

COMPUTER DATABASES AND ABORIGINAL KNOWLEDGE

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Digital technology and growing up young indigenous children

At a recent workshop on Aboriginal knowledge in Darwin, several women from the local Larrakia community talked about putting their elders' knowledge onto a database. One cautious non-indigenous researcher voiced some doubts about the over-enthusiastic embrace of digital technology: "Indigenous knowledge lives in country, and in doing things together in country – not in computers." The Larrakia women responded: "That's all very well, but while our elders are getting very old, the young teenagers today aren't interested in learning anything from them. We need to find good ways of preserving some of the knowledge of the old people before they all pass away."¹

Many Aboriginal parents and grandparents, concerned that the younger generation are not growing up with a strong indigenous knowledge/identity, endorse the use of computer databases to store texts, photos, videos, maps, lists etc to help with their work of teaching. It would be easy to assume that these digital objects actually contain knowledge, but in fact they are simply information: series of ones and zeros. The digital object is a re-presentation or an artefact of an earlier act of knowledge performance/production. Its function in the work of education lies in its incorporation into further episodes of knowledge production as any artefact like a book, a map or a photograph is used when people teach.

Databases are not innocent objects. They carry within them particular culturally and historically contingent assumptions about the nature of the world, and the nature of knowledge; what it is, and how it can be preserved and renewed. This paper aims to investigate the relationship between Aboriginal knowledge and databases which are springing up everywhere in what has been called 'archive fever' (Derrida 1995) with promises to help with 'knowledge conservation'. How can information stored digitally on a computer (texts, videos, audiofiles, photographs) be used and maintained by the older generation to help young people learn who they are, where they come from, and where they are going?

Literacy and the production of Aboriginal knowledge

Databases do not contain knowledge, they contain information (ie ones and zeros in particular formation). Education is not the transmission of information from one head to another (see (Reddy 1979), it is the negotiated production of knowledge in context (Turnbull 1997). Sorting out the relation between information on computer and knowledge in practice is neither obvious nor easy. Situating databases specifically in

¹ These discussions have led to an ARC Linkage research project looking into the potential uses of database technology in the intergenerational transmission of Aboriginal knowledge. This paper seeks to open some discussion. Thanks to Juanita Pope, John Greatorex, Ian Falk and Trevor van Weeren for their input.

the discourse of indigenous teaching and learning, a good first step may be to look at indigenous epistemology and pedagogy. How is traditional Aboriginal knowledge understood by its owners? How is it transmitted? Can databases help? In this section, I use Gee's (1991) theory of literacy to draw a link between an Aboriginal philosophy of knowledge and the use of database technology in traditional intergenerational education. I use the specific example of the Yolngu Aboriginal people of North East Arnhemland.

Yolngu have a long experience negotiating knowledge production and celebration within and among their various clan groups, and more recently with Macassans and Europeans. Yolngu curriculum developers and philosophers have written extensively on indigenous epistemology and pedagogy (Marika-Mununggiritj 1991; Yunupingu 1994; Wunungmurra Sept 1989). In Yolngu philosophy, identity is contingent upon one's father's and father's father's ancestors, who sang, danced, cried and spoke the particular features of your own land and your own people into existence as they passed through the land and sea, making the world knowable and inhabited. Every Yolngu claims and celebrates their identity through these land-based language and culture complexes. Identities must be preserved and foregrounded in the production of knowledge which depends crucially on identifying, acknowledging, and actively maintaining the differences of language, dance, art, etc among various contributing totemic groups.

In his earlier work defining literacy, Gee begins by defining discourse, which can be seen to parallel a Yolngu understanding of identity: 'a socially accepted association among ways of using language, of thinking and of acting that can be used to identify oneself as a member of a socially meaningful group.' (Gee 1991) While in the balanda world we may be happy to celebrate a range of discourses, each of which may contribute to the particular subjectivities we adopt in particular contexts, Yolngu are careful and remain within their own patrilineally acquired discourse which they distinguish from the many other secondary discourses (using Gee's term) with which they must always interact in an ongoing way. There are many Yolngu languages (some very similar to each other) each of which belongs to particular people, particular places, and particular histories, songs and images.

You can only tell your own story, it gives you your identity. It comes from your *mulkurr* – your head/mind which has a specific name depending on your totemic affiliation. Yolngu languages, like Gee's discourses (1991, p4), are inherently ideological: they provide standpoints to be taken up in relation to other discourses/languages and thus they resist self-scrutiny; they focus on particular themes, concepts, viewpoints etc at the expense of others; and control over these discourses/languages correlates closely with power (Christie and Perrett 1996).

Marriage in Yolngu society is exogamous, that is, one marries someone from another land/language base. As an adult you will take on your father's language and land, so your mother therefore always speaks a language different from yourself. You may start speaking your mother's tongue, but as you grow up you change to speak your own (father's) language. As you grow up, your ability to interact with discourses other than your own is a feature of your competence as a strong Yolngu in Yolngu society.

In Gee's analysis, one *acquires* one's primary discourse, and one *learns* all secondary discourses (the latter generally implying both the role of the teacher, and the development of a sort of metalanguage or metadiscourse through which one can begin to critique other discourses (Gee 1991). Often new discourses bear with them

unfamiliar uses of language which need to be learnt. Gee goes on to define literacy as control over these secondary uses of language. In the Yolngu case one's mother's and one's father's discourses are quite different from each other. One acquires one's mother's language first. Boys often stick with their mother's brother (who may well become their father in law). They learn the full depth of their father's (and their own) inheritance as they grow older, and are expected to begin to speak their father's (rather than their mother's) language with confidence as they begin to perform in ceremonial and other religious contexts.

Using Gee's construction, these processes of gaining control over the secondary "socially accepted ways of using language, thinking and acting" are the core definition of literacy. Yolngu use the Garma ceremonial ground as a metaphor to make clear the function and productivity of a similar literacy. The garma is a publicly recognised site for the negotiated performance of ceremonies. Yolngu from diverse land/language combinations, come together and celebrate their samenesses and differences through collaborative performance (Christie 1994). Within the garma, individuals work as groups (dancing, singing, painting, talking), to produce a new definition of the here and now, bringing the "past into the future" (Yunupingu 2003) through collaborative representations of ancestral practices and events. They work to produce a collaborative knowledge while preserving (and emphasising) their particular land/history based individualities (Christie 1995).

This involves particular practices of enactment and recognition of identity through each of Gee's four perspectives (Gee 2001) - natural (through links to the physical environment and species), institutional (roles dictated by ancestral narratives played out in song and ritual performance), discursive (through careful use of patrilinear language forms) and affinitive (kin links to the groups with whom ongoing negotiated relationships are crucial to economic, spiritual and physical viability).

The garma, like the database, does not contain knowledge. It is a site and a resource where new knowledge is produced for the local context from co-ordinated representations, largely sourced from outside (ie from the various estates and histories of the contributors). The best teachers/researchers/learners have the ability to access, and interpret a full range of representations in each new context of meaning making. The skill of the teacher (singer, painter, dancer) lies in the connections they can make. When Yolngu make knowledge agreements, they search out words which have a rich complex of denotations to enrich their performance. While western scientific knowledge may be valued for its objectivity, Yolngu knowledge is valued for its connectivity and sustainability.

This connectedness of Yolngu knowledge needs to be enabled and enhanced by the database if it is to serve the community which owns it. A person's name, for example, is often also a place, or a ceremonial object, or even a state or a process in which they are invested. Discussions as to which connections are productive and which are to be ignored need to be made as the databases are *used*, not as they are *constructed* (see below). The database itself (like the garma) needs to be read discursively alongside the data it contains: Who does it belong to? Whose interests does it serve? Which structures or concepts does it embrace and which does it marginalise? What possibilities for knowledge making does it support and prevent? Can databases be developed which allow for the sorts of selectivity, display, combinations and performance which characterise the garma? This 'sociotechnical designing' (Gee 2001) needs to be collaborative, that is, to be negotiated in the context of the

community of practice (Wenger 1998) which is continually transformed through acquisition of new ideas, members, activities, and technologies.

Databases, and the structure of Aboriginal knowledge

Typically a database contains a number of digital objects (eg texts, photos, videos, audiofiles) each of which has a text file of metadata linked to it. The metadata ('data about data') is like the library catalogue, through which one can find books by searching for topic, title, author, keywords etc. Normally each 'object' has one metadata file attached to it, although it is possible for one object to have several metadata files (for example generated by different people with different perspectives on the same object) or for one metadata file to relate to several objects (eg a video recording, a text transcription and a translation, of the same interview).

When databases are set up, decisions are made as to the structure of the metadata (which 'fields' are to be used and what sorts of data might fill them) as well as the 'pathways' through which users will access the digital objects by searching through the metadata. These search paths are made real and visible through series of interfaces – what you actually see on the computer screen.

In processes of setting up a database, we make decisions about how the data is to be structured. In developing this information architecture, we find pressure in a number of opposing directions. One is pressure towards standardising metadata so that different databases can be read against each other and be searched using standardised mechanisms: "interoperability". So we have for example competing claims for universal metadata protocols. At the same time, there is pressure towards making metadata structures and search methods reflect the special local nature of the content of a particular database, and the uses to which its data are intended to be put. There is also pressure to make the metadata rich, so that many different search approaches can be developed; and there is pressure to make the metadata simple, to enable people who are not highly text literate to upload and find what they want. Whichever way these political and technical decisions go – who makes them and why, and which features are excluded, none of them will remain apparent after the interfaces are developed and put in place. They will be obscured by the illusion of objectivity the interfaces convey.

Not only does the information architecture reflect a particular politics of knowledge but it also somehow enacts it. Every digital object requires some metadata to render it searchable, and the process of writing metadata is a kind of naming. Giving something (a story, a video, a photo) a name makes it locatable materially and conceptually. The name provides a textual link to the object describing it to some extent but never exhausting its content. (It may for example identify a storyteller but not anyone else whose presence shaped the telling). The process of naming objects is the beginning of the structuring of knowledge. In the western scientific tradition, the work of naming often assumes a world already objectively structured, and the possibility of a language which "cuts nature at its joints". But they are not. They are both selective and productive. We too easily assume that the information structures of a database reflect somehow the structures inherent in the natural world, just as the cognitivist perspective on literacy invokes the digital computer as 'the great metaphor' for information processes: 'computers process information based on its form/structure not its meaning' (Gee 1991)

Bowker (2000) has identified a number of effects of these hidden selection and production processes. Some things are harder to characterise than others. They don't fit easily into any particular category, so they tend to fall through the cracks. Maybe these things are hard to name, maybe they have fuzzy boundaries so are hard to classify. Some things are contested – there is no agreement as to where they belong. An agreement here might cause an offence somewhere else. Other things are radically singular – they are interesting precisely because they can't be classified, or they transgress accepted taxonomic norms. They may be left out of the database or become lost inside it. Some things are more “charismatic” than others, receiving more attention from researchers, policy makers and students, leaving others less acknowledged. For example, knowledge produced in the context of painting a body or dancing in ceremony receives more attention than that produced in the course of fireside storytelling. Politically flavoursome issues (environment, art, music) are likely to receive more funding, and therefore more extensive documentation. All of these factors can develop a sort of feedback loop which may skew the contents of a database and consequently our understanding of the world.

As the radical complexity and interconnectedness of the Aboriginal world is reduced or “grooved” by the structuring and filtering of metadata, we are in danger of falling victim to a ‘reverse bootstrapping process’ where we produce from the database a scientific model of the world which has its shape not because the world is so, but because this is the nature of our data structures (Bowker & Star 1999). When non-indigenous programmers make databases for indigenous knowledge owners, information architecture requires careful attention. If Aboriginal knowers and western researchers are to collaborate in knowledge production, there is much work to do in identifying and preserving samenesses and differences (Verran 2002). Databases need to be able to deal with these interactions.

Despite the generally unexpressed assumption that databases should be theory-neutral, they are never so. As we go about the work of setting them up, we are making both technical and political decisions, and there can never be any a priori attribution of a given question to the technical or the political realms (Bowker 2000). The work of turning the artefacts of knowledge production into discrete digital packages, and of organising them into searchable collections, turns them into politically and historically invested technologies. While the data can be read discursively and materially, so must the database itself.

Towards an indigenous database

An indigenous database must be a lot more than simply a conventional database full of representations of Aboriginal knowledge. For it to be an indigenous database, its architecture and structure, its search processes and interfaces, its ownership and uses must also reflect and support context specific indigenous ways of being and knowing, and people's control over their own knowledge (Agrawal 1995). The coding which makes up the software of the database reflects a theory of knowledge which is well hidden and carries the cultural bias of its designers. Metadata provides a good example.

Western scientists tend to see their work as choosing the right language to describe the already structured world which they have discovered. To them, therefore the pre-emptive structure of metadata is productive – the data are organised in the way of the

world. Thus databases are said to bear an ontology within them. Aboriginal scientists, on the other hand, whose work celebrates more the creative use of language to actively produce possible new worlds, (rather than simply reflect an immutable one) may be rather hampered by the structuration of metadata. The sorts of connectivities which can be given to a Yolngu word (it may be a place name, a person's name, a sacred object, a ceremonial procedure, or label for a totemic connection between groups) must not be prevented in the search process by the sequestering of metadata in particular fields. For Yolngu processes of connectedness to be best facilitated, all metadata should be equally available for search, as indeed should be all the text in the digital objects themselves. Here again we can address the issues of the particular ontologies of indigenous databases through paying attention to the indigenous practices of meaning and representation which engage the world as historically and actively (re)constituted through ongoing ceremonial and everyday performances. "How the elements of these configurations are to be labeled, viewed or characterised, how configurations are to be carved up into actors, events, activities, practices and discourse, is always up for grabs." (Gee 2000)

Working in another direction, we may also work to avoid the tyranny of text and look for visual ways of structuring, finding and presenting data. Images should be easily searchable through thumbnails. Text should not be a necessary component of a search for graphics, where for example map-based or other graphic user interfaces may be useful. But most of the time, text-based searches seem inevitable, and where literacy levels are low, and vernacular languages are difficult to spell, special features like "fuzzy searches" to help produce valid strings for producing search results must be developed. The common cry for more investment in the training of indigenous people in database use may be more profitably directed to the development of user-friendly interfaces which anyone can use. Train the databases, not the owners.

A radically simple approach to indigenous database construction

Most database development projects begin with discussions on the fields and formats for metadata – conceptualising data structures which predict the range of content to allow for efficient retrieval. But as we have seen, there are problems with starting with metadata distributed into fields: First, it can be difficult and complicated for not-so-computer-literate people to input and upload, and second, its structures can reduce (rather than enhance) the possibility for establishing the connections among conceptual objects upon which much of Yolngu knowledge production rests.

In setting up databases for the intergenerational transmission of local knowledges by their owners, we may do best to start with a minimalist approach to metadata and work in the first instance with a single field. Then, working with those who will own and use the database, start the database development process by focusing not on describing the content or nature of the digital objects to be uploaded (one by one) but rather ensuring their retrievability. If you were looking for this object on the computer, how would you want to go about finding it? What words would you use to look for it? What other ways of finding it might be possible? If all metadata on the database were provided by the indigenous owners/users this may help guarantee both 'ownership' and user-friendliness.

Negotiating user interfaces which combine both the advanced technical solutions which facilitate searches, and the subtle ways in which Aboriginal people use particular (digital) artifacts, (alongside language forms, performances, and contexts) to (re)make knowledge, requires an extensive iterative process of prototype development, discussion, use in context, evaluation, feedback, redrafting, more consultation, tweaking, and so on.

The best databases for indigenous peoples to use for their own purposes of knowledge transmission may be frustratingly difficult or counter-intuitive for western scientists to use. It might be possible to build a system which accommodates the purposes and mindsets of both indigenous communities and non-indigenous interest groups, but to do justice to the indigenous intellectual property owners and custodians, and the goals of intergenerational transmission of indigenous knowledge, indigenous ownership and facility of use should not be compromised by the perceived needs of non-indigenous partners for easy intuitive access.

There is a problematic disjunction between the structured information to be found on a computer, and the integrated, holistic, lived and performed knowledges of Aboriginal people on country. This disjunction may become more tractable as we focus on the actual and possible ways in which Aboriginal adults may use digital technology to teach aboriginal young people the knowledge they value. Summarising some ideas from this paper, we may do well

- starting with a limited data set, and with the processes of uploading data and creating metadata
- using the educational uses of digital artefacts as the framework for system development. Who will use it, how, and where?
- focusing on the retrieval and use of digital objects from the database as informing the logic of data structures, search engines and interfaces.
- minimising the structuration of metadata to facilitate the preparation and upload of data and metadata and to foster the peculiar connectivities of indigenous knowledge practices.
- exploring the database and its development as politically and culturally invested and thus itself in need of a discursive reading. Whose world does its structure and function reflect? Whose practices does it support? How could it be modified to suit our purposes?

Conclusion

The digital database may seem an unlikely object of theorisation in an effort of understand how an Aboriginal ontology and epistemology became relevant in contemporary educational contexts. However, using Gee's theories of literacy we can understand the role of both data and database in the enhancement of control over secondary uses of language. In this scenario, literacy for young Aboriginal kids learning traditional knowledge from their elders with the aid of computer technology, involves learning together to "read" the database materially and discursively, reading the classification itself, 'juggling its formal and informal aspects' (Bowker and Star 1999) in the work of producing Aboriginal knowledge for the modern world.

User-friendly databases for the primary use of indigenous communities for the control and use of their own digital data, are technically possible to create. Making ones which work well for their owners requires long term, deeply negotiated and collaborative processes where questions of the nature, politics and creation of knowledge remain central. Communities learning new literacies associated with digital technologies will learn to read databases profitably for their own purposes as they learn to write them.

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