

Aboriginal peoples all round the world have knowledge systems that are just as complex and logical as those in the West. Can we learn from each other? Margaret Wertheim reports

# THE WAY OF LOGIC

NEW SCIENTIST

FOR almost two centuries, anthropologists have been studying how non-European cultures understand the world around them. Now philosophers of science are getting in on the act. Armed with intellectual tools and methods that have traditionally been applied to Western science and its understanding of the world, they are turning to the "knowledge systems" of other cultures. Leading the way is Helen Verran, an Australian philosopher of science at the University of Melbourne, who for the past decade has studied the knowledge system of the Yolgnu people of northern Australia.

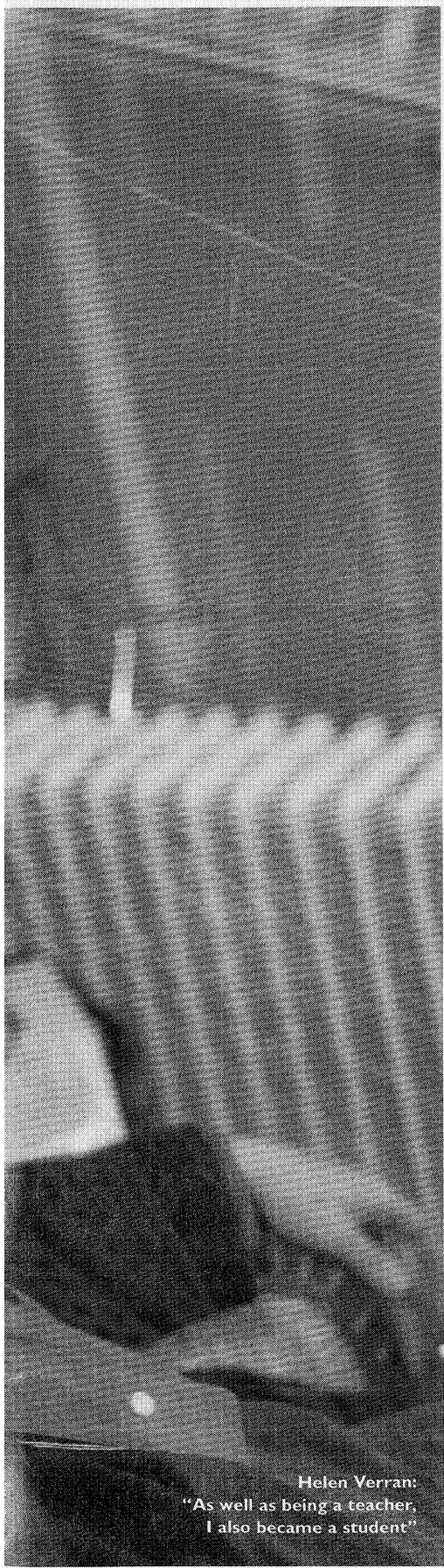
Verran's goal is not merely to cast a new light on Aboriginal knowledge, overthrowing some deeply held Western beliefs about their ways of seeing. It is also about establishing a new perspective for Western science, about "standing inside another culture's knowledge system", as she puts it, "to unpack science". And it is this reciprocal nature of the approach that most impresses other researchers. Verran allows "the local people to influence the academic context", according to Kathryn Addelson who teaches the history and philosophy of science at Smith College in Massachusetts.

The iconoclastic French philosopher of science Bruno Latour, who sees science as a cultural construct rather than as a quest for some kind of external "truth", calls the approach "symmetric anthropology" and sees Verran as its "world leader". What she is doing, says Latour, "is neither the anthropology of contemporary societies, nor of traditional ones, but of both". He talks of Verran creating no less than "a common playing field, a sort of negotiation where the question is no longer 'will they modernise?' or 'have we lost the quality of our archaic past?', but 'how can we sort each other out?'"

Verran's first foray into non-Western knowledge systems was working with the Yoruba people in Nigeria during the early and mid-1980s. But after seven years in Africa, she realised she wanted to work in her own country with indigenous Australian cultures. And so in 1987 she returned to Melbourne to teach at



Photography: Graham Munro/Painting by Naminapu White



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Deakin University, where the emphasis was on comparative knowledge and which had an active policy of recruiting Aboriginal students.

One of Verran's earliest students was Mandawuy Yunupingu, lead singer of the successful Aboriginal rock band Yothu Yindi and a member of the Yolgnu group of clans from the Arnhem Land region of the Northern Territory. Through him Verran was inducted into the Yolgnu, where she now has many of the rights and responsibilities of a full member of the tribe. "As well as being a teacher, I also became a student," she says.

This will probably take her the rest of her life because the Yolgnu way of seeing the world is radically different from anything in Western culture.

Rather than resenting this intrusion, the Yolgnu have charged Verran with making their knowledge known in white society. According to Verran, they are acutely aware not only of the crisis of Aboriginal culture—which for many tribal groups amounts to cultural genocide—but also of the existential and environmental crisis of Western culture. After being rejected by white Australia for two hundred years, the Yolgnu believe the time has come when the immigrants

might be willing to learn from the indigenous people. Yolgnu members who work with her and her graduate students gain teaching and environmental studies qualifications.

One important difference in Verran's



Rogan Coles/Redferns

**Mandawuy Yunupingu: the Aboriginal rock star who introduced Verran to the Yolgnu group of clans**

approach is that she takes seriously the Yolgnu's insistence that their knowledge is based on logic. Anthropologists use the word "tradition" or "mythology" when speaking about indigenous people's ways of understanding the world. By using the term "knowledge system", Verran signals the formality and rigour of their world picture and its underlying epistemology. In fact, she says, the Yolgnu's knowledge system is so highly structured they are "just as



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Such a view does not go down well with the many people who want to maintain a view of Aboriginals as some primitive "other" steeped in art and mysticism. "When you get up and say that Aboriginal life has a very strict logic it rather takes people aback. You become quite unpopular because it disturbs people's cherished views that these are people in touch with romantic spirits."

But if Yolgnu knowledge is based around logic, it is of a definitionally different sort to the Western variety. In our science, the logical underpinning is provided by numbers. Physicists, and to varying degrees scientists from other disciplines, attempt to explain the world using the language of mathematics. The Yolgnu system derives not from the symbolic use of numbers but from kinship. The name they give to this kinship-based logic is *gurrutu*, and Verran suggests that it must be seen as

nothing less than an alternative mathematics.

The parallel with maths is quite explicit. At the root of mathematics are the ten numbers, which traditionally arose from the naming of our fingers. In *gurrutu*, the basic elements named are not the fingers but the relationships between three generations of a family. To understand this, consider the family group of a husband and wife, their four parents and their eight grandparents.

What is named is not the family places per se, but the relationships between them. For instance, there is a name for the relationship between husband and wife. From the wife's side it is *dhuway*, but from the husband's it is *galay*. The relationship between the husband and his father is *gathu* from the older man's side and *bapa* from the younger man's. Altogether there are 16 relationships named in reciprocal pairs. And these form the basic elements of *gurrutu*. Since what is named is always

a relationship between two people which points from one of them to the other, the elements of *gurrutu* could be seen in a sense as vectors. The system thus constitutes a network, or mesh, of relationships.

Now, just as one can indicate any number at all using the ten basic elements in a systematic way—so, too, the Yolgnu can name the relationships between any two people using their sixteen basic elements. All people, not just immediate family, fit into the *gurrutu* web.

And just as scientists can use the language of mathematics to talk about things as diverse as the dance of the planets and the form of a leaf, so the Yolgnu can name everything in the world through the logical language of *gurrutu*. Land, for example, can be represented through the network of *gurrutu*. For us, says Verran, "land is meaningful because it has area which we represent in numerical

terms. For the Yolgnu, land is meaningful because it has specific places that belong on the *gurrutu* mesh". Thus there is mother-land, father-land, grandmother-land, and so on.

Other things fit into the *gurrutu* mesh by belonging to a "clan". Each of the sixteen basic kinship names is associated with a clan, and all things belong to one or other of these. The *gurrutu* mesh, says Verran, "is like a very complex locating system", a sort of all-encompassing map of the world. But whereas with Western science we have to make our maps a posteriori, for the Yolgnu "the world comes to life already mapped". Their map is embedded in the very being of the world, and is quite inseparable from it.

### Other halves

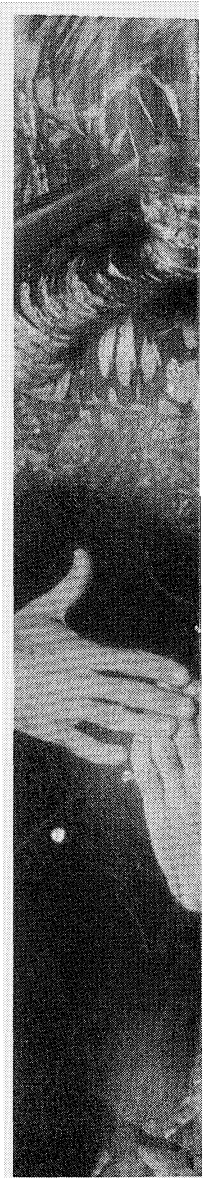
Within the *gurrutu* mesh is a primary classification dividing the world into two halves: *yirritja* and *dhuwa*. Of the 16 clans, eight belong to the *yirritja* side and eight to the *dhuwa*. All Yolgnu knowledge can ultimately be seen as an explication of the ways in which the two halves interact. Throughout the world the two strive to balance and harmonise each other. In human terms, this means that a *yirritja* man must marry a *dhuwa* woman, and vice versa.

Clan identity comes through the father, so if your father is *dhuwa*, you follow him and belong to that side of the world. But, says Verran, "the only way you can then go on is to get together with a *yirritja* person. This means reproduction, but also much more. In the conceptual sense, you have to get *yirritja* knowledge to go on in life." Knowledge is thus a dialectic between *yirritja* and *dhuwa*.

As an example of how this dialectic helps the Yolgnu in a practical sense—one that we might recognise as "scientific"—Verran points to their understanding of water flows. Yolgnu land, which has coastal and upland areas, contains both salty and fresh water. The flow of fresh and salt water through



Photography: Graham Munro/Painting by Ngalaurr Munungurr





Peter Dokus/L.G./Retna

alternate sections of *yirritja* and *dhuwa* land, and their interactions, has theoretical importance for the Yolgnu. The practical outcome of such knowledge is in tracking the movement of water underground and predicting where springs will arise. Such predictions are based on a complex—and sacred—set of rules encoded in the Yolgnu song cycles.

In the dry season, the Yolgnu engage in a sophisticated pattern of land burning. Again, the knowledge of what and where to burn is encoded in rules within the song cycles. Such rules talk of wind directions, smoke patterns, soil conditions and the like. Yet it is not this kind of knowledge that most interests Verran: it is their approach to knowledge—their epistemology—which excites her. In

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the age of science, Verran stresses, Westerners have constructed a new world view, but "we have hidden from ourselves the fact that we have done so". Seeing the world through different eyes, she says, can help us see more clearly how our own science was constructed.

The power to make predictions, for example, is generally regarded as the hallmark of Western science, yet to the Yolgnu it is unimportant. In fact, says Verran, their world picture does not encompass the concept of prediction in the way we understand the term. Our notion of prediction is based on a linear conception of time which the Yolgnu do not share. According to Verran, "the whole issue of prediction is related to our conception of causality", but the Yolgnu's notion

of cause is very different from ours.

More starkly, the Yolgnu world picture does not posit a fundamental divide between nature and culture—a division which simply does not exist in their language. A comparably important division for them is between *yirritja* and *dhuwa*. This, conversely, has no parallel in our language or science.

The two systems are radically different and it takes a major psychic shift to move from one to the other. Because of this, Verran acknowledges that she will never truly see the world through Yolgnu eyes. But then, her aim is not to become a Yolgnu, but rather to shift her perspective, a little. "I've put a toe over there," she says, "and I've been able to put a little bit of weight onto that toe." □

**Margaret Wertheim** is a science writer living in New York. Her book *Pythagoras' Trousers* was published in August by Times Books.