his older brother Whanui (a star known also as Vega), who is guardian of the celestial kumara. On being refused, Rongo-maui decided to steal some of the tubers thereby accounting for the origin of theft in this world. After returning to earth with the precious tubers in his scrotum, he
impregnated his wife Panitinaku (tinaku = to germinate, sprout, conceive) who then gave birth to their earthly descendents in the waters of Wai o Mona-Ariki. (This underwater birth of the kumara is often re-enacted today in the practice of placing stored tubers in water to stimulate sprouting of shoots prior to planting). After cooking the kumara to remove its tapu (sacredness) they were eaten and enjoyed by her nephews the Maui brothers, who then enquired as to their provenance. Pani’s silence persuaded one of the nephews to secretly follow her and upon observing their birth he informed his brothers they were being fed on the impurities of Pani, which caused them to depart to far-off lands. In shame at being observed, Pani fled to the underworld with her daughter Hine-mata-itī, who became the ancestor to the kiore (Rattus exulans or Pacific rat) a nocturnal animal which inhabits dark places. In the meantime Whānui looked down and on seeing men cultivating his stolen kumara, decided to seek revenge. So he sought the help of Nuhe, Toronū, and Moka. Each summer the physical manifestations of these celestial beings descend from the heavens as caterpillars (one species is known to scientists as Agrius convolvuli) to attack the leaves of the kumara crop” (Roberts 2012:744-745; see also Best 1972: 827–833).

The story above, for example, outlines the history of the kumara (a native sweet potato), as well as the social norms for behavior in relation to the resource – its nutritional and ‘tapu’ qualities. The above excerpt emphasizes the importance of cooking kumara before eating (in order to remove its tapu). But Roberts also argues that these stories provide crucial information regarding the planting and harvesting of the plant food itself (i.e. the fertility of kumara in certain areas and seasons) (Roberts 2012:5).

Roberts argues that the structure of whakapapa outlining familial relationships were typically used as effective information storage devices for animal and plant taxonomies. They serve as memory supports for the types of ecological information that were important to a functioning economy:

“… it provides the mental framework for spatial information about the local terrain, in this case the ‘environmental realm’ of Rongo. This deity, the personification of the kumara, immediately locates the listener in a specific landscape i.e. the gardens in which food plants were cultivated. The narrative acts to put flesh on the bones of the whakapapa, describing in more detail spatial, temporal and functional interactions between the kumara and its surroundings” (Roberts 2012:745).
The story of the kumara provides information on its spatial relationships with other plants, and where the kumara is grown (in wet areas), as well as temporal information about the seasons (alongside information about predators and pests) (Roberts 2012).

In another example, Roberts examines the taxonomic organization of fish and lizards within the whakapapa structure. She states that the myths surrounding the god Punga, for example, convey information for species with their common ancestral lineage (Roberts 2012:746). Speciation appears to be connected to general aesthetic attitudes also, since Roberts states that Punga, god of ‘ugly things’, was also associated with fish and lizards. Species were also identified within a whakapapa for their morphological similarities (Roberts 2012:746).

As an epistemic framework, whakapapa also constituted a cognitive orientating device. In their article “Understanding Māori Epistemology” (1998) Roberts and Wills claim that whakapapa was integrated into a belief system that incorporated myth, history, kinship and ecological knowledge. Roberts and Wills claim that cognitive devices like whakapapa were elements that constituted a 'worldview', and while cultural practices can be isolated and examined for their cognitive function, they nevertheless remain part of a larger cultural framework that reinforces certain values and experiences. A functional worldview, they claim, also encompasses concepts of time and space, in addition to attitudes towards knowledge (i.e. an epistemology). Roberts and Wills (1998) provide a brief overview of how knowledge was organized by early Māori through cognitive maps like whakapapa. As stated above, whakapapa performed a functional role as a genealogical and mythological library system:
“Whakapapa thus encapsulates the Māori worldview. It acts as a cognitive template for the ordering and understanding of the visible and invisible worlds, as a paradigm of reality” (Roberts and Wills 1998:46; emphasis added).

Within Māori culture “to know” something is to locate it in space and time” (Mere and Wills 1998:45), and knowledge about a person or tribal identity was embedded in an idea of place and knowledge of ancestry. Like whakapapa, the landscape is littered with markers tracking the myths and historical identity of the people and their relationship to it. Place names are therefore crucial to an understanding of tribal history and identity since they connect people to a place and time. Having a historical basis for identity, therefore, requires that an individual recognize when and where their tribe and family is from:

“Knowledge is a sacred power that belongs to a group rather than the particular individual who may hold it for a time, and can only be passed on to chosen members of the group. As a sacred power knowledge can be ‘talked into’ physical objects as in the blessing of a building or a ceremonial ornament. Likewise, stories are told of how ancestors, in claiming territory, named landmarks, rocks, trees, waterfalls, and so on, and thereby locked together tribal understanding with the entities themselves so that a place and its knowledge could be separated” (Roberts and Wills 1998:49).

Within a traditional Māori epistemology, knowledge is viewed as something tangible that can be stored at various locations or ‘talked into things’ (Salmond 1982). This is why knowledge, once encoded in myth, was associated with actual locations. Places are where knowledge can be found, and later in Chapter 5, I will look specifically at the cognitive dimensions of memory and landscape. I argue that oral cultures utilize physical properties – like places – as cognitive inputs for supporting memory. However, in the next section I will outline some of the historical data on the use of landscape and myth within Māori oral tradition. Like whakapapa, it is argued that the landscape was utilized for organizing knowledge and supporting oral memory, by organizing the landscape through myth and place names. The cognitive organization of physical cues follows on from the previous chapter’s
overview on mnemotechnics, while the next section elaborates further on the traditional Māori use of geography and myth.

3.4 The Epistemic Landscape.

As Anne Salmond (1982) states, landmarks were not just metaphors, but concrete places where knowledge was stored. Roberts and Wills (1998) observe that Māori identity is closely linked to genealogy and place and this is why location and myth is so tightly bound up with whakapapa. Within traditional Māori culture, knowledge can be located on the landscape and embodies a sacred value alongside its place. As in the case of the kumara whakapapa above certain informational resources can be unlocked by the retelling of a mythic narrative. Place names and landmarks helped reinforce a particular conception of knowledge – and that information could be ‘located’ on the landscape also.

Roberts (2012) suggests that landmarks or place names served a similar function to whakapapa for supporting memory and knowledge storage. Valuable information could be placed on the landscape, like repositories of knowledge, and then accessed through the retelling of certain narratives. Like the method of loci, characters within a story travel logically from one location to another in a sequence that follows a particular pathway. However, the narrative normally associates the location with significant historical knowledge, or information about the landscape itself. Mythic narratives in conjunction with landmarks facilitated the organization of knowledge into manageable units:

“In pre-literate societies, mental maps help to locate and fix things of importance to a culture in time and place. The landscape itself is clearly an important referent not only in spatial terms but once names, it also served as a repository of mythical, spiritual and historical information. Once rendered cultural, the landscape acted as a mnemonic whereby knowledge of past events
could remembered and recalled by walking the land and retelling the narratives pertaining to the place… In this respect place names may also have a whakapapa in which various layers of information overlay and conceal hidden historical and mythological meanings” (Roberts, 2012:747; emphasis added).

Comparisons can be made here with the Melanesian examples discussed in Chapter 2, particularly Harwood’s examination of the Trobriand use of landmarks as memory devices (Harwood 1976). In both cases, information is cued through storytelling and the recollection of place. Roberts and Wills (1998) argue that place, or whenua, serves as mnemonic support for unlocking historical information about tribal knowledge (Roberts and Wills 1998:54-55). Salmond states that the naming of places is not just a matter of applying labels. Instead, knowledge actually belongs to, or is found in specific locations (Salmond 1982:84):

“Landmarks and certain buildings are critical to group structures of knowledge in Māori society. It is not so much that structures of knowledge is projected onto an imaginary landscape or into a metaphorical building process; rather, specific knowledge is ‘bound into’ specific landmarks and chiefly houses, carvings, carvings and heirlooms belonging to the descent groups, in a direct and immediate relationship” (Salmond 1982:84).

Names have a power, and the capacity to fix knowledge in a specific location meant that knowledge could accessible in space and time. The ‘truth-value’ of something is founded upon a landmark with historical and mythic significance attached to an actual physical property. In the Māori case, the naming of a place often applies to the ancestral history of a tribe with the stories themselves describing ancestors who traveled to these locations. Place names are often associated with a story or deed involving an ancestor (or mythical being) traveling along a route with place names being ordered into a logical sequence on a map:

“In the accounts of any descent group (its histories, songs, players, proverbs and oratory), stories are told of how ancestors claimed territory, naming landmarks after parts of their bodies; how they traveled across that territory, leaving names behind them… A child would often be taught a particular account in the one place, so that the place and its knowledge were one, and the place and its name became a guarantee for the truth-value of that account – ‘I know it’s true because I have seen that very rock’” (Salmond 1982:84-85).
Salmond focuses on the epistemological value of place here, and further comparisons can be drawn between Harwood’s (1976) study of the Trobriands and the traditional Māori case study (see Chapter 2; Harwood 1976). A peoples’ history can be plotted on a landscape, and the truth-value of that historical relationship can be interfaced through myth. Once more, Salmond does not contend that Māori viewed these relationships of spatial and temporal properties as merely metaphorical associations. Instead, the naming of territory is commensurate with an epistemic frame-of-reference that cannot be separated from knowledge: landscape and naming functions as a physical system of knowledge storage. As discussed in Chapter 2, landmarks are used in conjunction with myths to support oral transmission. I argue that spatial imagery plays an important part in the myths and history of Māori oral traditions.

There is also a cognitive dimension to the structure of myth and the use of place names, and it will be argued further in Chapter 4 that landmarks functioned as cognitive inputs for supporting memory and representational ability. But first, this section will look at some of the data concerning the relationship between landmarks and myth within Māori oral tradition. The records discussed below were compiled for the New Zealand Geographic Board (NZGB) (1990), and clearly demonstrate how maps were orally passed on through storytelling. The compiled material in *Place Names of the Ancestors: a Māori Oral History Atlas* (1990), provides a historical overview of Māori place names from around Aotearoa, alongside the their origins and social function. The book puts into context traditional Māori place names by supplementing the myths associated with the landmarks and their translations. The book’s goal is to show how myth and landscape interface for the purposes of organizing knowledge and oral memory. According to *Māori Oral History Atlas* these were oral maps constructed within mythic narratives for the purposes of recalling critical geographical information.
Furthermore, oral maps contributed to an epistemic framework (i.e. worldview), since myth and storytelling aided in the coordination of knowledge and place. It is argued that, unlike the European (Pakeha) names for geographical locations (which evidently became common with colonization), Māori place names embodied valuable information about the land and its history. For example, many of the mythic narratives within Māori oral tradition related to landmarks and follow the route of an ancestor or mythical figure. Each place name would be interconnected with a story about the character and the location and. Often, the name of the locale could be used to convey details about the local ecology or geography. So while a landmark functioned as a narrative cue, the stories themselves provided a mental map of the terrain.

The *Māori Oral History Atlas* (Wilson 1990) points out that navigational skill relied heavily upon oral accounts of the landscape. Without the use of physical maps, stories that contained details about a route or territory were committed solely to memory, and since Māori oral tradition relied upon individual memory for the transmission of knowledge, features of the landscape functioned as mnemonic cues:

“The names of the landscape were like survey pegs of memory, marking the events that happened in a particular place, recording some aspect or feature of the traditions and history of a tribe. If the name was remembered it could release whole parcels of history to a tribal narrator and those listening. The daily use of such place names meant that the history was always present, always available. In this sense living and traveling reinforced the histories of the people” (Wilson 1990:xiii).

Particular names given to landmarks functioned as information storage tools for memory. Names could embody information about a particular area, and these were used as signposts within stories, whereby place names were ordered in a sequence that reflected locations on a map. The events in the story were often placed in a particular order according to the order of
the place names on the landscape. The narrative of a story followed a route along these places, thus providing a structure for the story (as well as a means to convey a logical sequence of locations on a map). This method of coordinating myth and place constitutes the oral map while supporting navigational memory:

“It is this relationship between the historical tradition and a group of names which gives rise to the concept of the “Oral Map”. The story explains and orders the geography and the land geography reinforces the history. The two serve each other” (Wilson 1990:xiii).

The Māori Oral History Atlas points out that the significance of place names were often contextually mutable, and so when tribes moved to a different region they just ‘replanted’ their history within the new area by utilizing the same names from their ‘place of origin’ onto the new territory (Wilson 1990). As a result, comparisons can be made between Māori and Polynesian myths from other territories. Indeed, Agathe Thornton (1989) has previously noted that there are strong similarities between the motif-sequences, formulas and narrative structures of Māori and traditional Hawaiian myths (Thornton 1989; see also Grey 1971/1854). These similarities suggest that it is not only the stories themselves that are passed on, but the oral ‘styles’ (or formulas) as well.

The Māori Oral History Atlas (Wilson 1990), however, examines specifically the use and structure of oral maps within myth. Here, I examine two stories from the Atlas in order to highlight how myths and geography were blended into a historical-mythological narrative. These two stories from the Atlas, ‘He Oriori Mo Wharau Rangi’ (‘Hau: A Lullaby for Wharau Rangi’) and ‘He Whakarāpopotonga I Ngā Kōrero Mo Poutini’ (‘Poutini: A Guardian Taniwha’) both follow particular routes along geographical locations that are integrated into a narrative.
The below lullaby provides a mythic description for how the rivers on the West Coast of the North Island were named. The latter part of the story is focused Hau and his pursuit of Wairaka (who is thought to be his wife):

“He Oriori Mo Wharau Rangi,

1
Taku pōtiki, e, ko Wharau Rangi e!
Ka rongo o tūpuna, ka makā mai ki au,
Māku, e hine, ma te hūrū e,
Ma te whakarongo kite whita kōrero
I pipiri ki te pō
Ngā toka whakaahu o to kōrua kuku e,
0 iōku rua wāwā’i, o taku rua pakē,
Ka wehea ko te tau e.

2
Hoki mai, e hine, kite ao, mārama!
Whakatū tāua ki aku manu e,
Te tangata i patua e te tini o Tio,
Waiho nei ki tāua, e.

3
E hine āku, e tangi nei kite kai,
Me whakainu koe kite wai e ngata,
Me whakangongo koe kite wai ka rail;
Te mate o Tāwhaki, e.
Whakaputa kite toni, ka kē te kāhu,
Na Tiurangi, e, na Tiupākihi.
Na Kapokai, e.

4
Kimikimi noa aria ahau, e hīne,
I to kunenga mai i Hawaiki,
I te whakaringaringa, i te whakawaewae,
Te whakakanohitanga.
Ka mānū, e hīne, te waka i a Ruatea,
Ko Kurahaupō.
Ka iri mai tāua i runga i Aotea,
Te waka i a Turi.
Ka ū mai tāua te ngutu Whenuakura;
Huaīna te whare, Rangi Tāwhi
Tiria mai te kūmara;
Ka rua mai te karaka kite tai ao nei.
Keria iho e Hau ko te punga tama wahine,
Ka riro i ngā tuahine, i a Nōnokouri i a Nōnokotea.
Translation in English:

“Hau: A lullaby for Wharau Rangi,

1
My little Child, Wharau Rangi!
What your grandsires heard they freely gave unto me
For me and mine, O maiden, because I listened, Heeded, and retained the stories complete.
In the house was told the Kāhui Rongo ritual, Told to a group in the night, Hence the rock shrine of your tight-lipped elder, Hence my store pit, renowned pit, to be shared with my absent loved one, ah me.

2
Return, O maiden, to the world of light! Let us pause and pay tribute to my noble ones. He who was killed by the myriads of Tio
Bequested grief and sorrow to you and me, 
ah me.

3
O maiden my own, now fretting for food,
I shall offer you the water that satisfies
You are to sip from the water that spurts.
Now as to the death of Tāwhaki,
It came in the third month with Hawks
a Screaming,
Aloft were Swooping-in-the-heavens, Swooping-
down-to-earth,
And the Food-snatchers, ah me.

4
I am trying to remember, O maiden,
How it was you sprang forth from Hawaiiki,
How the hands were formed, then your feet,
Until your face took shape.
Now afloat, O maiden, is the canoe of Ruata,
And ‘tis Kurahaupō.
We two were carried hither aboard Aotea,
The canoe of Turi.
We landed at the river’s mouth at Whenuakura,
The house there was named Rangi Tawhi;
The kūmara was then planted;
The karaka, too, soon flourished in the land.
Hau thereupon dug the odd extra female plots,
Which were taken by his sisters Nōnokouri and Nōnokotea
To mark them off, the border of a robe was hung,
Hau scooped up a handful of earth
From the portion of the Staff of Tūroa;
He then crossed the river
Which won him great renown, and it was
WHANGANUI;
He splashed through cloudy waters, hence
WHANGAEMU;
He felled a tree so he could cross, hence TURAKINA;
He strode across the land, hence ‘Tīkei;
(RANGITĪKEI)
Then he stumbled, O maiden, hence MANAWATŪ;
A buzzing sound assailed his ears, hence HŌKIO;
A tiny stream he named his own, hence Ō HAU;
He held his staff as he spoke, hence ŌTAKI;
The water beyond were lost in the sands hence
WAIMEHA;
He stood and stared in amazement, hence
WAIKANAE;
Then he breathed a sigh of relief
For he had come to Wairaka.
And he cast a spell; fixing it above, and fixing it below.
It was thus he came to rest, O maiden!
He gave a flashing glance, hence WAIRARAPA;
Indeed it was there your ancestor gazed about him.
The clouds lifted up on high, hence TE PAE A WHAITIRI;
The lengthened day was made to detain Kai Tangata
Out on the open sea.
The beam was made and posts were fixed;
The posts were Stiffened-was-the-heavens and Meremere.
The family became the anchor of his canoe,
They were Te Haumea and Te Awhemā;

Below is a table (Table 1) showing the place Names from ‘Lullaby for Wharau Rangi’ and their translation (Wilson 1990:67). The names relate to parts of the story above, but they also demonstrate how imagery is utilized in the story as a mnemonic: each name is shown to have a concrete-physical association to both the landscape and a component of the story:

<table>
<thead>
<tr>
<th>Place Name</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whanganui</td>
<td>Great river</td>
</tr>
<tr>
<td>Whangaehu</td>
<td>River of cloudy water glance</td>
</tr>
<tr>
<td>Turakina River</td>
<td>Crossing on a felled tree</td>
</tr>
<tr>
<td>Rangitikei</td>
<td>River crossed by striding</td>
</tr>
<tr>
<td>Manawatū</td>
<td>Stumbling</td>
</tr>
<tr>
<td>Hōkio</td>
<td>The hearing of a buzzing sound</td>
</tr>
<tr>
<td>Ō Hau</td>
<td>(River) of Hau</td>
</tr>
<tr>
<td>Otaki</td>
<td>The holding out of a staff</td>
</tr>
<tr>
<td>Waimeha</td>
<td>Water lost in the sands</td>
</tr>
<tr>
<td>Waikanae</td>
<td>Water of staring in amazement</td>
</tr>
<tr>
<td>Wairarapa</td>
<td>Water of a flashing</td>
</tr>
</tbody>
</table>
This simple lullaby contains cartographic information (as an informational resource) while conveying a mythic-historical story about these places. Oral mnemonics and devices would have been essential for the transmission of knowledge, and in the above example stories are intertwined with places for a similar purpose. The attachment of these stories to place names – and subsequently specific geographical locations - provides a physical anchor for memory. In the latter half of the lullaby place names are retold in a sequential order following pathway locations on a map (see Fig. 3). However, the logical structure of these kinds of narratives also supports the premise that spatial imagery is linked to declarative memory (Rubin 1995). The underlying features of the oral map stories suggest that there is an optimal connection between the narrative structure of myth, spatial knowledge and memory. In Fig. 3 below we see how these names are placed on the map, as well as the route taken by the characters in the story.
The second narrative I will look at involves a chase involving the taniwha, Poutini, who kidnaps the wife of Tamaāhua, who then pursues Poutini southwest across the North and South Islands. In addition to protecting the waters along the West Coast of the South Island, Poutini is also said to guard “both the people and the spiritual essence or mauri of pounamu, greenstone” (Wilson 1990:83). In particular, Poutini is in service to an atua (god) named Kahue (or Ngahue) whose spiritual force or ‘mana’ is connected to pounamu (greenstone) (Wilson 1990:83). The story of Poutini begins with an abduction of Waitaiki, and the eventual pursuit initiated by Tamaāhua. The husband pursues Poutini and his captured wife to
various locations from the top of the North Island and down to the West Coast of the South Island. Poutini eventually transforms Waitaiki into pounamu (or greenstone) in order to hide her and lays her down in a riverbed.

The story is a mythic explanation for the origins of pounamu (greenstone) in the Arahura River. However, it is said that the story of Poutini summarizes the very first ‘geological survey’ of New Zealand, as the prominent place names used in the story coincide with specific locations where ancient quarries can be found (Wilson 1990:84). The narrative follows the chase by Waitaiki’s husband, Tamaahu, as Poutini navigates his way to various locations of significance where the mining of certain stones were once common:

“‘He Whakarāpopotonga I Ngā Kōrero Mo Poutini,
Ko Poutini te āingo o te taniwha, arā, te kaitiaki a tōna iwi, me te mauri hoki o te pounamu o te tali hauuru o Te Waipounamu.
Na, he mōkai a Poutini nā te atua nei nā Kahue (Ngahue), nāna nei i tuku tōna mana kīte pounamu. Ka noho ai a Poutini i te moana he tauītia tāna mahi i te mauri o te pounamu I ngā wā katoa.
I tētehi wā i kawe motutia e Poutini tētehi wāhine no Tūhua, ka kāwhakitia e ia, tau noa atu ki roto I te awa o Arahura. Tēnei ano te tāne a tāua wāhine kei muri e whai haere atu ana. Ka mau a Poutini ki tāua wāhine - ko Waitaiki te āingo - kātahi ka whakakōhatutua, hunā iho ki roto i te awa o Arahura. Tukua e Poutini tōna mauri ki a Waitaiki, arā, te mauri o te pounamu. Waiho tonu iho a Waitaiki hei whaea mo te pounamu, whānau mai ai āia te katoa o te pounamu. Ko te tāne a Waitaki i hoki ki tōna kāinga i roto i te pōuri i te aroha ki tāna wāhine.

No Poutini Ngāi Tahu te āingo e mōhiotia nei ko Kāti Waewae, he hapū here i a Ngāi Tahu Whānui ki Te Tai Poutini.
He taniwha a Poutini, ko ia te kaitiaki o Kahue (Ngahue). Nā, ko Kahue, (Ngahue) he atua pounamu. Tōna hoariri mai rā anō, ko Whatipū. He kaitiaki tēnei no Hinehōanga ko ia nei te atua o ngā hōanga, arā, ngā kōhau orooro pounamu.
I tētehi wā, ka kitea atu a Poutini e Whatipū e tere haere ana I waenga moana kātahi ka whāia - koia nei hoki tāna mahi i ngā wā katoa - kāore i mau a Poutini. Tēra a Poutini e huna mai ra i roto i te wai i tētehi kokoru whāiti i te tahatika o te moutere TŪHUA. Ao ake, te atatū tonu, ka kite atu ia i tētehi wahine ataaahua e haere ana i te tahatika. Ko Waitaiki te āingo o tāua wahine. Ko titiro atu a Poutini ki te wahine nei e unu ana i ōna kākahui, ā, kua ruku kite wai. I te tino ataaahua o tāua wahine ka pohanetia e Poutini.
Kua warewaretia e ia tēra tāna hoariri, a Whatipū e kimi haere ra āia i waenga moana, mau atu ki a Waitaiki kawe motutia, tau noa mai i Tahanga (kei te taha tonga tēnei o Moehau a Tama).
Tērā te tāne a Waitaiki, a Tamaāhua, kei roto i tō rāua moenga ktahi anō ka oho ake te wairua. Ka tirotiro kei whea a Waitaiki, ka karanga, kāore he whakautunga mai, ka karanga anō, ko taua āhua anō. Kua pāwera ia kātahi ka heke kite tai, nā, e hora ana ngā kākahu o Waitaiki I te tahatika. Mōhio tonu a Tamaāhua kua pā he aitūā ki tāna hoa. I roto i ōna pōkekakeka mō Waitaiki ka hare ki tana ūāhu ki rēira tuku ai i tana karakia ki ōna atua Ida hōmai he māramatanga ki āia. Ka puta te māramatanga tērā, ko tana tekateka heī kai tohutohu i te ara hei aru mana e kīteia āi e ia a Waitaiki. Heoi, ka whiua e ia tana tekateka, ka tārewa i te takiwā, ā, ka tohu te mata o te tekateka ki tuawhenua. Kakama tonu te whakarewa a Tamaāhua i tana waka, ko ia e aru ana I te ara i tohua ra e tana tekateka.

Tērā a Poutini kua tae ra ki TAHANGA, kua kā te ahi hei whakamahana i a Waitaiki. Ka mahana anō a Waitaiki ka whati te tira a Poutini I tuawhenua tau noa mai i WHANGAMATĀ I Taupō.

I muri, ka tae atu a Tamaāhua ki Tahanga, kua mate noa atu ngā ngārahu o te ahi a Poutini: Heoi, aru tonu ia i te huarahi i tohua e tana tekateka, ā, ka tae at-u ki Taupō, arā, ki Whangamatā. Nā i rēira e tōpū ana ngā ngotungotu o te ahi a Poutini kua mātao kē noa iatua. I tēnei wā kāore anō a Tamaāhua kia mōhio ko wai tēnei e kāwhaki nei i a Waitaiki, he tangata, he taniwha, he aha rānei.

Pēnei tonu te mahi a ngā tokotoru nei. Ko Poutini rāua ko Waitaiki ki mua ko Tamaāhua me tana tekateka ki muri whai haere atu ai. Tae atu ki ONETĀHUĀ, tae atu ki WHANGAMOA I Whakatū, ki RANITOTO ka huri ki te tonga aru haere atu i te tahatika ka tae atu ai ki PĀHUĀ (kāore i tawhiti atu i Punakaiki). Haere tonu, pahemo ake a Māwheranui, a Taramakau, a ARAHURA, tae at-u ai ki Mahitahi. I ngā rā o mua haere ai ngā tūpuna mā runga waka mai i konei ki TAKIWAI. I a Tamaāhua e whakawhiti ana i te puaha o te awa o Arahura ka rongo iho ia i te āhua mahana o te wat o tēnei awa. Tēna tana tekateka e tāwhiri mai ra i āia heoi tāna he whai kau atu, ka ahu rāua ki te tonga.

Mai i Mahitahi ka tere a Tamaāhua mā runga waka ki Takiwai — ko te puaha tēnei o Piopiotahi. Ka tirotiro ia kāore he aha i rēira ēngari ko tana tekateka kua huri te mata kite ara I arumia mai ra e rāua. Kua tino pāwera a Tamaāhua i āia e whai haere atu ana i tana tekateka. Tae atu ki Arahura - ko te awa tēnei i rangona ra e ia te mahana o te wai - kua mōhio tonu ia kua tino pangia tana hoa wahine e te atūā. Heoi, ka whakarite i āia mō te parekura - he tauā ra hoki ia.

Ko Poutini kua mōhio - he aha ra hoki - tēnā a Tamaāhua kei te whai haere atu i roto i te awa o Arahura ki te patu i āia kia mate rawa ātu. Kātahi ia ka huna ki roto I tētehi awa e whangai a-u ana ki roto o Arahura. Ko te awa tēnei e möhioitia nei i nāianei ko WAITAIKI.

Mōhio tonu a Poutini ina mau ia i a Tamaāhua e kore ia e ora. Ka tan tana whakaaro mēhemea e kore e oti tāna i āhia ai, ara, kia riro i āia a Waitaiki, e kore hoki ia e pat kia riro i tētehi atu. Na rēira i whakakōhatutia ai e ia, e tukuna ai e ia tōna mauri pouarnui ki a Waitaiki, waihotia atu e ia kia takoto ana i te whaiawa o te pūnuituanga o Waitakiwa iwa roto a Arahura. Ka hun a Poutini ka aru ki te moana, whakamōkihi haere, ā, ka pahemo ano i a Tamaāhua, ko ia tēna e tere ana kīte moana, ngaro atu, waiho a Tamaāhua kia kimi ana i a Waitaiki i roto o te awa o Arahura.

Kei rēira tonu a Poutini e tere haere ana I nāianei, he kaitiaki nō ngā whenua o te tai hauāuru ki te tonga me ngā pouarnui i whakatapua iho e ngā tūpuna o neherā. Koia taua tai c möhioitia nei i nāianei ko TE TAI POUTINI.
Kitea rawatia ake e Tamaāhua tana hoa wahine kua kōhatutia, ara, he pou namu kōmā nei, he ataāhua, he īnanga te īngoa o taua pou namu, he pou namu tino nanawanuitia e te tangata i nāianei. Ka mu tu rā anō tana tangi kia Waitaiki, ka titiro ake ki ngā maunga e rua e tū mai ana i rēira ka taunahatia e ia ko TŪHUA tētehi ko TAMAĀHUA tētehi. Ka mu tu ana whakarite kātahi ka hoki. Ka moe anō he wahine ka puta he uri, ko ngā kōrero mō aua uri kei te mōhiotia e tōna ivi o tōna takiwā.

Mai rā anō i aua wā o mua, ka kōrere te hukapapa o ngā maunga, ka rere te waipuke o Arahura ko tahia iho ngā kuru pou namu, koia nei ngā uri o Waitaiki. Ko ngā un ēnei o te mauri o Pou namu.

Ko tēnei pakiwaitara e whakaatu ana i ngā wāhi mahinga a ngā tūpuna o neherā i a rātou maripi, arā i ngā toki, i ngā mere, i ngā hei me ēra atu taonga a mua.

Nā, i TŪHUA he matā te taonga, paopaoa ai kia ngahoro ngā kongakonga koia nei a rātou maripi. I TA HANGA, he pakawara te īngoa a te kōhatu i orooroa hei toki; i WHANGAMATĀ - he matā anō ēngari he panetao te īngoa i mōhiotia e ngā kaumāta, he rere kē i ngā matā o Tūhua. I ON ETĀHUA ko ngā kōhatu ēnei kua pūngurarutia e te wai; i WHANGAMOA he pākohe, he wāhi mahinga mere me ēra atu mea; i RANGITOTO ko taua kōhatu anō, kei rēira ngā wāhi mahinga o ēnei taonga a te patu, mere, me ēra atu mea. Kei PĀHUA ka kītea tēnei kōhatu, te Hine a tauira, mā tēnei hei wiri e puta ai te rua ki te pou namu. Kei TĀKI WAI, arā Piopiotahi tētehi wāhi mahinga i nga taonga kuru takiwai (tangi wai), kāore e kītea tēnei taonga, te takiwai, (tangi wai) i ētehi wāhi atu.

Hoki rna ki ARAHURA ko te tino rangatira o ngā kōhatu katao, e mōhiotia nel e te ao whānui, ko Pou namu me ona tini kāranga rangatanga; īnanga, kawakawa, kahurangi, kahotea, totoweka, tēnā te mūnga atu o nga īngoa.

E kī ana te kai ihi koia nei te whakaatu tuatahi i ngā wāhi i kītea ai ngā kōhatu e ngā tūpuna o nehera e whakaatu ana hoki i ngā wāhi mahinga o a rātou taonga.” (Wilson 1990:79-82)

Translation in English:

“Poutini: A guardian Taniwha,

Poutini was a taniwha, a giant water being. He was guardian for Kahue (Ngahue), the atua or deity of pounamu, greenstone. The only being that Poutini feared was another taniwha named Whatipu, the guardian for Hinehōaka, the atua of hōaka, sandstone. Grinding with sandstone ‘knives’ was the only way the tūpuna could cut the tough pounamu stone.

Once, when Poutini was being pursued in the oceans by Whatipu, he took refuge in a shady corner of a bay at TŪHUA (Mayor Island). It was early morning. Lying quietly in the still morning water, Poutini saw a beautiful woman coming down to the water’s edge to bathe. Her name was Waitaiki. He watched as she removed her clothes and slipped into the sea. He lusted after her.

Disregarding the danger of being discovered by his enemy, Whatipū, he slipped through the waters of the bay and with a swirl of water and - not a sound - he caught Waitaiki and fled with her across the sea towards the mainland.

Meanwhile, back at Tūhua, Waitaiki’s husband, Tamaāhua, woke and called to his wife. No answering call came and, disturbed, he went looking for her. He found her clothes at the water’s edge and knew that some dreadful fate had befallen her. Distraught, he went to his tūāhu (place of ritual) and sought to discover her late by the powers of karakia (incantation) and divination. He used a
tekateka to gain the knowledge he sought. A tekateka is a small, dart-like spear. He hurled it in the air and it hung there quivering and pointing to the mainland in the direction taken by Poutini and his beautiful captive, Waitaiki. Rushing to his canoe, Tamaāhua paddled off in pursuit.

Poutini had stopped at TAHANGA on the Coromandel Peninsula and lit a fire on the beach to warm Waitaiki. Then he fled across the land to WHANGAMATĀ on the western shore of Lake Taupō where he lit another fire for Waitaiki. Meanwhile, Tamaāhua landed on the beach at Tahanga and discovered the fire, but the ashes were cold. Using his tekateka again to divine the direction of his quarry, he took off in pursuit, eventually arriving at Whangamata. He discovered the remains of the second fire and, again resorting to use of his tekateka, traveled on in pursuit of Poutini and Waitaiki, still ignorant of what had happened or who was involved.

The chase went on - fires and tekateka at every pause. To RANGITOTO or D’Urville Island, to WHANGAMOA in the hills above Whakatū (Nelson) and to ONETĀHUA or Farewell Spit. Then down the western coast of the South Island to PĀHUA near Punakaiki and on past Māwheranui, past Taramakau and ARAHUARA, right to Mahitahi where the tūpuna when traveling south left the land and took to the sea using canoes. As he crossed the mouth of the Arahura River, Tamaāhua noticed the water was not as cold as the water of other rivers he had been crossing, but he was too hot in pursuit to waste time - the tekateka was drawing him southward.

By canoe he paddled south from Mahitahi to TAKIWI25 at the mouth of Piopiotahi, Milford Sound. Here he found the tekateka hovering in the air and pointing back along the route he had just come. Frustrated and angry, he headed north again following the tekateka. It paused, waiting for him, at the mouth of the Arahura River, where he had noted the water was warmer on his journey south. By incantations he knew that his beloved Waitaiki was in distress up the Arahura River valley. He prepared himself, as a warrior, for battle.

Poutini was indeed hiding in the upper Arahura River, by a stream which flows into the main river. That stream we call today WAITAIKI. He knew, because he was of the atua, that Tamaāhua was coming up river, prepared to kill him. He knew he had little chance of escape should he be found, but he did not want to leave his beautiful captive. Deciding that if he couldn’t have her then no-one else would either, he changed her into his own essence — pounamu — and laid the woman-stone in the bed of the river, just by the junction of the stream now called Waitaiki with the main river. Then he slipped silently away downstream, right past the wrathful husband, Tamaāhua, striding up intent on destruction. Poutini swam to the coast and ever since he has cruised its waters as the kaitiaki, guardian spirit, of the land and its sacred stone. That is why the coast is known as it TAI POUTINI, ‘the tides of Poutini’.

Tamaāhua found his beautiful wife Waitaiki. She was lying in her final bed, all grey-green and smooth — inanga stone. He began to tangi for her and for himself at his loss. When his tangi was complete he looked around him and named two hills, TŪHUA after his island home, and another TAMAĀHUA after himself. He then began the long return journey whence he had come. He married another

25It is important to note the difference in between the word ‘Takiwai’ which is another pronunciation of ‘Tangiwai’, meaning bowenite.
woman and had many children and is known in the traditions of several tribes of the Coromandel coast/northern Bay of Plenty region. Ever since those ancient times, when the winter snows melt in spring and the waters tumble down the wild Arahura gorges, pieces of pounamu are broken off the great body of Waitaiki and make their way down the riverbed. These are the uri, children, of Waitaiki, the mother lode of the stone and the parent of the mauri that lies within pounamu.” (Wilson 1990:83-84).

Fig. 4: Route from oral map for ‘He Whakarāpopotonga I Ngā Kōrero Mo Poutini’. From “Place Names of the Ancestors: a Māori Oral History Atlas” (Wilson 1990:78-85).

The place names associated with the characters and the story are highlighted in the English translation above (and the map in Fig 4) shows the route taken by Poutini in the story. Below, in Table 2, the place names of the story and their translation are outlined in a table. The geographical locations named within the story are related to actual stones that were
commonly mined in those regions. Tūhua, for instance, is now called Mayor Island following colonization, and is a dormant volcano off of the upper North Island coast near bay of Plenty. The island has a rich source of obsidian, or volcanic glass, which was used to make cutting tools (Seelenfreund 1989). More importantly, the island in the story is named after the resource it provided, and the other place names from the story is associated with their mineral resource are outlined in Table 2 below (Wilson 1990:85):

<table>
<thead>
<tr>
<th>Place Names</th>
<th>Translation/Current Name</th>
<th>Stone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waitaiki</td>
<td>(Stream of) Waitaiki</td>
<td></td>
</tr>
<tr>
<td>Te Tai Poutini</td>
<td>The tides of Poutini</td>
<td></td>
</tr>
<tr>
<td>Tūhua</td>
<td>(Hill of) Tūhua</td>
<td></td>
</tr>
<tr>
<td>Tamaāhua</td>
<td>(Hill of) Tamaāhua</td>
<td></td>
</tr>
<tr>
<td>Tūhua</td>
<td>Mayor Island</td>
<td>obsidian</td>
</tr>
<tr>
<td>Tahanga</td>
<td>Tahanga</td>
<td>basalt</td>
</tr>
<tr>
<td>Whangamatā</td>
<td>Whangamatā</td>
<td>obsidian</td>
</tr>
<tr>
<td>Rangitoto</td>
<td>D’Urville Island</td>
<td>argillite</td>
</tr>
<tr>
<td>Whangamoa</td>
<td>Hills above Nelson</td>
<td>argillite</td>
</tr>
<tr>
<td>Onetāhua</td>
<td>Farewell Spit</td>
<td>argillite</td>
</tr>
<tr>
<td>Pāhua</td>
<td>Pāhua</td>
<td>flint</td>
</tr>
<tr>
<td>Takiwai</td>
<td>Piopiotahi (Milford Sound)</td>
<td>bowenite</td>
</tr>
<tr>
<td>Arahura</td>
<td>Arahura</td>
<td>pounamu</td>
</tr>
</tbody>
</table>


Māori Oral History Atlas (1990) claims that the above story provides details of an oral map that traced specific location geological resources were accessed. The narrative is structured with the names of these ancient quarries being ordered in a logical sequence, as they are located. The book claims that these kinds of stories provided a navigational function. The story provided information about the terrain and the optimal means for travel.

The mnemonic value of the myth and place in is demonstrated well by the Māori Oral History Atlas (1990). But we also need to know why and how there is an optimal relationship between myth and physical space, and in Chapter 5 I will return to the stories above in relation to a cognitive analysis. In addition, The Māori Oral History Atlas (1990) does not
discuss the spatial imagery and memory extensively, however correlations can be made between Harwood’s (1976) examination of the Trobriand use of myth and Māori oral maps. Chapter 5 will expand further on the use of ‘oral maps’ in Māori oral tradition and how a cognitive ecological model can better describe how physical structures - such as landmarks - support representational ability and memory in this case. On this view, myth serves a navigational function as well as a psychological function. It was argued in Chapter 2, that myths involve action-oriented themes, spatial imagery and supernatural elements because these characteristics serve as memorable cues. Rubin (1995; see Chapter 2) argues that the prevalence of action, mythic characters and space within oral storytelling is to be expected since these structures are more optimal for working memory. This does not imply, however, that these simple ingredients will constitute an effective means by which memory and narrative intermingle. Instead, Rubin claims that there is a typically cognitive bias towards mnemonic imagery located within a mentally represented physical space (Rubin 1995: 41-48).

3.5 Discussion.

The literature discussed in Chapter 2 supports the premise that spatial imagery is incorporated into oral storytelling as a means of structuring a narrative (see Harwood 1976; Kahn 1990; Campbell 2006; Chapter 2), and in the case of Māori oral maps, the stories themselves provide mnemonic support for the memorization of a particular route taken on a map. Place names and myths seem to have a multivalent purpose within the context of information sharing. First, they function as a mnemonic device and subsequently act as organizational tools for a narrative structure. These devices ease the cognitive burden during oratory, while the active engagement of storytelling is enabled in real time by material cues.
Second, oral maps perform an epistemic function in establishing a material basis for knowledge systems. Roberts (2012) claims that whakapapa is a system for information storage and retrieval. So Whakapapa is more than just a genealogical map, but a library of informational resources. It also serves an implicit epistemic function by establishing a cultural frame-of-reference that is used to communicate a variety of cultural concepts. A similar claim can be made for landmarks and place names as shown in the Māori Oral History Atlas (1990). Myths and place names act as material anchors for knowledge transmission. They perform an epistemic function, like whakapapa, in organizing informational resources and establishing epistemic markers.

Importantly, the next two chapters will look at both Māori pedagogy and oral maps, in conjunction with two cognitive ecological models that underscore the dialectical relationship between reproduced (i.e. engineered) environments and information management. The next two chapters will look at how these resources function as cognitive properties. In order to do so, we will have to demonstrate how brains are in many extended into the environment through cultural processes. We engineer environments specifically for cognitive purposes. The stories that were told within the traditional Māori corpus should not be viewed as merely epiphenomena of other key cognitive functions. These stories were an encapsulation of a historical corpus that was essential to the cosmogony, social structure and epistemic framework (Marsden 2003:56).
CHAPTER FOUR

4.1 Introduction.

“They [the elders] would wait late at night at the marae, until late and then the lights went down, all the lights were switched off, tilly lamp, candles, they blew it out and the room was in total darkness and they’d practice on us as little children for the retention of memory. They’d practice talking so that we can beam in with our ears and we were more comprehensive and tentative of the information because there was no visibility of our eyes to contaminate our brain, it was totally clear” (Mahuika 2012:279).

This excerpt is taken from an interview conducted by Nēpia Mahuika with Anaru Kupenga of the Ngāti Porou tribe. Kupenga speaks of how traditional forms of memory training were employed to sharpen the mnemonic ability of students who were expected to learn their tribal history and the verbal arts. These memory skills, Mahuika argues, have been learned less frequently since the introduction of text, but given that tribal knowledge had to be passed on orally, mnemonic ability would have been a skill that was nurtured in close contact with tribal elders. A student would be expected, then, to gain an education in both the corpus of their tribal history as well as the appropriate methods for memory and orality.

This chapter will survey some of the ethnographic material on traditional Māori pedagogy and epistemology. I will examine the claim that cultural transmission within traditional Māori society was strictly regulated by cultural norms and conventions. With more ‘traditional’ Māori learning methods, the informational character of the environment was regulated by both tikanga (customs), and the tapu (sacred) status of these learning methods. Due to the sacred nature of these learning methods, not all individuals had access to the sacred corpus of knowledge (Bowdon 1979). As a result,

memory and eloquence would have been essential skills that were nurtured not only for communication, but also for the preservation of an oral history (i.e. the accurate retention and communication of sacred knowledge).

The descriptive data discussed on Māori pedagogy will be set against the background of an *epistemic niche construction* (ENC) model. Put simply, ENC describes how organisms shape their informational environment, and the feedback effects generated by engineered environments. Humans are unique in our capacity to actively engineer our cultural environments for learning purposes, also. Cultures rely heavily on the informational resources available to them in order to subsist in a wide range of environments. Within oral cultures the sustained organization and transmission of valuable information would have been critical to an economy and subsistence.

This chapter will argue that the cognitive resources available for supporting information transmission are often peculiar to a cultural niche. Organized educational methods condition individuals to function in socially and technologically complex environments. The first half of the chapter will provide an overview of the ENC model that will be applied later to the literature on Māori pedagogy and epistemology. However, it will be valuable to provide some background on the basics of biological niche construction in order to appropriately convey the underlying mechanics of cultural niche construction (i.e. ENC), and an early portion of the chapter will be devoted to the theories supporting biological externalism.

Cultural environments are critical to the development of human cognition, and we depend greatly upon the tools and strategies that are learned. While cognitivist theories claim that many of our cognitive traits are innate and fixed, ENC argues that we are cognitively plastic,
and subsequently sensitive to external cognitive properties in our environment. A behaviorally malleable species would suggest an opportunistic evolutionary heritage, one that required adaptively strategic responses to informationally complex (and changing) environments. Out of these conditions hominin cognition would develop an emergent dependency upon engineered cultural niches (e.g. tool use, information sharing, and so forth).

I argue that our learning environments support both working cognitive connections, while critically regulating the flow of information. In the second portion of the chapter I will put into practice the ENC model by examining traditional Māori pedagogy. The importance of structured learning environments will matter to the material on Māori epistemology, and I claim that religious traditions are supported by external cognitive properties specific to a cultural niche. Information transmission is further regulated by religious norms and customs. In traditional Māori social structures, elders in the tribe, who were also charged with the responsibility of preserving, and further communicating an oral tradition, commonly monitored the sharing of knowledge (Bowdon 1979; Pere 1982; Metge 1984). This application of the ENC will help to elaborate further on my own critique of SiM, but it will also demonstrate the importance of the historical and ethnographic data for motivating a cognitive examination of religious activity. I look specifically at how learning methods and mnemonic strategies support cognition for the purposes of transmitting sacred knowledge.

4.2 Niche Construction: an overview.

The received view of biological change describes how organisms adapt to changing external conditions (i.e. environments) over time (Sterelny 2000, 2001). On this view, cumulative morphological changes to organisms remain subject to the standard principles of
variation, competition and inheritance between organisms. On the received view, adaptations occur on the phenotypic level, while environments are adapted to by organismic change. For example, organisms develop defenses from predation with some animals evolving methods of concealment, like camouflage. The plumage on the Egyptian Nightjar, for example, allows the bird to rest during the day in sand and not be visibly detectible by predators. Its plumage color - pale browns - is well adapted to hiding in sandy conditions. In this example, predation defense is an example of how environmental conditions are a causal explanation for evolutionary change.

Other models, however, have emerged to describe more complex interactions between organisms and environments (Godfrey-Smith 1998, 2000; Laland, Odling-Smee and Feldman 2000; Lewontin 1982, 1991; Sterelny 2000, 2003, 2006a, 2006b). These models recognize a gap in the literature regarding the role that engineered environments play in shaping organismic development and behavior. The niche construction model recognizes that organisms are active agents that make noticeable changes to their local ecologies, and in turn these changes act back upon the organism leading to fitness effects (for both the engineering organism and those who share their ecology with them).

Richard Dawkins (1982) articulated this idea famously in his book *The Extended Phenotype* (1982), where he describes how organisms exploit their ecologies for fitness purposes. We see this extension of the phenotype in termite mounds, spider webs and beaver dams. On Dawkins’ view, genes build organisms that exploit their environments – through their own activities – leading to fitness advantages. Dawkins observed that we should look at an organism’s phenotype as being extended into the environment - as a kind of exosomatic
system – since many species depend greatly upon environmental resources for shelter, ecological defense and also as suitable means for harvesting food resources.

The concept for extended replication systems are taken seriously by niche construction models (Laland and Odling-Smee et al 2003; Laland, Odling-Smee and Feldman 2000; Sterelny 2001), and while the extended phenotype and niche construction models appear similar, niche construction views organisms as ecological engineers, whereby environmental changes lead to further organismic/ecological effects. These engineered ecologies both alter the selective environment, while constructed ‘niches’ or ecological systems are inherited by downstream generations. Organisms actively influence their evolutionary future through their own activities. In turn, their descendants, who also utilize these niches, are inheritors these engineered environments:

“…to varying degrees, organisms choose their own habitats, mates, and resources and construct important components of their local environments such as nests, holes, burrows, paths, webs, dams, and chemical environments” (Laland, Odling-Smee and Feldman 2000).

Many phenotypes, therefore, shape their ecology for utilitarian purposes. But these can have flow-on effects for genes also. So the selective environment is changed when organisms engage in the active modification of their ecological conditions, and subsequently ecological engineering has significant feedback effects on the organisms living in that ecological niche (Laland, Odling-Smee and Feldman 2000). For instance, dam building by beavers not only enables the spread of dam-building genes, but their engineering projects also have consequences for those who inhabit the same ecosystem (Naiman et al 1988; Laland and Sterelny 2006). For example Earthworms are more adapted to live in freshwater conditions than soil conditions (Lee 1985; Satchell 1983; Turner 2000; [see Laland & Sterelny 2006 for discussion]), and because the earthworm’s kidneys are better adapted to freshwater
conditions, their activities change the structure and chemistry of the soil for an adaptive purpose. The earthworm has not developed any physiological characteristics to adapt to its environment. Instead, the earthworm alters its environment to overcome its biological limitations (Laland and Sterelny 2006). Niche construction (NC) recognizes that organisms alter their environments for downstream generations also (e.g. other earthworms inherit the modified environment of the previous generation), and so organisms not only inherit genes, but they also inherit engineered ecologies.

NC considers multiple levels of organization – genes, organisms and environments - in the same way that the extended phenotype model views modified environments as being important to the way that genes are expressed. While the primary unit of selection is the gene within niche construction models, organisms shape their environment and further change the selective environment (Sterelny 2001). NC, subsequently, highlights the role that ecological engineering plays in the transmission of genes. But NC is also serious about the role that ecological inheritance plays. While genes are considered the primary inheritance mechanism within NC, environments allow for the expression of these genetic resources. In other words, engineered environments can qualify as ‘scaffolding’ or support for phenotypes and their genes:

“For genes to have stable phenotypic effects, they must be inserted into a structured and predictable developmental environment. Even if replication is of high fidelity, it is of no use to just make a new set of genes: the parental generation must build an environment in which those genes are used in the right way. The more complex the developmental pathways, the more the genereading environment is as important as signal quantity and fidelity” (Sterelny 2011:810; emphasis added).

Our hominin ancestry is distinguishable as an ecological engineering legacy. For example - historically - humans have constructed tools, destroyed and recreated their environments,
developed resource acquisition strategies in groups, built shelters and managed their conditions by regulating their ecology. Indeed, the survival and qualitative range of human lifeways can be attributed to a history of niche construction activities.

One of the more noticeable products of human niche construction activities is our technological history, which has been defined by our ability to innovate tools and strategies for adaptive means. Through cultural transmission – channels of communication - humans have been able to pass on these informational resources cross-generationally (Sterelny 2007; Tomasello 1999). While our great ape relatives (e.g. chimpanzees), are capable of constructing new tools and developing adaptive strategies, they are also incapable of passing robust knowledge resources cross-generationally. While there is some mimicking behavior between elders and juveniles, these learned skills are often never innovated upon, and typically always never shared throughout the population. Thus innovation never emerges cross-generationally (Tomasello et al 1993). Human niche construction is defined by our capacity to not only develop tools but also engineer environments that augment the fidelity of information transmission. In the same way that niche construction activities facilitate gene-reading environments for organisms, human niche construction facilitates the shape the flow of cultural information.

4.3 Epistemic Niche Construction.

Engineering activities directly or indirectly influences the informational character of the environment, and subsequently the experiences of the next generation. Laland and Odling-Smee et al (2000) describe ecological inheritance in terms of multiple evolutionary processes in operation. There is no causal arrow from culture to minds. Instead, agents play a
substantial role in the way in which environments are shaped and inherited. Epistemic niche environments constrain the selective cultural environment ensuring that cultural variants remain more stable over time (Laland and Odling-Smee 2000).

Cultural transmission - as a form of non-biological inheritance - is peculiar to human niche environments. Unlike genes, cultural transmission operates under a variety of inheritance modes that are unique to human social environments. Culturally learned tools and strategies have influenced the way in which people transmit traditions. We outsource our cognitive ability to engineered properties in our environment. In other words, we lean on culturally evolved properties to boost the fidelity of cultural transmission. For example, the invention of text has noticeably influenced the way in which information is stored and retrieved. The advent of literacy and external symbolic devices has significantly boosted the fidelity of information transmission.

In addition, we learn in a social environment whereby experts educate novices for a variety of adaptive skills. Both our parents and peers influence the breadth and scope of our cognitive ability as juveniles. Agents are exposed to and shaped by the developmental learning environments they are raised in. The vertical transmission of cultural variants (i.e. from parent to offspring) is a particularly robust mode of cultural inheritance. However, human agents also benefit from the horizontal (from peer to peer) and oblique (teacher to student) modes of transmission also (Boyd and Richerson 1985). The channel of information flow is, therefore, not limited to a single mode of inheritance, but distributed across a variety of channels. Children learn not only from their parents, but also from their peers who are able to pass on their expertise through basic interactions. Often, the passing on of a complex skill involves interactions that are carefully coordinated between teacher and student.
Epistemic niche construction (ENC) claims that our engineered cultural environments support complex cognitive development and function. Structured environments scaffold cognitive expertise (Sterelny 2003). The term ‘scaffolding’ refers to how students learn through instructional support (Bruner 1960, 1984). Scaffolding describes how learning interactions are bolstered by a teacher’s capacity to provide support to a student, while they slowly remove their influence as the student eventually gains their autonomy. This method of learning is unique amongst humans: we are cooperative and invest time in nurturing skill development (Sterelny 2003, 2006). We should view scaffolding, then, as being a component of hybrid learning activities. Cognitive development is dependent upon a structured interaction between brains and environment (Laland and Odling-Smee 2000; Laland and Odling-Smee et al 2000; Laland, Odling-Smee and Feldman 2001; Sterelny 2006).

Societies cultivate apprenticeships, guilds and other educational supports for learning useful skills, and these intensified methods for learning enhance the fidelity of transmission:

“Thus human niche construction, partly dependent on socially transmitted memes, not only partly shapes the selective environment of genes, but also the selection environment of memes. Human material culture, in the form of tools, artifacts, and homes, may literally be transmitted from one generation to the next, as one aspect of the ecological inheritance of our species (Laland and Odling-Smee 2000:132).

While it is helpful to consider genetic inheritance as an analogy for cultural inheritance, the two modes should not be misinterpreted as functionally comparable. Genetic transmission is a high-fidelity mode of inheritance, while cultural transmission does not engage any unit of selection (see Chapter 1 and Sperber [1996]). Like Sperber, Sterelny (2003) argues that we cannot make strong comparisons between genetic and cultural transmission, as intra-individual cultural transmission is not high fidelity. However, Sterelny (2003) thinks there is
something important to the ENC’s concept that cultural information occupies multiple channels of inheritance. Instead of focusing on the unit of selection, we should look at the environments in which genes are expressed (Sterelny 2000). Thus, the genetic analogy still applies to culture, and like genes, cultural transmission does not operate independently of other more crucial developmental resources.

Sterelny states that structured learning environments are necessary to support the fidelity of cultural transmission cross-generationally. Preconditions for a robust social learning environment (apart from extensive cooperation), depends upon “the intrinsic accuracy of cognitive learning mechanisms” and “the control of the developmental environment” (Sterelny 2011:810). The fidelity of information depends critically on the mode in which it is transmitted. Cooperative social learning has enabled the accumulation of external cognitive resources within human cultures. This ‘cognitive capital’ has allowed our species to occupy a variety of habitats and exploit a diverse range of natural resources (Sterelny 2006; 2011). We are adaptable to a variety of ecological conditions because we have the capacity to share and pass on valuable information with others.

Unlike a memetic theory of cultural transmission (see Dawkins 1976), Sterelny and others argue that cultural learning is a hybrid process involving features that are basic to human cognitive architecture and external environmental properties (Boyd and Richerson 1985; Donald 1991, 2001; Clark 1998; Clark and Chalmers 1998; Griffiths and Gray 1994; Hutchins 1995a; Peter Godfrey-Smith 1998). So while some internal cognitive features are innately bound and predictable, we are developmentally plastic in many respects, as we are
able to process a wide range informational inputs, while generating a variety of responses to these environmental cues (Sterelny 2003).

According to ENC, environments are structured in a way to support learning development and information management. Without a structured learning environment whereby communication is organized, the cross-generational transmission of informational resources can become unstable. According to Sterelny the ‘bandwidth’ (or volume), and ‘fidelity’ of cultural information that is passed on is highly dependent upon the coordination of learning interactions (Sterelny 2008, 2011). For example, teacher-student interactions are important to the examination of cultural transmission, and apprenticeship style learning characteristically involves structured interactions that are developed specifically for coordinating the fidelity of communication.

The material on ENC and apprenticeship learning below will be relevant to my own study on Māori oral tradition since it supports this dissertation’s claim that religious transmission involves costs. The tools and strategies that are developed for the purposes of managing and transmitting religious knowledge imply the complexity and volume of information. Cultures invest in the innovation of information management tools because the perception of value is equal to a culture’s commitment to preserving religious knowledge. The dependency and investment in the tools and strategies for supporting transmission underscores the difficulty of managing religious information.

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27 In regards to social intelligence, for instance, Sterelny (2003) and others (Dunbar 1998) claim that while we come equipped with innate cognitive systems that are sensitive to developmental cues, these systems are enhanced by environmental inputs (Sterelny 2003; Sterelny 2006c:229). Social intelligence is enhanced within a social environment, and expertise in this domain requires exposure and conditioning to social complexity.
Sterelny (2011, 2012) has recently focused his attention on the teacher-student dynamic of cultural transmission (oblique transmission modes). Sterelny claims that the coordinated learning strategies between teacher and student, and the structured interactions developed by humans for pedagogical purposes has had a considerable impact on the way in which our cultural environments have been engineered. Without the cooperative sharing of information regional diversity – that is, the occupation of diverse niche environments by human populations - would not be likely. Humans are quite adept at inhabiting a variety of (sometimes-inhospitable) ecological conditions, and Sterelny states that social learning - and the cooperative sharing of information - is a crucial prerequisite for this outcome. While many species are adapted to stereotyped environments, the sharing of knowledge within human cultures has allowed for population expansion and migration.

According to Sterelny, the oblique transfer of information (i.e. from teacher to student) has been critical to this development:

"Apprentice learning offers a helpful conceptual model of the synergy between organized learning environment and individual cognitive adaptation. Apprentice learning is a very powerful mode of social learning, making possible the reliable re-acquisition of complex and difficult skills. It is learning by doing. But it is learning by doing in an environment seeded with informational resources... Moreover, there are many opportunities to learn by observing highly skilled practitioners. Often advice is available from both experts and peers, for learning is often social and collaborative. Apprentice learning depends on individual cognitive adaptations for social learning but it depends as well on adaptively structured learning environments." (Sterelny 2011:810)

The apprenticeship model – discussed below in relation to ENC - does not necessarily disregard the influence of innately bound cognitive systems on transmission, but it does underscore the social-environmental importance associated with learning development:

"Many important cognitive capacities are like literacy: they exist only in environments in which they are supported. So, individual cognitive capacities often depend on cultural resources that amplify learning capacities. Moreover,
informational labour can be divided: in cooperative environments, agents serve as memory and expertise stores for one another, and so individual capacity—innate or acquired—does not sharply constrain cultural complexity” (Sterelny 2011:813).

Information needs to be of high fidelity and stable in order to be preserved. As complexity and volume (bandwidth) increases, so does the need for cultures to develop the reliable means to store and retrieve information (Sterelny 2011). The ENC model suggests that stability and fidelity is partly dependent upon environmentally contingent features. Children are raised in an environment whereby the “reliable transmission of skill can begin as a side-effect of adult activity” (Sterelny 2011:810). Learning can be structured in an “incremental” fashion and is the result of the various stages in a person’s maturity (Sterelny 2011:810). Juveniles tend to copy - or ape - adult activity without any explicit teaching, while observing the conventions that are unique to their surroundings.

Children are also encouraged by adults to playfully engage in activities that indirectly support skill development. These activities can also be buffered careful monitored by adults with some direction (Sterelny 2011). However, when explicit teaching methods are employed, Sterelny states that coordinated apprentice learning can “support high fidelity, high bandwidth knowledge flow” (Sterelny 2011:810). An apprenticeship interaction involves the coordination of attention and task between teacher and student. Students may be provided with explicit instructions in addition to the dissected performance of a specific task. Students and teachers monitor progress and evaluate the progression of their skills through active engagement, with corrective measures being implemented directly through ‘learning-by-doing’ (Sterelny 2011).

This is, in part, the nature of scaffolded interactions between teacher and student:
“Apprentice learning is a good model of the ways learning environments are organized to make possible the transmission of a high volume of information with high fidelity. These learning environments can evolve gradually, beginning with juvenile interest in parental activities, and parental tolerance of their inquisitive exploration. From that platform, there can evolve both increasingly sophisticated individual adaptations for social learning, and increasing adult support of learning. This form of learning is sufficiently powerful to explain the observed phenomena—the maintenance of complex, demanding skills in populations without literacy or formal educational institutions” (Sterelny 2011:816; emphasis added).

Explicit methods of teaching are achieved between expert and student, and I argue that these interactions are influenced by both methods (tools and strategies for learning) and cultural norms and conventions. Teaching strategies support the fidelity of information, while religious norms and conventions regulate often how this information is shared and perceived. Indeed, religious norms are constitutive features of a culture’s epistemic structure. Scaffolded learning is relevant to both adaptive strategies and the retention of religious knowledge, and the next section will examine this dynamic more closely by looking at traditional Māori pedagogical methods against the background of ENC.

4.4 Māori Pedagogy and the Sacred.

In her paper “Māori Human Development Learning Theory” (1997), Arapera Royal Tangaere examines the similarities between the methods of teaching within the traditional oral Māori curriculum, and the fundamental methods of apprenticeship style learning, discussed above. She states that traditional Māori pedagogy involved a more holistic structure of learning, by incorporating both myth and utilitarian knowledge into a working whole. For example, knowledge about the local ecology or geography could be embedded in mythic narratives. Knowledge about seasonal changes and local resources was packaged, or
interwoven with stories of the ancestors. This is even more noticeable with the learning of whakapapa (Roberts 2012), and oral maps (Wilson 1990).

Royal Tangaere (1997) looks at how the coordinated learning employed between teacher and apprentice can better clarify how traditional methods of learning amongst Māori were developed. She likens pedagogy within a traditional context to the symbolic designs of the poutama - the staircase design patterns used in traditional Māori weaving and latticework (or tukutuku [see Fig 5]. Royal Tangaere associates the staircase pattern with steps that symbolically represent Tāne’s ascent to the heavens to gain the baskets of knowledge. This, she states, is an analogous model to the teaching and learning methods within her own life (as well as traditional Māori methods). Like the theory of scaffolding, a stable platform must be built at one level before proceeding to the next step in expertise:

“The poutama tells me that learning is a process which involved a period of time for the task or activity to be understood. This represented by the step’s plateau in the poutama. During this period the process of *titiro, whakarongo, kōrero* (repeating, practising, sorting, analysing, experimenting, and reviewing) is carried out until the task or activity is understood. Once this is accomplished, then the learner ascends, like Tāne, to the next step” (Royal Tangaere 1997:11).

Fig. 5: Tukutuku panels, wooden carving and kowhaiwhai, [ca 1930s]. Digital Image taken from the New Zealand National Library, October 2012 (http://mp.natlib.govt.nz/detail/?id=25741)
Royal Tangaere underscores the clearer connections between traditional Māori pedagogy and Vygotsky’s (1978) zone of proximal development and underlying function of cognitive scaffolding (Royal Tangaere 1997:11). The theory attempts to describe what a learner is capable of without active assistance from others. Learners gain their skills through exposure to either active teaching, or indirectly through non-structured interactions (e.g. basic observation). Once these skills are internalised, then further advancement can be realised through additional conditioning. Environmental processes scaffold learning and development while teachers actively engaging with students in order to support skill development (see Bruner 1984).

Expertise is the result of monitored proficiency, with teachers playing an active role in the coordination of skill with their students. Royal Tangaere states that this structured interaction underlies what is called the Tuakana-Teina relationship, and it is a key dynamic for teaching within a traditional Māori context. The Tuakana (an older, more experienced person) usually takes a Teina (a less experienced person) under their guard, while guiding them in their development towards maturity. Royal Tangaere states that this pedagogical arrangement originates from two principles: “‘whanaugatanga’ and ‘ako’ (to learn, and teach)” (Royal Tangaere 1997:12; see also Pere 1982), and the pairing of an elder with a juvenile is akin to an apprenticeship bond between teacher and student.

Within traditional Māori pedagogy, the sharing of knowledge was carefully regulated by cultural norms (Bowdon 1979; Marsden 2003; Metge 1984; Pere 1982). As we shall see in the examples below, specific tikanga (rules and customs) governed the transmission of knowledge within a traditional Māori context. Elders were typically discriminating in their choices for students, with some knowledge considered too tapu (sacred) to be made available to the laity. Like other social structures comprised of a hierarchical system, the distribution of
knowledge within Māori society was organized in a way to allow for the protection of knowledge amongst a select few in the tribe (Best 1922; Best 1924:142-143; Bowdon 1979; Marsden 2003):

“It was the basic tenet of Māoridom that the inner corpus of sacred knowledge was not to be shared with the Tūtū – the common herd – lest such knowledge be abused and misused. Such sacred lore was not lightly taught and was shared only with selected candidates who after a long apprenticeship and testing were deemed fit to hold such knowledge” (Marsden 2003:57).

There is debate over whether there existed any specific schools of learning within tribal systems (see Hanson 1989; Hemara 2000:17-23). The concept of a ‘whare wānanga’ - an exclusive house of learning - is still a point of contention amongst scholars (Simpson 1997). To what extent any school of learning was uniformly widespread is still unsure. But there seems to be some consensus amongst scholars that a system of formal learning methods was at least efficacious enough to be an intergenerationally relevant feature of transmission (Hemara 2000; Thornton 2004).

These methods of learning focused on the transmission of sacred knowledge, as well as the nurturing of memory and oral skill. Joan Metge (1984) argues that knowledge was defined by the teaching methods employed within the tribal structure. So while some members of a tribe learned through regular contact with cultural practices, others were required to observe apprenticeship training for the purposes of preserving sacred knowledge (Metge 1984; citation from Benavides 2009). The preservation of sacred knowledge, therefore, remained in the hands of a smaller number of high-ranking individuals (Bowdon 1979). As a part of this education, storytelling served a function as a method for teaching since these sacred narratives aided in memory retention while obscuring certain details from the laity. Mythic narratives served a function as tools for codifying knowledge:
“On the one hand legend and myth provided a mechanism to aid ease of recall. On the other hand, they were selected as camouflage to hide inner meanings from the uninitiated. This thereby preserved abuse and misuse” (Marsden 2003:63).

An example of this codification is provided by Marsden (2003), who suggests that the story of Tāne’s descent from the heavens - with the three baskets of knowledge - provides a clue to the pedagogical structure of early Māori society (see Chapter 3 also). Within the myth, Tāne traveled to the heavens and brought back to earth 3 baskets of knowledge: *Te kete tuā-uri, Te kete aro-nui* and *Te kete tua-ātea* (Marsden 2003:57):

“He descended to the seventh heaven where his brothers had completed the Whare Wānanga (House of Learning or Wisdom). After the welcome, he had to undergo more purification rites to remove the intense sacredness of Io. Having completed the purification rites, Tāne entered the Whare Wanange named Wharekura and deposited the three Baskets of Knowledge named Tuaruri, Aronui and Tua-ātea above the taumata – the sear of authority where the seers and sages sat – then deposited the stones Hukatai and Rehutai, one on either side of the rear ridge pole” (Marsden 2003:57).

Marsden argues that such stories were indecipherable without some reference to the mythical corpus. The preservation and memory of these resources were strongly dependent upon the customs of teaching. Subsequently, the pupils of a ‘wānanga’ were subject to a rigorous initiation prior to membership:

“Prior to entry into the Wānanga, selected and screened candidates or pupils (tauira) were required to go through certain initiation and purification rites which also included dedication to a particular tutelary deity such as Tangaroa, Tāne and Rongo in accordance with the major specialisation that he wished to pursue. His first action when he entered the Wānanga house was to proceed to the rear ridge pole, pick up and place Hukatai (sea foam) – the white stone – in his mouth and symbolically swallow it, after which he replaced it. This was a reminder that all knowledge and therefore to be nurtured and treasured. Only then could they be fed with the sacred food of the baskets of knowledge” (Marsden 2003:58).

Students of the wānanga were not considered adepts until they had undergone some form of hardship, by testing their commitment to the Wānanga:

“On approaching graduation, the students were required to undergo some searching tests. Those dedicated to Tāne were, for instance, ordered to go to the forest without any food supplies, sometimes for several weeks and were
expected to fend for themselves, living off the bounty provided by Tāne. It was a period of meditation and/or fasting in which they were not only expected to practice their bush craft but also to learn to commune with the spirit of their tutelary deity and return with some original knowledge. Their graduation depended upon their passing the rigorous tests and examinations imposed by the sages” (Marsden 2003:58).

The students themselves should be able to prove both their commitment and ability to remember and preserve the mythic corpus. Benavides (2009) states that this perception of knowledge by traditional Māori clearly distinguishes it from the Western epistemic paradigm, since was knowledge was conceived as a static entity that could not be altered through a wider dissemination:

“In strong contrast with the Western frame, regarding the status of the experts, despite the respect directed towards them, their knowledge is not exempt from scrutiny, any item of knowledge may -or should- be questioned and challenged, and of course replaced if it is seen as necessary by the academic community. In a traditional Māori context however, the tapu is seen as protecting traditional knowledge -already sanctioned, revised and accepted through other means and channels- from any kind of scrutiny, obeying to a very different logic in regard to the possible results of such initiative... One characteristic aspect of Tāne's quest for the baskets reinforces the notion of the protected status of Māori knowledge and that is the image of the basket in itself, which transmits the idea of a fixed and finite body of knowledge.” (Benavides 2009:36-37 [emphasis added]).

As Benavides states here, the three baskets of knowledge acquired by Tāne has a special significance within the Māori framework of knowledge. Te kete tuā-uri, Te kete aro-nui and Te kete tua-ātea all represent various types of knowledge with Tuā-uri representing the “patterns of energy behind this world of sense perception” (Marsden 2003:60). While Te Aro-nui represents knowledge within the natural world (all things that can be obtained through sense perception), Te Ao Tua-ātea represents the infinite realm beyond space, time and matter (Marsden 2003). The epistemic domain is subsequently influenced by this conception of knowledge as being held in containers corresponding to different qualities of knowledge. The conception of knowledge as being something bounded suggests that it was perceived as a ‘physical’ thing. Tribal knowledge – once passed on – was observed as taonga (treasure) to
be protected and those who had this knowledge passed onto them were expected to subsequently transmit the same mātauranga intact (Royal 2005).

As discussed above, the fidelity of transmission from teacher to student was better coordinated through specific pedagogical techniques that underscored mnemonic retention and eloquence. Mātauranga Māori (traditional knowledge of the Māori) was believed to be knowledge that had been passed down since the first Polynesian arrivals to Aotearoa, and had since been adapted to the new islands (Royal 2005:134). Traditional Māori social structure was based on a kinship network, and so knowledge of whakapapa (genealogy) was an intrinsically valuable resource, connecting tribes and individuals to their own history and identity. Whakapapa - as discussed in Chapter 3 – functioned as an epistemic device, and a means by which the universe and social order could be ordered.

Rangimarie Rose Pere (1982) claims that higher ranking individuals within a tribe were legitimated by familial descent and those in who could trace their descent from senior lines were typically in possession of a wider range of historical and genealogical knowledge:

“The serious responsibility of passing on this knowledge was that of the senior most persons of each ‘whanau’. People from the ‘rangatira’ class had a lot more information transmitted to them about the genealogies and the life experiences of ancestors within descent lines, because they were included in, and involved with the higher schools of esoteric learning. The more knowledgeable people would not only know their own direct descent lines, but also the names of spouses and siblings within collateral lines, including links they had with other tribal areas. Obviously a depth of knowledge about whakapapa and related issues gave an individual advantage within the group” (Pere 1982:10).

The tribal structure meant that the Pākeke (elders) were the custodians of the tribal history. Indeed, this custom is still a core part of knowledge sharing today. Knowledge was (and still is) intrinsic to the social structure within traditional Māori culture. But there are also deep
political conditions – such as the sacred legitimating of hierarchy- within the tribal structure that ensure the regulation of information channels. The political scope of knowledge sharing can be fundamentally reduced to tribal and familial connections, but these structures are also governed by the norms associated with information control. As Nēpia Mahuika (2012) states, there are social boundaries inherent with the sharing of knowledge by elders:

“Genealogical lines open and close access to various individuals and families, and are based largely on kin groups, or hapu and marae connections. Similarly, the age gap between the interviewer and interviewee can also have a significant bearing on the outcome of the interview. Pressing an older relative for more information or probing for deeper recollections can quickly become intrusive and be regarded as disrespectful. The correct navigation of these intergenerational relationships is based on fundamental codes of conduct such as manaakitanga, in which respect and hospitality is paramount” (Mahuika 2012:36).

The ‘codes of conduct’, which were so critical to the transmission and regulation of knowledge within traditional Māori society, also impact on the opportunity to access knowledge resources. Though the content of knowledge was observed as sacred, so were the customs associated with learning, and accessibility to knowledge though oral means is subject. Knowledge is therefore shared within the bounds of the culture’s customs. These conventions have a practical and spiritual significance for Māori also: since the customs involving information sharing are strict, it follows that tribal knowledge can be better preserved by making information expensive to access. The sacred observations associated with the transmission of knowledge serves a function for maintaining its protected status.

Following this section on Māori pedagogy, the next section will look specifically at the skills for memory and transmission that were nurtured within traditional Māori culture. Knowledge sharing within a traditional context involves the capacity to retain and reliably pass on information to the next generation. Skills in both memory retention and oral communication would have been key to the enhancing the fidelity of transmission. I argue
that mnemonic ability and oral eloquence within a traditional Māori context were critical to the success of being able to preserve sacred knowledge across generations. I will then return to how this is relevant to ENC and the apprentice model, discussed in the first half of this chapter. I argue that the recruitment external cultural properties and processes are more relevant to the transmission of sacred knowledge than domain specific cognitive engines. Both memory and eloquence are cognitive tools that are structured into the niche environment and support transmission within a religious context.

4.5 Māori Orality: eloquence and memory.

In her thesis “‘Kōrero Tuku Iho’: Reconfiguring Oral History and Oral Tradition”, Nēpia Mahuika (2012) takes an extensive look into her own tribal practices involving oral memory and transmission. The interviews that Mahuika conducts with members of her own tribe, Ngāti Porou, are revealing as her subjects share their own views on orality in a modern context alongside their understanding of traditional oral practices. What is salient from her study is that there are embedded prejudices still associated with the sharing of traditional knowledge. These principles, which could be viewed as a product of intergenerational politics, also stem from embedded cultural beliefs in the sacred status of knowledge sharing (Mahuika 2012). As one of her interviewees Te Uira Manihera from Tainui states here:

“The handing down of knowledge by old people is a very difficult thing. They have a look at their children and perhaps their oldest son. If he is mature enough or interested enough in his Māori, he might become the repository. But a lot of people say no. They would sooner take a knowledge of their oral traditions with them than pass them on to the present generation. They believe that if it goes to another person outside the family, in a short time it will have dissolved, absorbed by all the other people who have access to it. There is also a fear that by giving things out they could be commercialised. If this happens, they lose their sacredness, their fertility. They just become common” (Mahuika 2012: 38).

Again, the belief that mauri (life force) is thought to be weakened when shared with those outside of the tribal structure is a common epistemic thread that links the perception of
information sharing mediums. Even those who are able to communicate knowledge within the tribe are careful to pass on sacred knowledge to responsible parties. These interviews show that there is a general cautionary attitude associated with the transmission of knowledge within Māori culture even today.

In her own research, Mahuika had to guarantee that elders oversaw the interviews she conducted in order to ensure that protocol was upheld (Mahuika 2012:44). She states that within the tribal structure of the Ngāti Porou special individuals were “charged with the responsibility” of retaining and preserving tribal knowledge (Mahuika 2012:278). This shows that the memorizing oral traditions was managed through specialization, with the elders or religious leaders being guardians of a group’s history:

“What they remember as individuals is significant to the collective memory of the tribe as a whole because they are charged with the responsibility to hold our histories and traditions together” (Mahuika 2012:278).

Mahuika states throughout her thesis that practices associated with ‘collective memory’ are central to an understanding of the retention of oral history in Ngāti Porou. Memory techniques were traditionally employed when elders passed on knowledge to others within the tribe (see passage by Anaru Kupenga at the beginning of this chapter [Mahuika 2012:279]). The practiced retention of oral knowledge was therefore incorporated into pedagogical methods and purposefully designed to engage memory and speech ability, so that students were expected to be ‘correct’ in their rehearsal and performance of oral skills.

Similarly, Mervyn Evan McLean (1961) talks of how traditional Māori chants or waiata (songs) were learned and rehearsed accurately so as to preserve the structure and sacred content of the songs. Tradition was maintained through a disciplined practice of the songs’
performance. There was no room for error or improvisation when performing and mistakes were typically corrected to standard:

“The chants of the Māori have survived until now entirely through oral tradition. Associated with this oral tradition is an extreme concern for the accurate transmission of the chants. This concern showed itself in recording sessions by a notable reluctance to record without practice, except when the song was well known, and by an outright refusal to record when any uncertainty existed in text or in tune. Sometimes a group of singers would practise a song for a long time—perhaps twenty minutes—and then abandon it in favour of another after mistakes had been discovered which could not be put right” (McLean 1961:59).

McLean (1961) goes on to discuss the critical attention to detail that was given by performers of these chants who treated their lapses in memory as “an omen of death or disaster” (McLean 1961:59). Inaccurate performances were monitored and assessed by others (particularly the by the leaders of the group). As a result, a great deal of preparation went into the performance with those not only learning the words and melody to the song, but the history and context of the chant:

“Concern for the accurate transmission of the songs can be seen also in the long discussion of the historical background of each song which typically preceded recording and in the detailed announcements which were invariably made concerning the songs by singer or leader immediately before recording. These discussions would sometimes occupy up to three-quarters of an hour before it was felt that the details to be announced by the leader were beyond dispute. Once singing began, the aim was always to sing both words and music as near to the original as possible. Since much of the responsibility for this lies with the leader, the training traditionally undergone by the leader was very severe” (McLean 1961:59).

Indeed, as Margaret Orbell (1990) states, performers of traditional Māori waiata were required to rehearse thoroughly and commit to memory the repertoire of songs. As a result waiata incorporated a variety of themes and conventions that functioned as formulaic and structural properties within the songs (Orbell 1990). The use of rhythm, rhyme and structure were not uncommon devices used in traditional oratory performances, and these devices are commonly seen (particularly by researchers on Pacific oral traditions), as methods for aiding
the performer in remembering and communicating (Ong 1982). But they also assist in the pedagogical methods employed between teacher and student for memorization. As Mahuika (2012) states here:

“The rhythmic and mnemonic ‘patterns’ were not specifically addressed by the interviewees, nevertheless, they did note the process of remembering as a repetitious activity that mimicked the tone, phrases and orality of their teachers and mentors. Tia Neha recalls that the oral dimensions of songs and stories were ‘modelled’ and practiced for hours every week over a select period of time” (Mahuika 2012:298).

Mahuika argues that oral learning is not only comprised of structures intrinsic to the ‘text’ which is passed on, but that there are structured social interactions established between teachers or mentors, and their students. The social dimension of orality is often overlooked in oral-formulaic approaches to oral traditions. Repetition and accuracy appears to be critical to the teaching style incorporated into traditional Māori teaching methods, and being able to memorize and speak ‘properly’ were skill-sets that were taught within an apprenticeship designed to nurture young orators.

Similarly, Poia Rewi (2010) recent book *Whaikōrero: The World of Māori Oratory* (2010) discusses the importance placed upon learning and performing oratory correctly. Both speech and memory skills were highly regarded in a traditional context, and those who carried themselves publicly as a proficient orator were (and are) held in high regards by the tribe. Since orators were the practitioners and protectors of knowledge transmission for the tribe, memory and communication skills were considered critical to the nurturing of students:

“Having a good memory was one of the criteria by which students were accepted to attend traditional whare wānanga. Limiting external stimuli and keeping students isolated were thought to be conducive to developing mnemonic abilities” (Rewi 2010:23).
We find evidence for pedagogical methods employed for the purpose of oratory skill among some of the earliest literature on Māori education, and Best (1923) and Smith (1913) took a special interest in whare wānanga (i.e. schools for learning). As stated, there is still debate over what form these schools took (and whether they actually existed) (Rewi 2010:23-24), nevertheless the evidence suggests that the preservation of knowledge was underpinned by techniques that were aimed at enhancing both oratory and memory skill (Mahuka 2012; Rewi 2010). One of the purposes for refining these skills was for the accurate and faithful cross-generational transmission of knowledge:

“The objective of whare wānanga was the preservation of ‘all desirable knowledge’ pertaining to religious belief of the upper echelon, cosmogony and other traditional lore, and to hand this down to succeeding generations as accurately as possible. In opposition to the Western view of Māori as a culture devoid of literacy and literary artifacts, Māori scholars in the past were trained in oral history and had a ‘highly developed mnemonic capacity’ that ‘astounded counterparts from other traditions’. The whare wānanga was clearly an important institution for the oral perpetuation of knowledge” (Rewi 2010:24; see also Best 1923:6’).

Methods for developing memory and oral style have been a recurrent feature within ethnographic literature oral cultures and so it is no surprise that we find similar methods enhancing memory and orality within the Māori oral tradition. Orators are instruments for the transmission of tapu knowledge to the extent that only those individuals with maturity and skill would have been chosen to perform oratory (and these individuals would have been chosen either at birth, or at a very young age if a talent was recognized). Rewi states that students would undergo an apprenticeship following their induction into a mentoring immersion:

“We need to be aware of the fact that in former times not all people were privileged to receive traditional teachings... They [elders] preferred to identify talent, or potential, and then to mentor such individuals on a one-to-one basis” (Rewi 2010:29).
It is clear from Rewi’s research on the topic of Māori orality that there are practices and techniques unique to a traditional learning style that have subsequently been passed on and considered not only a relevant connection to the past, but an active form of performance in the present.

I argue that while memory and eloquence has contributed to the aesthetic of oral performance, expertise in the verbal arts additionally scaffolds the fidelity of cultural transmission. Apprenticeships for oratory were highly structured immersions in the craft and art of memory and eloquence. But the methods of delivery were also taught alongside the content. Thus, we see a systematic and well-established approach to skill development for oratory within a traditional Māori context (Rewi 2010: 30-31).

Similarly, Mahuika (2012) also states that one of the purposes for teaching oratory skills in a wānanga was to preserve tribal knowledge. Rewi cites Best’s (1923) observation that the acquisition of memory techniques was critical for the preservation of tapu knowledge:

“...memory was central to the success of the student who attended the wānanga of old whose tutors view these institutions as sanctuaries in which Māori could aspire to conserve knowledge in its purest form... Instant recall was an asset for both the scholar and orator, and the mnemonic capacity of students was acknowledged and respected” (Rewi 2010:24).

A certain capacity for memorization would have been essential for orality, but the formal presentation of an oral performance was highly regarded, also (Mahuika 2012:169). Mita Carter (2005) states that while mnemonic retention of whakapapa (genealogy) are important for orators, it is the delivery of the speech that is assessed by members of the tribe. In the recitation of whakapapa: “attention was given not to the substance of the whakapapa but to the intonation of the recital” (Carter 2005:43). This suggests that certain standards of eloquence were required before an orator could be taken seriously:
“The practice of recitation was a central part of Māori life... and thus the children learnt not only conversational speech but also to admire and memorise the higher forms of speech, which contained references to mythology, genealogy and tradition, and which were enriched with figures of speech and appropriate chants (Carter 2005:43).

Carter states that the learning methods for orality emphasized an orthodox approach to training in both preserving knowledge and speech. For example, Carter outlines a particular method where practicing orators would have to place a stone in their mouth called a “waha kōhatu” when rehearsing. This technique acted as both “an aid to memory,” and a preventive measure for “stammering” (Carter 2005:43).28

Whaikōrero is traditionally considered a developmentally advanced skill, regulated by norms and standards of conduct (Rewi 2010). Rewi states that only those with mana (some with prestige or high social standing) would have been allowed to deliver whaikōrero, and their oratory abilities are still a learned skill for this purpose. The command of language, and ability to memorize genealogy and tribal relations was (and is currently) critical for maintaining a speaker’s status, and their esteem as an orator. Gaining this status is one thing, but poor oratory skills can always potentially diminish “the mana of the group he represents” (Rewi 2010:56).

The orthodoxy of memory and speech is a critical necessity during oral performances undertaken on a marae (sacred community space), and since these spaces were created for public communication, special attention was (and is) given to the recitation of whakapapa and public speaking. Modern marae are structured in a way to convey information alongside oratories through the rich symbolic resources – e.g. such as carving, gesture, liturgy, and

ritual - that are present. It is therefore important to put the study of orality and memory into a performance context, since a variety of tools are active in the transmission of information on a modern marae. Subsequently, a comprehensive understanding of the oral performance itself cannot be found in the words alone. Indeed Mahuika (2012) talks of how marae functions as a symbolic technology that is used coactively alongside speech to support the transmission of knowledge:

“Oral history and traditions in these spaces were heard and experienced, its form transmitted in living contexts, where the performance weaved together the ceremonial cries of welcome to visitors (karanga), the art of formal speeches (whaikōrero), and the singing of ancient songs (mōteatea). Here the form is aural and physical, seen in body movement, traditional gestures, and facial expressions, where intonation, rhythm and silence are displayed and seen. The wealth of oral transmission here is layered and living, but perhaps the most significant aspect of the marae is its aesthetics, its fully carved meeting houses, walls adorned with carvings, photographs, intricate patterns, weavings, and other visual stimulants” (Mahuika 2012:130).

Carvings and other symbolic artifacts were commonly used as “physical aids” in conjunction with the verbal arts (Mahuika 2012:132). Symbolic structures such as whakairo (carvings) were, and are, viewed as ‘oral sources’ and deemed “living’ entities that carry the mauri (life force) of the ancestors they represent” (Mahuika 2012:132). Roberts and Wills (1998) also state that visual cues were utilized in the cueing of memory, while the word whaikorero, or Māori carving translates as: “to make knowledge visible” (Roberts and Wills 1998:53). In addition, knowledge was stored in “patterns of cloaks (taniko), in facial decorations (moko), and string games (whai)” (Roberts and Wills 1998:53). It is therefore difficult to take orality out of the physical context into which it was (and is now) taught and performed (Best 1922; King 1978; Hemara 2000; Haami 2004).

The examples above demonstrate the complexity of managing and transmitting knowledge databases through oral means. The ENC model underscores the importance of social learning
in developing cognitive expertise. I have chosen to focus on two points from ENC here: 1) that informational complexity determines the breadth and mode of learning strategies that are used to augment the fidelity of the information being transmitted socially; and also: 2) how information can be regulated through cultural/social conventions. The above examples show that skills in both memory and eloquence are scaffolded by learning strategies for the purposes of facilitating the preservation and communication of the information being passed on. The authors’ here show that traditional Māori oral practices are the result of highly structured interactions and that the tools for learning skills for oratory are embedded in the conventions and norms. So methods by which fidelity and stability are maintained can be found through the pedagogical strategies that have been developed for oral transmission purposes.

It can be claimed, then, that the ENC model maps well onto some of the ethnographic research conducted by the authors on traditional Māori pedagogy and orality. Niche environments are engineered to scaffold the transmission of religious knowledge. In turn, sacred conventions regulate the flow of information. However, the critical direction for this thesis is how religious enculturation (that is, the cross-generational transmission of sacred knowledge) involves a certain level of cognitive investment. The sophisticated methods by which sacred knowledge is preserved and transmitted within Māori oral tradition implies both the perceived value of explicit religious concepts (i.e. cosmogonical knowledge or theology), and the complexity associated with this class of knowledge.
4.6 Discussion.

Both learning and performance are embedded within a cultural network whereby the resources for information transmission are widely distributed in a structured environment. Furthermore, a wide range of cultural properties within the epistemic niche support the cognitive skills associated with both orality and memory. The study of oral traditions can be better understood from a psychological viewpoint when we take into account how information is managed through certain skill-sets and cultural conventions. The fidelity and stability of knowledge transmission is, therefore, determined by culturally innovated techniques for communication. The ENC model is a means by which to describe how cognitive ability and information flow is shaped by environmental factors working alongside psychological constraints. I argue that this is an important contribution to the CSR, and understanding the characteristics associated with religious transmission. Locally contingent factors, such as pedagogy and taboos are just as important to describing the religious mind as domain-specific features of our cognitive architecture.

The descriptive material discussed here on traditional methods of learning within Māori culture describes how cultural conventions shape the flow of information. Cultural norms, based on of tapu (sacred) observances, have had an extensive impact on the way in which knowledge is shared. From the descriptive literature, we can deduce the high level of investment involved in the transmission of sacred knowledge through oral means. A religious education can resemble something like an apprenticeship – associated with the transference of complex skill-based expertise - and less like a cognitively optimal pattern of transmission. In addition, while we may be able to predict some of the basic underlying traits associated a sacred observance, many pedagogical strategies associated with a religious education appear
to be context bound. The costs involved in this enterprise runs counter to a model that
presumes that the frequency of representations is causally related to intuitive cognitive
systems. Instead, the frequency of beliefs and practices seem to be largely dependent upon
active engagement with a structured learning environment. This describes why religious
beliefs and practices are peculiar to the cultural niche in which agents inhabit. Instead of
religious motivations emerging from domain-specific cognitive systems alone, there are also
multiple connections that we can identify in conjunction with both the motivational salience
of theologically correct beliefs and practices (i.e. explicit representations), and the structured
methods of cultural transmission. The breadth and variation of religious activity within
cultures suggests that memory systems are also active, and these internal systems need to
exploit external cognitive resources for support (Clark 1998; Clark and Chalmers 1998; Day

In addition, cognitive ecological models offer a picture of human cognition that is more in
line with the ethnographic literature on human cultural behavior. This chapter therefore
makes three general points about the cognitive anthropology of religious learning: 1) In order
to support the reliability of information transfer, individuals engage in the structured
coordination of learning religious knowledge. The pedagogical environment is therefore
crucial to the fidelity of transmission; 2) Sacred conventions regulate the flow of information
suggesting that the informational character of the environment is shaped by religious norms;
3) Epistemic niche construction suggests that knowledge is context-bound. The informational
classer character of a niche is comprised of variables that are locally contingent.

However, there is glaring concern that maybe obvious to some readers with this premise
on the outset. For instance, if the problem of fidelity and stability of cultural representations
is maintained through learning methods, it is easy to see how functional skills - e.g. such as hunting skills, foraging and navigation - are a consequence the practices discussed above. However, religious knowledge appears to serve no adaptive-utilitarian benefits for individuals or groups. The purpose of the stability of religious transmission - in an adaptive sense - is unclear in the case of religious transmission. Subsequently, unless the underlying mechanisms of religious activity can be identified as being causally relevant within an ENC model, then it will be problematic to demonstrate a connection between the fidelity of transmission and the prevalence of religious knowledge.

However, I do not expect that this kind of criticism will be a problem for this thesis. My goal is to demonstrate how our cognitive architecture is coactive with the cultural resources that support religious transmission. My job, therefore, is to show how the complexity of information is managed through external cognitive resources and how this matters to the structure of the cultural niche. The presentation of the ENC model is intended to provide an alternative to SiM. A cognitive ecological model demonstrates that any explanation for the spread of religious representations is going to entail a complex, multi-causal description that falls outside the scope of cognitive optimality, and these costs and investments are demonstrated well by the ethnographic and historical material on religious traditions (Whitehouse 2004).

Despite the cosmogonical features connected to the interpretation of the beliefs and practices of traditional Māori, this chapter has focused on the cognitive dimensions of learning and development. In this chapter it was argued that cognitive processes depended upon non-biological resources for learning: we learn and are raised in a niche that is structured to support cognitive development and expertise. The cultural tools embedded
within the niche environment therefore, scaffold learning and cognition. This is both a cooperative and technological feature of human lifeways. We share information and have innovated cultural tools for transmitting information more faithfully.

The next chapter will explore the concept of material engagement further and provide more detail on how memory and the physical environment are relevant to this examination on structured learning (see Malafouris 2004). Instead of providing a causal explanation for religious activity, the next chapter will look at how external cultural properties are recruited for cognition for the purposes of developing conceptual structures in relation to myths and maps. Subsequently, Chapter 5 will return to my own examination of oral maps as a means for organizing information in relation to oral narratives. Returning to the use of geography, spatial imagery and memory within a Pacific context, the next chapter will provide a more detailed approach to examining the problem of stability and fidelity within the CSR by looking at how physical structures, in conjunction with mental processes, help to support transmission. It will further examine the connection properties between mental processes and macro-spatial knowledge from the point-of-view of a distributed cognition and conceptual blending.
CHAPTER FIVE

5.1 Introduction.

This chapter takes a closer look at the use of traditional Māori oral maps in conjunction with other cognitive ecological perspectives on human cognition. Cartographer Jan Kelly (1999) states that oral Māori maps were traditionally known as 'nga tapuwae o nga matua tupuna' ('the footsteps of the ancestors'); or 'nga waewae tapu' ('the sacred footsteps'); or 'nga hoehoe tapu' ('the sacred paddlesteps') (Kelly 1999:16). Kelly states that oral maps (and navigation) functioned by recounting the place names of geographical locations in sequential order. She states that a distinction should be made between the ways in which Māori perceive representations of geography and the ways in which Europeans – at the time – utilised formal cartographic principles for navigation. Instead of maps being a purely visual-symbolic language (as European maps are), Māori recounted maps orally as pathways or routes that were sequentially labelled with place names. These place names were historically (and mythically) significant to the people, and served a multivalent function: as navigational markers and historical libraries for which stories and myths could be used to cue information about the landscape.

As outlined in Chapter 3, Māori incorporated place names into mythical stories in which a narrative would follow the deeds of ancestors or supernatural beings along a specific route. Place names on the route followed a logical sequence across the landscape and subsequently acted as a map. Narratives that included the sequencing of place names served a function for organizing information about the landscape also (Wilson 1990; see Chapter 3). It is argued here in this chapter that sacred knowledge was intertwined with knowledge of the landscape because Māori cosmogony was tied to valuable information about the terrain. Though we
may be compelled to think of these features of the traditional Māori epistemic world as distinguishable from one another, it is urged that researchers consider how myth, history, kinship and the land were once perceived as mutually associated. Physical markers – such as landmarks – were (and are) regarded as a testament to a living history for a people, and further active reminders of an ancestral history.

The last chapter focused on the fidelity of learning, and how transmission was augmented by traditional cultural practices. This approach highlighted the social dimensions of oral learning. The authors discussed in this chapter who endorse a similar externalist model of cognition and learning. Authors like Edwin Hutchins (1995a), Andy Clark and David Chalmers (Clark and Chalmers 1998) and Merlin Donald (1991) suggest a moderated alternative to a cognitivist approach by focusing on how external objects support mental processes. These authors argue that there are fundamental connections between external cultural objects and human cognitive ability. These externalist models of mind have been outlined previously within distributed cognition models (Hutchins 1995a, 1995b; Sutton 2010) and extended mind models (Clark 1998; Clark and Chalmers 1998).

Framed within a general cognitive ecological approach, like ENC, external-distributed models of mind generally claim that culturally evolved features of our environment can explain both the breadth and depth human cognitive expertise. Similarly to the ENC model, it is argued that agents have shaped their environments, and that these engineered environments have a critical impact on human minds and behaviour. Material culture has subsequently evolved alongside hominin cognitive development. Like the ENC model, extended-distributed cognitive models view the mind has being cognitively plastic (locally adaptable), and subsequently sensitive to proximate developmental conditions. So instead of focusing on
just the biological features of our intelligence, these models view cognition as an emergent property, generated by the interaction between both biological (internal) and non-biological (external) cognitive properties. The literature on external-distributed models has embraced the idea that cognitive evolution and proximate cognitive development is the product of co-evolved processes (constituted by organism-environment interactions).

According to an extended mind approach, for instance, features of our world should be conceived as constituting our intelligence (Clark 1997, 1998; Clark and Chalmers 1998). On Andy Clark's view, our cognitive abilities are extended and active with material things in our environments. Text-based media, for example, pen and paper, are recruited as information storage and retrieval devices that further broaden the scope of our memory resources. It is more apparent to see how physical artifacts, such as maps, can be classified as cognitive devices since they expand the range of capabilities available to brain-bound processes (such as the memorization of the landscape). However, as shall be argued further here, while informational complexity naturally emerges out of the use of external symbolic devices (e.g. such as maps) it should not necessarily follow that oral traditions were somehow lacking in cognitive resources for memory with similar value.

This chapter will therefore discuss how non-biological cognitive strategies and tools have been utilised within oral cultures for managing and organizing knowledge. In particular, this chapter focuses on the use of oral maps and navigation, and how geographic properties are recruited for cognitive purposes for supporting oral transmission. Maps were traditionally transmitted orally within traditional Māori culture, and physical markers – such as geographical locations – were commonly present within myths as narrative devices. Likewise, myths were employed to recall the macro-spatial knowledge and the ecological
conditions specific to regions on the landscape. It will be argued that valuable informational resources were preserved by exploiting variety of cognitive inputs (i.e. such as physical landmarks), and once combined these input spaces become powerful cognitive tools for conceptual reasoning and memory (Hutchins 2005).

Before examining the specifics of oral maps, however, the next sections will take a brief tour through some of the relevant material on extended-distributed cognition models (EM). It is important that any EM model is able to elaborate on the causally relevant details associated with mind-environment interactions. As we shall see, the focus on physical cognitive properties by EM is complicated by the lack of enduring material culture by pre-contact Māori in the archaeological record. If external things augment intelligence, it should follow that environments are commensurate with cognitive expertise. I will argue that this could be problematic for studying pre-literate cultures that noticeably lacked access to extensive symbolic resources. Subsequently, we must be careful in the application of EM since certain inferences can be skewed towards a textually biased conception of intelligence. This bias assumes that the optimal method for managing informational complexity is through external symbolic artifacts. The early sections of this chapter will therefore be spent clarifying the parameters on an applicable cognitive ecological approach for our case study. I will argue that we need to focus on the dynamics involved in mind-environment interactions within oral cultures, and so the simple premise that material culture augments cognitive skill is insufficient for the case study.
5.2 First and Second Wave Extended Mind Models.

Edwin Hutchins’ book *Cognition in the Wild* (1995a) sets out by describing the work that is conducted upon a pre-GPS naval vessel and its navigation. He observes how the devices and individuals onboard the boat are ‘distributed’ in such a way to facilitate both navigation and the operation of the vessel. A nautical chart is an external representational device used for navigating a real-world environment. Meanwhile the duties aboard the ship are distributed amongst the naval ranks, with various skills being assigned to individuals dedicated to a specific task. Both tools and specialisation are distributed in such a way to ensure the vessel’s operation. Generally, Hutchins uses this example to describe how external artifacts are recruited for tasks outside the basic brain, and the way in which these cognitive tools enhance our intelligence by expanding the range of skills applied to complex tasks. According to Hutchins, material culture and individual expertise constitute a cognitive distribution of labour, since the burden of managing a variety of complex activities can be unloaded onto artifacts or people. A *distributed cognition* model describes how our minds are supported by both the social (agents) and technological (tools and strategies) cultural properties.

While extended mind models (developed more noticeably by Andy Clark and David Chalmers [Clark and Chalmers 1998]), are similar to Hutchins’ model there are some noticeable and subtle differences in their conceptual approaches to brain-environment boundaries. Clark’s extended mind model claims that environments share the same functional qualities as brains, whereas Hutchins argues that tools, strategies and social agents merely support cognitive processes. Nevertheless, both these approaches are relevant criticisms against representationalist models of cognition. For instance,
cognitivist (or internalist) models (see Chapter 1) argue that the majority of cognitive processes are stereotyped events that can be causally related to specialized internal systems, while Hutchins and Clark argue that humans inhabit environmental ‘smart structures’ replete with informational resources (Tribble 2005).

Similarly, Merlin Donald (1991, 2001) has argued that the evolutionary impact of information storage through the use of external symbols has led to the widening of the human external memory field (Donald 1991: 354). Donald's own focus of research has been how the co-evolution between external communicative mediums (e.g. such as symbolic artifacts) and hominin cognition has further led to a greater capacity to store and retrieve information in our environment. Donald is clear in stating that the evolution of human cognition has evolved alongside technological developments in our ancestral history:

“I am referring to a class of manufactured objects that are sometimes called 'symbolic technologies'. These are specifically designed to represent, communicate and store knowledge. Such objects introduce a completely new element into human cognition: external, that is, non-biological, memory store (as in an encyclopaedia, for example). Non-biological memory media enable us to record and display complex ideas in highly accessible format that are easy to revise and refine” (Donald 2010:71).

According to Donald human representational ability and memory has been broadened with the development of symbolic material culture and the use of external media devices. Donald therefore splits human memory capabilities into two categories: 1) engrams: neurologically based memory storage (i.e. internal systems); 2) exograms: non-neurologically based memory store (i.e. external properties) (see Donald 2010 for discussion; also Donald 1991, 1995, 1998):

“Memory records stored outside the nervous system (for example, clay tablets, papyri, printed books, government archives or electronic data banks) can called 'exograms’” (Donald 2010:71).
The use of external symbols allowed individuals to offload the computational burden of memorisation, in correspondence with the active manipulation of external representations (e.g. through the manufacturing of external symbols). External symbolic resources cannot only be fixed and accessible, but they are also sensitive to engineering activities. So exograms are both fixed and mutable. According to Donald, then, the use of external media devices has been a potent factor in the development of human informational complexity.

In light of Donald’s thesis, John Sutton (2010) has stated that our mental flexibility is strongly related to our capacity to outsource mental processes in conjunction with environmental properties. We are both cognitively flexible and sensitive to external cultural things in the world. Regarding the distributed-extended cognition model, Sutton states:

“In certain circumstances, things – artifacts, media, or technologies – can have a cognitive life, with histories often as idiosyncratic as those of the embodied brains with which they couple. The realm of the mental can spread across the physical, social, and cultural environments as well as bodies and brains.” (Sutton 2010:189)

However, it Sutton claims that it is important to make a distinction between what he (2010) calls ‘first’ and ‘second’ waves of extended mind models (again Sutton abbreviates ‘Extended Mind’ or ‘Distributed Cognition’ to ‘EM’ in his paper) (Sutton 2010). Sutton argues that there are salient conceptual differences between these two waves of EM model. The lack of distinction has led to mistaken assumptions over the methodological value of EM. On the one hand, Clark's (1998) extended mind model states that there is no ontological differentiation between the inside and outside world: internal cognitive processes are assumed to be equal with external cultural properties. If a grocery list is a memory tool, like Clark states, then it is not just an exogram, but an engram also:

“If ‘exograms’ act as engrams do, then for explanatory purposes they can be treated as engrams, the difference in their location being entirely superficial:
thus breaking down classical and individualist distinctions between brain, body, and world, we see that the object can be (part of) the subject, and that, as we’ve noted, things can have a cognitive life” (Sutton 2010:196).

Clark’s (1998; 2001a) extended mind hypothesis states that the development of human intelligence can be explained alongside a historical understanding of humans and their interaction with cultural things. Human intelligence has co-evolved with material-cultural properties. Cognition on Clark's view is seen to be a “continuous with processes in the environment” (Clark and Chalmers 1998:10). Critics have claimed that Clark’s claim for 'parity' between brains and environment is exaggerated (Sutton 2010). However, Clark claims that since brains utilise non-neurological things in the outside world – tools for thinking - then no one feature of the cognitive process should be treated as distinguishable:

“The Parity Principle stresses the functional isomorphism of inner and outer processes and states... It’s this Parity Principle which gives EM its immediate metaphysical bite, enthusing sympathizers and infuriating critics. Parity is, in part, EM in critical mode, rejecting boundaries between brain, body, and world, undermining the easy assumption that the cognitive is inner and the non-cognitive is outer” (Sutton 2010:198-199).

Sutton points out that the ‘Parity Principle’ remains problematic for an EM approach, precisely because of its theoretical ambition, and claim to ‘isomorphism’ (Sutton 2010). Sutton argues that when the affective differences of physical artifacts have not been clearly defined by an EM examination then it will always be difficult to measure their influence.²⁹ Sutton says that the research by both psychologists and anthropologists often clearly recognise that different values that can be inferred by examining the interaction between symbolic artifacts and minds. Subsequently, Sutton argues, that it is methodologically awkward to assume strong parity between agent-environment interactions:

²⁹ Thus Sutton says it’s important to differentiate one system from another (i.e. agent and artifact), lest we underplay the importance of heterogeneity in our classifications and content of these properties and processes. For example, working memory (engrams) is quite different to external memory stores (exograms) because internal memory is non-static by nature. Working memory operates with representations that are fluid and changing, while a grocery list, for example, is a fixed externalized representation (Sutton 2010:202). In short, there are differences between agents and environments and these must be assumed. What is important, however, is the interaction of these things and the emergent properties that are unique to a particular interface.
“The Parity Principle, in short, fails directly to suggest study of idiosyncratic or peculiar features of particular external symbol systems, or of particular ways of interfacing with them” (Sutton 2010:205).

To be clear, then, Sutton is not discounting any EM model, only that idea of Parity typically leads to misunderstood assumptions from critics about the efficacy of EM. However, Sutton claims that Hutchins’ distributed cognition model makes no strong claim for parity since it recognizes external properties as being merely ‘supportive’ of cognition. Sutton argues, then, that a distributed cognitive model can be more methodologically valuable in its application. For instance, Hutchins claims that instead of external artifacts being commensurate with minds, a distributed model assumes external tools and strategies as only complimentary to cognitive processes. External things are not necessarily viewed as a feature of our cognitive machinery per se (as implied by Parity), but the result of a scaffolded interaction with the environment.

Sutton calls this the ‘Complementarity Principle’, as being defined as the 2nd wave of EM models. The 2nd wave of EM, according to Sutton, is theoretically moderate since its underlying conceptual basis recognises the effective differences between brains and external cognitive scaffolding. On this view, the Complementarity Principle distinguishes cognitive artifacts as things outside of the mind and not necessarily properties of the mind itself:

“…In extended cognitive systems, external states and processes need not mimic or replicate the formats, dynamics, or functions of inner states and processes. Rather, different components of the overall (enduring or temporary) system can play quite different roles and have different properties while coupling in collective and complementary contributions to flexible thinking and acting. So ‘exograms’ can be radically unlike engrams even while co-opted for the same purposes, and these differences will often be the focus of complementarity-oriented explanations in the EM framework” (Sutton 2010:41).
Sutton also discusses Evelyn Tribble's (2005) recent historical research from her paper “Distributing Cognition in the Globe” (2005) as a good example of this 2nd wave EM (i.e. Complementarity) (Sutton 2010:208-212). Tribble looks at how actors at the Globe theatre were able to learn the multiple plays – in some cases upwards of 70 roles – and perform them under time constraints without any extensive rehearsal. Tribble's approach intersects Yates' (1966) and Carruthers' (1990, 1998) historical examination on the use of mnemotechnic strategies, and the tools used for orality and memory (see Chapter 2). Tribble investigates the techniques for memorization by the players. Instead of the actors merely learning their lines verbatim, Tribble states that mnemonic strategies were built into the theatre, and play’s text to allow for the active recall of their lines during performance. These mnemonics included the rhyming structures of the plays themselves (the tempo and rhythm of the prose), the design of the theatre, and the immersive apprenticeships that emphasized memory retention.

Tribble also points to an early theatrical practice that remains puzzling for historians: in particular, the use of large folio sized pieces of paper called ‘plots’. These plots contained sparse information about the entrances, music cues, and casting of the play, and were always hung up in various spots behind the stage. These plots functioned “as a two-dimensional map of the play designed to be grafted onto the three-dimensional space of the stage” by the actors (Tribble 2005:146). Without the use of a script, the players could use these plots as rough heuristic tools for memorizing the shape and organisation of the play. According to Tribble, the tools for learning the play were therefore embedded in the environment and active within the performance itself. Again, Tribble’s examination demonstrates an interdisciplinary approach that draws together historical resources, as well as mnemotechnics and a distributed cognitive model. As Tribble’s example shows, a
distributed cognition model assumes that our brains are both unstable and highly responsive to external media devices. Our cognitive hardware – while being content-rich – is nevertheless dependent upon external properties to support complex cognitive activities.

The Complementarity Principle argues that the interface between agents and external devices is dynamic: so while material artifacts play a supportive role in augmenting intelligence, they are not constitutive of our cognition:

“It’s just because isolated items aren’t stored atomically in the brain that our relatively vulnerable biological memories are supplemented by more stable external scaffolding. Brains like ours need media, objects, and other people to function fully as minds.”(Sutton 2010:213).

Sutton states that Donald’s engram-exogram distinction can also be categorized as Complementarity, since Donald characterizes the affective content of both internal and eternal memory resources as evolutionarily connected, while distinct. Minds and the technological development of external symbolic resources have developmentally significant in the organization and transmission of knowledge.

Similarly, I argue that the Complementarity principle is more helpful for an interdisciplinary examination. However, Donald’s engram-exogram distinction, in particular, assumes that the salient impact on external memory storage has emerged through a strong coactive relationship between external symbolic innovation and internal cognition. Exograms are characteristically viewed as engineered external media devices used for information storage and retrieval, and it is an uncontroversial claim that the evolution of external media devices have allowed for more intensified information storage and retrieval. Donald's concept of exograms offers a method of for classifying cognitive-material engagement within an evolutionary framework. However, material engagement typically neglects to emphasize the
importance of other socially based pedagogical techniques, such as oral modes for transmission.

I argue, then, that some consideration needs to be given to research on methods for information management within pre-literate cultures. The engram-exogram distinction in regards to artificial memory is less obvious for my case study on traditional Māori culture. My examination is made unstable by the lack archaeological data on Pacific cultures and external material culture. We cannot pretend to know a culture without its artifacts, but it would also be reasonable to claim that since oral traditions have utilised non-material tools for memory and transmission that the definition for exograms could be expanded to include other strategies. Though Donald does state that mnemonic techniques within oral societies were crucial for the preservation of knowledge, it is nevertheless implied that complex information networks are unlikely without the invention of external symbolic storage:

“In societies that maintain a true oral tradition, uncontaminated by exposure to modern literate cultures, there are few, if any, exographic media available for recording the accumulated collective knowledge of the group; and those media that are available are very limited. The collective memory of such societies must be confined largely to the brains of its members. Memories are transmitted and held in highly stylized and repeatedly rehearsed stories, along with shared ritual mimetic practices. Major items, such as knowledge of medicinal herbs and poisons, or important myths, are typically memorized by trained specialists, such as bards or shamans. Such systems are rigid and difficult to change. Training in mnemonics and oratory, one of the primary aims of education in the political oral culture of ancient Greece, and still practised into the twentieth century in the West, conveyed only a slight advantage to those who underwent such training. *Without exographic storage, much of the cognitive energy of the group was tied up simply in maintaining traditions and structures.*” (Donald 2010: 76-77; emphasis added).

The assertion that exographic storage in the form of symbolic artifacts has alleviated cognitive burden is uncontroversial. However, engagement with external media (e.g. text) requires that a culture additionally develop methods for passing on literacy skills. Put simply, a reading-writing environment must also produce readers and writers. So while material
exograms can reduce the cognitive burden of preserving informational resources, it does not necessarily lead to a cognitive economy of scale. Informational storage has no utility without capable access to those resources. Informational complexity may not be the issue here, then, just the informational character of the environment, and Donald concedes to this notion here:

“It is, of course, a truism that the cultural buck stops ultimately at the threshold of personal consciousness. People must be able to acquire the appropriate skills to use their exographic technologies effectively, and to interact with them. Learning these skills consumes most of the early years of development, and an exographic device that exceeds the capacity of its users will not succeed. Designers of new symbolic technologies must take this fact into account in order for the technology to be effective” (Donald 2010:77).

Donald is right in stating that cultures offload the burden of cognition onto symbolic devices. However, the definition of 'exogram' may need to be complicated further to include some of the oral techniques for memory discussed earlier. It may be the case then that exograms could be defined as the means by which memory is amplified by culturally evolved tools and strategies.

However, this definition of exograms is probably far too broad for my own analysis, and does not offer much methodological focus. Though symbolic artifacts are important to an understanding of representational ability, this chapter contends that artifact modes of information transmission need to be further addressed. In other words, the levels of sophistication associated with a culture's methods for information transmission does not need to stand in comparison with symbolic literacy. Cultural norms often determine the values associated with a particular technology, and while external symbolic tools are efficient methods for information storage, they should not necessarily be the only standard by which other modes of transmission should be measured.
To sum up this section, it is claimed that a clearer definition of EM is plausible and Sutton’s distinction between Parity and the Complementarity Principle is helpful in detailing the broader methodological implications. Sutton states that the 2nd wave EM (Complementarity), conveyed more clearly by Hutchins’ distributed cognition model (Hutchins 1995a; 1995b), provides a more focused definition of a cognitive ecological model. In addition, this section provided a brief examination of the engram-exogram definition of memory. Donald (1991) has argued that the coevolution between symbolic technologies and minds has ensured a wider range of information storage and retrieval. This idea underpins the importance of cognitive innovation and artificial memory through external symbolic artifacts. However, it also neglects the distribution of knowledge that is transmitted through other tools and strategies, as defined by orally transmitted mnemonic devices. While social organization is important to learning interactions within oral traditions, the next section of the chapter will look at how non-symbolic material anchors – such oral maps - can be recruited as cognitive inputs for organizing knowledge. So while particular social environments facilitate knowledge sharing, informational resources can also be managed through material properties other than engineered symbolic technologies. The next section expands on the Complementarity Principle further by arguing that landscape, myth and other physical properties can be examined as a means by which memory and symbolic thinking are supported.

5.3 Conceptual Blending and Knowledge Stability.

This thesis argues that the transmission of religious representations is a hybrid process incorporating innate features of our cognitive hardware and external cultural properties. Societies have engineered their environments in order to shape the modes of cultural
inheritance. These channels can either improve fidelity or impose regulatory constraints on information flow (and these are not necessarily always in conflict). Without the use of extensive symbolic resources, oral cultures would have relied other means to preserve their oral corpus. As Harwood (1976) points out in her paper on the Trobriands (see Chapter 2), one of the problems for the study of oral traditions – both in ethnographic and cognitive investigations - is accounting for the stability of myth. Information can become destabilized through intra-individual transmission and even small errors can lead to long-term cumulative changes, which further impacts on social institutions. Harwood argues that oral cultures will normally develop tools and strategies to ensure the organization of knowledge despite the lack of extensive symbolic technologies. She states that the structure of the Trobriand epistemic world was reinforced through a merger between myth and as geographic locations, claiming that place names and physical markers were integrated into myths. Since social institutions depend upon the stable transmission of myths, narratives should have “stabilizing mechanisms” built into them (Harwood 1976:790). One of these stabilizing mechanisms, Harwood states, is the use of landmarks and spatial imagery in mythic narratives.

Hutchins (2005) presents a similar concern to Harwood’s problem of stability in his paper “Material Anchors for Conceptual Blends” (2005). Hutchins argues that representational stability can be managed by integrating physical structures (as representational tools) with online conceptual inputs (Fauconnier and Turner 2002). He states that the ability to utilize physical properties for blending with other cultural concepts ensures a material anchor for our representational systems. The physical property need not be a symbolic artifact necessarily. Indeed, concepts can be blended with other, non-symbolic physical objects for the purposes of establishing uniquely blended concepts.
This cognitive ability would have preceded language ability for hominins and having been utilized for information management purposes, our capacity for conceptual blending with non-symbolic physical properties would have ensured the stabilization of knowledge resources (Hutchins 2005). According to Hutchins, co-opting physical structures, in order to support thinking, allowed for greater cognitive flexibility for complex representational thinking and memory.

Hutchins states that the foundation for his class of conceptual blending requires two basic inputs: one conceptual, and one material (or physical) in order to create a third uniquely blended concept (see Fig 6 below). The conceptual blend is the outcome of blending two separate inputs to create a third space (Hutchins 2005:1556). According to Hutchins, coordinated minds require the coordinated connection to structures outside the mind. He argues, then, that physical structures are critical components in this capacity to anchor mental processes (alongside other cognitive inputs), since their materiality provides conceptual stability:
Hutchins (2005) claims that physical structures can be used and function as stabilizing mechanisms for complex representational thinking, since our online representational systems are may become overly burdened and unstable when complexity increases. This necessitates the 'anchoring' of some 'conceptual elements' onto physical things in the world in order to ensure stability (Hutchins 2005:1562):

“The ‘holding in place’ is accomplished by mapping the conceptual elements onto a relatively stable material structure. This is how a material medium becomes an anchor for a conceptual blend” (Hutchins 2005:1562).

Hutchins points out that the relationship between material structures and concepts can typically be found in both language and text-based media. However, this approach to conceptual blending is not the same class of representational ability expounded by Hutchins.
here. Symbolic systems are based on an established structure of signs and referents in relation to semiotic content. This semiotic content is not intrinsic to the symbols, but arbitrary, so the association between signs and meanings can shift. Instead, Hutchins is more interested in the way in which various structures interact with each other to support conceptual thinking. An examination of structural interactions does not involve meaning *per se*; it is not so much the semiotic content of words that are important to Hutchins' application of conceptual blends, but the way in which external representational properties are organized through physical structures. So for instance, while a paragraph or sentence conveys meaning, it is the way in which words are arranged on the page – their organization - that enhances coordination.

Hutchins, therefore, wants to steer clear of any text-based notions of external cognitive models that favor the idea of symbols being crucial to complex representational interfacing. It is the physical organization of external devices that interests Hutchins, as it is the coordination between online and offline cognitive resources that benefits from these structures:

“Thus, it may make more sense to say that the temporal or spatial organization of a spoken or written sentence can be a material anchor for some portion of the grammatical conceptual structure, than it does to say that a word is a material anchor for the concept it represents. This is because in the case of sentence structure, more complex aspects of the material organization are involved. No doubt the fact that spoken language has material form was important in the development of language, as the material forms provided anchors for concepts and conceptual relations” (Hutchins 2005:1573; emphasis added).

Hutchins states that we often reason under culturally informed constraints, and cultural conventions inform our conceptual reasoning (Hutchins 2005:1557-1558). This may explain why we are better at making inferences derived from “culturally coherent” premises, than purely logical ones (Hutchins 2005:1558). But it could also explain why we are able to make coherent inferences based on concepts that are only common to a culturally defined frame of
reference. For example, Hutchins illustrates our general tendency to distinguish between line concepts. We can normally distinguish the difference between people lining up in a queue at a cinema, and soldiers standing in a line formation. Both of these concepts follow the same structure, while each formation is contextually differentiated. The cinema queue follows a physical trajectory concept of linear order (i.e. front to back of line), and it also follows our conventional knowledge of individuals seeking a service (e.g. queuing at the cinema). The concept of soldiers in formation, however, is conceived quite differently - adhering to a distinct functional quality:

“Consider a line of people queuing for theatre tickets. This cultural practice creates a spatial memory for the order of arrival of clients. The participants use their own bodies and the locations of their bodies in space to encode order relations” (Hutchins 2005:1559; emphasis added).

The physical structure of bodies in space - adhering to a particular pattern – functions as a cognitive input for the conceptual blend. Instead of viewing conceptual blending as the product of integrating mental representations as inputs (i.e. internal online processing), Hutchins says that physical structures (e.g. such as queues and lines) should be counted as inputs as well. Understanding the structure of a queue does not require the additional complexity of deploying an algorithm for 'queue-like' profiles. Both of these conceptual blends – the cinema queue and line of soldiers – are coherent as concepts within a particular context. They are learned concepts, and since the queue exists in real time as a physical property functions as a material cognitive input.

Hutchins suggests, then, that physical structures are implicitly used to stabilize conceptual thinking. He argues that conceptual blending demonstrates how human cognition has the capacity to incorporate a variety of connection resources to achieve this mental stability:

“Conceptual structure must be represented in a way that allows some parts of the representation to be manipulated, while other parts remain stable. The complexity of the manipulations of structure can be increased if the stability of
the representations can be increased. The stability of the representations is a necessary feature of the reasoning process, but it is often taken for granted” (Hutchins 2005:1557).

In addition, he adds:

“Cultural models are not only ideas that reside inside minds, they are often also embodied in material artifacts... The theory of conceptual blending and mental spaces deals with abstract models of the kinds we usually think of as mental models. The organization of the models supports various inferences. The key thing here is the way in which two or more spaces are blended together. Various elements of the input spaces are selectively mapped to the blended space. In the blended space, new inferences are possible” (Hutchins: 2005:1558-1559).

The motivation for Hutchins’ examination echoes the claim made by Harwood (1976; see Chapter 2), that cognitive stability within the Trobriand oral culture (e.g. in relation to the preservation and transmission of myths) was outsourced to non-symbolic physical structures such as geographic locations. Subsequently, comparisons can be drawn here between conceptual blending and Harwood’s claim for integrating knowledge, myth and landscape. Hutchins looks particularly at Harwood's comparative approach to his study of Trobriand myth and the method of loci (Hutchins 2005:1563). Since the myths were often associated with various landmarks, storytellers needed to only follow the sequence of place names and locations to cue sections of the narrative. However, Hutchins argues that the method of loci system of memorization – in conjunction with actual physical locations on a map - represents a strong case for oral traditions like the Trobriand people organizing knowledge through conceptual blending:

“The method of loci sets up a simple trajectory of attention across a set of features or landmarks of the environment. One may establish a flow through the environment that brings attention to the landmarks in a particular order. This is a layered blend” (Hutchins 2005:1563).

Hutchins claims that the method of loci system has a slightly more complex structure, and is therefore classified as a compound blend. These structures are comprised of a variety of
input spaces layered upon one another. Below in Fig 7 is an image customized according to how a compound blend for a loci method of mapping might work:

![Diagram of Fig 7](image)

*Fig. 7: “The compound blend that underlies the use of the method of loci” (Hutchins 2005:1564).*

*Firstly,* the method of loci contains input spaces involving landmarks and the trajectory of the sequence. The relationship between the landmarks as a sequence is an “emergent property of this blend” (Hutchins 2005:1564). *Secondly,* the items placed within this sequence are then incorporated as an input space upon which the landmarks are mapped:

“The method of loci makes opportunistic use of space. The spatial relations of the landmarks do not contribute any semantic content to the problem. But
the landmarks themselves do provide memory cues, and the sequential relations among the landmarks, that were created by mapping a particular shape of motion onto them, is inherited by the set of items to be remembered” (Hutchins 2005:1564).

According to Hutchins the method of loci uses a variety of blends to coordinate working memory with macropsatial properties, and Hutchins even cites some of his own research amongst the Trobriand people to support this (Hutchins 2005:1563-1564). For instance, he notes that in the Trobriand myth of Baroweni, Baroweni's mother travels a particular route from village to village following a sequential logic (Hutchins 1987). Hutchins says that the story itself serves a function in that listeners learn about certain significant geographical locations, while “the narrators seem to use a variant of the method of loci to control the order of events in the narrative” (Hutchins 2005:1563). The use of organized space within the narratives, therefore, provides a kind of cognitive checklist for the storyteller. This compound blend – that Hutchins claims has an analogous loci structure - is constituted by a logical pattern of events within the narrative, coinciding with specific locations on a map.

Temporality within a narrative is also linked closely with spatial imagery since events within a story can be traced using the order of locations in which the narrative follows. The sequential flow of a narrative is therefore dependent upon the spatial imagery and locations provided by the story. This is what Hutchins means by a compound blend: conceptual and material inputs are layered up within multiple spaces.

5.4 Māori Oral Maps and Distributed Cognition.

Conceptual blending provides the background for this next section on traditional Māori oral maps. Similarly to Harwood and Hutchins, a comparative examination can be made in relation to the ordering of landmarks through linguistic devices within myths (i.e. place
naming) and how these devices function as a means for organizing knowledge. The cartographic practices used by Māori were not atypical of oral traditions that often incorporated myth and place names into mapping their geography. As Harwood (1976) states (see Chapter 2), the Trobriand people organized their landscape into logical pathways through the use of names and storytelling. Similarly, as Renee Louis (2005) states here, Hawaiians used names and pathways in narratives that were ‘performed’ during storytelling:

“Hawaiians have an oral tradition and hence did not encode their knowledge in archival graphic forms. They privilege process over product, incorporating their understanding of their island setting into their moʻōlelo (stories), oli (chant), ʻōlelo noʻeau (proverbs), hula (dance), mele (song) and their moʻokūʻauhau (genealogy)... In the Hawaiian tradition, this knowledge was incorporated into various cultural acts in which mnemonic symbols such as place names are of central importance.” (Louis 2005:94; emphasis added).

Louis argues that the differences between Western and traditional Hawaiian cartographic practices demonstrates a distinction between the cultural tools that were utilized for recording information about the landscape. The standard for colonizing Europeans was (and is) the use of graphic conventions (i.e. physical maps), while the indigenous Hawaiian culture, according to Louis, had previously integrated their oral maps into a range of different mediums – such as storytelling - and expressed the conceptual organization of the landscape through oral performance (Louis 2005:94).

Similarly, in her paper “Māori Maps” Jan Kelly (1999) looks at some of the differences associated with the concept of maps during early European encounters with Māori. She states that the historical evidence shows that Māori were highly competent at constructing visual representations of the local geography, and tribal members were often asked by colonial settlers to draw rudimentary visual maps. Kelly recounts a stories whereby settlers had asked ask local Māori navigators to sketch basic topological images by using lines in the sand, or with charcoal on wood. These sketches acted as coherent and logical representations of the
landscape and readable maps for Europeans. However, the important point that Kelly wants to make in her paper is that Māori were able to convey a representational characterization of their local geography – in the form of a basic image of a map - to a foreign culture without ever having any education in map-making, or knowledge of the other culture's cartographic tools. However, unlike the European understanding of maps as a graphic representation, Māori did not view these types of sketches as a primary method of mapping their landscape (Kelly 1999). Instead, maps were transmitted mainly in oral form through storytelling and the recitation of whakapapa (genealogy).

Kelly states that the European tenets of cartography, which emphasized certain accepted conventions, were never a main concern for Māori who employed other navigational methods without the use of physical maps. European maps, for example, relied on the encoding of a symbolic language specific to a graphic representation and predetermined standards of measurement. Kelly states that this should not necessarily lead to a general classification of map-making conventions. Instead Māori predominantly organized the landscape through place-names and storytelling. These strategies performed three key functions: 1) it organized the local geography through the labeling and pathways; 2) while physical locations provided a concrete anchor for memory; and 3) further, place names and landmarks were integrated into a larger cosmogony constituting a historical frame-of-reference to pool data from:

“Not having a written medium, the Māori named the landscape features as a way of describing the landscape and committed such descriptions to memory. The events or characteristics associated with each place anchor it and give it a durable reference, as well as floating access to a huge range of oral information” (Kelly 1999:21; emphasis added).

Kelly states that boundaries and routes were not subject to standards of measurement such as miles or yards, as in the European conception of mapping. Instead Māori used landmarks, stories and names to organize the landscape into areas of historical and mythical significance.
Stories were attached to various locations, or objects on the landscape (e.g. hills, rivers, rocks and trees etc) that were deemed significant within their mythical corpus. Stories embedded a history into the landscape and geographical space was therefore organized through narrative and naming:

“Sometimes trees were planted or stones placed to reinforce and define a known limit. And as the genealogies were recited and waiata chanted the oral pegs were hammered into the land. As the pegs were struck the stories were fixed through generations” (Kelly 1999:15).

As an example of this, Kelly says that oral pegging through myth were often necessary means by which land ownership claims could be made through familial and tribal descent during the Māori Land Court hearings. Transcripts from the proceedings describe how boundaries were delineated through the use of place names and stories (Kelly 1999). Oral pegs, she says, were anchor points within stories to describe how the people organized the land into logical units within the mythic corpus. Kelly also states that pathways – from point to point - were important to remembering the local geography and those who could sketch a map often drew upon the major bodies of water, followed by the paths and routes that joined these points of significance together. Instead of maps being visually integrated, Māori remembered their maps as a series of pathways joined by various landmarks of significance. Indeed routes were comprised of a sequence of named locations along a specific route.

Kelly quotes a marae elder, Rakihia Tau, who states that maps were not remembered as a visually complete object necessarily, but as a series of sequentially defined pathways with linked place names. These were not 'lines' per se but routes joined together via naming:

“[Rakihia Tau] writes that paths were identified by a series of place names that not only confirmed the path but could be used to measure the distance traveled in a day and to find one’s way at night. He illustrates this with part of a modern map on which paths are sketched not with a line but as a sequence of named points, although rivers and the coastal edge are shown as lines. The named places along each path were memorized in chants, he says, to assist the novice when first traveling the trails of old. After a day’s journey, one would
know not only one’s whereabouts, but also the history of the surroundings’” (Kelly 1999:16).

Chapter 3 looked at this method of incorporating geographical information into the use of place names and myth. From the textual evidence we can surmise that these stories were well preserved through oral means, but the myths had a functional basis also. These stories both conveyed important historical information as well as geographical data for the purposes of remembering the landscape. Commonly, these oral maps – in the form of a story - traced the route of an ancestor or mythical character whose travels led to their naming places along the route. These names were traditionally incorporated into the narrative and often represented deeds undertaken at those points.

However, as stated in Chapters 2 and 3, place names also cued information about the geographic locations themselves. For example, in the lullaby 'He Oriori Mo Wharau Rangi' (outlined in Chapter 3), during the pursuit of Wairaka by Hau, Hau he manages to cross a large river:

'Ka whiti i te awa,  
Ka nui ia, ko WHANGANUI;  
Tiehua te wai, ko WHANGAEHU;'

'He then crossed the river  
Which won him great renown, and it was WHANGANUI;  
He splashed through cloudy waters, hence WHANGAEHU;' (Wilson1990: 63-66).

The names used in the story covey information about both the deeds undertaken by the character Hau at those locations as well as crucial information about the geography at that point on the map. These features of the lullaby are organized in a sequential fashion so as to demarcate points along a pathway. We also see the same recurrent structure within a story emerging in “He Whakarapopotonga I Nga Korero Mo Poutini” (Wilson1990: 78-85). In a
section taken from the story below, both the main characters Poutini and Tamaāhua stop at various points along the map, while the story reveals crucial information about the landscape and the optimal route to be taken by travelers:

“This small section of the story includes some crucial information about the geographical features of the region as well as the experiential aspects of the landscape. More importantly,
however, is that the place names are ordered in a sequential fashion within the narrative as pathways.

As Kelly states above, Māori maps were mainly structured and comprised of pathways remembered through various oral methods such as chants, songs or storytelling. However, the cognitive dimensions associated with the transference of oral maps to visual representations presents the most interest to Kelly (and this section), and a cognitive ecological model – specifically conceptual blending – may provide a means for examining traditional Māori oral maps further. Conceptual blending between explicit representations, innate conceptual structures and physical properties supports working memory because physical inputs function as material anchors for fixing representations associated with other conceptual spaces. I argue here that this is decidedly relevant to our case study since physical points and spatially conceived representations function as mental anchors for working memory, while the pathways between the points are structured as trajectors on a map.

Comparisons can be made between Hutchins' model, Rubin's work on spatial imagery and the case studies examined in Chapter 2 and Chapter 3. Imagery, Rubin argues, is an effective memory aid when used in conjunction with spatial cognition. Within oral traditions, stories and myths often include characters that would move from one scene to the next within the narrative, while the spatial context informed the temporal content of the story. Hutchins states that a common feature of the method of loci is the use of a 'trajector' along a group of landmarks. This trajector operates as the sequencing layer for a compound blend. According to this view, the ordering of landmarks along a pathway is not an already assumed pattern, but must be stabilized by anchoring the sequence to a group of physical locations (e.g. like a queue of people whose bodies in space act as the physical markers for culturally defined
pattern). In the case of oral maps, place names and the stories associated with the locations on a map are anchored to the trajector, and subsequently the physical markers (i.e. the geographical location).

For instance, in the story “He Whakarapopotonga I Nga Korero Mo Poutini” physical markers in the form of geographical locations are utilized within the narrative to structure the sequence of place names. But the trajector is also arranged within the narrative so as to organize the sequence of events associated with the characters of the story. We cannot only plot a route on the map, but these physical markers help structure the logic of the narrative also. In addition to this layer, place naming is also employed within the sequence. In the story “He Whakarapopotonga I Nga Korero Mo Poutini” (see Chapter 3), place names within the story further denote areas on a map that were valued stone quarries. These place names constitute a narrative sequence and provide stable reminders of not only the geographic locations of the quarries, but also the type of resources found at these locations (see Table 3):

<table>
<thead>
<tr>
<th>Place Names</th>
<th>Stone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Tūhua</td>
<td>obsidian</td>
</tr>
<tr>
<td>2) Tahanga</td>
<td>basalt</td>
</tr>
<tr>
<td>3) Whangamatā</td>
<td>obsidian</td>
</tr>
<tr>
<td>4) Rangitoto</td>
<td>argillite</td>
</tr>
<tr>
<td>5) Whangamoa</td>
<td>argillite</td>
</tr>
<tr>
<td>6) Onetāhua</td>
<td>argillite</td>
</tr>
<tr>
<td>7) Pāhua</td>
<td>flint</td>
</tr>
<tr>
<td>9) Takiwai</td>
<td>Bowenite</td>
</tr>
<tr>
<td>8); 10) Arahura</td>
<td>pounamu</td>
</tr>
</tbody>
</table>

Table 3: Place names - Māori and English translations in order of narrative sequence from “He Whakarapopotonga I Nga Korero Mo Poutini” (Wilson1990:78-85).

The capacity to cognitively arrange our environments into logical systems suggests that macro-spatial knowledge is a heuristic trait that is recruited in conjunction declarative memory (Allen 1982). Hutchins contends, then, that the organization of concepts in this way
provides greater stability in the communication and comprehension of representations, and one way to think about landscape and place names is to consider the relationship it has to language. The landscape is typically categorized linguistically into segmented spaces constituted as a map.

Similarly, Burenhult and Levinson (2008) have discussed the problem of labeling the landscape by arguing for a cognitive-linguistic approach to how place names are applied cross-culturally. They state, that: “Landscape features, for the most part, do not come pre-segmented by nature” and are organized through linguistic devices and labels (Burenhult and Levinson 2008:138). According to their view, the naming of the area or geographical feature largely influences the ontological status of landmarks. Indeed, the question remains if there is a universal ontology underlying the linguistic principles associated with place names (Burenhult and Levinson 2008). It appears from the research that place names seem to be largely the product of culturally specific templates. However, despite the contextual nature of place names, cultures divide their world’s up linguistically through the use of specific labels and categories:

“Just like the body, parts and categories rely on a segmentation of what is, from a topological point of view, largely a continuous surface – the division into parts is to a great extent imposed by our categories (Burenhult and Levinson 2008:136).

Therefore, linguistics plays a causal role in influencing the perception of geographical chunking. It is curious that the ontological perception of a landmark is therefore reliant on a variety of cognitive inputs - both perceptually and culturally. Language and places mutually reinforce the concepts that are part of a cultural context. According to this view, there is no
universal logic, cross-culturally, to the naming of geographical areas and features according to (Burenhult and Levinson 2008).³⁰

Burenhult and Levinson (2008) argue then that cultural templates provide mental maps as a foundation for the categorization of the landscape. As stated above, our memory systems seem to be well suited for applying “non-spatial memoranda to a spatial scheme” (Burenhult and Levinson 2008:139; Yates (1966), cited from Burenhult and Levinson 2008). Cultural schemas are often applied to spatial imagery in stories and myths, and these combinations are especially salient to memory:

“Specifically, cultural themes or linguistic patterns are imposed on the environment to create, co-ordinate, subcategorize, or contrast landscape categories” (Burenhult and Levinson 2008:144).

Subsequently, there is little reason to assume that all cultures adhere to the same basic conceptual modeling when linguistically organizing the landscape. Through place names these physical structures help support the semantic content of working memory. In other words, names embody meaning as well as information about the geographic regions. But the landscape is syntactical also, since the linguistic organization of the landscape provides a logical structure for mapping. Mythic narratives within the traditional Māori case, for instance, are comprised of a rich blend of both material anchors (i.e. physical landmarks) and linguistic devices (i.e. place names). And it could be argued, as I do here, that these are stabilizing mechanisms for the organization of knowledge.

³⁰For instance, Burenhult and Levinson state that you may be able to assume a “taxonomic (kind-of) relations between landscape terms, so that e.g., a brook could be a small kind of stream, which could be a small kind of river” (Burenhult and Levinson 2008:137). It would be reasonable to follow this logic, that we automatically categorize areas and features into “kind-of” relations, like we do with species. But this is not the case at all, it seems. Again ontological categories differ cross-culturally in the naming of places.
5.5 Discussion.

Distributed cognitive models describe the outsourcing of cognitive resources onto external physical properties for scaffolding mental processes. Subsequently, there is a hybrid relationship between minds and the environment. However, it has been important to be specific about the kind of connection properties that is present these interactions. The suggestion that the use external tools as a cognitive resource is relevant and this has deep roots in human evolutionary history, however it is critical to highlight how material structures are connected to specific features of our cognition. Hutchins (2005) has stated that individuals engage physical structures as cognitive inputs for conceptual thinking. Material anchors further stabilize representational capacities while alleviating the cognitive burden of conceptual reasoning.

I have argued that there is a strong relationship between the blending of cognitive inputs and the structure of traditional Māori oral maps. Oral cultures organized their landscape through the use of place names and storytelling, while physical structures, such as landmarks, provided epistemic stability for these blended structures – and this is most notable in the case of oral maps. Oral maps, it is argued, are compound blends that are structurally analogous to the artificial memory systems like the method of loci. Within oral maps, geographical locations are layered alongside a sequence trajector within the narrative structure of a story. The sequential ordering of routes, for instance, is both the product of basic structures and culturally specific epistemic systems. But cultures also utilize linguistic devices for organizing the landscape and knowledge into workable units (Burenhult and Levinson 2008).
What Hutchins’ distributed cognition model demonstrates is that there are robust input connections between physical structures, conceptual content and working memory. Route knowledge, for instance, is structured through the use of multiple cognitive inputs - including actual physical places. Geographical landmarks are named and organized in sequential order along pathways and provide a logical structure for both mythic narratives and the mental represented coordination of the landscape. Route knowledge within oral cultures, according to Hutchins, is stabilized by the use of landmarks for organizing sequential patterns. These sequential patterns are helpful for mnemonic purposes, but they were also incorporated into myths for working memory.

This model is reflected in Kelly’s treatment on the use Māori oral maps and the peg-type mnemonics that were integrated into storytelling. One of the ways in which traditional Māori engaged with their landscape was through place names and myths. The meaning behind the place name offers ways to access the cultural knowledge of a tribe (while reinforcing both cosmogonical conceptions of the world and identity). As stated, place names were often used in myths to recount travels made by a particular mythic character or ancestor. The recounting of place names within a story organized the myth into a logical narrative, but it also traced the place names along a physical geography of the landscape. Indeed, place names seemed to serve a multivalent function within traditional stories, and the intergenerational transmission of oral maps is crucial since maps embody valuable informational resources about the ecology and navigation. I have argued that the conceptual blending of landmarks, place names and myths play a key role in the mnemonic retention (and stability) of informational resources.
Hutchins demonstrates that the use of physical geography as a system for organizing knowledge has a common cognitive underpinning related to working memory, conceptual reasoning and language. Put simply, the use of landmarks as memory devices with myths is no accident and demonstrates some regularities of a particular cognitive profile. The sequential ordering of place names and landmarks within Māori oral traditions has been recognized historically and this chapter set out to highlight the cognitive dimensions associated with these conventions. Subsequently, it was argued that: a) a distributed cognition model could suitably describe how non-symbolically engineered physical structures are relevant for symbolic thinking; b) that conceptual blending is substantive for working memory and that the sequential ordering of place names and landmarks within traditional Māori narratives are relevant to this background; c) representational stability can be managed within oral modes of transmission.

The profile associated with distributed cognitive models shows that in the absence of symbolic resources the mind recruits features of its environment for conceptual, mnemonic and communicative purposes. But more crucially I wanted to demonstrate in Chapters 4 and 5 minds are coactive with environmental features, and so a comprehensive theory or religious transmission should take these complexities into account. Cognitive regularities are indeed a causally relevant feature and that is why some comparisons can be drawn between the presence of common structures (e.g. memory constraints and macro-spatial imagery) and a particular cognitive profile unique to human evolutionary history. Nevertheless, the rules governing these commonalities do not necessarily override the locally contingent details associated with cultural practices.
CHAPTER SIX

6.1 Conclusion.

The core claim of this thesis has been that many aspects of religious enculturation resemble something like the transmission of complex skill-based abilities. Like any craft, structured learning interactions are relevant to the methods for religious transmission. For instance, I have argued that specific tools and strategies targeting memory retention and speech communication further reinforced information fidelity for teaching and learning. Generally, a cognitive ecological approach stresses how information-rich environments are structured in a way to support learning and development (and this extends to religious and aesthetic domains also). More specifically, however, I have argued that culturally evolved methods for information management (either social or technological capabilities) have facilitated the stable transmission of mythic knowledge within traditional Māori oral culture over time. The methods of transmission are by no means discrete, but instead, like any form of cognitive capital, are embedded within a larger epistemic framework. Pedagogical systems are structured to enhance the fidelity of both adaptive knowledge (e.g. foraging strategies, for instance), and also the conceptual knowledge structures associated with myth.

This thesis intended to underscore some of the research limitations of cognitive optimality as it pertains to religious transmission. Subsequently, I had intended to show how features of the cultural environment function as cognitive resources for managing the volume and complexity of religious information. The presence and use of culturally developed strategies within religious oral traditions implies the complexity of managing and organizing religious knowledge without external information storage devices (i.e. literacy and text). Due to the cognitive demands associated with information management, learning tools and strategies
enable a more robust engagement between actors and religious traditions. The costs and investments related to the transmission of religious knowledge – through structured learning and the use of cognitive resources - denote the difficulties associated with managing informational resources with oral traditions. The literature on traditional Māori pedagogy describes some of the demands associated with the passing on of sacred knowledge, and the means by which memory limitations were overcome through learned methods of transmission (Benavides 2009). Thus, the integration of orally communicated stories, place names and landmarks were a common means by which mythic, historical and geographical information could be conveyed within traditional Māori practices (and similar practices have been cited as being common in both Melanesian and Polynesian cultures also [see Harwood 1976; Kahn 1990; Campbell 2006]).

The invested costs in preserving in transmitting a mythic corpus suggests that agents are motivated – not just by minimally counterintuitive representations – but by a commitment to the preservation and stable transmission of a complex religious epistemic network. Therefore, I have argued that the fidelity of oral transmission has depended on learned methods for enhancing memory and communication. This thesis has chosen, then, to focus on 3 aspects of memory and transmission:

1) The regulation of information through sacred conventions;
2) Memory and eloquence in orality;
3) The use of macrospatial mnemonic techniques (i.e. oral maps).

*The regulation (i.e. coordination) of information through sacred conventions:* One of the motivations of this thesis has been to draw parallels between the management and regulation of knowledge, in conjunction with the cultural conventions that shape the network distribution of information. I argue that feedback relationships between structured environments and individuals play a large role in sustaining these customs. Individuals are
raised in environments that shape cultural preferences and experiences, and these perceptions impact on cultural structures. Food taboos, for example, are peculiar to a cultural niche and can have a noticeable effect on a culture’s economy. Taboos are often implicitly logical within a culture’s religious doctrine. Tapu (sacred) knowledge is not only potent because of its perceived content (i.e. its sacredness), but also by how sacred knowledge is manifested, and made real through ritual. Sacred rules establish how knowledge is shared and the mode by which it is transmitted.

I also discussed how the transmission of sacred knowledge is supported by the teaching methods that nurture memory and orality, and how religious customs can shape the social dynamic between teachers and students. Social learning through close apprenticeship underscores the importance of scaffolding for learning expertise (Sterelny 2011, 2012). But pupils are also monitored within an environment regulated by sacred customs. The accurate retention of sacred knowledge is critical for the stable transmission, and the systemization of learning interactions within traditional Māori pedagogy were strongly shaped by these epistemic attitudes to learning (McLean 1961; Bowdon 1979; Pere 1982; Metge 1984; Marsden 2003; Rewi 2010; Mahuika 2012).

Memory and eloquence in orality: Throughout this thesis I have also focused on how mnemonic skills have played a crucial role in the stability of orally transmitted religious traditions, and so it was necessary to highlight how skills for memory can be enhanced through structured learning (see also Gade 2004). Since religious norms emphasized the preservation of scared knowledge, memory retention and skills associated with oral communication would have been critical for enhancing fidelity. Similarly, I have argued that oral traditions recruited memory techniques into their mythic corpus partly for the purposes
of stabilizing the transmission of informational resources. Traditional Māori customs surrounding the sharing of information often emphasized the accurate retention and communication of tribal knowledge (McLean 1961; Metge 1984; Mahuika 2012), and I discussed the importance of learning sacred myths ‘correctly’ (e.g. for public communication). Memory and eloquence play a critical role in the transmission of information within Māori oral tradition, and developmental environments have been critical for nurturing oratory skills.

The use of macrospatial mnemonic techniques (i.e. oral maps): Finally, I claimed that some traditional Māori oral traditions were able to manage information through the incorporation of landmarks into their mythic narratives. Chapter 3 discussed how historical, familial and geographical information was preserved through whakapapa, and Roberts (2012) has argued that whakapapa functioned as a cognitive map for managing these informational resources. Epistemic devices, like whakapapa, reinforced a particular cosmogony, but they also acted as oral library systems. Likewise, the common use of landmarks and place names within oral traditions points to the mnemonic efficacy of macrospatial structures as organizing devices (Rubin 1995). The use of place names has been shown to help structure narratives for better recall (Harwood 1976; Rubin 1995; Yates 1966). Spatial imagery also seems to be effective as a system of cueing information (as shown with the discussions on the method of loci [Rubin 1995]), and themes associated with landscape are prominent in traditional Māori myth.

But there is a practical and epistemic dimension to the common use of landmarks within traditional narratives. Place names and the sequential order of these names help support the memorization of knowledge connected with these geographical locations. So while
landmarks and place names help retain the structuring of narratives (and better recall), real world geographical knowledge is also embedded in these stories in recollected through storytelling. In addition, landmarks and place names provide epistemic markers by which historical information could be tracked. Traditional Māori views perceived knowledge in actual places, and the content of these knowledge markers are activated through the use of narrative.

Importantly, I have also examined three key areas of research for a cognitive ecological analysis – epistemic niche construction, distributed cognition and mnemotechnics – and further attempted to demonstrate some of the comparative features of these approaches. In regards to memory and orality, all three models underscore the significance of mental tools and strategies for organizing knowledge resources. The organization of cognitive resources for the purposes of large-scale information management within oral cultures is preconditioned by: the cooperative sharing of knowledge (which also involves the costs associated with the access and opportunity to informational resources), and a highly structured cognitive niche (Sterelny 2003, 2011, 2012). I have claimed that both social and technological resources have been critical for the organization of sacred and mythic knowledge within traditional Māori culture.

I have claimed that there is a noticeable relationship between optimal features of memory, conceptual reasoning and the methods by which oral knowledge is remembered and communicated. For example, I have investigated how knowledge is identified with physical locations within traditional Māori myth, in addition to the thematically consistent features of storytelling. Oral maps are ways of blending these various modalities into a stable form epistemic template (similar to whakapapa [Roberts 2012]). Oral maps are constituted by a
variety of blended inputs, while geographical locations provide a stabilizing mechanism for other conceptual structures such as narrative structure, sequential ordering of names on the map, and information about the landscape.

As shown with the descriptive material on Māori oral tradition (Chapters 3-5), structured pedagogical environments have been critical to the intergenerational transmission of oral knowledge. However, I have also examined how the preservation and transmission of religious traditions within oral cultures was strongly influenced by the customs and norms specific to a cultural milieu. These conventions traditionally incorporated specific rules for sharing knowledge. Sacred conventions, I argue, are causally related to a culture’s epistemic framework. Subsequently, while there are some universal features that conform to predictable structures (i.e. such as memory constraints), the practices, experiences, and mediums associated with knowledge transmission can often vary across cultures. These variables are frequently sensitive to socio-ecological conditions (e.g., such as demographics, the availability of technological resources and social norms), and from this standpoint, I have argued that cognitive ecological models assume both the variation and diversity of these structures, since these models typically explore the range of cognitively optimal connections within a specific cultural setting. Such optimality is often contingent upon the learned strategies and tools relative to these niches.

However, one of the many criticisms, or mistaken claims, that could be directed at this dissertation is that it is been yet another coordinated attack on EP (and it’s various siblings). And while much of the earlier sections of my thesis may have resembled a setup for an argument against cognitivism, in large part I have only claimed that a cognitive ecological examination has something to offer the CSR. Subsequently, I have mainly set out to critique
some of the claims made by the SiM (particularly the optimality thesis), while being careful to avoid direct criticisms towards EP (and other research branches from this field).

It was important to this dissertation that I critique the cognitive optimality thesis, and the other claims made by SiM: that cultural stability is generated by internal cognitive regularities only. For instance, SiM claims that domain specific systems regulate adaptive (internal) informational resources, and the byproducts of these processing features are also causally relevant to the frequency and content of religious representations. From this premise, SiM claims that the constraints operating on religious transmission will inevitably carry low cognitive demands, since we are cognitively predisposed to non-adaptive religious activity (Barrett 2000; McCauley 2000; Boyer 1994a, 1994b). My chief concern with these types of claims is that while some innate cognitive features govern religious transmission, the SiM overlooks the demands associated with information management and fidelity. SiM undersells the importance that engineered cultural environments have in supporting religious transmission. So while I have presented EP as a target for criticism - from the point of view of cognitive externalism - I do not think the project is entirely flawed. Only that SiM oversells the claim for optimality.

Another misreading could be that this thesis is intended to frame cognitive ecological approaches as some methodological cousin to the ethnographical and historical scholarship. On the contrary, by evaluating the gap between psychology and ethnography, by way of a cognitive ecological approach, demonstrated the benefit of an interdisciplinary approach for the CSR. However, I would like to further the claim that a cognitive ecological approach – while being more helpful to this integration – has yet to capably prove itself as a robust contribution to the interpretive project. Indeed, cognitive ecological models often
parasitically profit from the literature generated by participatory accounts and historical research. Qualitative reports can also tell us something critical about the relative values and attitudes derived from religious customs; how religious knowledge is transmitted; and the cognitive tools and strategies used for organizing religious knowledge (i.e. for memory and transmission). I have offered some lines of inquiry into the future efficacy of the CSR, but I would also urge that historians, anthropologists, and theological scholars, be relatively open to a similar dialogue with the cognitive sciences.

In relation to cognitive ecological models, I have argued that while there are some universal features of our cognitive architecture that correlate with predictable patterns of religious behaviour (i.e. such as memory constraints), the tools and strategies employed for supporting knowledge transmission varies depending on locally contingent factors. The relationship between expertise and external cognitive resources can often be described as locally optimal since the channels of transmission are dependent upon the informational character of the cultural environment. And while I have drawn some attention to cross-cultural similarities - such as the use of comparative mnemonic tools and strategies - the cognitive ecological models discussed in this thesis assume both the diversity and variation of cultural milieus.

Despite these bulkier claims, this dissertation has also made some modest attempt to extend the scholarship on historical mnemotechnics by focusing on Māori pedagogy, myth and narrative. The research material by authors on Māori oral tradition highlights the complexities in learning and communicating certain features of mythic knowledge and the methods by which memory was enhanced (Metge 1984; Marsden 2003). I have integrated these claims to support how mnemonic devices within Māori myth could be viewed as features for enhancing the fidelity of information transmission. But stronger comparisons can
be drawn between Yates’ (1966) work on artificial memory and my own case study. The method of loci has featured heavily within this examination, and I predict that the traditional Māori case study is still ripe for a comparative mnemotechnical approach.

I close by briefly summarizing the chapters in this dissertation and some of the challenges to future research. Firstly, Chapter 1 offered a brief overview of cognitivism for the purposes of representing the background research history within the CSR. It is argued by SiM that there is an optimal basin of attraction for religious transmission that is influenced by innate cognitive resources. This optimality predicts that innate cognitive systems determine the shape and character of religious activity. From the point of view of an epidemiological transmission model, information processing constraints and motivations determine the frequency and content of religious representations (see Sperber 1996, Boyer 2001). It is claimed by SiM that features of our cognition are violated by minimally counterintuitive concepts. According to SiM, religious representations are therefore both: 1) counter to functional ontological percepts, while being: b) grounded in some natural ontological percepts. This optimal relationship between natural ontologies and supernatural concepts makes religious ideas both natural and motivationally salient.

Later in the chapter I provided an overview of Harvey Whitehouse’s (2004) modes theory as a counter to SiM. Whitehouse argues that the cognitive optimality thesis is insufficient to explain the breadth and depth of religious ritual expression across cultures. Instead, he claims that a cognitive account of religious transmission must also examine the burden of memory in stabilizing, preserving and communicating ritual knowledge. Whitehouse’s modes theory attempts to model the interface between memory and ritual. He argues that particular ritual structures work in conjunction with the regularities of memory constraints, and these
structures are both contingent upon socio-ecological conditions and causally linked to the stability of the diffusion of religious ritual. Particular ritual actions activate both semantic and episodic memory systems, making the content of religious ritual more salient (or memorable). The shape of any one cultural milieu (e.g. such as demographics) will therefore determine the mode of religious transmission, whereby certain rituals function as a means to imprint on memory.

This echoes my own concern with SiM and the cognitive optimality thesis. Whitehouse claims that a culture’s diverse elements - locally contingent differences - are causally relevant to a description of religious expression. Subsequently, in order to advance a comprehensive description of religious activity, the CSR should also incorporate locally contingent influences into its analysis (i.e. and this includes ecological conditions such as population, economy and political life). While this thesis has not elaborated on the specifics of ritual modes, it has aligned itself with Whitehouse’s motivation to underscore the limitations of internal cognitive optimality. I have claimed that the volume (depth and complexity) of religious information necessitates culturally developed tools and skill-based strategies for managing religious information and its transmission. Similarly to Whitehouse, I propose that there are relevant invested costs involved in the transmission of religious knowledge. These invested costs imply that the commitments and motivational salience of cognitively demanding religious concepts are significant for a psychological analysis of religious activity.

Chapter 2 provided an overview of some selected historical and anthropological material on the study of memory and mnemonics. This chapter focused on the historical research into mnemonic methods utilized by oral cultures. Yates (1966) and Carruthers (1990) have
previously examined the Classical, Medieval and Renaissance methods for oratory and memory by looking at how mnemonic strategies – such as the method of loci - were used for the preservation and communication of knowledge sources. In this chapter I introduced some background on the method of loci and how spatial imagery, as an example, has previously been a common method for cueing information for oratory purposes (Yates 1966). The method of loci is characterized within the study of mnemotechnics as an artificial memory strategy for information storage and retrieval. This historical analysis on mnemotechnics would be meaningful to the later chapters on Pacific oral traditions, and I would argue later that place names and landmarks (i.e. macrospatial imagery) have been commonly recruited as supportive connections for working memory.

Mnemotechnical approaches have been previously applied to both Melanesian and Polynesian oral cultures, and later in Chapter 2 I provided an overview of Harwood’s (1976) study of Trobriand oral tradition and their use of macrospatial mnemonics (Harwood 1976; Kahn 1990; Campbell 2000). According to Harwood, and from a structural point of view, myths support social institutions while providing a cognitive orientation within a culture’s epistemic framework. Harwood argues that the causal relationship between myths and social structures within oral cultures require further examination since myths are prone to transmission instability. Without the use of administrative systems – such as text - she argues that oral cultures relied on other stabilizing mechanisms in order to preserve a mythic corpus. Harwood argues, then, that the incorporation of method of loci-type mnemonic tools was critical to the organization of knowledge resources. Physical markers on the landscape provided a means for coordinating mythic information, according to Harwood, and narratives were structured in accordance with significant landmarks for mnemonic purposes.
Following on from Harwood’s analysis, and later in Chapter 2, I briefly examined some of the experimental evidence for the use of macrospatial knowledge and memory. David C. Rubin’s (1995) psychological analysis of oral traditions suggests that there is an optimal relationship between working memory and macrospatial imagery (over lists or verbatim). Rubin claims that the psychological evidence regarding an individual’s capacity to memorize and recall information provides support for the historical and ethnographic data on oral traditions and myth, and the experimental evidence correlates well with Yates’ (1966), and Harwood’s (1976) study of mnemonic devices and landscape. I argue that the common use of landmarks and place names in myths are coherent with a cognitive study of religious memory and transmission. Harwood and Rubin’s research would be relevant to the cognitive ecological models examined in chapters 4 and 5 since these models emphasize how physical and conceptual structures enhance cognitive abilities.

Chapter 3 expanded on the previous chapter by focusing specifically on traditional Māori myth, epistemology and oral maps. This chapter was split into two sections, reflecting the application of the cognitive ecological models that would be discussed in chapters 4 and 5. In the first half of Chapter 3 I examined the epistemic features of traditional Māori epistemology and the attitudes towards knowledge sharing. I discussed some of the key differences between European and Māori conceptions of knowledge, and the cultural bearings of text as an information distribution medium. Since knowledge was perceived within a traditional Māori context as a protected resource, having a life force of its own, the practices and mediums associated with the open access of information contravened an embedded epistemic perception: that the indiscriminate spread of knowledge would greatly reduce its tapu (sacredness). It was argued that these epistemic prejudices had a significant impact on the customs associated with knowledge transmission (King 1978). As in all
cultures, the medium (or mode) by which information is disseminated and the perception of knowledge sharing will typically have cultural attitudes attached to them, and these perceptions are often informed by religious norms.

This simple overview on Māori epistemology would later provide support the chapters on pedagogy and memory. It was important to show how traditional Māori attitudes towards knowledge inform the way in which learning was structured for the purposes intergenerational transmission. The attitudes associated with knowledge sharing also demonstrated the significance placed upon memory and the methods by which sacred knowledge was communicated publicly.

Kinship and place significantly shaped the way in which knowledge was organized within traditional Māori culture, and later in Chapter 3 I looked at Mere Roberts’ (2010) claim that whakapapa (genealogy) served as a database for this purpose. Roberts argues, that the memorization of both myth and kin was intertwined with whakapapa, providing a ‘cognitive map’ by which this information could be stored and retrieved. By tracing a line of descent alongside a mythic narrative, whakapapa also functioned as an interactive library system for the purposes of storing and retrieving a variety of knowledge resources (including ecological, economic and political information) (Roberts 2010).

Next, I proposed the importance of assessing the epistemic value of landscape, place names and myths within Māori oral tradition. I argued that learned methods for retaining information – such as cognitive maps - functioned as supportive mechanisms for working memory. Anne Salmond (1982) has observed that within Māori oral tradition, landmarks were places where knowledge could be stored. Geographical locations were not just physical
places, but epistemic properties also - they are storage places for sacred knowledge, and accessible through mythic narratives. This area of research on traditional Māori epistemology would also have value in my own examination of physical geography and memory. I argued that physical and linguistic structures - such as landmarks and place names – aid in the organization of information by providing cognitive inputs in the absence of other symbolic structures.

In the same chapter, my own evaluation of the *Māori Oral History Atlas* (Wilson 1990) elaborates further on the traditional Māori perception that information could be stored on the landscape through the retelling of mythic narratives. With the recitation of narratives, place names could be recollected in sequential order while further providing cues to geographical locations and their significance. These myths were not only a way to recall places with a mythical significance, but also a means to provide navigational support for travelers. According to a *Māori Oral History Atlas* (1990) mythic narratives are viewed as ‘oral maps’, since they embody critical information about the landscape and a sequential order of places. This is most notable in the myth of *He Whakarāpopotonga I Ngā Kōrero Mo Poutini* (‘Poutini: A Guardian Taniwha’), whereby the characters moved from one location to another. Each location correlated with a stone quarry and the name of the resource that could be acquired there. The story of Poutini provided both an oral map for navigating these places of significance, as well as valuable geological information.

While SiM overlooks the costs involved in the organization and transmission of a sacred knowledge, I have chosen to highlight the burden of memory in the preservation and communication of a mythical corpus through the use of external cognitive properties (for a functional examination of this, see also Bulbulia et al [2012]). The use of landmarks and
myth as orienting devices would become more relevant to my own study in my own evaluation of two cognitive ecological models: epistemic niche construction and distributed cognition. In these chapters (4 and 5) I examined both the social dimensions of learning (i.e. structured pedagogical environments), and the use of mnemonic devices (i.e. macrospatial memory) for the transmission of mythic knowledge.

Chapter 4 examined the first of two cognitive ecological models: epistemic niche construction (ENC). ENC provides a materialist explanation for the evolutionary significance of environmental engineering, while underlining the importance of cultural environments as supportive systems for cognitive expertise. I supported the claim here that human cultural learning is founded upon the capacity to construct, reproduce and interact with structured informational environments that scaffold cognitive abilities. Further, the cross-generational transmission of these structured cognitive niches has been a crucial mechanism in information inheritance. Importantly, the fidelity of information transmission is augmented by the active engagement with social learning strategies and tools.

Internal content-rich cognitive systems are not the only causal mechanisms for the transmission of religious knowledge. In its place, structured learning environments play a key role in the development of our cognitive ability and the fidelity of transmission. In particular, I looked at the interplay between structured teacher-student interactions (i.e. apprenticeship arrangements [Sterelny 2011]). Following on from Sterelny’s work on ENC and coordinated apprenticeship learning, I further claimed that the development of focused teacher-student interaction enhances the stability and fidelity of religious transmission.
The content and the mode by which information is passed on are subject to locally contingent factors, such as socioecological conditions. The contention made by authors such as Harwood (1976), Salmond (1982) and Roberts (2010) is that myths shape epistemic perceptions and interactions, as well as the informational organization of social structures. For instance, sacred conventions are distinguishable as culturally prescribed structures that can impose rules on information sharing, and in Chapter 4 I described how traditional Māori norms and customs (i.e. the observance of tapu [sacred], as well as the adherence to tikanga [rules and customs]) shaped how individuals interacted with their epistemic environment.

Scholars of early Māori pedagogy have often underscored how sacred norms influence the structure and flow of informational resources (Metge 1984; Roberts 2010; Roberts & Wills 1998; Royal 2003; Royal 2005; Salmond 1982). I have argued that memory and orality can be viewed as skill-sets nurtured for the purposes of boosting the fidelity of transmission. Subsequently, the supervision of a student’s skills in this area by tribal elders was a critical component in the learning strategies employed within a traditional Māori context. Because the accurate transmission of sacred knowledge depended upon strong mnemonic and communication abilities, both the strengthening of memory and the refinement of oral skills were considered prestigious expertise.

Chapter 5 expands further on this idea that environments are structured as a way to support cognition. Here I argued for the hybrid nature of learning development and cognitive scaffolding. I supported the claim made by external-distributed cognition models that the flexibility of human cognition allows for the recruitment external properties for working memory (Hutchins 1995). I argued that the use of physical properties and place names in mythic narratives buffers the costs of information management, with oral maps being
employed as organizational templates for knowledge. Physical structures - such as landmarks - act as cognitive inputs and ensure the tractability of conceptual reasoning (Fauconnier and Turner’s 2002; Hutchins 2005). Hutchins use of conceptual blends describes how knowledge is stabilized through the incorporation of physical properties as cognitive inputs. Conceptual complexity and working memory are better stabilized through physical properties since these material anchors provide a fixed relation to the conceptual structures.

Hutchins argues that the capacity for conceptual blending can better describe how artificial memory strategies, such as the method of loci, correlate with other mnemonic templates used in oral cultures for organizing knowledge (Yates 1966; Harwood 1976; Hutchins 2005; see Chapter 2). Spatial imagery appears to be efficacious in the structuring of sequential cues within mythic narratives and provides a representational network blending a variety of modal domains across external and internal cognitive systems.

Cognitive ecological models and descriptive evidence should be mutually relevant in their responses to the problems of: a) the unstable nature of transmitting complex bodies of sacred knowledge, and: b) how stability and fidelity was maintained through culturally evolved strategies and tools. Subsequently, I have argued four related claims that point to the cognitive demands of managing sacred knowledge within oral traditions:

(1) There are limitations to modular/cognitivist theories of religious behaviour since these models do not take into account the complexity and costs of transmission. Predictions derived from the cognitive optimality thesis are limited to a broader cognitive profile, emphasizing the motivations associated with just intuitive mental processes. I was skeptical that these motivations can explain the commitment to the
preservation of complex theological knowledge (such as mythical information and blended concepts). In contrast to SiM, a historical treatment of information management within Māori oral culture implies complexity, not optimality. While modular approaches to the cognitive study of religion state that transmission is cognitively optimal, the invested costs in both pedagogy and memory demonstrates that the transmission of religious traditions implies informational demands. The costs involved in transmitting a complex theology/cosmology are not sufficiently explained by the cognitive optimality thesis.

(2) Ecological features matter to the transmission of religious knowledge, and both the niche construction model and distributed cognition models (outlined in Chapters 4 and 5) show how agents are sensitive to their culture milieus through a variety of input connections. There is evidence that cognitive regularities do determine some cultural patterns, but culturally evolved features of the environment also have a marked impact on the methods by which mythical knowledge is retained and transmitted.

(3) A cognitive ecological model will inevitably rely upon both historical and ethnographic data on how cultural actors interact with their symbolic/cultural environments. Cognitive models should benefit from participatory reports of cultural practices since they can better describe how cognition functions in context. Memory constraints are overcome through culturally evolved strategies and tools that augment the fidelity of transmission, however the subtle differences in these tools and strategies demonstrate the complexity and variation of cultural niches. Divergence is therefore qualitatively relevant to both ethnographers and the cognitive scientist since cognitive resources for religious transmission remain locally contingent.
(4) Ecological models better explain the stability and fidelity of transmitting religious traditions. Environments are engineered and scaffold the transmission of large bodies of information, and while information channels can be controlled through cultural conventions (e.g. taboos, hierarchical structures, ritual norms), cultural environments are also structured for the purposes of large-scale information transmission. This is preconditioned by extensive cooperation (social learning) and technological innovation (the tools and strategies of information management and transmission).

The value of the externalist thesis is that it frequently incorporates descriptions of the proximity and engagement with locally contingent cognitive resources, and this method can draw upon the interpretive literature (e.g. such as ethnography). However, instead of underscoring the semantic content of cultural activity, cognitive ecological models look more commonly at the functional relationship between minds and environment. Nevertheless, a cognitive ecological approach relies greatly upon the data generated by historical and anthropological research for its own analysis, and in order to better describe the embeddedness of cognition, researchers require data on how mental processes are distributed across practices that are specific to a cultural milieu. As shown in this thesis, the incorporation of descriptive (ethnographic and historical) material has been essential in my attempt to advance on my own externalist methodology within the CSR. Future research in this area will certainly require further comparative studies on oral traditions.

Any cognitive model of religion should therefore account for the cognitive demands associated with transmission, but it should also be able to account for the ecologically
contingent means by which religious traditions are preserved and passed on. My own application of ecological models to the descriptive material on oral traditions should be valuable in understanding the cognitive and evolutionary significance of material engagement. While my more moderate aim was to provide a balanced perspective for cognitive approaches to the study of religion, it is also hoped that this thesis offers a meaningful and self-reflective contribution to the scholarship within the CSR. Though my experience with the criticisms directed at the CSR suggests that the project is misunderstood, I predict that future research and interdisciplinary approaches will put the future of the CSR in (some) good stead - especially with the more established scholarship within religious studies. Nevertheless, I also urge that it is important for the CSR to be consistently evaluative in its own theoretical and methodological assumptions.
Appendix 1: Māori Glossary of Terms (general).

ako = learning, to teach, study, instruction
atua = god
hapū = larger kinship group or tribal community.
karanga = a formal call, or ceremonial call.
kete = basket
kete aronui = basket of love, sympathy, compassion
kete tuatea = basket of evil, of all things evil
kete tuauri = basket of ritual chants
kūmara = sweet potato
mana = power or prestige
manaakitanga = hospitality
marae = formal meeting area or courtyard, related to hospitality.
mātauranga Māori = Māori knowledge, ancestral knowledge
mauri = aura, life force
moko = facial tattoos and decorations
mōteatea = traditional lament, or sung poetry.
Ngāti Porou = Māori tribal community, East Coast of North Island
noa = common or without tapu.
oranga = necessity for life, health and welfare.
pākehā = A New Zealand person of predominantly European descent
pākeke = older, mature person, elders
Papa-tū-ā-nuku = wife to Rangi-nui and original mother and atua.
pounamu = greenstone
poutama = the stepped pattern in tukutuku (latticework)
rakau papatupuna (rakau whakapapa) = staff used as a mnemonic aid for remembering and recitating of whakapapa

rakau whakapapa (rakau papatupuna) = staff used as a mnemonic aid for remembering and reciting of whakapapa

Rangi-nui = husband to Papa-tū-ā-nuku and god of the sky. Original father and atua.

Tāne-mahuta = atua (god) of the forest, trees and birds. Son of Rangi-nui and Papa-tū-ā-nuku.

Tāne-te-wananga = Tāne as the bringer of knowledge and occult lore.

taniko = patterns on cloaks

taonga = cultural wealth, treasure, valuable object

tapu = sacredness

tauira = student, pupil, apprentice

teina = junior line of descent, younger person

tika = to be correct, true, accurate

tikanga = rules, custom, proper method

tuakana = an older, more experienced person

tukutuku = latticework decorations

tūtūā = commoners, laity

waha kōhatu = stone in mouth

waiata = to sing, or song.

wānanaga = school, forum, place of learning

whai - string games

whaikōrero = formal speech, oratory.

whakairo = to carve, or carving.

whakapapa = genealogy, family tree or to place layers on top of one another.
whānau = extended family.
whare wānanga = house of learning.
whare whakairo = carved house, or talking house.
wharenui = meeting house, big house
whenua = land
Appendix 2: Māori Place Names Glossary.

Aotearoa = traditionally the name for the North Island of New Zealand. Today, contemporary use as Māori term for New Zealand as country.

Arahura = Arahura (stone: pounamu/greenstone)

Hōkio = The hearing of a buzzing sound

Manawatū = Stumbling

Ō Hau = River) of Hau

Onetāhua = Farewell Spit (stone: argillite)

Otaki = The holding out of a staff

Pāhua = Pāhua (stone: flint)

Rangitikei = River crossed by striding

Rangitoto = D’Urville Island (stone: argiflite)

Tahanga = Tahanga (stone: basalt)

Takiwai = Piopiotahi (Milford Sound) (stone: bowenite)

Tamaāhua = (Hill of) Tamaāhua

Te Pae a Whaitiri = Lifting of the clouds on high

Te Tai Poutini = The tides of Poutini

Tūhua = (Hill of) Tūhua

Tūhua = Mayor Island (stone: obsidian)

Turakina River = Crossing on a felled tree

Waikanae = Water of staring in amazement

Waimeha = Water lost in the sands

Wairarapa = Water of a flashing

Waitaiki = (Stream of) Waitaiki

Whangaehu = River of cloudy water glance
Whangamatā = Whangamatā (stone: obsidian)

Whangamoa = Hills above Nelson (stone: argillite)

Whanganui = Great river
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