GROUNDED:

Indigenous Knowing in a Concrete Reality

LYNNE KELLY

Rounded Globe

I Indigenous knowledge in a concrete reality

Indigenous cultures are too often represented as if they live in a fog of superstition. In B-grade movies and far too many documentaries, so called 'primitive' people are shown performing nebulous rituals to their gods. They are apparently afraid of thunder because they don't have an explanation for it and perform all sorts of sacrifices to appease the deities. The reality is very different. This essay will demonstrate that the rituals of indigenous cultures are grounded in reasoned practices. It will demonstrate their ability to retain, maintain and communicate the complexity of their physical and cultural domains.[1]

This essay will also argue that we need to go beyond respecting indigenous cultures to recognizing how much we can learn from them. We can add to Western education practices by grounding our contemporary learning in knowledge structures, fixed by physical locations and enhanced by integrating song, dance and vivid imagination with the way we encode information right across the knowledge domains.

The misconception that we have little to gain from indigenous intellectual achievements arises from the fact that we who use literacy to store information have not grasped that there is an alternative: orality. We often read that non-literate cultures left no written records. Culture is built around what you do have, not what you don't. Cultures which have no contact whatsoever with writing are referred to as primary oral cultures and have developed a suite of mnemonic technologies in order to memorise the learning built up over the millennia.

In order to grasp a totally different way of knowing it is necessary first to appreciate just what is known. Then, and only then, can we look at the power associated with the control of

knowledge. Ceremonies can then be explored as pragmatic gatherings which serve to ensure that knowledge is retained accurately and transmitted appropriately. Having grasped the complexity of the pragmatic intellectual lives of indigenous elders, we can then explore the extraordinary memory systems they use to maintain an encyclopaedic knowledge of their physical environment and cultural obligations. Indigenous cultures must live in a concrete reality or they simply wouldn't survive.

Everybody gains new memories all day every day. Most are lost. A few are retained for life. Those memories come naturally. That is not what this essay is about. Some memories are deliberately encoded, formally memorized using a deliberate effort to do so. It is those memories which create an indigenous oral tradition.

Sociologist Carl Couch wrote that

> In all societies the bulk of the information used to organize conduct has been accumulated and preserved by prior generations. Communication is the core process of all human societies. Consequently a comprehensive theory of social life must attend to how information is accumulated, preserved and shared.[2]

Cultures without writing accumulate and preserve information in human memory, and share it directly from memory. We know a great deal about pre-literate Greek society as the culture became literate and documented their transition. Ancient Greeks differentiated between natural memory and what they referred to as artificial memory. The latter is a trained memory, an asset greatly admired in pre-literate and early literate society. Not surprisingly, all non-literate cultures also train their memories. Their very survival depended on them doing so.

When discussing oral tradition, the majority of resources will talk about history and religion as if these are the components which combine to create the indigenous knowledge bank. Consequently, we focus on the major areas of difference between us and them. However, it is our commonalities which form the significant proportion of our knowledge, where 'our' refers to all societies, all humans, whether oral or literate. Our knowledge of fauna and flora, astronomy and geology, seasons, weather, human behaviour, of navigation and obligation, of birth and of death are genres which captivate us all. Obsidian is black, shiny and sharp, corn cross-pollinates and bones break whether you use oral or literate technologies to store that information. It is the way that information is accumulated, preserved and shared which is the significant difference.

Is important at this stage to clarify some terms. Pre-literate societies are those that went on to develop writing themselves. Non-literate or oral societies are those which have no contact with writing. People who are illiterate are those who do not read despite living in a society which has writing. This is hugely significant when considering the power structures and knowledgeable elite. In non-literate societies, the elders are also non-literate and use mnemonic technologies to maintain both information system and their power. Those who are illiterate will almost certainly live in societies in which the power and knowledge base is controlled by literates.

The study of non-literate societies will be influenced by the proximity of literacy. For example the influence of Islamic literature on many Southeast Asian and African cultures indicates that they are further from a primary oral state than Australian cultures with a more recent contact date. It is only a century ago when Sigmund Freud wrote: 'I shall select as the basis of this comparison the tribes which have been described by anthropologists as the most backward and miserable of savages, the aborigines of Australia'.[3] It is those very Australian Aboriginal cultures, of which there are hundreds, which have so inspired me to understand the mechanisms by which they can memorise a vast store of practical knowledge. All contemporary anthropologists consider Aboriginal people as having the same intellectual potential, physiology and memory ability as has been typical of all humans for millennia. It is imperative that we look beyond superficial differences and celebrate our similarities.

Australian Aboriginal songlines and the method of loci

The way indigenous cultures across the world use the landscape to order, structure and ground their knowledge system can be best understood through the Australian experience. In talking about Australian Aboriginal cultures, the English terms 'Dreaming' and 'songlines' are frequently used. 'The Dreaming' or 'Dreamtime' is described in Aboriginal terms as 'a way of talking, of seeing, of knowing…'[4]. Critically, knowledge and law are by far the most common terms I have heard Indigenous Australians use when talking about the Dreaming

Songlines are sung pathways through the landscape. Australia Aboriginal people talk of Country, reflecting that their environment is far more than just a physical landscape. As popularized through Bruce Chatwin's influential book, *The Songlines*[5], singing these sets of ordered locations enables Aboriginal people to navigate through forest, deserts and open plains. They are able to teach each other these singing tracks and hence, collectively, navigate the entire continent. Zoologist Sue Churchill described her experience of travelling with Aboriginal men who were navigating by songline 1983. She was searching for cave-dwelling ghost bats.

> We travelled with different old men from different communities in an old Landcruiser. There were no maps and most of the caves had not been visited for many years. One involved a 100-km drive cross-country through sand dunes to a cave that couldn't be seen if you stood more than 3 m from its small vertical entrance. The old men who guided us were navigating by the shape of the sand dunes. They would stop every now and then and sing a long song to help them remember the landmarks of the journey. At each new locality the old men would try to tell us (there were some serious language barriers) the Dreamtime story of the ghost bat, or explain the ring of standing stones near a cave mouth, and sing the songs that they learned as young men. They even pointed out the woman in the story, a large rock on one of the ridges above a cave.[6]

In talking about Chatwin's book, my Aboriginal colleagues have reiterated the disappointment many felt that the complexity of the concept of songlines was not conveyed.

At every location along a songline, a ritual is performed. 'Ritual' is too often a nebulous term used to refer to any kind of sacred act. In this essay, I am using the term 'ritual' as defined by anthropologist Roy Rappaport, that is ritual is 'a relatively invariant and formal sequence of acts and utterances not encoded by the performers'.[7] Rituals in oral cultures must be considered in terms of the culture in which they performed. They should not be likened to rituals in literate religions, where the pragmatic aspect of the performance is of secondary importance, if it exists at all. It is naive to try and find an equivalence between the role of ritual in non-literate and literate cultures. Such an equivalence does not exist.

For the discussion in this essay, rituals are considered in terms of the efficacy in encoding practical information including navigation, animal behaviour, plant properties, cultural expectations and interactions, environments and resources among many. In Australia there are over 300 language groups and it is estimated there were probably around 800 dialects before colonisation. Consequently it is important to be culturally specific whenever possible.

The Australian Yanyuwa people refer to their songlines as *kujika*. In a superbly comprehensive book on the topic, *Singing saltwater country: journey to the songlines of Carpentaria*,[8] anthropologist John Bradley describes how through *kujika* every detail of the land is described and stored in the sung narratives. He has mapped over 800 km of songlines in his three decade long association with the Yanyuwa. As will be described below, indigenous knowledge exists in both public and restricted forms. Bradley wrote that 'the public *kujika* is a thick description–a very detailed vision of the country–its geography and the plant, animal species, phenomena and objects one might encounter in it'.[9] The following extract from the Rrumburriyi Tiger Shark's *kujika* shows the way in which a songline acts as a set of subheadings to the songs associated with each location along the path and the information which will be sung, repeated, ritualised at that location.

> We sing this spring waters there in the north and we come ashore at Yulbarra. We come ashore and we sing the people at Yulbarra. We sing the paperbarks swamp and then onwards and northwards we sing the messmate trees and then we climb up onto the stone-ridge country and we sing the cabbage palms, and then we come to that place called Rruwaliyarra and we are singing the blue-tongued lizards and then the spotted nightjar, the quoll and the death adder, and we sing that one remains alone– the rock wallaby–we are singing her, and then we sing the messmate trees.[10]

Bradley described another Yanyuwa singing track which embedded in the named landscape knowledge of people, winds, seasonal events, objects, the correct way to hunt and forage, process food and make tools, along with various groups' rights to the land. When they arrived at the quarry site, the elder who had last travelled there over fifty years before, sung verses that explained a particular stone tool technology. Although the technology had not been used for 100 years, the songs matched the flakes scattered at the site.[11]

Australian anthropologist Howard Morphy wrote that the 'landscape created by mythological actions is the ultimate medium for encoding mythological events and does so almost by definition through ordering them in space'.[12] Not surprisingly, the same memory technique is documented for a wide variety of cultures around the world. For example, American Indian,

Donald Fixico describes the sacred landscape sites as 'touchstones for memory'.[13] Belgian anthropologist Jan Vansina worked with African cultures and explained that the African 'landscape, changed by man or not, was often a powerful mnemonic device'.[14] There can be no more reliable way of grounding information, of ordering and indexing a knowledge system than using the landscape itself. It is not surprising, therefore, to find linking oral tradition to rocks, streams, rivers, lakes, hills, cliffs, trees and other natural features a feature of oral cultures universally. It is also not surprising that this powerful memory method can be found right through human history.

The Dreaming tracks represent a cognitive technology very similar to the method of loci, so well known from ancient Greek resources. The 'method of loci' is described in detail in Frances Yates's seminal text, *The Art Of Memory*.[15] Pre-literate Greek orators mentally placed each section of their performance in a specific location within a streetscape or building. When delivering their oration, they would simply imagine themselves walking the street or ambling around the building withdrawing each item to be presented in order. No item would be lost and the sequence would always be preserved. Homer's *Illiad*, for example, was possibly aided by some written guide but it was recorded that he could recite all 16,000 versus from memory which would have required a number of evenings for the full performance. Eight times world memory champion, Dominic O'Brien[16], developed a version of the method of loci independently and still uses what he called 'the journey method' as he has found nothing better. I find his description of mentally travelling the set of locations as a journey by far the most apt for the way I experience this method having now it used extensively for number of years.

A great deal about understanding of the methods used by the ancient Greeks and adopted by the Romans comes from an anonymous Latin textbook for orators, *Rhetorica ad Herennium* (circa 86-82 BC). The textbook recommends that the set of locations use should be in a fixed sequence, away from the distractions of daily life, well lit, differing from each other, of moderate size and with a moderate distance between them.

The method of loci was widely used in schools from classical times right through the Middle Ages and even into the Renaissance, changing form and slowly fading with the dominance of writing. This will be discussed further in section IV of this essay when the implications for contemporary education will also be addressed. In Western society and indigenous cultures alike, the use of this spatial memory technique was not purely for oratory but to memorise all forms of information which could be structured. Stories are far easier to remember then list of facts. Narratives and vivid characters enacting the knowledge increases the chance that it will be remembered. Structuring information in such a concrete way also allows for commentary and recognizing patterns and stimulating questions in a way that many contemporary educational methods have lost.

The *Rhetorica ad Herennium* advisors its orators that to make the information most memorable, mental images should be as striking as possible with vibrant active characters displaying exceptional beauty or singular ugliness. They should be engaged in striking or comic effects involving heroes and trauma, disasters and great feats. These characteristics also describe the active and highly emotive myths found throughout the world's indigenous

cultures enriched with exaggerated characters and monstrous creatures, part human part beast, which make the story much easier to remember.[17] Although to claim that this is the sole purpose of mythology would be clearly naïve, there is no doubt that mythology greatly aids the memory of more mundane information.

Too often, the learning in traditional societies is depicted as being conveyed while out on the daily gather and hunt or through child-like stories told around the campfire. The vast store of oral tradition is formally taught. It is committed to memory, practiced, repeated, performed and stored in the only databank available: human memory.

Integration of spiritual and pragmatic domains

Knowledge within oral cultures is held within an integrated information system. Mythological stories encode and make memorable information about flora, fauna, navigation, genealogies, land resources and management and all the other domains which will be discussed more fully below. Studies of the songs and mythology from cultures as diverse as the Australian Dyirbal[18] and the West African Yoruba[19] demonstrate the vast array of practical information stored within the ritual performances.

Unfortunately in English we do not have words which represent the complexity of indigenous knowledge systems. With the arrogance of literate colonisers, we label rituals according to the nearest equivalent we can find in our cultures. Prevalent is the misuse, of the word 'magic'. For example, rituals performed before a hunt are often described as 'hunting magic' with the explanation that the indigenous culture believes that these calls to supernatural beings increase the fortune of the hunt. Indigenous cultures assure us that this is the case and a rational analysis shows why this is most certainly the case. Rituals, that is repeated performances, not only request supernatural assistance but also often involve re-enactment of hunting strategies. When out in the field, calling to each other would not only take time but alert prey. The group enact their signals and co-operative plans to ensure an optimum hunt as well as reminding the hunters of the prey behaviour.

The hunting songs from Central Australia[20], for example, describe the subtleties of behaviour of the various prey. Dances demonstrate details such as ear movements of kangaroos which indicate when the prey is alert and therefore likely to flee or whether it is relaxed and unaware enabling closer approach. Performance of dances replicating these behaviours ensure that every member of the hunting party is observing and reacting appropriately. Songs replicate the subtle sounds of an animal feeding, again indicating that it is unaware of the hunter. Songs describe footprints and other tracking indicators whilst also warning against actions which may lead to noisy approach. The songs have also been shown to encode which parts of the prey are most valuable in terms of proteins and oils, and which bones are rich with marrow to ensure these items are brought back to camp.

Indigenous 'magic' is grounded in reality and calls on spirituality without any necessity for differentiation between the two. Informal discussions with Australian and North American indigenous cultures assured me that they were perfectly well aware of this link. I am not

qualified to assess the value of the call to spiritual forces, but the practicality of the 'hunting magic' is undeniable.

Orality expert, Ruth Finnegan argues that too often a misleading distinction is made between modern, rational, literate 'us' and the primitive, magical, oral 'them'. This is reflected in the way that 'they' are 'somehow mystically closer to nature than ourselves'. This idea has been popular with sociologists and romantics who dream of a vanished natural past, but Finnegan claims it says more about the writers than about the evidence.[21]

Communications expert, Emevwo Biakolo wrote that

> perhaps the commonest in all anthropological-philosophical discourses of this sort … is the notion that the magical, with its connotation of, and connection with, ritual and religion, is the dominant characteristic of all primitive thought and behavior. The volume of anthropological research, from James Frazer upwards, demonstrates that this assertion is indeed overwhelming. What is not so certain is the theoretical justification for this. .... Why, for example, is the comparison not made within the same experiential domain, say, between traditional religious thought and modern Western religious thought? Or alternatively, between an instance of traditional nonreligious thought and science?[22]

British anthropologist Bronislaw Malinowski emphasised in his writing about the Trobriand Islanders that they were perfectly capable of separating the magical (in our terms) and practical when asked to describe soils and cultivation. Similarly, Leah Minc's study of the Nunamiut and Tareumiut[23], Dennis Tedlock's research with the American Zuni[24] and Polly Wiessner's work with the Enga of Papua New Guinea[25], among many, demonstrated that the knowledge keepers were perfectly capable of making a distinction between the mundane and the spiritual domains.

Tellingly, Jan Vansina[26] describes the way a real event was developed into a mythological form with the full understanding of the Hopi of exactly what they were doing. Vansina wrote about a historical quarrel between the Pueblo Hopi speakers and Navajo about the border between their lands. Over the following eighty years, the record of the location of the border was enforced through narration of the events. The narrative increasingly took on characteristics of oral tradition, including mythological characteristics and, even today, the decisive affray is narrated as an aspect of Hopi history preserving the border location.

It is well beyond the scope of this essay to define and discuss religion in all its variations. In a broad, geographically diverse range of non-literate cultures, stories are told of spiritual beings who created the land, plants, animals and people. Reports from early contact with indigenous cultures were often written from a Christian ethic. Gods, worship and prayers were part of the worldview of Christian writers and therefore often assumed to be part of all cultural belief systems. In his huge collection of Central Australian Aboriginal songs, T.G.H. Strehlow wrote that 'it is a striking characteristic that there are no invocations or prayers to the spirits or to the totemic ancestors contained in these songs'.[27] Sir James Frazer makes a similar point:

it is a serious, though apparently a common, mistake to speak of a totem as a god and to say that is worshipped by the clan. In pure totemism, such as we find it among the Australian aborigines, the totem is never a god and is never worshipped.[28]

In contemporary Aboriginal contexts, stories come from Ancestral Beings, Spiritual Beings, Ancient Ones, Ancestors … but never gods. Nungarrayi, a Warlpiri colleague, emphasised that 'the Dreaming' is better translated as 'the law' and 'the knowledge' and are not merely the simplistic stories about religious beliefs as so often portrayed. The stories told to those who are not initiated give the narrative framework for layer upon layer to be added over a lifetime of learning.

Are the ancestors mythological or actual forebears? The distinction may be of more consequence for historians than indigenous people. For recent generations, they are most likely actual forebears. As we move further back in time, it is more likely they have been fully mythologized and maybe conflated with the beings in the origin stories. The distinction will vary hugely depending on the culture and their societal priorities. What is universal is the way in which the stories of mythological encode a vast store of pragmatic, rational, spiritual and cultural information in a highly memorable form.

Although it is acknowledged that personal biases and background cannot be eliminated when trying to understand a different belief system, they can be minimised. By seeking analogies in the ethnographer's own belief system, the ethnographer distances him or herself from looking more deeply at the purpose of ceremonies and supernatural beliefs, reducing them to primitive versions of what contemporary religious individuals might consider their own superior belief system. Terms which derive from analogies with Western cultures, words such as 'gods', 'priest', 'prayer', 'worship', should be avoided. Cultural beliefs should be represented, wherever possible, in the terms used by the indigenous people themselves.

The most revealing study I came across when trying to understand the complexity of mythology from an indigenous perspective involved another of the Pueblo cultures, the Tewa. Indigenous Tewa writer Alfonso Ortiz[29] and ethnobotanist Richard I. Ford[30] both describe the way in which the Pueblo ensure a reliable corn harvest each year in a harsh environment. Each suggests reading the version of the other. If you read Ortiz alone you would learn the stories of the Corn Mothers and of the coloured Corn Maidens (blue, yellow, red, white, black and all-coloured). The stories link to many other aspects of the oral tradition. If you read Ford alone, you would learn of the extraordinary ability of the Pueblo to maintain pure stands of multiple varieties of different coloured corn over generations if not millennia, despite the readiness with which corn varieties cross-pollinate. Read together, you will find a stark representation of seemingly mutually exclusive versions about corn, yet each deliver the specialist knowledge on which the physical survival of the Pueblo people depended. Ford wrote that

From an ecological perspective, plant nomenclature is a component of the information system that regulates behaviour towards plants. In the case of corn, the

colour name used to define each type implies a culturally recognized range of hue and the physical management of the corn in order to comply with these expectations. The skills and knowledge required to maintain these corn types include recognition of pollination, spacing of fields, patterning of plant populations, time for maturation, and noninjurious cultivation techniques. If the cognized environment is considered, then attention to pure coloured corn is the means to revere or to placate the spirit forces of the Tewa world who would otherwise be offended and bring disaster to the crops and people if fed "mixed up" corn. Pure color corn is a mediating force in the cognized environment. On the other hand, when the operational environment is examined, then the maintenance of named corn types by raising each type in separate and dispersed fields prevents total crop losses in a land of climatic extremes and uncertainty. From both points of view, the application of a particular colour term to maize requires concomitantly an appropriate behavioural sequence for its perpetuation from time immemorial, and verification of a farmer's adherence to tradition is attested to by the condition and success of his corn harvest.[31]

Weather and the impact of domesticated animals, grasshoppers, birds, skunks, deer and nomadic raiders also impact upon the corn harvest. Although the total yield will not be maximised, planting different colours reduces the high risk of total loss which could occur with a monoculture. Modern farming methods have a great deal to learn from the Pueblo. Ford explicitly linked ritual to survival when he wrote that

> ritual imperatives and traditional cultural practices depend on corn types of pure colour. Adherence to the practice of growing sacred colour corn in the face of adversity means survival for the Tewa…. The outcomes resulting from adhering to ritual needs through the cognized environment, or maintaining named corn types in separate and dispersed fields in the operational environment, are the same – reliable corn production in a harsh climate.[32]

Research indicating that rituals serve the pragmatic purposes as described for the Tewa can be found across the world, such as in taro cultivation in the New Guinea Highlands.[33]

Domains of knowledge

The human species has adapted to almost every environment on the planet in a way no other animal species has been able to do. Such incredible adaptability is only possible because humans have developed methodologies which can manage a vast store of information.

There is ample evidence that the knowledgeable elders in indigenous cultures across the world effectively memorised field guides to all the flora and fauna in their environment. They stored extensive navigational charts in memory, along with the legal system, trade agreements and the cultural expectations that bind communities together.[34] The most complex data sets of all, intricately interwoven genealogies, are found it all oral cultures, held in memory and often used to structure other aspects of the knowledge system. Oral tradition

always records lessons from the past to provide knowledge for the future, especially about how to survive in times of extreme resource stress or cultural conflict.

My research into the indigenous stories of the 23 crocodilian species around the world indicated that the stories reflect a very detailed observation of the physiology and behaviour of the specific species in the local environment, those which are eaten, avoided or simply observed.[35] This started me on the journey through years of research discovering the extraordinary depth of animal knowledge stored in the oral tradition of indigenous cultures across the world. The natural sciences provided database which is essentially consistent for both literate and non-literate observers providing a particularly valuable insight into the way knowledge is stored so differently across the orality/literacy divide.

The difficulty is finding and funding a team which can successfully cross the divide and produce a record which accurately reflects the knowledge of the indigenous elders. For example, the North American Navajo have worked with ethnoentomologists to produce a classification of over 700 insects. Most have no apparent practical use, but are known because, being human, the Navajo value knowledge for its own sake.[36] The research team may require a number of elders, scientists from the required domain and extremely adept linguists. This is not an easy team to put together.

An ethnobotanist must be familiar with every plant in the environment under study. Botanists struggled during research among the Hanunóo in the Philippines in the middle of last century because indigenous experts named 1,625 Hanunóo plant types, far more than were known to Western science at the time.[37] More likely, the scientist would need to recognize all plants and animals, something rare in our segmented academic world. John Bradley described this issue when writing about trying to learn an Australian Yanyuwa songline, a *kujika*:

> So much knowledge was being presented to me, at many levels and intricately interrelated. I was struggling to find words for much of the material as it was deeply encoded and dependent on other knowledge.
> There were many verses describing the myriad species–fish, sharks, birds and other animals and plants, whose names in Yanyuwa were so familiar to my informants that I had yet to identify in English. ...
> I was amazed by the detail of this kujika, especially of the different species of sea turtles, their life cycle and habitats; it was a biology lesson in sung form.[38]

The resulting studies have concluded that the classifications of non-literate cultures are scientific in the Western sense of the word.[39] However, unlike in Western education, these classifications form a concrete foundation for adding layers of information from a variety of domains by linking the knowledge to specific places. The classifications are made more memorable through performance. When introducing a detailed study of the plant use of the Australian Yankunytjatjara culture linguist Cliff Goddard commented on the inadequacy of using only writing to record what he was being taught as much of the information was given through performance. [40]

All indigenous cultures maintain knowledge of a pharmacopoeia, combining medicinal plant knowledge, information on protecting and binding wounds and treatment of mental illness. Often traditional medicines are seen as vastly inferior to Western science, but those treatments which are still considered purely traditional represent the remaining healing knowledge after much has already already been adopted and refined by modern science.

The way in which animal and plant knowledge is integrated within the entire knowledge system is far too complex a topic for this essay. Suffice to say as an understanding of animals and plants within the environment offers a significant resource for setting the calendar on seasonal behaviour and migrations. Plants and animals are also frequently used as metaphor for human issues, a significant proportion of which deal with ethics and morality.

One area of indigenous study which has been well documented is that of navigation.[41] No indigenous culture relies solely on their astronomical observations, detailed as these often were. If a navigator relied solely on the stars, they would only be able to travel on clear nights. Obviously, this would never be the case. Pacific navigators cross thousands of miles of open ocean. The navigation schools across the Pacific involved years of intense training song, story, mythology and incorporated a host of physical mnemonic devices to ensure their navigators could recall details enabling them to safely travel between distant islands and to colonise further and further afield. Australian Aboriginal cultures used a similar set of mnemonic technologies to create the singing tracks which enabled them to traverse the entire continent and surrounding seascapes, each language group able to teach a traveller the next stage. As much of the country is desert, navigation training had to ensure that sources of water were known. Survival depended on it. The Inuit also used a range of oral and material mnemonics to travel across moving ice, often with no visible landmarks. More importantly, their skills ensured that they could return home again across a landscape which may have changed visibly in the time they were away. Understanding snow drifts and wind angles, among many other features, was critical to the survival of both the hunters and their families waiting at home.

Navigation was also essential to ensure those travelling to gatherings managed to find their way, often across great distances. Anthropologist Howard Morphy described the relatively infrequent and complex ritual performances among Australian Aboriginal cultures as 'often operatic in scale'[42] involving thousands of participants. Such gatherings in traditional cultures served a multiplicity of purposes: trade, social meetings, securing marital partners and, critically for our purpose here, to share, repeat and trade information. But it was also essential that the attendees arrived on time. Timekeepers in historic oral societies wielded immense power. All cultures, modern or traditional, operate with an awareness of both immediate and long-term time. In order to optimise hunting, gathering and any form of land management, someone must maintain a calendar to predict and respond to seasonal changes.

Unfortunately most ethnographers were not scientists nor did they have they necessary linguistic skills to recognise environmental knowledge. The desire to 'educate' indigenous peoples in Western beliefs blinkered those who made the first contact to the depth of the knowledge they were literally overwriting. More recently, many New Age devotees chose to misappropriate and romanticise indigenous cultural practices. They created the illusion that

indigenous elders had some kind of psychic link to the earth. In every culture I studied, the elders had acquired the knowledge through years of learning and to imply otherwise is offensive. We literates study. Non-literates study every bit as hard. They use orality rather than literacy as their storage device.

With so many domains of knowledge, each with a vast store of information to be memorised, it is not surprising that knowledge was highly valued and a source of power. Essentially, an elder at the peak of his power would have memorised field guides to all the flora and fauna, navigational charts, a year of astronomical maps, the laws, ethical expectations and trade agreements, along with genealogical networks, far more complicated than our simple hierarchies of forebears. Anthropologist Jan Vansina argues that indigenous genealogies 'are among the most complex sources in existence'.[43] All this information would be stored in songs, numbering in the hundreds, if not over a thousand.

Although much of the information discussed above is essential for survival of the society both physically and culturally, all human societies, non-literate and literate, also demonstrate a love of knowledge for its own sake. French anthropologist and ethnologist Claude Lévi-Strauss wrote half a century ago that the 'thirst for objective knowledge is one of the most neglected aspects of the thought of people we call "primitive"'.[44] I would argue that this situation has not much improved. Lévi-Strauss also observed that 'animals and plants are not known as a result of their usefulness; they are deemed to be useful or interesting because they are first of all known'. This aspect of 'native' science, Lévi-Strauss argues, 'meet intellectual requirements rather than or instead of satisfying needs'.[45] That intellectual system, being entirely stored in memory, needs to be structured and consciously retained. A new person, a new technology or a newly identified plant or animal species must be named and linked into the existing system to ensure it is not forgotten.

It is this method of constantly structuring information and adding new information to the existing structure which is the strength of indigenous knowing. The intellectual domain is sorely lacking in popular depictions in indigenous culture, especially when recreated for documentaries of prehistoric cultures.

Literacy makes storing information much easier, enabling a much larger data bank to be available in permanent storage. While engaging with the huge benefits of literacy, we have also dispensed with many aspects of orality which are natural to human learning and understanding. We segregate art and music from science and literature. We don't let vivid characters tell the stories about the science and history, geography and politics. We don't ground our curriculum in the physical environment, letting memory locations fix the information in logical sequences in touchable places that are infinitely expandable. We sit still when we could dance.

I have no doubt that a fusion of literacy and orality offers the optimum for contemporary education.

II Initiation as the path to restricted knowledge

There are no truly egalitarian societies known. Those that appear to be egalitarian are so judged because there is no differentiation in material wealth. No society is egalitarian when it comes to knowledge. Cross-cultural ethnographic evidence is unequivocal. Power in small scale traditional societies, mobile and sedentary, is granted to those who control knowledge.[46] It is only in larger societies that leadership is maintained through force and granted individual wealth.

It is through initiation that the young gain the higher levels of the knowledge system and the most critical information which must be retained accurately. I explored the way knowledge was disseminated in a wide variety of oral cultures including the mobile Australian Aboriginal cultures and the sedentary Pueblo farmers, the African Luba and Yoruba, the New Guinea Tsembaga, the New Zealand Maori and the Melanesian seafarers. Every one employed formal teaching methods to instil the songs, stories and dances through initiation.

Public and restricted knowledge

Teaching higher levels of the knowledge system in initiation ceremonies built on the framework provided by the public stories taught to children. It is only these public stories which we, being uninitiated, can be told. Too often the child-like nature of the stories is taken to represent the intellectual standard of the entire culture. In fact, the stories appear to be child-like as they are primarily taught to children. In the view of the elders, we who are not initiated are only children in terms of initiation into the knowledge of their culture. Initiation leads to access to the restricted content of the oral tradition. The public/restricted dichotomy is critical in most, if not all oral cultures.[47]

Public narratives can be adapted and the skill of the storytellers which is hugely admired. Even if the performance includes pragmatic knowledge, the entertainment value of a well-told narrative adds to the memorability of the content. Embellishments may reflect the storyteller's or singer's talent and individuality, however the basic content will not vary greatly.

Initiation ceremonies are performed in restricted settings. As the initiates climb to higher levels, they are taught the more restricted versions encoding more and more of the knowledge system. The dichotomy between public and restricted knowledge, and degrees of each, can be found in cultures across the world. Imperfect repetition can lead to corruption of critical knowledge through the so-called 'Chinese whispers' effect. Corruption of factual content due to repetition by large proportion of people cannot be tolerated if the group is to survive. In particular knowledge of plants, seasonality, genealogies and in particular navigation cannot be adapted to the whim of the storyteller. Consequently, the most elite and restricted group store the songs which contain the information which must be retained accurately for the entire society. Secrecy is rigorously enforced. This public/restricted dichotomy is not only reflected in the songs but also in the sacred designs which are owned by those who are initiated to particular levels within particular subgroups, such as totems.

Australian Aboriginal men do not acquire the full complement of knowledge until they are quite old. It is only then that they attain status and authority. Australian anthropologist Howard Morphy wrote that

> creation of secret knowledge is part of the process of mystification by which other members of the society are persuaded by the authority and power of those without access to it. Control of such knowledge enables groups of people – elders, members of a secret society – to exercise some degree of control over other members of society.[48]

Anthropologist Peter R. Schmidt wrote that in Tanzania

> the groups that directly controlled iron production did so with highly esoteric technological and ritual repertoire. The ritual that surrounded iron production mystified the technological process to such a degree that it appeared to be mastery over something natural, human fecundity, rather than control over specialized technological knowledge. Such powers of mystification conferred certain economic advantages to the groups that controlled them.[49]

Strategies to deal with times of extreme resource stress are more likely to be retained accurately through the restriction of the knowledge to the high levels of initiation. The hunter-gather cultures of the Nunamiut and Tareumiut of Northwest Alaska are constantly facing resource stress due to the wild seasonal fluctuations in the availability of their most important game animals, the caribou and the whale respectively.[50] Anthropologist Leah Minc noted that the public forms of the songs tended to reflect the seasonal and short term adaptations to variation but retaining the body of reference knowledge on the pan generational time scale involved restricted ritual performances. She recorded thirty recurrent themes within the restricted level of the oral tradition which reflected critical survival strategies included complex relationships with critical trading partners who depended on a different primary game animal. The survival information also included adopting different storage methods, pooling labour, utilising kinship ties, using secondary resources, conducting inter-community marriage and feasts, exploring resource potentials of other habitats, and even moving into other habitats. Knowledge imparted included learning to deal with unfamiliar resources through learning alternate skills via social contact. The oral tradition recorded the impact on resources of past scarcities, seasonality, famines, starvation, death, as well as the effect of climatic changes.[51] the implications of Minc's research are also reflected in studies of the Klamath and Modoc myths from North America[52] and the famine myths of the Tsimshian of British Columbia as well as the Kagruru of Eastern Tanzania.[53]

As access to restricted material cannot be granted to the uninitiated, ethnographic knowledge of what is often referred to as 'secret business' is understandably limited. Given that most ethnographers were male, 'women's business' is severely underrepresented in the ethnographic reports.

Oral tradition is not just oral history

The term 'oral history' is often used interchangeably with 'oral tradition'. Knowledge attained over long spans of time should be considered as a complex of genres rather than the discipline which Western cultures value as history. Oral tradition encompasses all knowledge of the lived environment with oral history as a subset. It is generally accepted that for most indigenous cultures, oral tradition is unreliable as a chronological history.[54] For many cultures, in particular Australian Aboriginal societies, an accurate chronological record of past events is not of high consequence. By comparison, some Maori can recite 800-year genealogies from when their ancestors first reached New Zealand.[55]

However, great deal of research has emerged recently about the longevity and accuracy of oral tradition in Australian Aboriginal cultures, the oldest continuous culture in the world. The information is specifically about landscape changes. In one study of 21 locations around Australia's long coastline, oral tradition has recorded events that occurred more than 7000 years ago. The stories, both narrative and mythological, refer to rising sea levels and the resulting change in geography when the post ice age sea level rise reached its present levels. Other stories tell of volcanic eruptions, the creation of islands and formation of lakes and habitat changes.[56]

It is not surprising that the stories which can be traced accurately for such an extraordinarily long time relate to the landscape and skyscape, both of which are used as fundamental mnemonic sequences for Australian indigenous oral tradition. Similar stories are known from around the world, but have often been dismissed as wholly fictional by researchers. This probably reflects the mnemonic wrapping of mythology and the inability of Western scientists to recognise it as such. Lévi-Strauss, in his seminal work, the title of which is usually translated as *The Savage Mind*, asked that ethnographers reconsider the representation of the low intellectual level of 'primitives', writing that scientific thought is 'extremely widespread in so-called primitive societies. We must therefore alter our traditional picture of this primitiveness'.[57]

Primary orality

How can indigenous elders remember so much information reliably when they have exactly the same fragile memories as those reading this essay? What is the mechanism that enables such extraordinary recall? Most importantly, can we learn from the mnemonic skills of oral cultures and in so doing enhance our own educational experiences?

The theoretical foundation of my research comes from the robust body of research on primary orality which includes the way in which knowledge is stored in cultures that have no contact with writing.[58] 'Primary orality' is essentially an information technology. The mnemonic technologies discussed can be considered as tools that increase the ability of humans to process information and so increase the amount and complexity of information preserved in cultures with no access to writing. The research indicates that song, story, dance, repetition, rhyme, rhythm, epithets and mythology all serve to increase the memorability of information and are therefore considered as mnemonic technologies.[59] It is critical to note that indigenous knowledge systems tend to be integrated, the concept of separate spiritual and

secular information being almost meaningless. Mythology works as a very powerful mnemonic device while also serving spiritual needs.

The role of song, dance, story and mythology

In Western theatres, music, dance and the telling of stories with mythological characters are primarily for entertainment. In Western education systems, we often offer the performance arts as a separate class from the subjects which are considered more academic. However, a major lesson from indigenous cultures is that song, dance and vivid storytelling enhance the ability to retain critical information in all genres accurately and in a structured form.

In primary oral cultures, the performance arts serve a broad and critical role. In looking at four groups of contemporary hunter-gatherers from four very different environments on three separate continents, Morley found that the traditional music mostly, if not always, 'constitutes an important repository of knowledge'.[60] It can easily be argued that due to the importance of rhythm for memorisation, indigenous musical instruments should be considered as mnemonic tools.

Indigenous Australian, Eileen McDinny (Yanyuwa) explained: 'Everything got a song, no matter how little, it's in the song – name of plant, birds, animal, country, people, everything got a song'[61].

In an analysis of the Australian Yolgnu songs, anthropologists noted that that descriptions of the plants and animals encoded in the songs describe the form, colours, smells and sounds of flora and fauna along with seasonal changes.[62] I am used to classifying according to observed characteristics, rarely using more than one sense. My Walpiri colleague, Nungarrayi, suggested that I listen to the trees and grasses and heard the differences. Not convinced, I tried it. Within minutes I could tell the difference between the sounds of the eucalypts and acacias. I could tell the trees from the grasses. Although it was nowhere near sufficient to identify the species, I was convinced that this would be possible. I tried smelling and touching the species around me and, not surprisingly, the differences were remarkable and would be so valuable in identifying species.

Indigenous use of the sound of birdsong is widely documented. It is close to impossible to identify bird songs from the written description in a field guide. Recognising the call of a bird is valuable for identification and for tracking a bird which is a food source or environmental indicator. But it can be more than that. Identification of a bird call can mean the difference between life and death. The aquatic diving bird, known as loons or divers (*Gavia spp.*) have a piercing call, precious to Tlingit and Inuit and a many other cultures across its wide northern range.[63] Critically, the loon is not a pelagic, that is it will not stay out at sea overnight like most of the sea birds. Consequently, if a fisher is caught still fishing or moving between oceanic locations when the weather turns nasty, he can follow the loon back to land as long as can recognise its call among the many at sea. Performing the song which replicates the call of the loon during 'fishing magic' before venturing out to sea is a potentially life-saving ritual.

Songs may or may not be accompanied by dances. Dance may be performed with or without song. Often they are performed together. In the film of Aboriginal dances (Cameron 1993), the Woomera Aboriginal Corporation chose to present fourteen dances, along with a narration that referred to them constantly as 'our law' and to their role in teaching the culture. The majority of the dances were about animals, of which six involved a metaphorical teaching ethical behaviour. Other dances were entirely pragmatic, such as demonstrating how to make fire, the way the sea behaves on the rocks, and how to detect and collect honey.

Like all aspects of oral tradition, dances are not stagnant forms, but are maintained, adapted or created as serves the needs of the society. Hamilton A. Tyler described the performance of the Hilili-Eagle dance, introduced into Zuni from another Pueblo culture, Acoma-Laguna, around 1892.[64] Significantly, he wrote about the way that various aspects of the dance had been added such that 'a number of elements are slowly gathered to form a new ceremony' and that a 'myth grew up almost immediately to account for parts of this new Zuni dance, which indicates that myths can have secular origin and only acquire religious meaning with later developments'. He described the way the dance was incorporated into in the ceremonial calendar and restricted to the control of one of the societies, which effectively indexed it so it would not be lost.

Philosopher, David Abram wrote that anthropologists have tended to view the stories from oral tradition as 'confused attempts at causal explanation by the primitive mind'.[65] If the story carries knowledge about a particular plant or natural element, he explained, then that entity will often be cast, like all of the other characters, in a fully animate form. It will be capable of human-like adventures and experiences while being susceptible to the kinds of setbacks or difficulties that we know from our own lives. This makes the character and the encoded information about the plant easily remembered along with medicinal properties and risks of poisoning. The precise steps in its preparation will be clearly portrayed in the sequence of events in the legend chanted during its preparation.[66] Abram concluded that stories from oral tradition 'which we literates misconstrue as naïve attempt at causal explanation may be recognized as a sophisticated mnemonic method whereby precise knowledge is preserved and passed along from generation to generation'.[67]

Are oral cultures aware that they are using mythology in this way? Anthropologist John MacDonald quotes Inuit Elder, Hubert Amkrualik:

> Stars were well known and they were named so that they could be easily identified whenever it was clear. They were used for directional purposes as well as to tell time…. stars could be remembered by the legends associated with them. The people before us had no writing system so they had legends in order to remember.[68]

For the Pueblo, a cast of masked mythological characters, numbering in the hundreds, perform a ceremonial role imparting information through highly entertaining dances. These kachina (katsina) are also represented on pottery and other decorated forms while being given to children in the form of figurines. These are not dolls, they are the foundation of a knowledge structure which will be built around the kachina over a lifetime. One popular kachina in contemporary Pueblo culture features a female character with many children. If

found in an archaeological context, it may be readily interpreted as a fertility figure. It is a representation of the Storyteller representing the importance of conveying the stories to children. Without the oral component, interpretation of figurines is highly speculative.

> As is too often the case with other African art objects, Luba works have been labelled simplistically as "fertility figures" due to their nudity, or "ancestor figures" because of what is interpreted as ethereal spirituality, without an accurate sense of what they were intended to mean for the people who originally made, owned and used them.[69]

A set of figurines can be sequenced to act as an index to the knowledge system. Anthropologist and ethnographer Claude Lévi-Strauss described the way a collection of fifty-eight figurines were used by the Senufo of Southern Mali during initiation ceremonies. These figurines represented animals, people or symbols of activities. They were shown to novices in a prescribed order. Lévi-Strauss argued that the elders used the figurines as a lexicon of symbols which formed the 'canvas of instruction imparted to them'.[70]

III Material mnemonic devices

However the authorities on primary orality did not recognise the significance of material mnemonic devices, from the landscape, skyscapes and permanent art forms to a vast array of portable mnemonic devices. One of the major writers in the field, British social anthropologist Jack Goody wrote about a few well-recognised mnemonic devices including the birchbark scrolls of the Ojibwa, the winter counts of the Dakota and the Australian churinga. Goody concluded that these mnemonic devices are used to

> record or identify the words of the song, the accounts of an individual, the event of the year. They maybe abstract or pictorial, and are 'signs' of the sequential kind. However they are not transcripts of language, but rather a figurative shorthand, a mnemonic, which attempts to recall or prompt linguistic statements rather than to reproduce them.[71]

Later in the book, Goody was more specific. He wrote:

> Let me put the problem in another way. If verbatim learning were widespread in oral cultures, we would expect to find developed there a number of mnemotechnical devices of the sort described by Francis Yates in her well-known book on the [sic] The Art of Memory (1966). Certainly mnemonic devices were available to pre-literate cultures, though the repeated recourse to the quipu of the Inca as an example might suggest that these were not so common as is sometimes supposed. But, more significantly, the elaborate systems discussed by Yates, appear to have been invented by a literate society. "Few people know" writes Yates, "that the Greeks, who invented many arts, invented an art of memory which, like the other arts, was passed on to Rome whence it descended in the European tradition"[72]

I have no argument with Goody's conclusions that verbatim learning is not widespread in oral cultures. I have also found that the khipu is referred to constantly, while discussion of other mnemonic devices is difficult to find. However, my research shows that a wide variety of mnemonic devices are in fact much more common that the references imply. I disagree very strongly with Jack Goody's claim that the method of loci is not found within non-literate cultures. I can find no difference between the Art of Memory, as described by Yates, and the Australian Aboriginal songlines discussed at the start of this essay. Nor can I find any difference with that mnemonic technology and the use of pilgrimage trails by Native Americans, processional roads of Polynesia or the Inca ceques.

Alongside the landscape and skyscapes, oral cultures all use an array of smaller mnemonic devices, many of which are portable.[73] The knotted cord device used by the Inca, the khipu (also spelt quipu) is an inordinately effective device. Khipus consist of a main cord with any number of attached cords which hang vertically when used. Great complexity can be encoded through the use of different colours, secondary cords attached to the primary cords, twists in various directions and a complex of multiple knots. It is the most flexible of all the portable memory devices I have used because if the ability to tie and untie the knots, add or remove cords and constantly alter any aspect of the device. I have shown that the reason the non-literate Inca managed an empire which outshone their literate contemporaries the Aztecs and Maya, was their use of the khipu in combination with a cognised landscape.[74] The systems of ceques by which they divided their capital Cusco in Peru, operated exactly like the method of loci. Along the extensive system of roads, some which may have been purely imaginary, were locations at which rituals were performed. These are often referred to as 'shrines' for want of a better word. Spanish chroniclers quote the Inca description of them as being like books recording their knowledge.

All the non-literate cultures I explored used mnemonic devices. Given that the human brain is similar across the world, it is not surprising to find that the range of mnemonic technologies is similar across a wide variety of oral cultures but that these general categories of memory aids are implemented very differently across disparate cultures. In any given culture, a range of material mnemonic devices will be used concurrently.

Universal is the role of vibrant characters, be they based on actual forebears or mythological ancestors or a combination of both, to tell the stories. The representation of these characters permeate all stories and are represented on a vast array of media and in figurines. They are often portrayed as masked figures in ceremonial dances. I use a combination of key figures from history as well as characters based on animals and plants in memorising the domains of information in my own memory experiments. What has surprised me is the degree to which I have become emotionally involved with these characters and the information they convey through their memorable acts and words. There is a huge lesson for education in the role of human agents, and of imagination, when teaching and learning all forms of knowledge from the humanities to science, technology and mathematics. Indigenous cultures engage with their characters throughout their integrated knowledge systems in all domains of knowledge.

Too much scholarly writings refers to enigmatic decorated objects found within traditional cultures as 'ritual' or 'magical' or 'religious' without exploring any possible purpose for

encoding the vast corpus of rational information which is essential for the survival of the population. My own research organised this information to form a classification of the mnemonic devices widely used by oral cultures which will enable ethnographers and archaeologists to consider this role in interpretation of enigmatic objects they may encounter.

I have no doubt that educationalists can also make use of these technologies to encode aspects of the regular curriculum. Suitably decorated objects are so effective as memory devices that they enable the discussions and commentary which are not available to students who do not have a basic knowledge grounded in a firm structure on which to build higher levels from the Bloom's taxonomy of cognitive domain: comprehension, application, analysis, synthesis and evaluation. Without a firm knowledge base, the higher levels are severely weakened.

Indigenous mnemonic technologies

After the landscape and skyscapes discussed in the first chapter of this essay, there are other non-portable mnemonic technologies. Decorated poles are known across a wide variety of cultures, but most famously from the totem poles of the indigenous peoples of the Pacific Northwest Coast. Totem poles relate to stories, some of which are restricted. Similarly, rock art is known to act as a memory aid for Australian cultures and has probably served that purpose globally for millennia.

Nungarrayi, to use her Warlpiri title, explained to me that for Australian Aboriginal people, art is never primarily for aesthetics. It is always to help remember Country, the stories and the knowledge. Australian Yolngu people have written about the laws and rights to sea for non-Yolngu through bark paintings in a book specifically designed for that purpose.[75] In the book, Dula Nurruwuhun wrote:

> By painting these designs we are telling you our story. From time immemorial we have painted just like you use a pencil to write with. Yes we use our knowledge to paint from the ancient homelands to the bottom of the open ocean.[76]

Djon Mundine wrote:

> Aboriginal bark paintings are more than just ochre on bark: they represent a social history; an encyclopaedia of the environment; a place; a site; a season; a being; a song; a dance; a ritual; an ancestral story and a personal history.[77]

Indigenous designs the world over include representational figures of animals, animal tracks, landscape, plants and humans. However, a large proportion of the motifs consist of circles, spirals, arcs, lines, chevrons, dots and a vast variety of other abstract shapes enabling a multiplicity of meanings and many levels of complexity to be encoded to the same device. The more restricted knowledge, that referring to the information which must be maintained accurately, tends to be linked to the abstract designs.

The open sacred places, the marae of Polynesia included wooden structures which housed carved figures. These carvings act as mnemonic for complex genealogies. Extremely long notched sticks have also been used as mnemonic aids for genealogies by cultures in the Americas and Africa. The best documented are the staves still used across the Pacific cultures where each knob represents a generation enabling the oral specialist to recite the genealogy and associated events by touching each of the knobs in turn. Well documented examples include the Rarotongan genealogy staff and the New Zealand Maori *rakau whakapapa*.[78]

In the Sepek River area of New Guinea, the Iatmul retain an enormously elaborate totemic system of personal names as a mnemonic for their mythology. Research has shown that a 'learned man' may possess between ten and twenty thousand multi-syllabic personal names, each of them acting as mnemonic to the songs possessed by the clan. They constantly recite the names to ensure they are memorised correctly.[79]

There are a vast array of handheld objects made of fabric, stone or wood and inscribed with abstract decorations which are used as mnemonic devices. Having implemented a range of these for encoding similar genres of information, I have found them to be extraordinarily effective.

Winter counts are maintained by various language groups within the Native American cultures. They take the form of pictographs drawn in sequence on hides or fabrics. The annual cycle is taken from the time of the first snowfall of the winter. One significant event from the previous year is added to the pictographic collection to act as a mnemonic to the history of the tribe for that year. Other events, such as births, marriages and socio-political occurrences, are stored in stories linked to the event depicted. The winter count acts as memory aid to the oral history, enabling both content and sequence to be recorded.[80]

The oral specialists, the Midéwewin of the Ojibwa(y), also referred to as the Chippewa(y), of North America used inscribed scrolls made of bark from birch trees to aid the recall of the origin-migration songs which form the basis of their oral tradition. Not only acting as a guide to the songs encoding the oral tradition, the scrolls had marks for changes in rhythm, tempo and the divisions between song sequences for the performance, which was accompanied by drums and rattles.[81] Very similar to the birchbark scrolls are songboards, inscribed wooden boards used to aid memory of songs during performance in a number of Native American tribes.

Inscribed wooden objects are commonly used as they are light to carry. In the case of the mobile Australian cultures, symbolic decorations were added to shields, boomerangs and other utilitarian objects. I have been granted custodianship of a food carrying dish known as a coolamon. The underside of the curved wooden dish is covered with etched lines which form no discernable pattern but are also clearly not random. My Warlpiri colleague, Nungarrayi, on presenting me with the 100-year old coolamon from the Western Desert, explained that the symbols on the coolamon reminded people

> of meetings, places, stories, events and travels across the landscape's dreaming tracks, in the footsteps of the ancestors and creation spirits. Such symbols also had levels of

meaning according to who read them. Initiated women would know the deeper
meanings. Coolamons were used by women as the gatherers and nurturers to carry
food, water, small animals and lizards, honey ants, sugar bag (wild bush honey),
medicine leaves and plants and even babies! The coolamons were extremely important
possessions. They supported life and carried messages.

A very similar technology in terms of its mnemonic properties is the churinga (also spelt
tjuringa) of the mobile Australian Desert cultures. Churinga as usually elongated, flat pieces
of wood or stone incised with geometric designs. Unlike the coolamon, they are restricted
objects, seen only by initiated men. Fully initiated men would sit with the churinga, touching
each symbol and singing the related songs, telling the stories, reinforcing the knowledge and
teaching the new initiates. Photographs of 'men of memory' from the elite Mbudye Society of
the African Luba show the users sitting touching each portion of their memory board in
exactly the same way.

The Luba Kingdom once flourished in what is now The Democratic Republic of Congo.
Their memory board, the lukasa, is an extremely complex esoteric mnemonic device,
constructed of wood and encrusted with beads and shells. Lukasas were used as mnemonic to
vast amounts of oral literature and other information which was highly restricted and
gradually taught by older members. Each bead or shell on the Lukasa could be read in
multiple ways depending on the context. The lukasa also acted as an index to Bambudye
ceremonies and the complex set of initiations required to progress through the society. This
initiation sequence was likened to a journey through the maze of beads on the lukasa.[82]

I have created a number of memory boards based on the technology behind the lukasa. To
one, I have encoded the 408 birds of my state in taxonomic order. I have added information
including identification, habitat and behaviour. I am in the process of expanding the use of
the same device to form a field guide to all 880 birds of Australia, and have no doubt that it
can be done. I would never have considered this possible without actually working with a
memory board myself.

Other mnemonic technologies which I have found effective, but difficult to implement, are
the so-called 'divination' systems of the Yoruba of West Africa. In the best documented
system, sixteen cowrie shells or pine nuts are tossed, the reading resulting from the number of
shells or nuts which land face up. A close reading of the definitive text on the practice shows
a complex knowledge system using the fall of the cowries to index the restricted knowledge
hidden behind the public divination practice. The verses encode, along with ritual
instructions, knowledge of animals, plants and a pharmacopoeia, how to protect against
smallpox infection, navigation instructions, rules for trading, guidelines for the use of power
and authority, methods for dispute resolution, cultural history along with social and legal
precedents. American anthropologist William R. Bascom produced a 305-page volume of the
song-poetry which represents all the verses memorised by a single, knowledgeable sixteen-
cowrie diviner.[83]

The sequenced group of 256 Odù in the more complex Ifá divination system, which requires two tosses of the seeds or cowries, is estimated to contain over 1200 verses at its most minimal level.[84] Similarly, the Highland Mayan 'daykeepers', members of the Quiché language group of Guatemala, have retained their oral tradition into contemporary times. They use sequences of tossed seeds to help remember divinations and their extremely complex calendar.[85] At this stage of my experimentation, I am not convinced these are the best methods for contemporary implementation due to the complexity but I am far from experienced enough with these technologies to make any firm conclusion.

The knowledge specialists of a number of different cultures use groups of objects as memory aids. Strung on a piece of cord or carried around in a net, these objects are used to represent the repertoire of songs. The American Blackfoot Indians use a bundle of objects in ceremonies ensuring the correct song sung for each object presented in a prescribed order. Some ceremonial bundles contain over 160 items. West African Mende healing specialists carry a bag of stones, each representing a particular illness, and which are manipulated as the elder asks the patient questions. My limited experimentation with bundles of objects indicates that this would be a very effective memory system offering multiple levels of complexity.

Arrangements of stones, shells and sticks can used as mnemonic and teaching aids. The Inuit, for example, use stones to represent the interrelationship of celestial bodies and the seasonal behaviour of the sun. The Pacific island navigators are renown for their extraordinary ability to regularly cross hundreds of miles of open ocean. Their knowledge system involves the memorisation of many lengthy chants, teaching about marine animals and plants, navigation by the stars, swells and islands, weather and food sources, all learnt through complex mental imaging studied through the manipulation of stones and stick chart.

We have a great deal to learn from non-literate cultures about grounding knowledge in structured systems using robust memory technologies. It is perhaps time to introduce them into contemporary education. But first we need to examine exactly what happened to the memory systems as the phonetic alphabet became the dominant method by which information was stored in Western civilisation.

IV. Learning from a different way of knowing

Western colonisers failed to recognise that the oral cultures they have literally overwritten had methods for recording information which were misconstrued as simplistic mythologies. The dismissal of the 'primitive thought' encouraged the invading 'pioneers' to convert the indigenous people to their religions and rule through the written law. But the memory methods survived in Western cultures. They were transformed and became less complex, but they can be traced through the classical times to the Renaissance and Middle Ages. Through the contemporary memory champions, they are still practiced today.

Contemporary education could benefit greatly from the lessons we can learn from oral cultures by using a combination of the lessons from orality alongside literacy. The time for us to learn the mnemonic technologies and grounded learning structures from indigenous cultures has almost run out, and this is to our great loss. My thinking has changed and

expanded when using indigenous knowledge structures and mnemonic technologies over the last few years. I have barely scratched surface, yet I am convinced that we can greatly enhance our current education system by grounding our learning in the landscape, skyscapes and memory devices along with creating vibrant narratives peopled with highly memorable characters to make information in all genres far more memorable and readily available for contemplation. But first, it is timely to offer a brief reflection on what happened to the knowledge specialists in Western cultures as the Roman Empire lay down the origins of our current education system.

The definition of writing is the subject of debate and is, unfortunately, beyond the scope of this essay. British linguist and palaeographer David Diringer distinguished between ideograms and phonetic writing. This essay will follow his distinction. Diringer described ideograms, in which symbols represent ideas, as having been found among many indigenous people across the world. He uses the term 'ideographic writing' when there is no connection between the symbol and the spoken word enabling the symbols to be read in any language. Phonetic writing is when writing directly represents speech so the text will be read with exactly the same words by all literate speakers of the language. Phoenetic writing may be either syllabic or alphabetic.[86]

Key writers in the field of primary orality, such as Eric A. Havelock and Walter Ong asserted that writing radically changes the entire mode of thinking of a culture, enabling philosophy and science in a way which is not possible in oral cultures.[87] Although, throughout this essay, I have been using the dichotomy between oral and literate cultures extensively, I am doing so only in terms of the way knowledge is acquired, stored and transmitted. I do not accept that science and philosophy, nor any other aspect of complex human thought, are not possible in cultures which rely on oral mnemonic technologies to store and transmit information.

From orality to literacy in the Greco-Roman world

For around 100,000 years, modern humans had existed without writing. There was no other way to record all these people learnt than to remember it. Any information that was forgotten was lost forever. A very few cultures, such as the ancient Greeks, developed writing as a continuation from their oral past. It is through them that we can see the impact on education of the slow transformation from a purely oral to an almost purely literate culture.[88]

Although there is evidence of the early stages of writing from around 3000 BC, from the Egyptians and Sumerians, Phoenicians and Hebrews, Indians and Chinese, most of their populations were not literate. Writing was restricted to a very small elite who performed a priestly or commercial role. Powerful cultural roles such as law and government were still managed by non-literate means, through orality not literacy. Those small literate elites, of course, were keen to maintain their power, and thus had no desire to teach writing to the masses. Some scripts, such as the Mycenaean, were restricted to so few people that they disappeared when those few died and had failed to pass it on.

In many very early pre-literate cultures, images resembled the object they represented. In Egyptian hieroglyphics, for example, a picture of a beetle would represent a beetle, although abstract concepts could also be recorded through some kind of representational image. Chinese writing, which retains representational characters in a stylised form, requires about 3000 of such characters to be known for basic literacy, with 50,000 characters or so to be mastered for full literate proficiency.

It is a massive leap of human creativity to go from the concept of an object or idea being represented by a symbol which looks like it, to a system of symbols which represent the sounds which combine to form the spoken words. It is mind-boggling to think about how that change could possibly come about. It would be wonderful to know about the moment of creativity of those who first thought of representing sounds not ideas. So was born the alphabet, a system of signs each of which represents a single sound of speech. The first true alphabet, assigning letters to both consonants and vowels, was that of the Greeks, adapted from the Phoenician script. The spoken word could now be written down exactly with all readers repeating what was being conveyed word for word. All speech, all ideas and all forms of expression could be permanently recorded.

Initially, writing was used more as an aid to memory than as a standalone technology. Consequently, it was not necessary to create a letter for every single sound the human voice can make; such a vast number would have become unmanageable. With teaching and word recognition, the multiple combinations of a relatively small set of phonetic letters made reading possible. Nevertheless, the diffusion of writing eventually led to the demise of the oral tradition. It always does – orality never survives the onslaught of literacy

Even when writing had been invented by the Greeks, it was not originally used for much more than writing names and recording transactions. Important knowledge was still kept in memory. Consequently, those highly skilled in the use of their artificial memories were hugely respected in the ancient Greek and Roman worlds just as they had been in the non-literate indigenous cultures which preceded them.

A highly trained memory was greatly admired in the classical Greco-Roman era. Not only was it incredibly useful in politics and speech making, it was also a terrific way to show off. Seneca the Elder was an orator and writer in ancient Rome. In one of his classes, over two hundred students recited a line of poetry, one by one, each line unrelated to the last. Seneca repeated all two hundred in order, and then proceeded to repeat them in reverse order. It is also claimed that Seneca could repeat two thousand names, having been told them only once.[89] Augustine of Hippo, later to become a saint, used to tell of his friend, Simplicius, who could recite Virgil forwards and backwards. Quintilian tells of a man who would watch a full day's auction, and at the end of the day name all the articles sold, the buyers and the prices, all from memory. Pliny the Elder described numerous feats of memory, such as Cyrus, who knew the names of all the men in his army; Lucius Scipio, who (it is said) knew the names of all the Roman people; Cineas could name all of the many senators; Mithridates of Pontus knew the twenty-two languages of the peoples in his domains while Charmades could recite the contents of all the books in the library. While some of these claims are almost certainly exaggerated, I am less suspicious of them than I was before I had become a practitioner.[90]

However, the purpose of memory training was far more than just showing off. Having a great deal of knowledge held in memory allowed the orators to convey their knowledge but also to play with the information adding commentary and philosophy to their deliberations.

The ancient Greek and Roman cultures flourished from around 800 BC, the time of Homer. Without books, the memories of the great orators served as the encyclopaedias for the entire population. The most famous of all the pre-literate Greek orators was Homer, who is often referred to as performing the role for his society which an encyclopaedia would offer ours. Homer's epic poems, *Iliad* and *Odyssey*, tell of events surrounding the aftermath of the Trojan War and are the oldest known Greek literary works. Although scholars dispute the date, is believed that Homer was born around 800 BC. He can be considered as the chief educator, the primary authority for knowledge in Greece for his time.

Oral tradition was most often presented in poetry sung by wandering minstrels. By constantly repeating particular stories, the information stored within them was disseminated among the population. The Greek epics, as performed by Homer and his many fellow orators, were essentially massive repositories of all the cultural information of the society, customs, laws, social proprieties, history, geography, knowledge from afar, along with knowledge of science and technology.

As mentioned previously, although there was some form of writing during his time, it was recorded that Homer could recite the entire *Iliad* from memory, nearly 16,000 lines. That would have taken at least four long evening sessions. There's nearly as many again in his other great work, the *Odyssey*. We know of Homer's epics because they were later written down between 750 and 650 BC, but the language is not the same as the dialect spoken at the time. It has formal and archaic vocabulary. The style and content of the epics reflect what was essential to a pre-literate society. Unlike daily conversation, Homer's epics are composed in a form which aids memory and is reflected in the song-poetry of non-literate cultures around the world. The epics have a repeated beat. They have a sequenced story, with each scene populated with vivid characters. Each scene is set in a specific location, the journey through them acting as a set of subheadings for the information stored.

The purpose of these epics was for both information storage and entertainment. Without the information storage, the culture could not survive. Without the entertainment, people would not be willing to listen in order to receive and remain familiar with the encoded knowledge. Homer composed his speeches to be performed. He was an oral poet, not a writer.

Even as writing became more widespread, as orality gave way to the literacy, the power of the orator continued. Cicero and Quintilian, around the time of Christ, and later Augustine of Hippo, were the pop stars of their time, their lengthy speeches and dramatisations captivating audiences. All of them relied on formally training their memories, without which they simply couldn't have performed their incredible feats. When the era known as 'classical antiquity' came to an end, around 400 AD, the written word had started to erode their power, but the methods by which they memorised vast stores of information would not be forgotten.

Simonides, born around 556 BC, was a guest poet, hired as entertainment for a dinner held by Scopas, a nobleman of Thessaly. Various reasons are given why Simonides left the banquet, but he did so fortuitously, as while he was outside the hall the roof collapsed, killing Scopas along with all his guests. The bodies were crushed beyond recognition, which was rather a problem for the relatives arriving to claim their loved ones. The poet was able to recall each of the guests according to the position that they had sat at the table for dinner. Consequently the bodies could be identified and distributed for burial. Simonides realised that it was through the physical locations of the guests that he was able to identify them and that this orderly arrangement was essential for reliable memory.

Many of the classical writers, including Cicero, Pliny and Quintilian, described Simonides as the inventor of the most effective memory method ever known, sometimes called the 'method of loci', sometimes the 'art of memory' and sometimes the 'journey method'. There is little doubt, however, that Homer was using just such a method long before Simonides. I have no doubt that indigenous cultures were using it for millennia before that.

The method of loci, as used by the pre-literate and early literate Greeks, has been thoroughly documented.[91] It is a technique for using physical places to memorise long pieces of prose. Pre-literate Greek orators first became so familiar with a streetscape or building that they could imagine themselves walking it, noting every pillar or doorway, mentally recording every location on their journey. Breaking up the speech into memorable sections, the narrator would walk around the physical space, allocating each part of the speech to a given location (loci). They used their memorised landscape and the series of mnemonic images representing portions of the speech just as the indigenous elders used the landscape as a structured memory space for their songs and stories. The orators could then perform their speeches by imagining themselves walking through that space, giving not only the content but the sequence.

We know a great deal about this method from the ancient Roman textbook for orators, *Rhetorica ad Herennium* (circa 86-82 BC).[92] The set of locations, the orators are advised, must be in a definite sequence, should be in a location away from distracting passers-by, well lit, and not too much like one another, of moderate size, with a moderate distance between them. The *Rhetorica ad Herennium* also suggests that mental images should be as striking as possible with vibrant active characters in order to be the most memorable. Exceptional beauty or singular ugliness, striking or comic effects, heroes and trauma, disasters and great feats—all make the story easier to remember. This is reminiscent of the active and highly emotive myths with exaggerated characters and monstrous creatures, part human part beast, say, which make indigenous stories much easier to remember.

The Greeks did not only use the landscape as a set of memory locations. Like indigenous cultures, they also used the fixed, but cycling, position of the stars. Metrodorus was born in 145 BC in Scepsis, a small town in what is contemporary Turkey. A politician with considerable power at the Court of Mithridates, he was best known for his phenomenal memory. Cicero, Quintilian and Pliny the Elder frequently mentioned his extraordinary abilities. The technique used by Metrodorus was described as being based upon 360 different locations within the signs of the Zodiac. Metrodorus was versed in astrology at the time

astrologers divided the zodiac into 12 signs, and then 36 decans, each of which covered 10 degrees. Each decan was associated with a figure, often considered a deity, giving imagery and a character to each group of locations. Metrodorus therefore had 360 locations to use for memorisation, a set of places permanently kept in order by the positions of the stars.

In the very early days of writing in ancient Greece, the skill was restricted to a very small elite. It was centuries before the general public learn to write and was no longer dependent on the old oral methods of learning. The alphabetic script spread throughout the population, albeit very slowly. The Greek script is thought to have been in use since about the eighth century BC about the time that trade with Egypt bought papyrus to the Greek state. Until then, parchment had been made with skins or writing had been stored temporarily on wax tablets. Discovering that a thin paper-like material could be produced from the pith of the papyrus plant, *Cyperus papyrus*, changed everything. Papyrus enabled the broad distribution of writing in a way that was never possible before, leading to a literate culture by the sixth century BC, with schools teaching reading and writing within a hundred years of that. The first populations in the world which could be considered essentially 'literate' were those in the city states of Greece and the Greek settlement of Ionia, situated in modern-day Turkey.

Once a culture has writing, the reliance on human memory for storing critical information, of science and technology, law and governance, becomes the domain of written records with their supposed permanence and reliability. Very few cultures in the world have made this transition through their own creation of a written language. The vast majority of cultures have had writing imposed on them through some kind of invasion. Non-literate Britain, for example, gained writing from the invading Romans, but also seems to have lost it again when the Romans left.

Writing creates a permanence and an ability to constantly re-read and analyse what has been written. The Greeks started analysing the poems of Homer and Hesiod, converted into the written form. They analysed them with the literate mind and started to question the literal accuracy of the information the epics contained, finding fault with the inconsistencies in the works which had been designed to be performed, not read.

The Greek gods, the heroes of the poets Homer and Hesiod, and the traditional legends of old were no longer needed for their role of storing information. They became a source for theatre, literary works and philosophical discussions. The pragmatic information had moved into the written domain. Poetry and performance had become entertainment, part of the arts and growing further and further apart from the sciences, from chronologically recorded history and from the law.

The Greeks and rhetoric

The Greek philosopher Socrates was born in 469 BC, with his pupil Plato born about 40 years later. Socrates had lived in a time in which society was primarily oral, a society which relied on the publicly recited literature to convey the cultural knowledge, despite the existence of the Greek alphabet. By Plato's time, prose in the written form was becoming the basis for serious issues to be recorded and transmitted. Plato's *Phaedrus*, written in about 370 BC,

takes the form of a dialogue between Socrates and Phaedrus, the latter being an Athenian aristocrat. A dialogue was the way which Socrates liked to do his thinking, through logical interrogation of the ideas of others. Plato recorded Socrates, during this debate, as quoting a conversation between the King of Egypt, the God Thamus, and the inventor, Theuth.

> This, said Theuth, will make the Egyptians wiser and give them better memories; it is a specific both for the memory and for the wit. Thamus replied: O most ingenious Theuth, the parent or inventor of an art is not always the best judge of the utility or inutility of his own inventions to the users of them. And in this instance, you who are the father of letters, from a paternal love of your own children have been led to attribute to them a quality which they cannot have; for this discovery of yours will create forgetfulness in the learners' souls, because they will not use their memories; they will trust to the external written characters and not remember of themselves. The specific which you have discovered is an aid not to memory, but to reminiscence, and you give your disciples not truth, but only the semblance of truth; they will be hearers of many things and will have learned nothing; they will appear to be omniscient and will generally know nothing; they will be tiresome company, having the show of wisdom without the reality.[93]

Plato's famous student the philosopher Aristotle was born in 384 BC. He wrote about many topics including science and the arts. As was common in his time, he made a clear distinction between natural memory and an artificial, trained memory. He referred to the use of imagery and places in his treatise, *On Memory and Reminding Oneself*. In this work, Aristotle makes it clear that the classical philosophers still used memory imagery along with the place system, the method of loci, to help remember their philosophical arguments.[94]

It was Cicero who introduced the Romans to the major schools of Greek philosophy and their mnemonic methods. Born in 106 BC, Marcus Tullius Cicero's influence was still profound in the European Enlightenment, sixteen centuries later. He is a major influence on Western thought and literature even today. Cicero was considered one of Rome's greatest orators, lawyers and prose stylists, revered for his phenomenally trained memory.

Among Cicero's many writings, the most important in terms of memory is his *De oratore*, completed in 55 BC. Cicero did not elaborate on the method of loci, indicating that it would be tedious to do so as the topic was so familiar to his readers. But his summary showed that he was drawing his techniques from the *Rhetorica ad Herennium*, by then a document hundreds of years old. He wrote that he employed a large number of places which were well-lit, clearly set out in order, with moderate intervals between and that he used images which were active, clearly defined, unusual and fast to recall. He concluded that natural memory can be greatly improved by the art.

Power struggles continued in Rome, with the conservative Cicero becoming a highly visibly enemy of Mark Antony. Their battle was not physical. It took place through attacks in speeches made to the Senate, a battleground where Cicero had no equal. Cicero argued for the Republic to be reinstated. Despite his brilliant oratory, Cicero was declared an enemy of the state and murdered in 43 BC.

Around 80 years later, the most famous of the Roman teachers of rhetoric was born, Marcus Fabius Quintilianus. Quintilian, as he is known in English, described the methods for the memory arts in *Institutio oratoria*, where he recommended the use of a building for forming the series of memory places. He suggested choosing a spacious and varied building. The places are then assigned: the forecourt, the living room, bedrooms and parlours. Again, the orator is instructed to visit each location, each with the vivid images placed in them to be retrieved during the oration thus ensuring that all will be in the correct order and no points of argument will be missed. Quintilian wrote of memory:

> We should never have realised how great is the power nor how divine it is, but for the fact that it is memory which has brought oratory to its present position of glory.[95]

Quintillian's writings are well preserved in numerous manuscripts, but even more survive of Cicero's writings. But there is one writer who outshines them both, Augustine of Hippo, the pagan who went on to become a profound influence on the Christian Church.

Toward the end of the classical era, the role of the memory arts was greatly influenced by the writings of Augustine of Hippo. He was initially a pagan teacher of rhetoric who talked of using places for memory in the hugely influential *Confessions* about his conversion to Christianity. He is now better known as Saint Augustine. Through his influence, mnemonic techniques became closely linked with religion in the Middle Ages. Born in 354 AD, he became Bishop of Hippo Regius in present day Algeria, then a Roman province.

In a brief passage in *Confessions*, Augustine describes retrieving images carefully placed in memory locations. His description resonates strongly with my own experience, nearly two thousand years later. Some images come back effortlessly on the merest thought of a location. Others require more effort. Those which are not well enough placed, or have little relevance, can be lost altogether. Augustine describes the way experiencing a memory space feels, moving through the places in order, drawing out the memories and the vivid images used to store them. And he does it so beautifully:

> And I come to the fields and spacious palaces of my memory, where are the treasures of innumerable images, brought into it from things of all sorts perceived by the senses. … When I enter there, I require what I will to be brought forth, and something instantly comes; others must be longer sought after, which are fetched, as it were, out of some inner receptacle; others rush out in troops, and while one thing is desired and required, they start forth, as who should say, "Is it perchance I?" These I drive away with the hand of my heart, from the face of my remembrance; until what I wish for be unveiled, and appear in sight, out of its secret place. Other things come up readily, in unbroken order, as they are called for; those in front making way for the following; and as they make way, they are hidden from sight, ready to come when I will. All which takes place when I repeat a thing by heart.[96]

Medieval memory arts

Imagine that you are a student. You are expected to memorise huge amount of the Bible, word for word, without error. You are also expected to memorise important speeches from leading thinkers from ancient times, current speeches, laws, history, the natural history of animals and plants and a lot more. It is early in the Middle Ages. The books available are just a few precious handwritten manuscripts. There is no paper yet. You can use a wax tablet, but it must be constantly erased to use again. Books are written on either papyrus or on parchment made laboriously from animal skins. Both are very expensive materials. How can you remember all that you are expected to know?

As was the case in classical times, memory studies were an essential part of the medieval curriculum. The memory spaces of the pre-literate and early literate classical eras evolved to suit this new world where written documents were initially extremely rare but slowly, very slowly, becoming available to ordinary people. The old memory methods lingered. Cathedrals became particularly popular buildings to use as sets of memory locations.[97]

The Middle Ages are generally considered to begin around 400 C.E. and continue on for a thousand years. They are usually referred to in four stages; the Early Middle Ages to around 1000 C.E., the High Middle Ages until around 1300 C.E. and the Late Middle Ages for another 100 or so years in Europe, when the new thinking and ideas of the Renaissance began. This radical change in thinking didn't reach Britain for another hundred years or so.

At the start of the Middle Ages, the Roman Empire had split into the East, based in Constantinople, and the West, based in Rome. While the Eastern Roman Empire flourished, the Western Roman Empire essentially collapsed after Rome was invaded by Alaric I in 410. Over the next 600 years, the Western and Eastern Empires developed Christian devotion in their own ways, finally splitting into the Roman Catholic and Orthodox Churches respectively. In the West, the Latin scholarship of Rome diminished in influence as the city diminished in size with knowledge and teaching enclosed within the monastic cloisters. In the East, Islamic forces conquered much of the Eastern Empire, adding a new dimension to scholarship. Highly illuminated pages of manuscripts along with stylised art works, became the memory spaces for religious knowledge on both sides of the Empire.

The foremost authority on memory in the Middle Ages, Mary Carruthers, wrote that

> Mediaeval culture remained profoundly memorial in nature, despite the increased use and availability of books for reasons other than simple technological convenience. The primary factor in its conservation lies in the identification of memory with creative thinking, learning (invention and recollection), and the ability to make judgements (prudence or wisdom). Writing… was always thought to be a memory aid, not a substitute for it.[98]

The primary purpose for memory training in Europe changed during the Middle Ages from the rhetoric and rational arguments of the classical orators to the pious sermons and meditation of a society dominated by the Christian Church. Although the value of active

images persisted, the range of memory techniques employed started to include other forms, in particular memorising from the written page. Mediaeval people were in awe of those with highly trained memories, not only as a sign of intellect as it had been in classical times, but also as a mark of superior moral character. In fact, a prodigious memory is recorded in the descriptions many of the saints lives, including St Francis of Assisi. Saint Anthony, it is said, memorised the entire Bible from hearing the words, having never seen them written down. Thomas Aquinas mixed in a highly literate group, yet at the time his colleagues' greatest praise was for his memory, not for the writing which led to his influence still being so strong today.

Many mediaeval writers described the brain in metaphors which represent the memory space: bees bringing knowledge-nectar to beehives, pigeons arriving in coops, coins being deposited in divided money pouches, treasures being placed in a chest and books being positioned on bookcases. In all cases memory was seen as a structured set of locations into which knowledge was stored. Coins, jewels, birds and other memory tropes were frequently drawn in the margins of the decorated books from early in the Middle Ages. These images do not illustrate or relate to the content of the actual text. They make the page unique and memorable, serving to remind the readers that the text is nectar for their mental storehouse. Recollection was seen as drawing together parts from different storage cells, an act of composing, one of creativity which could not be performed unless the information had been thoroughly memorised in advance. Have we forfeited some of this creative process by relying on storage on the page, and now depending on computer memories rather than our own?

As literacy spread, logic dictates, dependence on memory would reduce, but all evidence suggests that there was an increased interest. Written works on memory methods became very popular during the Middle Ages. Emphasis was given to meditation, deep quiet concentration on the images being created and their spiritual value, while still associating the images with architectural locations.

Preachers toured the country delivering greatly entertaining sermons. Their oratory was dependent on the same concepts as the orators of the classical world, that is breaking down the planned delivery into small segments and associating each segment with some form of memory device in which the order was strictly defined. This is not rote learning. When each section is linked to a specific location, as I have found constantly with the methods I am using, you can stop at any point, elaborate, and then return to that point and continue with ease. New ideas can be inserted into the oratory each time it has performed without losing the overall narrative stream. Although wide variety of memory aids were used in the Middle Ages, they still all reduce to associating information with some form of memory space which gave structure to the knowledge.

Until the Middle Ages, the media for writing included incisions in clay or stone, temporary marks on wax tablets and papyrus scrolls. It was only papyrus which offered a reasonably portable surface to permanently record literature, but it was fragile to handle. It wasn't until the first century that scribes started using carefully prepared animal skins, known as parchment or vellum, to create separate pages which could be bound together to form the first

books. More correctly referred to as codices, these books presented knowledge in a way that had never been possible before.[99]

The beautifully inscribed handwritten words were often used as a prompt for medieval memory, so it is not surprising to see these words enmeshed in images which match the classical recommendations for making information far more memorable. For example, it was common to have each chapter start with a coloured initial, alternating between red and blue. There were various forms of the commonest letters, so the same image would not be repeated on a leaf of parchment giving each statement a uniquely memorable appearance. To further aid memory, distinctive ornamentations were added around the text. Mediaeval manuscripts enshrined images of grotesque and violent acts along with fanciful beasts, strange figures, gross ugliness and extraordinary beauty. It is interesting to ponder the art of the Middle Ages and ask how much of the ornate and vivid images, grotesque and vulgar as they seem to us now, are the result of creating images for the sake of memory and not merely the taste of the times? Is it time to suggest students start illuminating their notes in schools and universities with grotesque and highly imaginative characters?

What was most important of all, as the memory training had always suggested in the past, the medieval images had to stir the emotions. The illuminations, as the most elaborate of the art work is known, enhanced the memorable nature of the written word even if there was no representational content, just exquisite flourishes. Illuminating manuscripts was mostly the work of monks and nuns in the Early Middle Ages. Writing was not about creativity but about copying. Very little new work was created. The most common books produced were the individual books of the Old Testament, the first four books of the New Testament and collections of the 150 psalms known as Psalters. Monks were expected to memorise at a minimum all the psalms, a task which took somewhere between six months and three years.

Some monasteries became famous for the manuscripts produced in rooms dedicated to this purpose known as scriptoriums. The most famous of these, the Abbey of Cluny in France, produced high quality manuscripts for its many dependent priories extending across Europe and into Britain.

Around 331 C.E., the Roman historian, Eusebius of Caesare, divided the Gospels into around 1160 sections. He then created lists of chapter numbers, known as 'Eusebian canons'. The canons indicated areas of agreement and of difference between the Gospel accounts. Typically, the canon tables were presented as elaborately decorated lists of numbers written between illustrations of columns with arches above, replicating Romanesque architecture. This is a close adherence to the ancient memory advice when intercolumnar spaces are recommended locations in which to store memory images. The vertical spaces between the columns were then divided by horizontal lines into small rectangular spaces each holding no more than five items, the maximum number suggested for retaining in memory for a single location. The canon tables were designed to be memorised, the basic design remaining in use for nearly a millennium.

It was in the fifth century that education became formalised beyond simply memorising religious texts and the associated commentaries.

Martianus Capella was a pagan at the time when Christianity was sweeping the empire, yet his influence on education was profound. The date of his birth is unknown, but the book which influenced educational thinking so highly, *De septem disciplinis* (*On the seven disciplines)* was written between 410 and 429 C.E.

Capella's book was used as the standard for academic learning for seven hundred years. The book introduced a structure for learning based around the seven liberal arts: Grammar, Dialectic, Rhetoric, Geometry, Arithmetic, Astronomy and Music. Capella introduced the seven liberal arts through story, a mythology in which the seven liberal arts are characters. At the wedding of the Roman god Mercury and Philologia (a name meaning the love of learning), one of the wedding gifts was seven maids to serve Philologia. The seven maids are characterisations of the arts be studied: Grammar, Dialectic, Rhetoric, Geometry, Arithmetic, Astronomy and Music. The personifications of Architecture and Medicine were also present as the details of the liberal arts were taught, but were not considered worthy of speaking in the company of the deities.

The ancient rules for memorisation require that these characters are either extremely beautiful or extremely ugly, grotesque, vulgar or in some way highly distinctive. Capella presented Grammar as a fearsome old woman seeking grammatical errors to remove from children's work with her knife and file. Rhetoric, however, was tall, beautiful and richly dressed in cloth decorated by figures of speech and carrying weapons with which to wound those who would argue with her.

Capella was recommending a memory method which reflects the instructions in the *Rhetorica ad Herennium.* The anonymous author of that little school text book continued to be read 1300 years after he wrote it. He would have been disappointed to know that during the Middle Ages his authorship was ascribed to 'Tullius', the name by which which Tullius Cicero was known, as it had been attached to Cicero's *De inventione* as an appendix., but one aspect of the teaching of the *Rhetorica* had changed. Architectural locations were no longer mentioned. The written page was now the memory space.

The era of illuminated manuscripts

During the High Middle Ages, from around 1000 A.D., the population expanded rapidly. Books became more available and cathedral schools became more common, moving the hub of education out of the monasteries. The first universities were established in Italy, France, Spain and England, starting with the University of Bologna, founded in 1088. The university curriculum consisted of the seven liberal arts of Martianus Capella. The memory arts were still part of the standard curriculum, taught under rhetoric.

One of the writers whose specific instructions on how to memorise have survived was the influential theologian and teacher, Hugh of Saint Victor. Born in what is now Germany in 1096, he became an Augustinian canon before travelling to Paris where he settled at the abbey in Saint Victor, teaching in the school there until his death in 1141.

To memorise a large work, such as the books of the Bible, Hugh advised that every text should be reduced to a series of short sentences. The words should be memorised exactly as they appear on the manuscript page. He wrote that it was essential that students always learn from the same manuscript because the memorisation was so heavily based on the visual page. He also emphasised that students must take special note of the colour, shape, position and placement of the letters, their location on the page and the ornamentation. In fact, he wrote that 'Indeed I consider nothing so useful for stimulating the memory as this'. However, students were also expected to apply this method from an oral presentation of the words. They were taught to imagine their memory as being organised into a large number of cells. Each cell was numbered and organised into a grid. Short pieces of text were placed within these numbered cells to be memorised. Hugh's method required that the 150 psalms were placed in a line of 150 cells. For each psalm, he then imagined another set of numbered cells, one for each verse.[100]

Hugh of Saint Victor also described how to use physical locations as memory spaces. He wrote of using an imaginary space, that of Noah's Ark as described in Genesis. This memory-ark was infinitely expandable. Hugh was organising his encyclopaedia on a series of architectural locations which were familiar to his clerical audience.

Even indexes were held in memory. Manuscripts did not have indexes, so scholars used a variety of signs and abbreviations in the margins, referred to as *notae*, to indicate a link to a particular topic. Popular were foreign alphabets, modified zodiac signs, mathematical figures and other sets of symbols which had the important characteristic that they had a specified order and therefore could be memorised easily. These *notae* enhanced the role of the page as a memory space. The number of such signs taught to Roman notaries is estimated to be over 1000. Students were expected to mentally project these symbols onto the pages they were memorising. However there are examples of scholars systematically adding such *notae* in ink to manuscripts.

During the twelfth century, a new structure known as a 'glossed book' became popular. What is fascinating in terms of the concept of the memory space is that these books were laid out specifically for memorising. The most highly decorated manuscripts known, they were also the most thoroughly memorised. The source text was written on alternate lines in the centre of the page with the glosses in smaller writing between and around them. The glosses were essentially commentary added by various readers. Quirky illustrations, known as drolleries, were often added around the text to make each page even more memorable. The drolleries often depicted of foxes and rooters, cats and mice, dogs and hunters and savage boars. Some manuscripts had entire narratives in pictures along the bottom of the text, or even between the columns. This could be stories of animals such as Aesop's Fables or the Renart stories. Humorous images of animals such as monkeys imitating human behaviour were added, which were usually violent or ugly or titillating – anything which would invoke an emotional response and aid memory. A plain page of text surrounded by clean space was considered very poor for memorisation.

The Smithfield Decretals, digests of canon law, contains the most wonderful images, unimaginable in a legal book of today. It can be viewed easily online.[101] Students were

expected to memorise the Decretals in order and with extremely accuracy. Adorning the bottom margins are delightful stories told entirely through pictures, resembling the frames of a cartoon. It is difficult to see any relationship between the drolleries of the Decretals and the text. One story tells a scandalous story of the seduction of a miller's wife by a friar who then murders her husband. The grotesque incidents from saints lives are vividly illustrated while animal stories abound. Killer-rabbits, for example, track, take to court and hang a hunter.

Mediaeval bestiaries include illustrations and moral descriptions of both real and imagined animals. They were often found in monastic libraries. The bestiaries are remarkably similar in sequence of the animals represented. Mary Carruthers writes that:

> Scholars have wondered what function such apparently puerile, unscholarly material might serve to justify its preservation. ... my hypothesis is that they function not only to delight and intrigue mediaeval students but to provide them with mnemonically valuable heuristics, orderly foundations or sets of mnemonic *loci*, which came continue to have value throughout one's education (a lifetime project).[102]

Bestiary cycles had been found in the decorations in the margins of the psalters. This supports the idea that the ordered set of animal images may have been used as a memory aid as well as presenting animals in moral allegories.

A grid layout of images forming a narrative was also considered an aid to memory. An excellent example is the full-page image known as 'The Gospels of Saint Augustine' painted in a three by four grid of images in a sixth century manuscript.

I am creating books to test these ideas and ponder the implications for contemporary education. Unfortunately, my artistic skills are not equal to those of the medieval scribes, but the effect on memory is convincing. I am using both grid layouts and animals alphabets in one experiment. In another, I am using glosses and drolleries along with elaborate text, flourishes and decorations to make text more memorable. It is time consuming, but certainly effective.

For 500 years, scholarly interest in the classical Greek philosophy had been minimal in the Christian West. It was the brilliant Muslim philosopher, Abu al-Walid Muhammad ibn Ahmad ibn Rushd, better known simply as Averroës, who led to the Western revival of Aristotlian ideas, and with it the art of memory. Averroës was born in 1126 in Spain and died in 1198 in Morocco. He was a physician by trade, an intellectual expert on topics as broad ranging as law, theology, psychology, politics, music theory, medicine, mathematics, physics, astronomy and celestial mechanics. But it was his extensive commentaries on Aristotle which were so hugely influential in Western thinking in the twelfth and thirteenth centuries.

Working from Arabic translations of Aristotle and Plato's *Republic*, Averroës tried to reconcile Aristotle's ideas with those of Islam. He saw his religion and Aristotle's philosophy as being different ways of viewing the same truth. Averroës's Arabic commentaries were

translated into Latin at a time when very little of Aristotle's writing was available to Western philosophers.

The use of architecture and the physical landscape to store memory images seems to have been lost amid the early medieval mnemonic wonders of glorious illuminated manuscripts, grids and alphabets, animals and the zodiac. But large memory sapces were soon to enjoy a revival when recommended by two of the major figures of the High Middle Ages, Albertus Magnus (~1200–1280) and Thomas Aquinas (1225–1273-4).

Thomas Aquinas takes the memory arts to a new high

Albertus Magnus and his pupil, Thomas Aquinas, were responsible for the reintroduction of architecture as a memory space. Albertus was studying the writings of Aristotle and teachings of the contemporary Muslim academics. In particular, he was interested in the work of Averroës, who had died only a few years before Albertus was born. Albertus Magnus argued that the *Rhertorica ad Herennium* provided the best memory system of all and enthusiastically recommended vivid images and metaphors to aid memorising concepts. In the pious Middle Ages, violent, lewd or highly fanciful images were seen by many in authority to be highly inappropriate. Albertus justified their use because of the value for creating mnemonic images for memorising moral philosophies. It was his pupil, though, who became the star of his time. In her seminal work, *The Art of Memory*, Frances Yates wrote: 'If Simonides was the inventor of the art of memory and 'Tullius' its teacher, Thomas Aquinas became something like its patron saint.'[103]

Born in 1225, Thomas Aquinas was recognised for his exceptional memory while still at school. With the advantage of training with Albertus Marcus, he was reputed to be able to retain perfectly everything he read. He wrote that, like Aristotle, he believed that no human thinking could take place without images. His influence on teaching, philosophy and theology led to his being honoured as one of the most revered of the Catholic Church's saints.

Even though Thomas Aquinas lived in a time when books were becoming much more readily available than during the early Middle Ages, he still memorised all his reading to enable him to draw from these sources in any combination he wanted. He recommended using an ordered series of locations and memorable images, as is always the case. He emphasised the need to repeatedly meditate on each location, writing that:

> Meditation is nothing other than considering things many times as an image of things previously apprehended and not only in themselves, which mode of preserving pertains to the formality of memory. It is clear, too, that by the frequent act of remembering the habit of memorable objects is strengthened, as also any habit (is strengthened) through similar acts; and a multiplication of the cause fortifies the effect.[104]

I find this advice ubiquitous in its application. Non-literate cultures constantly repeat the songs, dances and stories rooted in physical locations within the landscape which encode the knowledge system. In using the few thousand memory locations I now have active, I find meditation, as described by Thomas Aquinas, far from arduous. I constantly travel my journeys in my mind and revisit the locations. The characters and the stories have become a habit, as Thomas Aquinas suggests. If I hurry recalling the locations, the impact is far less effective, and far less pleasant, than pondering and meditating upon the ideas and their representative images.

From the thirteenth century, the memory section of the *Rhetorica ad Herennium* reached beyond the monasteries. The Dominican friars, in particular, were recommending the memory arts as a devotional exercise for laymen to ensure they knew the virtues and thus could reach heaven through their practice. Memory treatises, by this time referred to as *artes memorativae,* were translated from Latin and circulated in the vernacular languages, especially Italian and French.

One of the most amazing stories is of a library including books recreated entirely from memory. Richard de Bury (1287 – 1345), is chiefly remembered for his *Philobiblon*, considered the first text on librarianship. Books that de Bury could not collect physically, he would memorise and then have his secretaries write it out from his dictation. He also had a network of clerical searchers who would travel all over the Christian world and recite the new works to him from memory. In this way, books which resided in one city of Europe could travel, via a trained memory, to any other location. The task of copying books moved out of the control of the monks and monasteries and into the role of professional copyists and secretaries.

The memory arts in the Late Middle Ages

The ideas expressed above about the way illuminated manuscripts and mediaeval art were designed in accordance with methods for training memory have been confirmed in the writings of the mathematician and theologian, chaplain to Edward III and briefly Archbishop of Canterbury, Thomas Bradwardine, active in the early fourteenth century.[105] In his short treatise, *De memoria artificiali adquiranda*, written around 1335, he drew together all the advice on acquiring an artificial memory which had been available in the previous few centuries, and added his own. For example, he wrote about the way puns could be used to memorise the syllables of difficult words, something I use continually when learning the scientific family names of animals and plants.

Bradwardine advised that abstract concepts should be given material forms, such as the women who were used to reflect virtues and vices of the seven liberal arts. These characters should presented in the standard sequence common at that time. Reading the image starts in the middle, with the second image at its right hand and continuing out to the right hand edge of the artwork. The order then returns to the middle and works to the left-hand edge. Each figure was to be depicted as actively involved with the next in line, often in some kind of violent or sexual way. Bradwardine gives an example for memorising the order of the Zodiac

which is then used as a set of memory locations. He describes the first location with the central figure Aries, a pure white ram being kicked by an equally white bull (Taurus) to its right. This bull has greatly swollen testicles which spew blood as a result of being kicked in return by Aries. In front of Taurus are the twins (Gemini) being born in some grotesque way either from a woman or the bull, one of them crying due to being pinched by a hideous crab (Cancer) as the other twin caresses the crab. Returning to Aries in the centre, the ram is also kicking a lion (Leo) in the head whilst this lion attacking a beautiful maiden (Virgo). Virgo meanwhile, tries to balance scales (Libra) in her right hand, whilst already suffering from a dreadfully swollen bite from the scorpion (Scorpio) in her left. In a second scene, an archer (Sagittarius) has wounded a goat (Capricorn) to its right, which bleeds whilst pouring water from a jug (Aquarius) in its right foot for a fish (Pisces) in its left.

Despite the pious mediaeval context, Bradwardine recommended obscene, violent or frivolous images which he deemed acceptable because images which shock are so much more memorable, and a well trained memory was considered essential for meditation and preaching. However, not all agreed. St Bernard admonished the Benedictine monks of Cluny advising that monks had no need of such grotesque figures because distraction was a sin during meditation.

Less dramatically, the fresco known as 'The Wisdom of Thomas Aquinas', c. 1365, reflects the same principals. Painted on the walls of the Spanish Chapel in the Church of Saint Maria Novella, Florence, Thomas Aquinas is seated in the middle surrounded by three winged figures representing the three theological virtues, Faith, Charity and Hope along with the four cardinal virtues, Prudence, Justice, Fortitude, Temperance. On his right and left sit the saints and patriarchs. Beneath Thomas's feet are the heretics who have been crushed by his wisdom. On the lower levels are fourteen female figures, the bodily representations of the abstract seven liberal arts: Grammar, Rhetoric, with Cicero seated in front, Dialectic, Music, Astronomy, Geometry and Arithmetic, along with Civil Law, Canonical Law, Philosophy, the Holy Scriptures, Theology, Contemplation and Preaching with St Augustine seated in front. Aristotle has been claimed as the figure in front of Dialectic and of Philosophy, so the interpretations seem to be hypothetical.

Bradwardine concluded that having constructed such scenes, their contents can be recited from any starting point, forward or backward.

It may seem that all this creating of images seems like a great deal of effort in order to commit something to memory. As a practitioner of the memory arts, using virtually all of the methods described above, I have experienced the fact that these techniques are so much more effective than any other form of learning, and so much more fun, that it actually feels like a less work than the conventional study methods I have used until now.

Memory treatises of the Renaissance

During the Renaissance, literacy spread and the availability of books greatly increased with the invention of printing. Logic would dictate that these radical changes would destroy the

need for memory systems, but there was a sudden splurge of short books about mnemonics, known as memory treatises, or *ars memoria*. As always, these emphasised the use of places and images. Most Renaissance memory treatises were simply handbooks intended for theologians, preachers, professors, jurists, notaries, travelling philosophers, ambassadors and merchants to aid their persuasive skills. They use the familiar concept of rooms divided into five locations each of which was used to store the image of an idea.

The most popular was in use consistently for the next 200 years. Titled *Phoenix*, it was written by the Italian jurist Peter of Ravenna (c. 1448-1508) who boasted that he used 100,000 memory locations. He advised that the best building to use for setting personal memory locations was a quiet church. Peter would add new churches and monasteries to his repertoire whenever he travelled, circling their interiors three or four times to commit them to memory. Peter also used alphabets as ordering memory devices. To make the alphabet more memorable, Peter used human figures in place of the letters to create a vivid, living entities with which to create the memorable links. He suggested that his memory was best stimulated by enticing women, but warned against their use if the reader should loathe women or were unable to control themselves.

Another extremely popular memory treatise was that of Johannes Romberch (c. 1480 -1533) a German Dominican who wrote, *Congestorium artificiose memoriae* on the art of memory in which he makes reference back to the *Rhetorica ad Herennium* and to Cicero's memory skills. Romberch includes as an example an Abbey where each of the buildings, such as the library, courtyard and chapel, serves as a memory location. He has drawn a hand in every fifth location and a cross in every tenth, dividing the locations into memorable groups as advised in the *Rhetorica ad Herennium*.

Romberch recommended having lists of animals, birds, and other names arranged in alphabetical order to use along with the physical places. Visual alphabets in the shapes of animals were common in the fifteenth century treatises on memory but are thought to date much earlier. The Italian scholar, Boncompagno da Signa (c. 1165/1175 – c. 1240), for example, wrote about using such an 'imaginary alphabet' for remembering names. The name of the animal sometimes, but not always, start with the letter it is representing. Visual alphabets also involved the letters created from human figures or from objects such as compasses, ladders or garden implements. Some were gloriously artistic. The use of a visual alphabet is effectively adding structured layers of complexity to the initial layout of physical locations, much as indigenous cultures do with initiation into the higher order of songs and story associated with each of the scared places.

Along with real places, Romberch also recommended a memory palace based on the cosmos, planets, stars along with the nine orders of angels. He considered the signs of the zodiac to be a useful set of memory places based on the ideas of Metrodorus of Scepsis, having read of them in the writings of Cicero and Quintilian.

Italian philosopher Guilio Camillo (ca. 1480–1544) argued that using cathedrals, churches and homes for memory palaces may be effective, but surely a purpose designed building would do better. He became famous across Europe for his memory theatre ambitiously

designed to provide a mnemonic library containing all the knowledge of mankind. The theatre took the form of a wooden amphitheatre. The scholar was to stand mid-stage, alone in the theatre. Looking up, he would see seven tiers divided by seven gangways representing the seven planets. Gates were decorated with multiple images. The 'seating' consisted of rows of drawers and boxes filled with cards. On the cards was written everything that was known and everything that was knowable, all categorised by subject. The entire structure formed sequences of memory locations, which Camillo acknowledge was based on the method of loci.

The spectator was to meditate on one of the mnemonic images and all the knowledge contained on the cards would theoretically be called to mind. In this way, Camillo said, the spectator would be capable of discussing any subject as fluently as Cicero himself. Camillo had designed a theatre in which he claimed the occult buried in the universe would be revealed turning the method of loci into a mystical art. This was a grand scheme indeed.

But was it ever built? There is record that a wooden theatre was shown by Camillo in Venice and something similar was later on show in Paris. Nothing of the theatre remains and the details of how it actually worked were to be revealed only to the King of France, Francis I. Camillo documented the plans for his memory theatre, publishing the scheme in a manuscript in 1530 to elicit funds from Francis I of France , under whose patronage he stayed for seven years. When funds dried up he returned to Milan to draw up the final plans of his Theatre in February 1544. Three months later he died having never produced the great manuscript he promised which would include all of the designs.

If buildings and theatres, landscapes and skyscapes all acted as memory palaces, then surely school ground and classrooms, universities and streetscapes can all do the same today. It is only in the last few hundred years of Western culture that memory spaces have not had a prominent role to play in education. The memory arts are still in use, though. All modern memory champions depend on exactly the same techniques.

Modern memory athletes or mnemonists

Research into modern mnemonists started with Russian clinical psychologist Aleksandr Romanovich Luria (1902-1977) who was particularly interested in the way memory worked. He wrote a detailed account of his study of a man who Luria rated as one the most extraordinary mnemonists of the time.[106] Memorising long lists after a single hearing, Shereshevskii could still repeat them decades later. Luria regularly tested Shereshevskii on this feat and was never able to produce a list so long that it would not be repeated perfectly. Shereshevskii also memorised table of random numbers, mathematical formulae, letters and even poetry in languages he didn't speak.

Shereshevskii possessed a naturally formidable memory, but he also trained it. Luria recorded that Shereshevskii used a streetscape, such as that of Gorky Street in Moscow. He converted words into vivid images which always needed to be placed in well lit locations along the street. If he struggled to recall a particular image, Shereshevskii would mentally bring up a

street lamp to illuminate the item which had been placed at that location. He talked about the need to ensure there was contrast in his images, that the objects needed to be sufficiently large and that he avoided crowded streets as they could confuse the clarity of the location.

For foreign languages, Shereshevskii would reduce any word to the syllables and then memorise the sequence of images representing the syllables. Complicated mathematical formulate what also memorised by creating a story which linked each symbol within the formula.

Shereshevskii became a theatrical mnemonist performing his feats of ever-increasingly difficult sets of data, often tables of random numbers. Once he was given a table that had a very simple pattern to it. The first line was 1, 2, 3, 4, the second 2, 3, 4, 5, the third 3, 4, 5, 6, the fourth 4 5 6 7and so on. Shereshevskii did not notice the pattern. He used his mnemonic methods as always. Asked for the table of numbers years later, Shereshevskii couldn't still repeated as long as he was told where he had first memorised it.

In 1966, British historian Frances Yates published by far the most influential book on the method of loci, *The art of memory*.[107] Yates wrote:

> The subject of this book will be unfamiliar to most readers. Few people know that the Greeks, who invented many arts, invented an art of memory which, like their other arts, was passed on to Rome whence it descended in the European tradition. This art seeks to memorise through a technique of impressing 'places' and 'images' on memory. It has usually been classed as 'mnemotechnics', which in modern times seems a rather unimportant range of human activity.

> There is no doubt that this method will work for anyone who is prepared to labour seriously at these mnemonic gymnastics. I have never attempted to do so myself but I have been told of a professor who used to amuse his students at parties by asking each of them to the name an object; one of them noted down all the objects in the order in which they had been named. Later in the evening the Professor would cause general amazement by repeating the list of objects in the right order. He performed this little memory feat by placing the objects, as they were named, on the window sill, on the desk, on the wastepaper basket, and so on. Then, as Quintillian advises, he revisited those place in turn and demanded from them their deposits. He had never heard of the classical mnemonic but had discovered this technique quite independently.[108]

Unlike Yates, I am convinced that contemporary education would greatly benefit from using the ancient orality skills alongside literacy. I think my difference of opinion arises from two causes. Firstly, Yates believed that the Greeks invented the method of loci and was therefore unfamiliar with the complexity and pragmatism of the memory methods as used by oral cultures. Secondly, she was not a practitioner and could only relate a trivial example of a contemporary application. It is only with time and application that a practitioner can fully appreciate the value and pleasure of having a store of knowledge in a format which enables the student to interrogate it at will.

Eight times world memory champion Dominic O'Brien, like Yates's professor, developed the method of loci independently, claiming his powers of concentration were greatly enhanced along with his memory. He soon discovered that he was not the inventor of the system but his experience indicates the ease with which the human brain makes the link between a sequence of locations and memory. O'Brien still uses what he called 'the journey method' as he has found nothing better.[109] O'Brien has written widely on the topic, taking his skills beyond the competition stage to many aspects of contemporary life and is one of the world's best known and most respected authorities on memory training.

Contemporary mnemonists are best known through their participation in memory competitions which started in 1991. Events in the memory championships include memorising sequences of digits, letters or the order of shuffled decks of cards. Most memory athletes use some form of the method of loci to store the sequence of items as required. They use algorithms to group numbers so more than one can be stored in a location. They grant each playing card a character, much like the characters found in mythology, and then create sequenced stories for them when a random order of playing cards is to be recalled. The critical difference between competition and all the applications of the memory arts I have discussed to date is that memory athletes need to perform their feats at speed and under significant pressure.

Joshua Foer described training for the US memory championships in his bestselling book, *Moonwalking with Einstein*[110], the title being a reference to the strange images he uses. Foer described his surprise at discovering that memory training was fun because it doesn't feel like work as much as just getting better and better dreaming up wild images. In a TED Talk, Foer said that 'the crazier, bizarrer, weirder, raunchier, funnier, stinky at the image, the easier it is to remember'. He described his 'standard competitive memorise as training kit' as a pair of earmuffs with a set of safety goggles that have been taped over except for two small pinholes because 'distraction is the competitive memorise is greatest enemy'.

While Joshua Foer was in his silent basement in his earmuffs and goggles, I was out in the sun walking the dog and having exactly the same fun dreaming up crazy, bizarre, weird, raunchy, funny and stinky images. I can't compete with the memory champions, nor is my training as intense, but my fun is giving me a matrix of memories which serve to enrich my life every day. In my own landscape learning information which is relevant to contemporary life, the methods I use are just the same as the indigenous cultures, the ancient orators and the modern memory champions.

Notes

[1]A detailed academic justification for the claims within this essay can be found in Kelly, L (2015) *Knowledge and power in prehistoric societies*, Cambridge University Press, New York. That book also looks at the application of these ideas to archaeology. A broader discussion for the general reader can be found in Kelly, L (2016) *The Memory Code*, Allen & Unwin, Crows Nest, NSW. A full bibliography covering both books can be found on my website at http://www.lynnekelly.com.au/bibliography-the-memory-code/

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[92] The entire text can be found at the Internet Archive for the *Rhetorica ad Herennium*: https://archive.org/details/adcherenniumdera00capluoft

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[101] *The Smithfield Decretals* have been digitised in all their glory by the British Library. Warning: Do not visit this site if you have little time to become engrossed in one of the most stunningly beautiful books of all time. http://www.bl.uk/manuscripts/FullDisplay.aspx?index=0&ref=Royal_MS_10_E_IV

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