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ROCK ART AND NARRATIVE

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Abstract. Sometimes the narrative behind visual imagery is lost because there is no one who remembers it but the imagery remains, silent, an enigmatic testament to past lives. Sometimes however the story survives, the imagery assisting in the process of passing the narrative down the generations, perhaps changing in some aspects but retaining its essence. This paper is about narrative and about language itself. How words first became symbolic for objects and how awareness developed of self as separate from others. It is also a story about an evolving understanding of how modern human brains have adapted and put to new use pathways already existing in the primate brain.

Introduction

A small group of people recently visited two rock art sites on the coast of the Kimberley region of northwest Australia. They were a well-travelled group interested in the flora and fauna of the region, its geology and history both pre- and post-contact and were fascinated by the landscape. They had no prior knowledge of its rock art nor were they informed about rock art in general. They were a naive audience.

The group visited two rock art sites. The first was a large open cave with high ceilings, the walls and ceiling being densely covered with Wandjina style paintings. The second site was more complex with Gwion Gwion style paintings distributed over three outcrops within 100 metres of each other. The paintings were less obvious and required a little more searching out but people climbed enthusiastically to see as many as possible.

At the first site the guide told a story about the paintings. The story told of a fish falling in love with another fish of a different species, something he should not have done and how a powerful figure, wanting the second fish for himself, stopped their endeavours. The guide was not indigenous but had the permission of the traditional owner to tell this version of the story. He pointed out paintings of the different fish and the large anthropomorphous figure on the ceiling who had put paid to their desires. He also pointed out how at least one painting had been refreshed, as was traditional with Wandjina art. At the second site he talked in some detail about a dark grey coloured, solid infill echidna and pointed out Gwion Gwion figures.

When asked a few days later which site they had liked best there was a consistent response. All the individuals asked thought for a moment and then said the first site. When asked why, they all said, 'because it had a story'.

Narrative

Film maker, Brian de Palma quoted by Abbott said 'People don't see the world before their eyes until it is put into a narrative form' (Abbott 2008: 6).

Narrative is a universal tool which children begin using as young as three to four years of age, when they first start to link nouns with verbs (2008: 3). They move from using an identifier such as 'cat' on its own to an action statement 'cat sleep'. As they grow up stories play a vital role in their acquisition of knowledge and the sharing of it with others. Children like repetition: adults want to hear a new story or see a new film, while children want to hear the same familiar story over and over again. It has to be read or told in exactly the same way each time. Children like picture books and quickly identify the different characters so that before they are actually able to read, they will turn the pages of a familiar book and narrate the story themselves.

In the twenty-first century narration is no longer just the province of the traditional story teller; the keeper of a society's lore. Stories old and new are transmitted across the world through radio, television, films and smart phones while social networks allow anyone to become an instant narrator. Such ways of telling stories depend on their being fixed in some way through the use of a physical script, a code which can be read and interpreted by other individuals.

Reading and language

According to Dehaene it was only five thousand

years ago that scribes in ancient Sumeria hit upon the potential in the human brain which makes it possible to convey language visually (Dehaene 2009). Dehaene stresses that there are no specialised reading circuits in the brain but that through a process of neuronal recycling *Homo sapiens* has been able to use the primate visual system for reading. Research using PET (positron emission tomography) scanning and fMRI (functional magnetic resonance imaging) in human subjects demonstrated that, whatever language was being used, word recognition always engaged the same left occipito-temporal region, called by Dehaene the human letterbox. Japanese researchers working with macaque monkeys showed that a region of their brain homologous to the human letterbox was vital for object recognition. Recording from single neurons in the macaques' brains, they demonstrated that different neurons responded preferentially to certain shapes which Dehaene has called 'proto-letters' (Dehaene 2009: 137). What Dehaene observed was that many of these preferred shapes closely resemble letters, symbols and elementary Chinese characters. He considered the most likely hypothesis for these preferences was that these shapes frequently occur in nature such as circles, T-shapes where one object overlaps another and Ys and Es and asterisks where edges meet. For the macaque they provide a kind of shorthand observation of a visual scene. Dehaene quoted the work of psychologist Biederman who stated that 'our memory does not store fully detailed images of objects. It merely extracts a sketch of their non-accidental properties as well as their organisation and spatial relations' (Dehaene 2009: 138). The first array of symbols acting as referents for objects and ideas, developed over time into systems of writing which may appear very different but have common attributes. Evolution is parsimonious, so whatever system of naming and encoding occurred, it was constrained by the forms preferentially recognised by the human letterbox, the homologue of the primate brain area for object recognition. The many systems of writing that have developed across the world may superficially appear to be very different but they share common attributes derived from, and constrained by, their common primate inheritance.

Just as modern ways of narration are dependent on there being scripts to follow, so scripts are dependent on there being a language in which to formulate and express ideas. Language has been described as a catch-all term for a combination of characteristics that mediate human communication in a way that is different from other primates' (Roeboeks and Verpoorte 2009: 150). When language first developed is one of the most debated questions in archaeology as well as other fields of enquiry, including studies in theory of mind and consciousness. The transmission of information and ideas clearly did not wait for the Sumerians to develop their code of symbols, so how far back does it go? Language *per se* does not leave formal traces of its presence but material evidence can be found which is indicative of language. Roeboeks and Verpoorte (2009: 151) suggest the following archaeological phenomena as being such indicators; use of colouring agents, personal ornamentation, notational and arbitrary symbols, representational art and evidence of humans in challenging situations. Several of these indicators have been found in archaeological deposits dated to the Middle Stone Age (MSA) in Africa.

Excavation at Blombos Cave near Still Bay in South Africa revealed three phases of MSA occupation, the first, designated M1, was dated to 73 ka and contained bifacial points, bone tools, engraved ochre and marine shell beads (Henshilwood and Dubreuil 2009: 49). The next layer M2, dated to 77 ka, contained bifacial points and bone tools. Both layers contained un-worked and striated ochre and also evidence of extensive use of both terrestrial and marine resources as is typical of modern subsistence practices (2009: 49).

The beads have been the focus of much study and a summary of some of the evidence for their presence not being due to natural causes follows.

More than 65 *Nassarius kraussianus* shells, coming from rivers 20 km east and west of Blombos Cave were found in the M1 deposit and they had been deliberately pierced by inserting a small bone tool through the shell's natural aperture (Henshilwood and Dubreil 2009). There were minute traces of ochre on the shells and evidence of use wear caused both by friction from the thread used to link the shells together and from contact with human skin. The shells were not found randomly distributed through the deposit but in groups which showed an internal consistency in size, types of perforation and patterns of use wear.

D'Errico and Vanhoeren argue that the shells had been carefully selected for their size and colour and suggested they were non-utilitarian objects worn for display in front of other members of the community. There must have been a symbolic meaning encoded by the shells which was shared between members of the community and was perhaps related to status or membership of a particular group. D'Errico and Vanhoeren describe this non-utilitarian use of the shells as representing 'a quintessential archaeological proxy for the use of language or at least an equally complex communication system (2009: 37).

Further evidence pushing back the date for hominid use of language comes from the study of genetics. As is the case with much of our modern understanding of human behaviour, a malfunction suggested a new line of enquiry.

Three generations of a London family known in the literature as KE were found to suffer from severe speech defects and some associated brain abnormalities, which were detected on MRI (Diller and Cann 2009). The main defect causing problems with speech was found to be in the control of the oro-facial muscles concerned with articulation. Genetic studies showed that these individuals had a mutation in a gene known as FOXP2. FOXP2 is linked to vocalisation in birds and

bats such that if both copies of the gene are deleted the birds do not vocalise at all and suffer an early death. Diller and Cann (2009: 139), quoting in particular the work of Enard published in 2002, note that FOXP2 is a highly conserved gene with no changes in its amino acid sequences stretching back from the chimpanzee to the mouse. There have, however, been two mutations in FOXP2 since the split six million years ago of the hominid line from the common ancestor with the chimpanzee and both of these are present in all humans. Affected members of the KE family have only one copy of the gene rather than the normal two, rendering it inactive, and the suggestion is that it was the mutation in FOXP2 which gave humans the capacity for speech. If that is the case then knowing when the mutations in FOXP2 occurred would provide a time frame for the beginning of that capacity for speech. It is not possible, at present, to extract genetic material from fossils as old as *Homo habilis* or *Homo erectus* so Diller and Cann looked for evidence within the human genome. A single nucleotide polymorphism (SNP) occurs when there is a change in just one letter of the genetic code. When this is successfully transmitted to subsequent generations, by a process known as 'genetic hitchhiking' the adjacent area of the chromosome gets dragged along with it so that descendants have not only the gene mutation but an identical adjacent area of chromosome (Diller and Cann 2009: 144). At subsequent mating recombination of chromosomes occur and the area that hitch-hiked along with the mutation, known as the select sweep, becomes progressively shorter. Diller and Cann (2009: 145), reporting on a 2007 paper by Willamson, note that there is too much variation in the area adjacent to the FOXP2 gene to be consistent with a sweep in the last 200 000 years. They calculate that the selective sweep centred on the FOXP2 mutation occurred about 1.8 to 1.9 million years ago, which is around the dates when fossils of *Homo ergaster* and *Homo erectus* appear in the fossil record (Diller and Cann 2009: 146*).* The fact that a genetic mutation gave hominids an ability to make vocalisations does not mean to say they immediately began speaking in tongues. Over thousands of years the hominid brain was getting larger with preferential development in the prefrontal cortex and association areas. Through the processes of epigenetics, brain development and socialisation would have progressed together, responding to changes in the physical and social environment. Tools became progressively more complex and began to show evidence of a shared understanding of the process of construction needed for a desired outcome (Shipton 2010). Movement out of Africa into unfamiliar territory and across both land and water barriers would have been facilitated by oral communication and the need to share information for survival under new and challenging situations would in turn have spurred the need for better communication. The hominids could have used pictures but that is a much less efficient way of communicating with a group than is speaking with them.

As will be discussed later, combining a visual message with an aural one enhances both memory and recall. It is highly likely that the sharing of knowledge through narrative was enhanced by pictures drawn in the sand, created with close-at-hand objects such as sticks and feathers or even carved into and painted onto rocks.

Types of narrative

There are narratives, described as master plots, which are retold in myriad ways within a society providing a cultural glue acting to link members in shared experiences (Abbott 2008: 46). In Western society they include folk stories such as Cinderella, the Arthurian legends and the Iliad and the Odyssey. While they may undergo changes in detail they retain powerful messages with themes ranging from moral codes to examples of the hero's journey in which trials are overcome, help is obtained from sometimes unexpected quarters and the end, while a triumph, may not be that which had been expected. The messages are recognisable to members of the particular society and knowing the narrative may provide an individual with a passport to membership. The late George Chaloupka who spent much of his adult life searching for rock art in northern Australia's Arnhem Land, was referring to the Faustian master plot woven into his European roots, when he said he would sell his soul to the devil for another life time researching rock art. Stories of wrong relationships and the punishments they invoke are legion among Australian indigenous communities, the names and species may change but the message is still the same.

Narratives may be classed as non-fiction, implying that they relate to actual events and real people as opposed to fictional narratives in which the people and events have been created by the author. However, many fictional narratives are loosely based on, or influenced by, real events and individuals; and what constitutes fiction? Creation stories are universal; all societies seek to explain their past and justify their future. Unbelievers will call them myths while believers will testify to their truth.

Some stories stand alone but many are nested within a larger frame, the frame providing the rationale for the telling of the individual stories. There may be a spatial and temporal component to the frame. Travellers making an arduous pilgrimage provide the narrators in *The Canterbury tales*, while the ancestors in Australian Aboriginal song lines create both the landscape and the narrative as they move across the unformed soil of the continent.

Altman approaches narrative from the point of view of a dual or single focus, using the Bible among other examples. The Old Testament he describes as an example of a dual focus narrative in which the world is polarised into opposites. Rather than darkness being created it is separated from light, as is woman separated from man and Jew separated from non-Jew

(Altman 2008: 60). He compares this with the single focus narrative of the New Testament which follows a single person and stresses single -focus values (2008: 335). The worlds of some Australian Aboriginal peoples were traditionally divided into two moieties, sometimes further subdivided into four or eight subsections, including not just persons but all features of the world, both animate and inanimate. Transgression of the rules pertaining to correct relationships between moieties was severely punished ultimately by death or exclusion from the social group. If you followed the dictates of the society you belonged, if you did not then you were out; an essentially dual-focus world.

The narrator

Knowledge is power. In preliterate societies that power was held by those who knew the stories. We cannot assume, from knowledge of traditional Australian Aboriginal culture acquired in the past two hundred years, that an analogy exists between the way secret and sacred knowledge has been transmitted down recent generations and how such knowledge was transmitted even ten thousand years ago. However, it does suggest a paradigm in which possessing the deepest levels of knowledge is not a given but has to be earned. Modern Western societies are no different. The acquisition of the highest levels of knowledge goes to those who persist through ever more difficult trials. In modern times the trials are usually mental rather than physical but with the same ultimate goal that those who reach the highest levels will have that knowledge and will pass it on to those who have the right and the ability to care for it.

The ideal narrator is one who has gone through the many stages necessary to reach the highest level of knowledge. He or she will hold that knowledge as if it were an onion, only peeling it back to reveal its core to those who have the right to know and can be trusted with the knowledge. The ideal narrator will be aware which level of knowledge is appropriate for any given audience and will tell the story in such a way as to engage the audience. The non-indigenous guide who told the story at the Wandjina site told it as it had been told to him. There were no embellishments; he did not 'over-read' it, seeing interpretations for which there was no evidence (Abbott 2008: 89).

Narrators can be unfaithful to their material, adding to the text or subtracting from it so that if the process is repeated by the next narrator, like 'Chinese Whispers', over time the message is unrecognisable. Master plots as discussed above may change some of their elements without losing their core message. A story that is passed on may be changed deliberately to fit within an altered political agenda or it may happen through sheer ignorance. An earnest young guide at Nourlangie Rock was overheard telling an attentive group of young people that the dingo they saw represented on the cave wall had been brought to Australia by the Macassans. No doubt at least some of them would pass on that new-found knowledge.

Not everyone is a good storyteller, nor will all members of an audience receive and remember the words equally well.

Working memory

Memory is an elusive quality the mechanisms of which are gradually being unravelled using techniques such as fMRI and PET scanning. Memory can be divided into short-term or working memory and long-term memory. 'Working memory can be viewed as the collection of mental processes that preserve a limited amount of information in an especially accessible form, long enough for it to be of use in ongoing cognitive tasks' (Cowan et al. 2007: 43). Material presented both verbally and visually is retained in working memory using the phonological loop which consists of an articulatory rehearsal system and a temporary store (Baddeley and Hitch 2007). Words are vital to the articulatory system and Baddeley and Hitch suggest that the phonological loop 'has evolved as a mechanism to facilitate the acquisition of language' (2007: 6). The new techniques for imaging the brain have made it possible to identify localised areas which respond with certain tasks and also to demonstrate subtle differences in the degree of the response between individuals. fMRI studies have shown that, when verbal information is retained in the phonological loop, activation is evoked in the left ventrolateral prefrontal cortex (LVLPFC) while retention of visuospatial information evokes activity in the right ventrolateral prefronatal cortex (RVLPFC) (Osaka and Osaka 2007).

The capacity to allocate and coordinate attention to cognitive tasks, known as the executive function, involves additional areas of the brain (Osaka and Osaka 2007). Their studies have shown that complex tasks such as remembering six digits evoked activity in the dorsolateral prefrontal cortex and the anterior cingulate cortex, a part of the limbic system. Remembering only three digits did not evoke activity in the anterior cingulate cortex. fMRI studies have been used to demonstrate differences in brain responses between high- (HSS) and low-span (LSS) subjects. The differences are based on the ability to remember a string of unrelated words or a reading span. While both groups showed activity in the left prefrontal cortex and the anterior cingulate cortex, only the HSS group showed an increase in signal intensity of the activity in the anterior cingulate cortex when remembering the longer string.

Reading span tests were carried out on both high- and low-span tests subjects while introducing an intrusive factor (Osaka and Osaka 2007). The study was designed to test the subjects' ability to focus on the task despite the intrusion. Once again fMRI showed a difference between the LSS and the HSS groups. The high-span subjects demonstrated a superior ability to maintain attention on the target and fMRI was able to show a difference in function of another area of the

brain. The left superior parietal lobule (LSPL) was barely activated in either of the reading span tests in the low-span group. In the high-span group it was activated in both tests but when subjects were required to focus on the set task and ignore an irrelevant factor, activity in the LSPL was increased.

Long-term memory has proved even more elusive than short- term and research now indicates that it is not located in any particular area of the brain but is rather a network structure dependent on a level of background activation at synapses. The hippocampus, situated in the temporal lobe has a particularly important role in establishing and reintegrating information from different areas. The persistence of the memories depends on the strength of the synaptic connections which are enhanced in the hippocampus by a process known as long-term potentiation (LTP). This process involves the activation of glutamate receptors which by electrical and chemical pathways enhance the synaptic strength (Bliss and Collingridge 1993). The activation of receptors is increased by rehearsal and elaboration, the latter by forming associations and images (Howes 2007). The use of cues assists in the retrieval of material from long-term memory and retrieval is enhanced if the material carries a higher-order meaning, that is, it comes from whole statements rather than individual words (2007).

Conclusion

The Kimberley coastal cave provided a decorated frame for a simple story told to a specific audience. Yet within that frame are hidden multiple layers of meaning relating to a potential deeper understanding of the past, of creation, ownership and future responsibilities. Perhaps around 200 000 years ago, hominins, through a coming together of anatomical changes, a lowering of the larynx allowing punctuated exhalation and changes to oro-facial musculature, were able to vocalise in a new way. They began to use existing brain pathways to give names to objects, thereby favouring communication between themselves. It is unlikely that those early hominins shared equal abilities any more than do modern humans, so it may have been only a few individuals who at first took advantage of these opportunities. Mirror neurons, first described in monkeys but shown to be even more effective in humans, not only allow individuals to copy the actions of others but also to rehearse those actions and to acquire skills just by observation (Rizzolatti and Buccino 2005). Experiments in behaviour do not always advance smoothly and if not copied will simply fade away, but if emulated by others, by a 'ratchet effect' (Tomasello 1999) such as when a toothed wheel is stopped from reversing by a pawl which catches, so an innovation may be held and then spread into a wider community.

Naming creates identity and inevitably separates self from others, both animate and inanimate. The development of language allowed individuals to articulate their individual identity and to begin expressing individual narratives.

The difference between long- and short-span subjects discussed above probably goes far back in history. Not only were some individuals better at remembering than others, they were also better at recalling. At some stage it was discovered that providing visual cues could enhance both memory and recall. New theories about memory suggest that it is dependent on connectivity through synapses and the creation of neuronal assemblies (Greenfield 2012). Potentiation at the synapse is dependent on activity without which the chemical changes necessary for potentiation fade. Strengthening of the activity occurs during learning as signalling from one neuron to another becomes more efficient (Greenfield 2000). Such potentiation is clearly at work when stories are repeated over and over again, often accompanied by visual effects or imagery. There is a qualitative difference between memories stored through visual and hearing pathways. Hearing primarily works through a discrepancy in time while the visual pathway evokes spatial discrepancy (Greenfield 2012). They create different neuronal assemblies and so when both pathways are stimulated recall is enhanced. This provides a rationale for the fact discussed earlier that retrieval of material from long-term memory is aided by the use of cues and enhanced when the memories have a higher-order meaning.

We have only the visual pathway through which to access the voices of the distant past; rock art, stone arrangements and archaeological deposits are precious resources. They are increasingly vulnerable to damage or destruction through development and thoughtless or wilful acts. If they are lost so is all hope of discovering the narrative they encode.

The modern day narrator, telling his story within the frame of the cave, using visual cues for his recall and providing visual and aural pathways for his audience, is unconsciously using ancient pathways in the brain to enhance his story telling. As his audience affirmed, although they don't know why, grown-ups as well as children still like a story.

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