

# It's time we draft Aussie Rules to tackle Indigenous mathematics

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When discussing how to embed Indigenous Australian knowledge and practices into the Australian national curriculum effectively—particularly the maths curriculum—there's no better place to start than analysing our own distinctively Australian national sport: AFL, the winter game.



'Why?' you might ask. Well, have you ever wondered why Indigenous players frequently excel at Aussie Rules, where they are vastly over-represented in the national AFL competition?

In populist discourse, the exceptional ability of some Indigenous players is frequently ascribed to 'natural talent'. This is actually a soft racism, uncomfortably akin to the Social Darwinism expressed via the now-infamous 'ape' comment directed at a gifted Indigenous player during a recent AFL match.

The interrelated concepts of 'natural ability' and 'genetic endowment' are ultimately furrphies, because they fail to take into account learned cognitive factors routinely brought into play by some Indigenous AFL players—and the hard work that goes into their success.

## Elite footballers aside ...

This apparently remarkable aptitude on the AFL field is readily observable in matches between groups of young Aboriginal men who live in Australia's remote rural communities.

Throughout most of the 1980s and into the early 1990s I lived and worked, mostly as school principal, in such a desert community: the Warlpiri settlement of Lajamanu in the Tanami Desert, about halfway between Alice Springs and Darwin. Along with other community

members, I revelled in watching the home games, in which young Warlpiri men played dashing, thrilling football.

The seemingly superhuman exploits of the youthful, although mighty—according to local graffiti—Lajamanu Swans, who played electrifying footy in their bare feet on a dusty and grassless 'oval' (a circular tract of rock-hard red earth) is something I'll never forget.

Even smaller kids frequently showed outstanding skill in their capacity to grab hold of an airborne Sherrin™ flying from any direction whatsoever, while running at full pelt; in their ability to find a passage through a narrow corridor; and in the finely-tuned accuracy of their near-vertical jumps.

In what ways might Indigenous youths' early childhood learning experiences and socialisation patterns lead to greater-than-average success in the game of AFL? Before attempting to answer this question, it is necessary to identify what makes the Australian game unique as a game of football.

## How AFL stands apart

Unlike other football codes, AFL does not have an offside rule, making it a multi-directional sport.

Moreover, it takes place on a very large oval-shaped field, requiring of players 360° of spatial consciousness, with the need to update and re-align oneself in space continuously, with split-second judgement and timing. The requirement of 360° spatial cognisance and responsiveness, a by-product of the no-offside rule, is arguably AFL's most salient feature, differentiating it from other football codes.

Indeed, one of AFL's two major antecedents is an Indigenous Australian game with demonstrable kinship connections to today's AFL (the other one is Irish Gaelic football). As the late Paddy Patrick Jangala, the first professional Warlpiri linguist, attested in the Warlpiri Dictionary Project in 1987:

*Purlja, ngulaji yangka kalalu ngurru-manu nyurruwiyi wita japujapupiya wampanajangka, wirrijijangka, manu janganpajangka wirrijijangka yumurrujanga. Ngulaji kalalu pantumu kankarlarrakari ngulakalalu puuly-mardarnu manu kalalunyanu warru kujurnu yapangu. Yarlpurrukurlangumiparl. Yangka purljangkaji manyungka.*

*[Purlja is a small ball, which they used to make in the old days from string spun from wallaby fur and from possum fur. They used to kick it up in the air and then grab hold of it and throw it around to each other. Only age-mates (yarlpurrukurlangu) played on the same team. That is when they played with the 'purlja'.]*

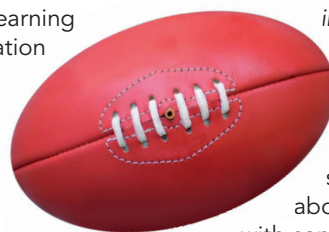
So, for what precise reasons do so many Indigenous players find the 360° attribute of the game to be such a good fit, in cognitive terms? Traditional Aboriginal mathematical systems are largely founded upon spatial relationships rather than on numbers, which is the case in Australia's dominant culture.

## A different spatial outlook

Australia's Indigenous languages are rich in spatial terminology. As linguist Mary Laughren once noted:

*Desert children's ability to handle directional and spatial terminology in particular is taken as a sort of intelligence test similar to the counting prowess test among Europeans.*

This ability, to handle sophisticated terminology about space and directionality with confidence and accuracy, and the concomitant skill in land navigation even when one is completely surrounded by desert, is inculcated into children from the earliest infancy, even today. My own observations based on more than a decade of living at Lajamanu confirm this, and the former principal of Yuendumu



School, Pam Harris, has written about it extensively.

Preschoolers, only two or three years of age, could confidently name all the cardinal directions by the time they entered school and instantly apply them with almost 100% accuracy no matter what environment they found themselves in—a learned skill essentially deictic in nature, that most children in our dominant culture Australia are still struggling with at 15 or 16 years of age.

Wendy Baarda, a teacher and linguist who has been living for many years at the Warlpiri settlement of Yuendumu (where little Liam Jurrah, and many others like him, first kicked a footy) drew attention to this commonplace linguistic and deictic ability in the following anecdote:

*One of the school's Warlpiri Literacy workers was walking along carrying her baby, who was about 18 months old. A bystander (another Warlpiri adult) called out to the child to get its attention. The child heard the voice but could not locate the person, so the speaker called out again, this time supplying the direction in which the child should look: 'Kakarrarni'—towards the east. Immediately the baby turned its head and looked in the right direction, towards the speaker.*

One important difference, in relation to the dominant culture of this country, is that a person's limbs ('left' or 'right') are not to be regarded as fixed entities in relation to self, as is implicit in the formulations 'left' and 'right'. Rather, they are conceived within a much broader context of spatial relationships with respect to the exterior world. So, in accordance with the specific spatial circumstance, a person might talk about one's north, south, east or west hand (or leg).

When one is continually on the move (or run) within 360° of open space, albeit with the intention of reaching specific goalposts within that space, the formulations of 'left' and 'right' in relation to one's own body have little or no meaning. This form of spatial apprehension is not restricted to people in the Central or Western Deserts of Australia, but ubiquitous throughout Aboriginal Australia, and as a method of orienteering one's way through space survives even where the local languages are faltering.

The American linguistic anthropologist John Haviland has written about the importance of cardinal directions for the Guugu Yimithirr (alt. Guugu Yimiddhir) people of Northern Queensland, in terms of position finding while in motion:

*... Speakers of the Australian language Guugu Yimithirr (hereafter GY) at the Hopevale community near Cooktown, in far North Queensland, make heavy use in discourse about position and motion of inflected forms of four cardinal direction roots—similar in meaning to north, south, east and west. The system of cardinal directions appears to involve principles for calculating horizontal position and motion strikingly different from familiar systems based on the anatomies of reference objects, including speakers and hearers themselves.*

*Rather than calculating location relative to inherent asymmetries in local reference objects, or from the viewpoint of observers themselves characterised by such asymmetries, the GY system apparently takes as its primitives global geocentric coordinates, seemingly independent of specific local terrain and based instead on horizontal angles which are fixed, as it were, by the earth (and perhaps the sun) and not subject to the rotation of observers or reference objects.*

While I have barely touched upon the complexity of these systems here, they have largely survived (not always in intact form) the vagaries of colonisation. Their survival is most evident in rural, tradition-oriented Aboriginal communities, but it persists across generations, following Indigenous diasporic movement into Australian country towns and big cities.

This culturally specific form of mathematical knowledge, intergenerationally transmitted, imparted in its most intact form via Aboriginal languages, plays itself out not only on the AFL field but in tradition-oriented Aboriginal art, and has an important role in other Indigenous knowledge.

The ability to apply such knowledge is a product of nurture, not nature—it cannot be genetically transmitted any more than it is possible to transmit concepts about number and computation to other little Australians, except via processes of acculturation.

## What are the educational implications?

In February 2011 the Australian Institute for Teaching and Learning (AITSL), a contributor to the Australian Curriculum, Assessment and Reporting Authority (ACARA), released a document titled 'National Professional Standards for

Teachers'. One of AITSL's key categories was titled 'Professional Knowledge'. Its Standard 2, 'Know the content and how to teach it', has several subsections, of which Focus Areas 2.4 and 2.5 are relevant in this context.

### Focus Area 2.4 reads as follows:

*Understand and respect Aboriginal and Torres Strait Islander people to promote reconciliation between Indigenous and non-Indigenous Australians*

while AITSL's Focus Area 2.5 has as its major thrust Literacy and Numeracy strategies. The idea of an integrated curriculum is thus intrinsic to the conceptual approach mandated by those charged with overseeing the writing of the Australian National Curriculum.

Nonetheless, educators contributing to, writing and implementing these national curricula are expected to 'embed' literacy and numeracy strategies as well as Indigenous knowledge/s into diverse subject areas, including English and the arts.

Such a cross-curricula approach means that Australian maths and science education will need to be conceptualised outside of what are often perceived as those disciplines' own self-referential silos.

There is an opportunity here to include such Indigenous knowledge, in the new mathematics and science curricula especially. There are many potential applications for spatial analysis in fields beyond the playing field: in computer science, mining, astronomy and many fields of research. It will enrich all Australian children to learn a little about Indigenous mathematics in the new curriculum, and will provide Aboriginal kids living in 'outback' Australia and others too, a real chance to shine.

We have a clear choice here. The easiest, most likely option is for teachers implementing the new national curriculum to pay mere lip service to such integrated curriculum approaches.

The more difficult pathway will involve taking these ideas and shaping them into a curriculum that goes beyond inclusion of 'Indigenous perspectives' but foregrounds 'Indigenous knowledge' at the level of the episteme.

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