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Cross-cultural categories Yolngu science and local discourses
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In Yolngu science we learn through observation. For example we observe the seasons and we see the changes in time. We watch the land and see changes in the weather patterns. In space we observe the sun and the morning star. The different stars and the moon tell us different things. Yolngu have been learning about how to read science through the moon. We've learnt to observe different cycles of the moon. It tells us when it's a good time for hunting. In different seasons different food items are ready to be eaten, like different plants. Yolngu don't just hunt for everything at once, but they go according to the different seasons. There are four seasons and Yolngu hunt according to these different seasons. Then each food source is found in abundance at the right time. We read the calendar to know for example when to go and get oysters, it also tells us when different fish is in season and when edible fruit and honey is available. Also Yolngu sing about these different seasons. They sing about the different stars. They observe and see and learn. For generations and generations people have passed on this knowledge orally. It has never been written down. It has been orally passed down to the next generation through oral history; songs, chants and stories. (Raymattja Marika, Yolngu teacher and linguist)

The transformation of concepts such as science, law, or religion into cross-cultural categories has occurred in the context of discourse across cultural boundaries. While cross-cultural discourse has always been an element in human communication and in category shift and redefinition, the systematic creation of cross-cultural categories has been part of a global process of discourse in which anthropologists have played a significant part. The creation of widely applicable categories has involved a process of critical engagement in which the meaning of the Western categories has been affected as much as the meanings of those elements of other cultures that have been squeezed to fit them. In some cases the categories themselves are in the process of dissolution, yet they remain as ghostly markers of the discourses that once revolved around them, historical signposts to what once seemed crucial areas of debate.

There are always going to be questions of power differences and differentials in the development of meta-vocabularies for cross-cultural communication. Western definitions may have become more embracing, but the inclusion of non-Western practices within them may nonetheless distort those practices and change their meanings. The convolutions and involutions in such arguments about categories lead anthropology itself to be divided between those who take a relativistic stance and those who take a relatively objectivist stance, seeking a middle ground between extreme cultural relativism and a belief in scientific objectivity. The problem is to acknowledge similarities that shade into common realities, and simultaneously allow for differences. This dilemma forced Arturo Escobar (1999: 3) to create two forms of nature: 'to strive for a more balanced position that acknowledges both the constructedness of nature in human contexts, the fact that much of what ecologists refer to as natural is indeed also a product of culture - and nature in the realist sense, that is the existence of an independent order of nature, including a biological body, the representations of which constructivists can legitimately query in terms of their history or political implications.' Which might be glossed as: while accepting that reality is 'out there', cultural factors intervene in our perception and conception of it. As Escobar continues: 'For constructivists the challenge lies in learning to incorporate into their analyses the biophysical bases of reality, for realists it is examining their frameworks from the perspective of their historical constitution...'. The challenge is to include the practices of both Western and non-Western cultures within the same cross-cultural category and not to produce one nature for 'them' and another for 'us'.

I will not attempt in this paper to produce a cross-cultural definition of science; a definition of Western science is problematical enough in itself. What I will be concerned with is the local discourse between Yolngu people of North-east Arnhem land and Europeans (represented by the settler Australian population) as evidence of the kind of context in which such definitions might be produced, or, failing definitions, understandings that, in some areas, members of different cultures are able to see a relationship between their systems of knowledge. The area of discourse includes topics that are familiarly bracketed in Western educational curricula as 'science'. These cannot, however, be taken as unproblematically classified in the West, since not only are the specific boundaries under challenge, but also in some cases the very idea of boundaries between the topics is being questioned. Two obvious topics that recur in discussions about

science are knowledge of natural phenomena and systems of logic or thinking about the nature of the world.

The general argument for creating an inclusive category of science is often framed as a critique of Eurocentricism. Sandra Harding writes, following Joseph Needham, that although 'there are clearly obvious and large differences between modern sciences and the traditions of seeking systematic knowledge of the natural world to be found in other cultures, it is useful to think of them all as sciences in order to gain a more objective understanding of the causes of Western successes, the achievement of other sciences, and possible direction for future local and global sciences' (1994: 309). Taking her inspiration from Ashis Nandy (1990) she subsequently pushes her argument towards the possibility of a de-centred global science in which there 'there would be many culturally distinctive scientific traditions that share some common elements with modern Western science.' (1994: 310)

Nandy's argument is singularly relevant since it focuses on the history of discourse between Indian and Western systems of knowledge and the development of Indian science out of that discourse, a process that has occurred without the alienation of Indian science from the general cultural context of Indian society. The encounter between different social and cultural groups has too often been represented as if it were an encounter between aliens with incommensurate and opposed world views. The historical process has been seen as the imposition of the dominant Western on the less powerful group, over-emphasising the cultural fragility of local and colonised societies and denying agency to their people.

Yolngu people from northeast Arnhem Land in Northern Australia have had a recent history of intensive engagement with the would-be colonisers of their land in which they have been actively engaged in discourses over key conceptual issues. The results of these discourses have often had fundamental consequences on their lives. In this paper I will analyse the process of category formation as it is evidenced through Yolngu engagement of outsiders in particular settler Australians (Europeans henceforth), in intellectual discourse. I will consider four areas in which we have strong evidence: religion, art, law and finally science. The nature of these discourses reflects strongly the complexities of the local political context. To see the Yolngu encounter with the wider world as being an encounter only with hegemonic capitalism would be a considerable distortion of the complexities of the local historical process.

The history of Yolngu interaction with Europeans is the most recent phase in a history of encountering outsiders, a history which has no finite beginning or end. The process of encounter is both the recognition of a difference and the beginning of accommodation to that difference. Yolngu have established ways of encountering others ranging from Indigenous neighbours, visitors from Indonesia and Papua New Guinea and finally Europeans and those who came with them. The history of encounters creates categories of difference that partly define people and how they should be approached. Other Aboriginal Australians tend to be classed under the broad rubric of 'Yolngu', in the recognition of shared cultural practices and overlapping ways of life. Other Aboriginal people are brought into Yolngu society through exchanges, marriage arrangements, and participation in ceremonies. Europeans have in some respects been classed together with that other set of outsiders, people who come from overseas and who lead apparently very different lives, in particular with the people from eastern Indonesia, the Macassan voyagers.

For several hundred years before European colonisation, traders from eastern Indonesia visited northern Australia each year to collect and prepare trepang, (*bêche de mère*), and pearl-shell. They established close and generally friendly relationships with Aboriginal people and as well as trading entered into exchange of knowledge exchange, and discourse about belief. Yolngu learnt new technologies from the Macassans — how to make dugout canoes, how to work iron, methods of harpooning dugong and turtles. They learnt to speak their visitors' language (and borrowed many words into the Yolngu languages) and became involved in religious discourse, perhaps developing ceremonial practices in common. The closeness of Yolngu observation of the Macassans is revealed in the Macassan song cycles still performed today and the ritual practices that refer to the Macassan visits. These provide quite detailed ethnographic accounts of life on the Macassan-Yolngu divide some 100 years ago, before the Australian government prevented the Macassans from returning again.

This background of close involvement with the Macassans and attempts to come to terms with their way of life and to accommodate to their annual presence is relevant to understanding the Yolngu response to Europeans. Effective European colonisation began during the first decades of the twentieth century. The

first response of Yolngu was resistance. Inland a number of Yolngu clans were massacred by encroaching cattlemen and police punitive expeditions. On the coast, Yolngu gained a reputation in the early 1930s for killing visitors to their shores. From a European perspective matters came to a head in 1933 following the killings of the crew of a Japanese pearling lugger in Caledon Bay and the spearing to death of Constable McColl on Woodah Island. Although there was pressure from some quarters to send in a punitive expedition, the time for such ventures was approaching an end. Yolngu had already begun a process of establishing friendly relations with other Europeans in the region and the response of the Commonwealth government was to commission an anthropologist, Donald Thomson, to find out what the issues of conflict were and simultaneously to support the Methodist Church in establishing a mission station at Yirrkala.

The establishment of the mission began a process of dialogue that can be viewed as a working through of a series of relativisms with European outsiders who, over time, became increasingly entangled in the Yolngu worldview and systems of knowledge. I have argued elsewhere that cross-cultural categories such as religion are not produced by any one system of knowledge, but are part of an anthropological metadiscourse. This, while it may be biased by colonial power structures and the hegemony of particular systems of knowledge cannot be seen as the simple product of those biases. To take up such a position is a denial of Indigenous agency. The history of the Yolngu encounter with outsiders is just as much about an exercise of Yolngu agency as it is about an imposition of external power. Indeed at the local level those power relations have been transformed through the colonial process as Yolngu have gained more control over their lives and their rights have been accorded greater recognition.

In this paper I will present the local Arnhem Land discourses about religion, art, law, and science as a historical succession, although they are interconnected and in many respects on a continuum. The order in which I introduce them reflects in part the relative prominence of a particular topics at different periods of time, which in turn reflects changes in the colonial process and increasing Yolngu autonomy. None of the areas of debate have ceased to be of relevance in eastern Arnhem Land and in all cases the discourse surrounding them are overlapping. Indeed I will argue in part that, from the Yolngu perspective, in each case a very similar body of knowledge is used to address the different topics.

The religious discourse

The first permanent local colonists on Yolngu land at Yirrkala were missionaries from the Methodist Church. Yolngu were lucky that these missionaries were oriented towards dialogue; had they not been their relationship would perhaps have been less productive. The Methodist Church had earlier established mission stations in the west of the Yolngu region and had established a regime in which indigenous religious practices were tolerated, as long as they did not contradict certain fundamental principles of liberal Christianity – vengeance killings, for example, were strongly discouraged. Wilbur Chaseling, the first missionary, began a syncretic dialogue with Yolngu over religious phenomena — a practice that continues to the present. I can only briefly summarise the process here.

From Chaseling's writings we learn that he entered into a process of religious dialogue, drawing attention to differences and similarities between Yolngu and Christian religious beliefs and practices. He did not dismiss Yolngu beliefs or attempt to overturn their cosmology. He respected Yolngu values and said that he learnt far more from Yolngu than he was able to teach. A key part of Chaseling's teaching was to draw analogies between Yolngu religion and Christianity, and one consequence of this may be seen in the continuing ways in which Yolngu relate aspects of their religious practice to biblical precedents. Ancestral Beings as local heroes take the position of saints, the twelve apostles can be seen as reflecting the division of Yolngu society into clans, the land-transforming actions of the ancestral beings can be seen as reflecting Old Testament theology and the generalised spiritual concept of *wangarr* can be seen as a manifestation of the one true God.

The dialogue between Yolngu at Yirrkala and their ministers continued over time, fluctuating according to the sympathy of the incumbent superintendent. The reverend Edgar Wells who spent ten years at the neighbouring mission station of Milingimbi before moving to Yirrkala in 1962, brought Yolngu religious icons firmly into the body of the Church. At Milingimbi he built a mud brick church and included in it stained glass windows representing important totemic animals associated with the main clans of the settlement. At Yirrkala he built another new church and on either side of the altar two great panels were installed, painted with the ancestral designs of the congregated clans. This magnificent gesture of

syncretism, was disrupted some 15 years later when a minister of more fundamentalist beliefs threw the panels out of the church, as heathen idols! They were subsequently resurrected in a side chapel built in the Yirrkala art centre.

The dialogue was engaged in as strongly by Yolngu as it was by the missionaries. The painted panels in the church were the result of a suggestion by Narritjin Maymuru, an elder of the Manggalili clan, and Yolngu modified elements of their religious practice to fit in with the changed circumstances of the settlement. Yolngu trained as ministers and carried their comprehensive beliefs into their ministry. Gawirrin Gumana's ordination robes were made in the design of his ancestral spiritual home of Gangan, and he sees no contradiction in acting as *djirrikay* — singer of sacred names — during the initial phases of a burial ceremony and then giving the Christian sermon over the grave. There are divisions in eastern Arnhem Land between different groups about the compatibility between Yolngu and Christian religion, but those differences have not diminished the continuing strength of Yolngu religious practice and the transmission of religious knowledge. They represent subtle theological debates at the margins of compatibility between different beliefs and practices rather than the rejection of one or other belief system as a whole — for example, one area of debate concerns whether or not major Yolngu sacred objects should be brought into the church during mortuary rituals or whether they stay outside.

The importance of the religious discourse reflects both central values of Yolngu society and the fact that missionaries were the initial colonisers; it is a coincidence of priorities. The missionaries who came arrived with a cross-cultural conceptualisation of religion that opened up the possibility of syncretism, and there is evidence that Yolngu showed a similar flexibility in adding elements of Christian practice to their own. McIntosh argues strongly that they had done this once before in their earlier encounter with the Macassans. There is certainly evidence in contemporary Yolngu ceremonies of influence from the ritual practices of eastern Indonesia (eg in the important role that cloth has, in the role of boats in spiritual journeys, and in occasional references to A'llah).

Europeans have art too

A second discourse that Yolngu entered into early was over art. As with religion it is likely that there was a precursor in dialogues with Macassans over designs (in textiles and paintings), songs and dances, though precisely what the overlap in categories was is unknown. From the beginning of missionisation, missionaries dealt in Aboriginal art, even though that category was only begin to emerge in European Australian discourse. Wilbur Chaseling commissioned bark paintings and other material culture objects and sold them to museums in the south of Australia. The objects were sold mainly to museums rather than art galleries, perpetuating the divide between primitive art and artefact, and the Western category of fine art. But that division had begun to break down in Europe over objects from Africa and Oceania and a similar process can be detected in Australia around the time of the establishment of Yirrkala mission.

Paintings by Yolngu from northeast Arnhem Land had a central role in the categorisation of Aboriginal paintings as fine art in Australia. The missionaries certainly appreciated the aesthetics of Yolngu ceremonial performance and part of their motivation for sending paintings to the congregations and museums in the south was to promote a positive view of Aboriginal culture. Edgar Wells corresponded with Leonhard Adam, author of the Pelican book *Primitive Art*, who lectured at the University of Melbourne, and through his connections Yolngu art was included in pioneering exhibitions in Sydney and Melbourne. Charles Mountford who was a leader of the 1948, American Australian scientific expedition to Arnhem Land, made major collections of bark paintings from Yirrkala as well as Groote Eylandt and Oenpelli. Gifted by the Commonwealth government, works collected on this expedition became the first works of traditional Aboriginal art to find their place within the hallowed walls of the art galleries. Shortly after, in 1959 and 1960, Stuart Scougall and Tony Tuckson made two visits to Yirrkala on behalf of the Art Gallery of New South Wales and made the major collections of large bark paintings — the first works of Aboriginal art actually commissioned for an art gallery as opposed to a museum.

Thus art from Yirrkala played a crucial role in the acceptance of Aboriginal art into the Western category of fine art. It is not easy to define the precise role that Yolngu played in this process. They recall that their motivation was both economic and 'educational' — to persuade Europeans of the value of their culture and to teach them about it. Yolngu art provided a good basis for discourse with Europeans since there are both

strong aesthetic and semantic components to Yolngu ritual forms. Yolngu ceremonies are operatic in their form and complexity and the idea of audience is built into their structure in different ways. Tuckson, when he arrived at Yirrkala in the late 1950s, felt able to have a meaningful dialogue with Mawalan and others as artists. In 1962 a group of Yolngu dancers under the auspices of the Elizabethan Theatre trust toured to Melbourne and Sydney for a period of two months. They produced ceremonial performances on the stage. The scenery comprised bark paintings produced by Narritjin Maymuru, that were later sold off at one of the first commercial exhibitions of an individual Aboriginal artist's work held in Sydney. The paintings collected by Scougall and Tuckson were at the time on exhibition at the Art Gallery of New South Wales. Narritjin recalled his visit to the gallery as being a significant event in his life. He was impressed by the reverential way in which Europeans treated their own art works and felt a great sense of pride that Aboriginal works were exhibited in the same way in an adjacent gallery. Perhaps from that moment on Narritjin referred to himself as an artist.

The fact that Yolngu artists shared the aspirations of the few European cultural entrepreneurs who were pushing for the inclusion of Aboriginal art in the fine art category was crucial in gaining them space in the galleries. It is also relevant that Yolngu saw no incompatibility between the categorisation of their works as religious icons in one context and public art in another. The journey for acceptance of Aboriginal art was a strongly contested one. No sooner had the Art Gallery of New South Wales accepted the works than some people were trying to get them removed, relocated to the basements of natural history museums. However Yolngu were going to continue to produce art and make it occupy spaces wherever there was a market or a reason. As circumstances changed, and it became no longer as easy to exclude the art produced by one sector of the Australian population from contexts where other artists were exhibiting, Yolngu gained increasing institutional recognition as artists. This did not however mean that their art became subordinated to the conditions of production and exhibition of other Australian artists. They added a difference to the Australian art world by requiring respect for the continuing religious and cultural value of the works, for example retaining the power to withdraw a work from exhibition or to repress the name of the artist, and gaining recognition of different copyright requirements and different criteria of authenticity.

Law and land rights

As a cross-cultural category law, like other such categories is simultaneously a basis for inclusion of disparate social and cultural phenomena within the same conceptual framework and a means of creating a framework for expressing difference. Yolngu assert that they have their own law (*rom*) in a number of different contexts, ranging from systems of punishment, and means of settling disputes, to marriage arrangements. In many of these cases Yolngu law is at marked variance with Australian law. For much of the period of intensive European colonisation, Yolngu *rom* carried on relatively independent of the European legal system. This was partly as a result of the isolation of eastern Arnhem Land from the rest of Australia and partly because conceptually and to an extent legislatively, the legal system did not recognise the existence of Aboriginal society. Where the two laws competed, as in the case of homicide, European law prevailed but tended to take account of the indigenous context in framing the crime and determining the sentence. Until recently, in many areas of Australian law, such as tax law and family law, Yolngu, *de facto*, sat outside the everyday operation of the Australian legal system. However increasingly Yolngu have come under its ambit. In order that Indigenous rights and autonomy can be recognised and respected legislative frameworks have been created which enable the recognition of Indigenous rights under Australian law. In some cases, such as native title and copyright, this has involved the application of existing Australian law to Indigenous cases. In other cases it has required the passage of new legislation. However the articulation of *rom*, that which Yolngu understand as law, with the Australian legal system remains a matter of great complexity.

Yolngu encountered the European law in one form or another from their earliest contact with Europeans, moving from being victims of police punitive expeditions to prisoners in Darwin for the murder of the Japanese. Yolngu framed these early encounters more as warfare than as legal events. In accepting the establishment of the mission station at Yirrkala, Yolngu imagined that they were making peace. Indeed there was a double sense of making peace, since warfare among Yolngu clans had increased as a consequence of the external pressure from Europeans. Yolngu did not imagine that they had lost any rights either to their land or to their autonomy.

It is not certain at what stage Yolngu realised that rights as basic as ownership of their land were threatened by the extension of colonial rule. On paper, they had lost their sovereignty a century before the missions were established. The violent encounters with the Japanese had reflected Yolngu concern over encroachment on their land, and Donald Thomson, on their behalf, tried to persuade the government to prevent further encroachments. Certainly by the mid 1950s Yolngu on Elcho Island had begun to develop petitions to demand greater autonomy, better educational opportunities and recognition of aspects of *rom*. And in the late 1950s the people of Yirrkala became uncomfortably aware of their loss of rights when prospecting for bauxite began on the Gove peninsula.

The Yolngu response to this was as active as their dialogue with the missionaries over religion, but in this case they had to operate on a wider stage. Yolngu had learnt something of the legal and political structure of Australia. With the support of key missionaries and some Australian political figures they began a campaign that would eventually result in land rights legislation for Northern Territory Aborigines. This is not the place to review the whole struggle for land rights, I will instead look briefly at one crucial event, the bark petition, since it illustrates and simultaneously reveals the interconnected nature of the process of engagement that the Yolngu were involved in.

In 1962 Yirrkala was visited by two federal members of parliament, Gordon Bryant and Kim Beazley senior, who had become aware of Yolngu concerns over the activities of the mining company. Yolngu were determined to send a petition to parliament. Kim Beazley had been shown the paintings on either side of the altar in the Yirrkala Church and had had their significance explained to him. The paintings represented the lands of each of the clans which were based at Yirrkala and illustrated the ancestral law and designs associated with each place. Yolngu clan designs show systematic variation from one area of land to the next — in effect the paintings demonstrated their entitlement to place. Beazley saw the connection and suggested that the petition should be sent to the Commonwealth parliament in the form of a bark painting. The discourse over religion and the discourses over law, art were thus interlinked not only in the minds of the Yolngu but in the imaginations of the Europeans who they had been conversing with — the process of persuasion was at least locally effective. Yolngu used paintings in the land rights case, where they took the federal government to court, and have used paintings on numerous subsequent occasions when they have needed to make a politico-legal point. Paintings are referred to as title deeds to land, or more generally as manifestations of *rom*. In 1997 when they discovered that the northern territory Land Rights Act did not give them any rights over the sea, their main source of livelihood and, in *rom*, indivisible from the land, they produced a new series of bark paintings detailing the ancestral *rom* associated with the clans along the full length of their sea coast. In paintings Yolngu found a means of expressing *rom* that was both effective and had synergy with certain aspects of European property law. These paintings will surface again later in the discussion.

In their engagement with the category 'law' Yolngu were explicitly arguing both for the existence of an inclusive substantive category which included within it their system of land tenure, and seeking the recognition of a difference. Their campaign resulted in land rights legislation, which under Euro-Australian law instituted a very different system of land tenure from that existing previously. In particular it created a form of title vested in perpetuity in a group of traditional owners and their descendants. From the Yolngu perspective it might be argued that in each of these cases categories of behaviour, beliefs and institutions that had a cultural meaning quite independent of the European categories of religion, art and law, were being constrained to fit in with these introduced categories. Certainly from a Yolngu perspective the same *madayin* underlies the discourse in all three cases: the ancestral law expressed through reflections of the sacred (*madayin*) in paintings song, land and ceremony. Yet in each case this interrelatedness, in Yolngu terms, influenced the cross-cultural discourse. Land-rights brought the discourse over religion and art into the European arena of the courts and arguably changed the basis of the law in the particular case. Yolngu are adept at exploiting the interrelatedness of categories and the contextual nature of meaning. The shifting of the panels from the Yirrkala church to an annex of the museum, where they became a symbol of the struggle for land rights rather than a token in religious discourse, exemplifies how Yolngu continue to give meaning to their own representations in dialogue with the outside world.

And now introducing Yolngu science

Science has entered discourse over and within Yolngu culture in many different ways. Yolngu knowledge systems have been analysed from the perspective of the history of science and Yolngu systems of classification have undergone the process of analysis as ethnoclassification. A dialogue with Western science took place at the individual level early on. Donald Thomson was by background a natural scientist. His background as an observational and taxonomic scientist is strongly reflected in his field methods and manifest in the meticulous attention to Yolngu terminologies for describing the world evidenced in the documentation of his collection, now housed in the Melbourne Museum. He also talked to Yolngu late into the night, as he camped in a platform house above the floodwaters of the Arafura swamp, about the principles of Linnean classification! He did so in order to show that Europeans too had detailed a parallel vocabulary that they could apply to animal and plant species just as Yolngu had a multiplicity of names for them.

Yolngu have been exposed from the very beginning of their colonial encounter to dialogues with Europeans who took up fundamentally opposed views to one another. Apart from the missionaries the two Europeans who Yolngu were closest to in the early days of colonisation, Donald Thomson and Fred Grey, were both agnostics who strongly opposed the church and any attempt to convert the Yolngu to Christianity. Yolngu were probably far more sympathetic to theological discourse than either of these men, but their presence ensured that from early on Yolngu were well aware of Europeans who expressed alternative views to those of the missionaries.

While I do not wish to exaggerate the significance of Donald Thompson's late night conversations, the particular way in which Yolngu science has become a significant factor in Yirrkala does reflect the interrelationship between individual discourse and agency, local visions and government policy. There has been a long-term interest on the part of outsiders in Indigenous systems of taxonomy and indigenous knowledge of the natural environment. That interest and the involvement of Yolngu in research projects and linguistic programs has provided an input into discourse over Yolngu science.

Since the development of the mission stations the school has been one of the main agents of change within Yolngu society. Yolngu have long been concerned with opportunities for education and have a history of involvement in the school system. One of the main demands of the adjustment movement of the 1950s at nearby Elcho Island was for improved schooling and Yolngu elders have a considerable role in the management of the school. The Methodist missionaries did not use schooling as an instrument for the separation of children from their parents, as happened elsewhere in Australia, and the school developed as an integrated part of the community. Towards the end of the mission period in the 1960s Yolngu people began to be increasingly employed in the school as teaching aides, and aspects of Aboriginal culture began to be taught in the school: for example, painting classes were taught by Mawalan Marika and his son Wandjuk. The church had also created the foundations for institutionalised bilingualism by encouraging the mission staff to speak Yolngu and by employing linguists to translate the bible.

In the early 1970s Australian Federal Government policy shifted away from assimilation towards integration, encouraging groups to Indigenous groups to maintain their own distinctive practices within a multi-cultural Australian society. This change in policy coincided with the development of land-rights legislation and Yolngu taking over the management of their school and their community. With support from the education department the school established a bilingual education program, ensuring that the children were taught partly in their own language. The development of Aboriginal teacher-training programs in the Northern Territory meant that by the 1980s Yirrkala school had a number of tertiary trained Indigenous teachers who were committed to bilingual education. Particularly prominent was Mandawuy Yunupingu who subsequently became head teacher of the school. The discourse within the school began to shift away subtly from bilingual education towards what became known as bi-cultural or 'two-way learning', in which children were not simply taught in their own language but in which the curriculum incorporated their own system of knowledge.

Such an approach is radical in that it introducing protocols and perspectives that are unlike those generally associated with 'Western' educational practice. Yolngu knowledge is socially distributed on the basis of clan membership, age, and gender, with rights of access varying on an individual basis according to these factors and a person's kinship position. Some Yolngu knowledge is restricted to certain people or contexts

and some knowledge can only be imparted by particular individuals. Yolngu also have restrictions on who can be taught together when certain topics are discussed. Learning the social and cultural basis of Yolngu knowledge becomes part of the curriculum. As Raymattja Marika explains: ' we have scientific names for different plants and different animals. Yolngu use these different names in language. Sometimes language that is linked to country and linked to knowledge that is restricted and deep. Also some of these ideas we use for everyday language.'

Similar issues arise as with other areas of category extension. The inclusion of Yolngu knowledge within the constraints of the school system involves changes in the way in which Yolngu knowledge is passed on, by codifying it and reproducing it in the form of books and packaged teaching materials. It also changes the context of transmission from one that is clan-based and allows for gender separation to one that comprises mixed classes that cross-cut clan organisation. It requires that Yolngu make choices that they might not otherwise have to. While at one level this may appear to be a contradiction at another level it is precisely the intention of the approach, since the argument for two-way education is that if Yolngu knowledge is left outside the school system then European knowledge systems will be privileged. It also reflects the fact that schooling takes a considerable portion of people's time. If Indigenous knowledge is not included in the school system then its transmission as a complex system will be threatened. Thus the inclusion of Yolngu knowledge as a separate component within the school curriculum presupposes its difference yet simultaneously asserts its equivalence.

While the process of two way learning may involve some changes to the Indigenous knowledge system it simultaneously acts upon the introduced knowledge system and its purveyors, the teachers, by drawing attention to dimensions of Yolngu society such as clan organisation and gender relations that will have an impact on the classroom situation. Two-way learning thus provides the context in which both pupils and teachers can interrogate the differences and similarities between the 'two' systems of knowledge and develop the ability and understanding to apply them jointly in particular contexts. In some respects the situation is not very different from that which any school child finds themselves in if required to apply methods from different disciplines — arts, humanities, sciences — to addressing a particular problem that will benefit from an interdisciplinary perspective.

Two-way learning thus provides the most important contemporary context in which Yolngu approach the discourse over Yolngu science. Yolngu knowledge is juxtaposed in a classroom situation with a curriculum based on Western categorisations. While the categories of Western knowledge are not replicated in the Yolngu curriculum, the two curricula continuously overlap. Just as the historical process has resulted in Yolngu developing a relative position on law, art and religion, so too does the school curriculum include such relativisms as part of contemporary Yolngu knowledge. Yolngu knowledge is not some discretely isolated body of information separated from the contemporary contexts of people's lives. The Yolngu curriculum thus inevitably deals with topics that articulate with Western categories such as history, medicine or science, but in doing so refers the students and staff back to the different social and cultural contexts in which such knowledge is embedded.

The Yolngu curriculum is designed by teachers to focus on topics that are relevant to students' lives and organised in such a way that it will improve their general skills in the presentation and organisation of materials, and their literacy and ability to communicate cross-culturally. The topics chosen will always have elements of cross-reference to subjects taught in the non-Yolngu curriculum. For example a Yolngu curriculum project might focus on the history of the land rights movement. Students are led through that history by member of the community who played a role in the various court cases. In reviewing the topic, the legal and political issues of land rights are addressed. In many respects the body of knowledge associated with land rights in the Northern Territory is something that arises equally out of Yolngu and European knowledge frameworks. Another topic might be looking at Yolngu approaches to health and medicine. In this case Yolngu are clearly aware of the overlap between Western categories and Yolngu categories, and indeed since Yolngu themselves have knowledge of Western medical practices, some elements of introduced knowledge systems will be an integral part of contemporary Yolngu knowledge about health.

The relationship between Yolngu knowledge and Western science is a developing dialogue, which involves both internal developments within the school and the community and engagement by the wider society in Yolngu knowledge systems. Internally the Yirrkala school and Yolngu teachers have seen relationships

between the Yolngu knowledge system and a number of different components of the introduced curriculum. Yolngu have long been aware of areas of overlap between Yolngu and European environmental and taxonomic knowledge. The dialogue started by Donald Thomson has been continued by researchers and linguists such as John Rudder, Bernhard Schebeck, Helen Veran, Neville White, and Nancy Williams, Yolngu have long collaborated in ethnoscience projects and have been co-authors of a major work in the field. The school teachers have also been interested in the relationship between aspects of Yolngu social organisation and language and Western mathematics. Analogies between Yolngu kinship and mathematical modelling have been discussed equally by Yolngu and anthropologists, in particular with reference to differences within the body of Western mathematics. Some have argued that Yolngu systems of thought are closer to set theory or relational mathematics than to other areas of mathematics such as numerical calculation.

Outsiders are often interested in the Yolngu knowledge system and in its potential application and use in other contexts. A recent development has been the approach to the Yirrkala school by the New South Wales education department to develop a unit that includes elements of Yolngu knowledge within the Year 9 New South Wales school science curriculum. The project originated from the determination of the New South Wales education department's indigenous curriculum body to include indigenous science within the school science curriculum. At the most general level the motivations are diverse. One is clearly to empower Indigenous students in NSW schools. A second motivation is to add a relativistic and social component to the school science curriculum for the mainstream. A third is the high currency given to the theory that Indigenous knowledge systems contain within them useful knowledge that can be helpfully incorporated within the knowledge base of Western science, for example Indigenous medical and environmental knowledge. In such contexts Yolngu are likely to be approached partly because their contact history has left their knowledge systems virtually intact and hence they are able to provide a rich resource of 'Indigenous' knowledge. The immediate stimulus however connects Yolngu science directly back to the previous categories that we have been discussing: religion, art and law.

A curriculum development officer of the New South Wales education department went to the opening of The Saltwater Paintings, an exhibition of Yolngu bark paintings that had recently been acquired by the National Maritime Museum in Sydney. These paintings, mentioned previously, primarily produced as a statement of the ownership of coastal waters by Yolngu clans, but were also representations of the marine resources of the coastal waters. The paintings were meticulously documented by Buku Larrngay Arts centre in cooperation with the artists revealing deep knowledge of the marine landscape and its interrelationship with the Yolngu people. The exhibition could be read by outsiders as an exposition on Yolngu knowledge of marine ecology through the medium of art works, and as a potentially attractive inclusion in the school curriculum. Other exhibitions of Yolngu art, for example, the Native Born exhibition at the Museum of Contemporary Art in Sydney, had also drawn attention to the potential of paintings for communicating Yolngu environmental knowledge to non-Yolngu audiences. The focus on paintings as a medium for introducing Yolngu science is in accord with the Yolngu emphasis on the holistic nature of their system of knowledge, in which phenomena at different levels are ultimately inter-related.

In Raymattja Marika's words: [The Yolngu} worldview is expressed through songs, through stories, through art, through rituals, and through paintings. Paintings consist of maps, abstract maps of the land, trees, the animals, and the plants, the rocks and so on. All have meaning; they're either Yirritja or Dhuwa. So everything is integrated, science, language, culture, law, they're all integrated, whereas in the non-aboriginal worldview all these things are taught separately. Science is taught differently, language is taught differently, art is too, they are all taught in their own components. For Yolngu, in the Yolngu worldview everything is interconnected and interrelated in a holistic way.

The inclusion of Yolngu knowledge within the New South Wales schools curriculum will involve precisely the same discussions over protocol and the same systems of permissions and acknowledgment of ownership as its inclusion in the Yirrkala School. Yolngu thus strongly influence the ways in which their knowledge is used, a necessary component of ensuring that in the translation process their knowledge is not simply subsumed into someone else's categories.

Conclusion:

The inclusion of Yolngu knowledge within the framework of science is relevant both to global theory and to local discourse. Theorists focussing on the relationship between indigenous systems of knowledge and Western science have often been concerned to emphasise the differences giving more emphasis to the space of separation than to the arena of discourse. The discussion has been theoretical and contentious, and the differences have often been represented as incommensurable in nature (e.g Horton 1967). Two fundamentally different systems of thought are brought together by the accident of their coincidence in time. Theorists such as Goody and Escobar provide very different models of the broader historical processes concerned. In Goody's case it is the development of literacy and the organisation of knowledge that makes the difference, in Escobar's case there are fundamental differences in the social and ecological contexts of knowledge production. Escobar creates a dualistic opposition between a capitalist nature and an organic nature associated with local communities. The capitalist nature involves the progressive incorporation of nature into the twin regimes domains of governmentality and commodity. (1999: 7) In contrast organic nature is predicated on the link between the domains of the biophysical human and supernatural worlds. (1999: 8) Perhaps in both these cases there is too much emphasis on the difference: in Goody's case indigenous systems of thought are almost left behind, and in Escobar's case they are effectively positioned as local. Both Goody and Escobar introduce perspectives that must be taken into account in the analysis of local discourse and both address components of the dynamics of the situation. Yet from the perspective of the local communities their own cultural categories are both contemporary and part of their discourse with the non-local.

In the Yolngu case the introduction of literacy and a school system, in the context of the introduction of external knowledge systems has in some areas resulted in a greater systematisation of Yolngu knowledge. The recording and transmission of knowledge in written and digital form, and its inclusion in a curriculum where it is related to other components, alters the method of transmission. On the other hand, the knowledge is presented in the context of the political and religious ordering of knowledge in Yolngu society and, in Escobar's terms, thus maintains a knowledge system that is more local in its conception of nature. When they engage in discourse with the wider world, local societies adapt, but they also modify the introduced categories.

The inclusion and systematisation of local knowledge within the school system through an evolving literate tradition provides the possibility for its long term survival and helps maintain its continuing relevance. The exclusion of Yolngu knowledge from the contemporary school curriculum would threaten its continuing transmission, since school takes up much of children's lives and is designated in wider Australian society as the context in which knowledge is transmitted. However does its inclusion in the curriculum result in the subordination of Yolngu knowledge through its positioning within the framework of introduced categories such as history of science?

To view a hunter-gatherer society in a postcolonial context is almost by definition to view a society in change. Yolngu have been engaged in a process of increasing literacy and formal teaching during the last fifty years of their colonial history. They have been intimately involved in the production of material for the bilingual education program and in curriculum development for the school. It would be surprising if these processes, together with a movement in the economy away from an exclusive dependence on hunting and gathering, had not brought about changes that had some impact on Yolngu conceptual systems. However there is little evidence that increasing literacy is producing the kind of changes in people's knowledge systems that Goody (1977) predicts. I hope I have shown that Yolngu agency has had an impact on the direction of change at the local level, and in some instances an impact on the discourses of the encapsulating society. To have had that impact has of necessity involved engagement in cross-cultural discourse and the use of cross cultural categories, but has not required subordination to them.

Yolngu knowledge of the natural world, for example, involves focussing on topics that might not otherwise be central to Western discourse on the same topic. Yolngu divide the world up in a different way. Learning Yolngu science, for example, requires the students to see scientific knowledge as being interconnected with other aspects of culture and society, with the existence of moieties and a system that categorises knowledge on the basis of an inside:outside continuum (see Morphy 1991). When Yolngu science is transposed into

another school curriculum then those other children will be given the conceptual tools to reflect on similar interrelationships between science and society in their own local contexts. There may even be synergies between the way science enters the Yolngu school curriculum and certain developments on the edge of Western science. Issues such as the relativism of knowledge systems, the social embeddedness of knowledge, the relationship between knowledge and rights are likely to be foregrounded in discussions at the interface between Yolngu knowledge and Western science. Consciousness that knowledge is related to its social context does not however render children incapable of understanding the objective basis of their observations, exercising scepticism or analysing the categories in which they see the world.

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