Chapter 7. Establishing the Contextual Framework of the Art Assemblage

The purpose of this chapter is to discuss the contextual evidence, which may have influenced the transformation of the art assemblage. Within the study of rock art, context is used as a tool to determine what external forces (e.g. social, demographic, environmental, and/or economic) are influencing the actions of the artists, as context is a driver of style. First, I provide a discussion of new dates provided by the *Change and Continuity* project, their contextual significance and limitations. Second, I briefly summarise the current evidence on climatic and environmental variability since the late Pleistocene, through the onset of the LGM and subsequent climate amelioration. Third, I discuss results of the excavations undertaken as part of the *Change and Continuity* project, and correlate them with the results of previous archaeological investigations of the broader Kimberley region. Finally, I provide a discussion on the current state of knowledge of population patterns within the Kimberley and broader Australia. In the following chapters this contextual evidence is then integrated with the art analysis in order to develop explanations for the continuity and variation in the assemblage through time.

Here, I reiterate Walsh's hypothesis concerning discontinuity in the art assemblage. Walsh (1994, 2000) proposed that there is a clear stylistic discontinuity at two points in the Kimberley rock art sequence, separating the assemblage into the following three epochs:

1. Archaic Epoch (Irregular Infill Animal Period),
2. Erudite Epoch (Gwion Period and Wararrajai Gwion Period), and
3. Aboriginal Epoch (Painted Hand Period and Wanjina Period).

7.1. The temporal sequence

7.1.1. Change and Continuity dating results

In order to obtain a more robust regional chronology the *Change and Continuity* project trialled three different dating techniques: Optically Stimulated Luminescence (OSL), Accelerator Mass Spectrometry (AMS) radiocarbon dating and Uranium Series (U/Th). The aim was to target major stylistic periods and compare results from each dating technique as a means to confirm their integrity. An outline of the methods employed and the respective results is provided below.

Uranium Series dating

U/Th dating was trialled by geochemist, Maxime Aubert (Griffith University) with limited results. Unfortunately, samples taken for U/Th dating either yielded insufficient uranium and thorium for dating or they were too contaminated with detrital material to provide a meaningful age estimate. Therefore, no dates are available to compare with other dating techniques (Ross and Travers 2013:75-6).

Accelerator Mass Spectrometry ^{14}C radiocarbon dating

AMS radiocarbon dating provided minimum age estimates for underlying motifs, but absolute dates for overlying wax resin, and for organic material in mud-wasp nests. The principles, assumptions and technical problems of radiocarbon dating are not discussed here as they have been reviewed elsewhere (see Elias 2007). Three samples were collected by Aubert; one on a Wanjina Period 'Argula' (spirit figure), and two on a Wararrajai Gwion Period anthropomorphic figure (Table 7.1). Radiocarbon years are reported before present (BP). These are not calibrated calendar years but statistical expressions of radiocarbon ratios. In addition to these samples collected by Aubert, geochronologist, Kira Westaway (Macquarie University) collected and processed one sample on an anthropomorphic figure that could not be classified to a particular stylistic period (Table 7.2). All samples are located unambiguously over the associated motif.

Table 7.1 AMS ^{14}C radiocarbon dating results (after Fallon *et al.* 2010)[53]

Sample code	*Change and Continuity* Motif ID	Motif, Stylistic Period	Sample Type	S-ANU#	Other ID	$\delta^{13}C$ per mil	Percent Modern Carbon (pMC)	D14C	^{14}C age
LR03D-01	LR03D-17-1521	Anthropomorphic Figure (Argula), Wanjina Period	Unknown/possibly gypsum (powder)	33109	9551	-23 ± 2	85.83 ± 0.34	-141.7 ± 3.4	1230 ± 35
Lawley River OIC-2	LR03C-2-1205	Anthropomorphic Figure, Wararrajai Gwion Period	Unknown/possibly organic resin (fragment)	33110	9978	-13 ± 2.0	85.20 ± 0.30	-148.0 ± 3.0	1285 ± 30
Lawley River OIC-3	LR03C-2-1205	Anthropomorphic Figure, Wararrajai Gwion Period	Unknown/possibly organic resin (fragment)	33111	9979	-14 ± 2.0	85.17 ± 0.30	-148.3 ± 3.0	1290 ± 30

Table 7.2 AMS ^{14}C radiocarbon dating results (after Fink *et al.* 2004)

Sample code	*Change and Continuity* Motif ID	Motif, Stylistic Period	Sample Type	ANSTO Code	$\delta^{13}C$ per mil	Percent modern carbon pMC 1 σ error	Conventional radiocarbon age yrs BP 1 σ error	^{14}C age yr cal BP[54]
KIM MWN BRY3	OTB01-2-1892	Anthropomorphic Figure, Unclear	Sediment	OZQ990	-27.3 ± 0.1	98.06 ± 0.32	155 ± 30	346-321

[53] $\delta^{13}C$ values are the AMS machine quoted values and are used to correct the age. They can differ from IRMS results.
The quoted age is in radiocarbon years using the Libby half life of 5,568 years and following the conventions of Stuiver and Polach (Radiocarbon, v. 19, p.355, 1977).
Radiocarbon concentration is given as percent Modern Carbon and conventional radiocarbon age.
Sample preparation backgrounds have been subtracted, based on measurements of samples of ^{14}C-free CO_2.
[54] Calibrated using the CALIB 7.0.4 program (Reimer *et al.* 2013).

Optically Stimulated Luminescence

Kira Westaway used OSL to date quartz grains from mud-wasp nests, which had formed over pigment art. Only samples where the nest was located directly on top of the art were taken. OSL provides a means to measure light sensitive signals that build up over time during a period of burial or cover. Specifically, OSL dating provides an approximation of the time since quartz or feldspar grains were last exposed to sunlight. The method is based on the 'time dependent accumulation of trapped electrons in the crystal lattice of these minerals and their proportional discharge once exposed to sufficient light' (Aubert 2012:575). The time elapsed since the last discharge is obtained by 'dividing the estimated dose acquired by the sample (palaeodose) by the estimated amount it receives per year (environmental dose rate)' (Aubert 2012:575). For more details on the method and its applications see Aitken (1998) and Elias (Elias 2007).

A total of nine mud-wasp nests (*Vespiae* and *Sphecidae* families) were processed (Table 7.3). Of these, one (remnant) fossilised nest was sampled on a transitionary Wararrajai Gwion Period anthropomorphic figure, four were of an indeterminate stylistic period, and four were from the recent Wanjina Period. Due to the problems encountered by Roberts *et al*. (1998), the *Change and Continuity* project planned to use parallel dating techniques to compare results to ensure chronological integrity. Unfortunately, as the samples collected for the U/Th program were too contaminated with detrital material to provide meaningful ages, we are reliant on the OSL and AMS radiocarbon techniques (Ross *et al.* 2012:9).

Table 7.3 OSL dating of quartz grains from mud wasp nests in Brremangurey, Upper Lawley and Lower Mitchell Falls, northern Kimberley: dose rate data, equivalent doses, and ages (after Ross *et al. in prep.*)

Sample code	*Change and Continuity* Motif ID	Motif, Stylistic Period	Accepted grains	Beta dose rate[55] (Gy ka^{-1})	Field gamma dose rate[56] (Gy ka^{-1})	Cosmic-ray dose rate[57] (Gy ka^{-1})	Water content[58] (%)	Total dose rate[59] (Gy ka^{-1})	Technique[60]	Statistical Model[61]	Equivalent dose[62,63] Gy)	Age[64] (ka)
UP1A	UL01-2-4284	Shape, Unclear[65]	57	0.921 ± 0.042	0.117 ± 0.004	0.184	1 / 2 ± 0.5	1.25 ± 0.05	OSL_{SG}	FMM	4.6 ± 0.2	3.7 ± 0.2
BRY3	OTB01-3-1892	Anthropomorphic Figure, Unclear	116	0.879 ± 0.041	0.179 ± 0.004	0.177	1 / 2 ± 0.5	1.18 ± 0.05	OSL_{SG}	FMM	1.02 ± 0.04	0.86 ± 0.05
BRY6	OTB01-2-1890	Fish, Wanjina Period	55	0.897 ± 0.041	0.085 ± 0.004	0.177	1 / 2 ± 0.5	1.19 ± 0.05	OSL_{SG}	FMM	1.97 ± 0.72	1.66 ± 0.61
CA-7	LR03D-17-1521	Anthropomorphic Figure (Argula), Wanjina Period	55	0.609 ± 0.036	0.128 ± 0.004	0.170	1 / 2 ± 0.5	0.94 ± 0.05	OSL_{SG}	FMM	2.5 ± 0.1	2.6 ± 0.2
CA-8	LR03D-1-1450	Bell-shape, Unclear	88	0.530 ± 0.035	0.120 ± 0.004	0.170	1 / 2 ± 0.5	0.85 ± 0.04	OSL_{SG}	FMM	21 ± 1	24 ± 2
CA-9	LR03D-12-1487	Anthropomorphic Figures, Gwion/Wararrajai Gwion Period (transitionary)	59	0.530 ± 0.037	0.099 ± 0.004	0.170	1 / 2 ± 0.5	0.83 ± 0.04	OSL_{SG}	FMM	3.9 ± 0.1	4.6 ± 0.3
JS-10	UBSC01-3-4261	Anthropomorphic Figure, Unclear	126	0.325 ± 0.032	0.088 ± 0.004	0.184	1 / 2 ± 0.5	0.630 ± 0.04	OSL_{SG}	FMM	1.32 ± 0.04	2.1 ± 0.2
JS-11	N/A	Yam, Wanjina Period	67	0.781 ± 0.039	0.109 ± 0.004	0.192	1 / 2 ± 0.5	1.12 ± 0.05	OSL_{SG}	FMM	0.9 ± 0.2	0.8 ± 0.1
LM-13	LMR02C-43-6202	Macropod, Wanjina Period	42	0.781 ± 0.039	0.097 ± 0.004	0.184	1 / 2 ± 0.5	1.09 ± 0.05	OSL_{SG}	FMM	6.4 ± 0.1	5.8± 0.3

[55] Concentrations determined from beta counter measurements of dried and powdered sediment samples.
[56] Determined from U, Th and K concentrations measured using a portable gamma-ray spectrometer at field water content.
[57] Time-averaged cosmic-ray dose rates (for dry samples), each assigned an uncertainty of ± 10%.
[58] Field / time-averaged water contents, expressed as (mass of water/mass of dry sample) x 100. The latter values were used to calculate the total dose rates and OSL/TL ages.
[59] Mean ± total (1σ) uncertainty, calculated as the quadratic sum of the random and systematic uncertainties. An internal dose rate of 0.03 Gy ka^{-1} is also included.
[60] Only one luminescence technique was applied to these samples $OSL_{SG=}$ optically stimulated single-grain dating.
[61] The statistical model used to determine the dose distribution between aliquots = FMM - Finite Mixture Model.
[62] Palaeodoses include a ± 2% systematic uncertainty associated with laboratory beta-source calibrations.
[63] OSL signal measured using single-grains of quartz - with between 300-700 grains run per sample (depending on the size of the nest) with on average 22% of the grains emitting an acceptable luminescence signal.
[64] Uncertainties at 68% confidence interval.
[65] This motif superimposes a Gwion Period anthropomorphic figure.

7.1.2. Discussion of new dates with old dates

New oldest date for an *in situ* painted motif in Australia

The results of the dating program offer a range of new minimum age estimates for the rock art sequence, most corresponding to the recent Wanjina Period. All age estimates are considered minimum ages as samples were only taken from material located directly on top of the art. The oldest date provides an OSL minimum age estimate of 24,000±2,000 BP for a mud-wasp nest superimposing a dark red indeterminately-shaped motif (Figure 7.1). This provides the oldest potential date for an *in situ* painted motif in Australia. Unfortunately, the motif cannot easily be assigned to one of the recognised stylistic periods, meaning that it cannot assist in anchoring stylistic shifts in the relative sequence or draw broader conclusions about the shifts in cultural behaviour. This minimum age estimate of 24,000 BP does provide evidence that rock art – not just pigment or unidentifiable marks – was produced in Australia more than 24,000 years ago. However, as there is only one other Pleistocene date for the stylistic sequence (Roberts *et al.* 1997) and the validity of this claim is disputed (Aubert 2012; Bednarik 2014), it is necessary to proceed with caution. Ultimately, by itself the date does not provide chronological evidence to support claims that the Gwion Period precedes the LGM. We cannot reliably assume Pleistocene antiquity for the rock art assemblage.

Figure 7.1 OSL date of 24,000 BP for a mud-wasp nest (circled) over a dark red bell-shaped motif (LR03D-1-1450)

Comparison between two dating methods

Samples from two motifs were processed using both OSL and AMS radiocarbon dating techniques; from a Wanjina Period 'Argula' anthropomorphic figure (Figure 7.2) and from an anthropomorphic figure of an indeterminate stylistic period (Figure 7.3). The 'Argula' figure returned an OSL minimum age estimate of 2,600±200 BP from a mud-wasp nest, and an AMS ^{14}C minimum age estimate of 1,230±35 BP from wax resin. The anthropomorphic figure of an indeterminate stylistic period returned an OSL minimum age estimate of 860±50 BP from quartz within the mud-wasp nest and an AMS ^{14}C minimum age estimate of 346-321 years cal BP from organics within the mud-wasp nest.

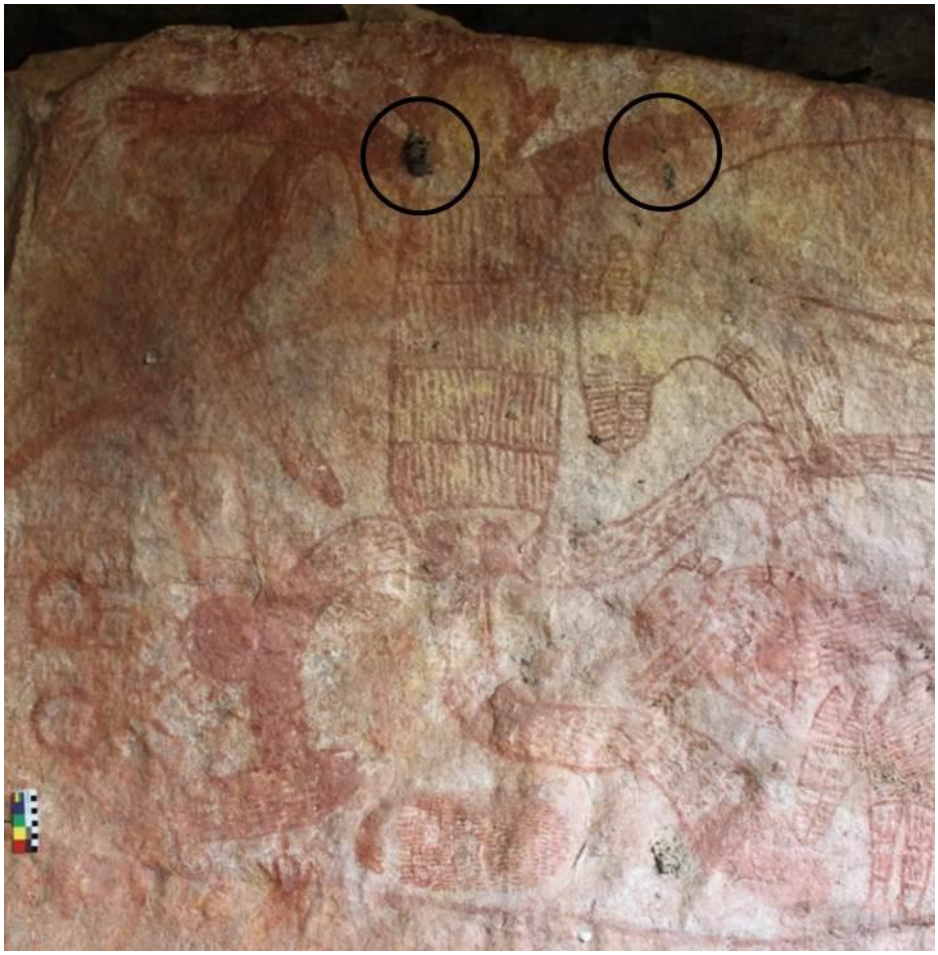

Figure 7.2 Mud-wasp nest (circled left) and wax resin (circled right) over Wanjina Period 'Argula' anthropomorphic figure (LR03D-17-1521), scale is 10 cm

Figure 7.3 Mud-wasp nest (circled) over anthropomorphic figure of an unclear stylistic period (OTB01-2-1892), photograph digitally enhanced using DStretch, scale is 10 cm

The AMS ^{14}C minimum age estimate provided for the 'Argula' figure draws a parallel with previously published ages for the black pigments in classic Wanjina-style paintings, dating from 1,210±140 BP (Morwood *et al.* 2010:6). If correct, the OSL minimum age estimate of 2,600±200 BP, however, extends our understanding of the development of classic Wanjina-style paintings by around one thousand years. This result suggests that classic Wanjina-style paintings developed closer to the known age for simple Wanjina figures, for example, the beeswax motif of a simple Wanjina head, which provided an AMS radiocarbon minimum age of 3,780±60 BP. The OSL and AMS ^{14}C minimum age estimates provided for the anthropomorphic figure of an indeterminate stylistic period correlate well. However, as the motif cannot easily be classified into the relative rock art sequence, these ages do not help anchor the assemblage.

Dating the Wararrajai Gwion Period

Wax resin overlying two motifs belonging to the Wararrajai Gwion Period was sampled and processed. One of the Wararrajai Gwion Period anthropomorphic figures returned two AMS ^{14}C minimum age estimates; one at 1,285±30 BP and the other at 1,290±30 BP (Figure 7.4). The second motif is a row of Wararrajai Gwion Period anthropomorphic figures, which returned an OSL minimum age estimate of 4,600±300 BP from an overlying mud-wasp nest (Figure 7.5).

The first anthropomorphic figure exhibits a number of traits common to the Wararrajai Gwion Period, including 'Square-Tip Legs', which have been identified as a core characteristic of the period. The row of anthropomorphic figures can be considered Gwion/Wararrajai Gwion Period transitionary figures as they contain *attributes common to both periods*, e.g. one figure has headdress type 'Droop Dunce Cap with Pom Pom' identified as a core characteristic of the Gwion Period, and six of the figures have a 'Two Line Body', most common in the Wararrajai Gwion Period (59.38%, n=38).

Figure 7.4 Wax resin (circled) over Wararrajai Gwion Period anthropomorphic figure (on right) provided AMS ^{14}C minimum age estimates of 1,285±30 BP and 1,290±30 BP (LR03C-2-1205), scale is 10 cm

Figure 7.5 Mud-wasp nest (circled) over a row of Wararrajai Gwion Period anthropomorphic figures provided an OSL minimum age estimate of 4,600± 300 BP (LR03D-12-1487), scale is 10 cm

These results sit comfortably with Watchman *et al.* (1997) results for the Gwion Period. The results of their preliminary study indicated that the Gwion Period is at least 4,000 years old (with the exception of the one maximum age estimate of 1,430±180). However, these are minimum age estimates only, and as such their actual age range is still unknown.

Dating the Wanjina Period

In addition to the 'Argula' figure, a Wanjina Period zoomorphic figure returned an age estimate earlier than any other published material. A macropod located at Kangaroo Shelter located east of the Lower Mitchell River, returned an OSL minimum age estimate of 5,800±300 BP from a mud-wasp nest (Figure 7.6). This macropod, painted on a ceiling panel, is depicted with internal features, which is unusual for the Kimberley, but common in Arnhem Land (Taçon 1987). The figure is polychrome, painted in red, yellow and white. It has a range of decorative infill applied, including 'Broad Longitudinal Line', 'Cross Hatched' and 'Ordered Fine Dot'.

Figure 7.6 Mud-wasp nest (circled) over a Wanjina Period macropod located on a ceiling panel, along the Lower Mitchell River (LMR02C-43-6202), photograph digitally enhanced using DStretch

Additionally, a Wanjina Period fish motif (OTB01-2-1890) returned an OSL minimum age estimate of 1,660 ± 610 BP from a mud-wasp nest (Figure 7.7). This motif superimposes a pair of Wanjina Period anthropomorphic figures. As a result, provides an additional minimum age for them.

Figure 7.7 Mud-wasp nest (circled) over Wanjina Period fish (OTB01-2-1890)

The results of the *Change and Continuity* dating program extend our understanding of the timing of the development of the Wanjina Period and classic Wanjina-style paintings. In order to secure these results and these implications, multiple similar age estimates will need to be obtained (Bednarik 2014:227).

7.1.3. Limitations of dates

It is important to keep in mind that the results of the *Change and Continuity* dating program provide minimum age estimates for the associated motifs only. Rather than directly dating the painting, a sample overlaying the motif was dated; exactly how much older the art underneath is remains unclear. As such, additional samples will have to be collected and analysed before a sound temporal sequence can be formulated for the art assemblage.

Lack of appropriate samples (e.g. mud-wasp nests associated with a motif clearly belonging to a specific stylistic period), problems of chronometric hygiene with

U/Th sampling, and an uncertainty of carbon sources all limited the success of the *Change and Continuity* dating project. Such difficulties in dating restrict our ability to robustly position the changes in the rock art sequence in time (David *et al.* 2013b:3).

Hopefully, we are moving closer to anchoring the Kimberley rock art sequence in a sound temporal framework so that we can better understand the correlations between stylistic changes, excavated evidence and climate and palaeo-environmental records. To do this, we need to apply multiple methods (where viable to collect) to high quality samples, and have a sound understanding of the samples being analysed. Only then can the validity of individual dates and suites of dates be progressively refined and higher resolution understandings be sought for particular archaeological questions (Ulm 2013:186).

7.1.4. Using subject matter as a temporal marker

Using subject matter as a chronological marker has not been of much help in the *Change and Continuity* study area, except for depictions of Thylacines (*Thylacinus cynocephalus*) and watercraft. No depictions of megafauna were identified.

Depictions of Thylacines can be used as temporal markers. There are two (possibly three) paintings of Thylacines recorded in the study area (Figure 7.8). The two that I accept as depictions of Thylacines can be classified as coming from the Gwion Period based on stylistic attributes. As Thylacines became extinct on the Australian mainland around 3,000 to 4,000 years ago (Johnson and Wroe 2003; Jones and Stoddart 1998), we have a minimum date for the Gwion Period, but this does nothing to anchor the paintings definitively. Ultimately, more research needs to be undertaken into the zoomorphic figures of the Kimberley, which make up 9.62% (n=729) of the motifs within the study area.

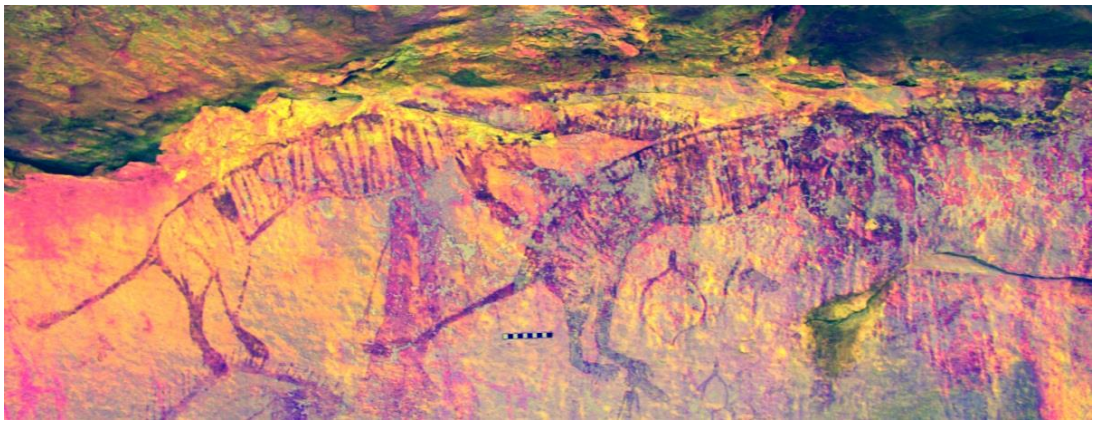

Figure 7.8 Pair of Thylacines along the Lawley River (UL29-1-4993, UL29-1-4996), photograph digitally enhanced using DStretch, scale is 10 cm

Fourteen depictions of watercraft were recorded within the study area. Of these depictions, seven are vessels typical of the European-style trading, pearling or fishing vessels that operated along the northern coastlines from the 1870s, e.g. twin masted sailing ships, probably sloops or schooners (Ross and Travers 2013:59). These depictions are identifiable as depictions of outsiders and have been correlated with the most recent stylistic period, the Wanjina Period. Additionally, two depictions of canoes containing crew members have been identified as belonging to the Wararrajai Gwion Period, based on stylistic attributes typical of period. Whilst these canoe depictions do not provide a temporal framework for the stylistic period, they do provide evidence for the use of watercraft during this period of rock art production.

7.1.5. ‘Short’ versus ‘Long’ Chronology

As shown, current dating of Kimberley rock art is insufficient to anchor the sequence in any meaningful way beyond the late Holocene. Because of this, the sequence cannot be accurately situated in one temporal framework. Therefore I present the following two options for the temporal framework of the Kimberley rock art sequence:

a) A ‘short’ chronology of around 11,000 years, and
b) A ‘long’ chronology of at least 25,000 years (Figure 7.9).

Such a dual system has previously been considered for the Kimberley by Veth (2013) and applied elsewhere in archaeological research; for example, the colonisation of Australia (e.g. Allen and O'Connell 2003) and the settlement of eastern Polynesia (e.g. Kirch and Kahn 2007). Pleistocene antiquity for Kimberley rock art has previously been suggested based on OSL dating of quartz grains from a mud-dauber wasp nest possibly overlying a Gwion Period anthropomorphic figure, which produced a minimum age of 16,400±1,800 years (Roberts *et al.* 1997); and an OSL minimum age estimate of 24,000±2,000 BP for a mud-wasp nest superimposing a dark red bell-shaped motif provided by the *Change and Continuity* project. If these dates are accurate, they indicate a 'long' chronology, commencing around 25,000 years ago. However, basing cultural interpretations on such a small sample of dates is highly problematic. For this reason, a 'short' chronology is also considered likely at this time, which places the beginning of the rock art sequence to the terminal Pleistocene, as all but two dates are restricted to the Holocene, and only one of the Pleistocene dates relates to a specific stylistic period.

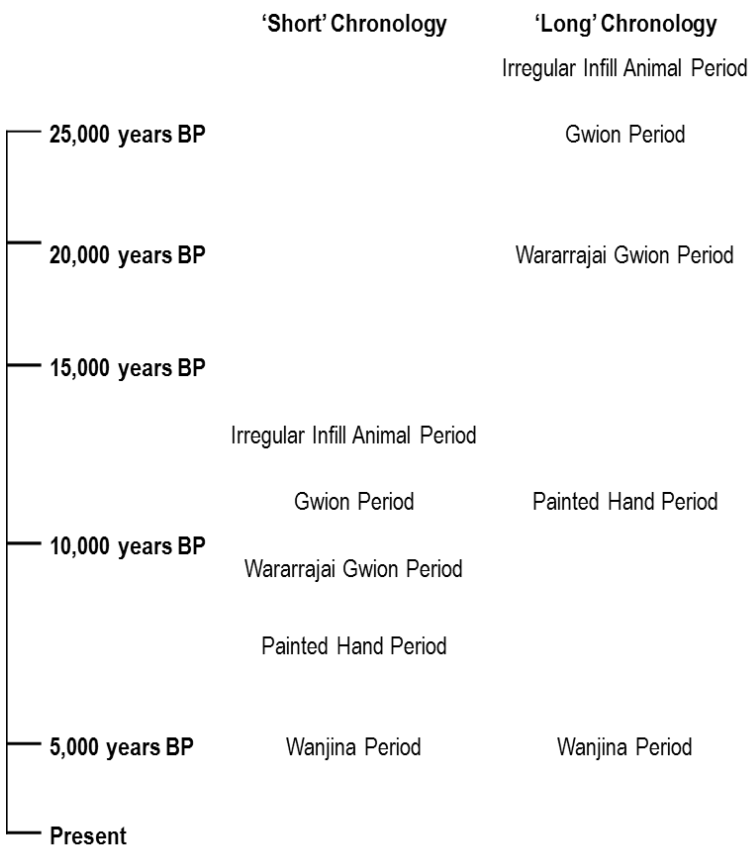

Figure 7.9 Proposed timeline for 'short' and 'long' chronologies

If I accept the oldest dates, the origin of the rock art assemblage of the Kimberley is of Pleistocene age, and the CA of anthropomorphic figures indicates cultural continuity throughout the LGM. However, if the rock art assemblage is restricted to a 'short' chronology, which agrees with Watchman's dates (Watchman *et al.* 1997) and Aubert's concerns, the sequence is of Holocene age only. Ultimately, until more data is available, I cannot say with any certainty, which one of these scenarios is likely to be more accurate. Notwithstanding these limitations, the following discussion considers change in stylistic behaviour in the northwest Kimberley in the context of these two temporal frameworks.

7.2. The environmental sequence

An understanding of Pleistocene and Holocene climate variability in the Kimberley is necessary in order to place archaeological findings into their wider environmental context. This is particularly important when the archaeological record indicates both cultural continuity and marked changes. Eren (2012:13-18) stated that, if climate change is influencing culture change, then the following three statements must be proven. First, there should be evidence of both environmental change and cultural change. Second, there should be tight temporal covariance of climatic/environmental events with behavioural changes. Third, there should be evidence falsifying other possible influences of culture change. Unfortunately, the connection between environmental change and culture change will rarely be clear cut, it is not a simple cause-and-effect process, and entirely unknown (to us) non-climate factors cannot be ruled out (Eren 2012:17-8).

The absence of secure dates limits our ability to correlate changes in the environment to cultural changes with any certainty and current conclusions are considered hypothetical. General acceptance of the hypotheses presented rests heavily on temporal correlation between environmental and behavioural change, which is still poorly understood in the northwest Kimberley (Allen and O'Connell 1995).

7.2.1. Palaeoclimate

Sea levels are known to have fluctuated throughout geological time, periodically encroaching or retreating across coastal plains. During the Quaternary, the dominant contribution to sea level change has been the periodic exchange of mass between ice sheets (also referred to as continental glaciers) and oceans (Lambeck and Chappell 2001:679). The most recent or last glacial period began around 45,000 years ago as a trend to cool, dry climates emerged. This last glacial period intensified rapidly with the onset of Oxygen Isotope Stage 2 (OIS2) approximately 30,000 years ago. By the end of OIS2, 17,000-25,000 years ago, dry conditions were so extreme that an exceptionally cold and dry phase transpired, referred to as the Last Glacial Maximum (LGM) (Hiscock 2008:56).

The Last Glacial Maximum

The LGM refers to a period in Earth's climate history when ice sheets were at their maximum extensions. Research undertaken by Yokoyama *et al.* (2000:713) indicates that 'from at least 22,000 to 19,000 (calendar) years before present, land-based ice volume was at its maximum', covering about 30% of the earth's surface (Williams 1993). The presence of the extended ice sheets, largely in northern latitudes, had dramatic impacts on the Earth's climate, causing drought, desertification, and a dramatic drop in sea levels, which in turn impacted local environments (Eren 2012:11; Mithen 2004:3; Yokoyama *et al.* 2000:713).

Within Australia, the effect of the LGM varied across the continent. Glaciation briefly occurred during and after the LGM though was restricted to the Snowy Mountains and the Tasmanian highlands on the eastern side of the continent; areas now displaying alpine vegetation (Kershaw 1995). Glaciers covered 19-32 km^2 in the Snowy Mountains region, and in excess of 2,000 km^2 in Tasmania and had local influences on climate, vegetation and presumably people (Kershaw 1995).

In broad terms, the climate was distinctly different to that of present interglacial conditions (Lambeck *et al.* 2002:343). Generally, cooler land and sea-surface

temperatures were characteristic of the LGM, with drier conditions than previously experienced, although episodic wet periods are noted in the fluvial records of northern Australia (Reeves *et al.* 2013:97). According to Barrows *et al.* (2002), lowest sea-surface temperatures occurred about 21,000 years BP and on land it was exceptionally cold and dry. Overall, the monsoon is considered to be inactive or greatly weakened at this time (Reeves *et al.* 2013:108).

General conditions such as reduced rainfall, increased aridity, increased evaporation and windiness, mobile sand dunes and lower mean annual temperatures, would have limited surface water availability and biological productivity (Bowler 1986; Chappell 1991; Hiscock 2008; Hiscock and Wallis 2004; Hubbarb 1995; Magee and Miller 1998; O'Connor and Veth 2006). Changes in rainfall, temperature and surface water availability acted together to enlarge desert landscapes, creating a much-expanded arid zone covering perhaps 65% of the continent (Allen and O'Connell 1995). Specifically, 'the semi-arid zone expanded laterally towards the continental margins, and previously semi-arid areas became arid' (Hiscock 2008:57). One of the main effects of the LGM was that the extended ice sheets locked water away, lowering the sea level, exposing continental shelves and creating extensive coastal plains.

Climate amelioration and onset of the current climate system

Yokoyama *et al.* (2000:713) argued that the LGM terminated around 19,000±250 years with deglaciation, a rapid decrease in ice volume. Continental ice sheets started melting and the sea level began to rise. In Australia, climatic amelioration after the height of the LGM is most clearly marked by the beginning of organic sedimentation in previously glaciated or periglaciated areas and by pollen changes in adjacent areas (Kershaw 1995). During this time, which incorporated the Pleistocene-Holocene transition, the Kimberley underwent substantial environmental changes as warmer and wetter conditions were established across the region (Reeves *et al.* 2013:109). Specifically, the climate warmed, the current tropical monsoon systems developed, rainfall generally increased, tree cover became more extensive, and the arid zone contracted (Allen and O'Connell 1995). By 14,000 years ago, the onset of the Indo-Australian Summer Monsoon (IASM) had occurred, corresponding with the flooding

of the Sunda Shelf. From this time, monsoon moisture across the region was greater and more reliable than at present (Reeves *et al.* 2013:97; Wyrwoll and Miller 2001). Such changes culminated with the onset of the El Niño Southern Oscillation (ENSO) dominated system, our current climate system.

Until recently, definitive evidence for the onset of monsoon moisture in northern Australia following the arid phase of the LGM has been elusive, in large part due to the lack of long, continuous sediment records. However, recent research is helping to identify the timing and nature of regional responses to global-scale climate change (see for example, Denniston *et al.* (2013a, 2013b); McGowan *et al.* 2012; and Wyrwoll and Miller 2001). These will be discussed in Section 7.2.2.

Sea level change

As a consequence of the LGM, oceans reduced dramatically revealing the continental shelf to a depth of up to 140 m below the present sea level, as moisture became locked up as ice or snow at high latitudes (Chappell and Grindrod 1983:67; Lambeck *et al.* 2002). 'This effect is most pronounced at continental margins far from the ice sheets, such as along the Australian coast' (Lambeck and Chappell 2001:682). As outlined by Allen and O'Connell (1995):

> *...now submerged areas of Bass and Torres Straits, the Arafura Sea, and the Gulf of Carpentaria were exposed, joining Australia, New Guinea, Tasmania and islands on the continental shelf into a single land-mass [Sahul] covering some 11.5 million square kilometres, an area roughly 35% greater than that of modern Australia.*

As such, the timing of sea level changes and their environmental implications are of importance to the interpretation of archaeological material (O'Connor 1999:20).

Comprehensive bathymetric models of sea level change have enabled the migration of coastlines to be estimated during glacial cycles, including the anthropologically important period in Australia from about 60,000 to the present (Lambeck and Chappell 2001:679). Global sea level over time has been determined by two methods:

- Dating of coral terraces raised by tectonic uplift (e.g. Huon), and
- Oxygen Isotopes from deep sea cores (Coller 2007).

Major changes over the 30,000 years, covering the extent of the 'long' chronology, are as follows. Thirty thousand years ago the sea level off the coast of the Kimberley was approximately 116 m below its current level (Figure 7.10). By approximately 25,000 years ago the sea level fell to a maximum low of minus 135 m, exposing much of the continental shelf. Due to the wide continental shelf off Australia's northwest coast, the coastline was some 120 km to the northwest of its current position (Coller 2007). Obviously such dramatic sea level changes make a big difference to land area, and to inhabitants of the Kimberley.

The sea level off the coast of the Kimberley had begun to rise by around 19,000 years ago, and stabilised at its current position at a generalised date 6,000 years ago (Barrows *et al.* 2002:159; Lambeck and Chappell 2001:683; Morwood and Hobbs 1995:750; O'Connor 2007:63). During this extended period of sea level rise (over 14,000 years), Lambeck *et al.* (2002:358) indicated that it was a non-uniform increase in ocean volume from the time melting started, and there may have been 'periods of stasis or even short reversals' (Beaton 1995).

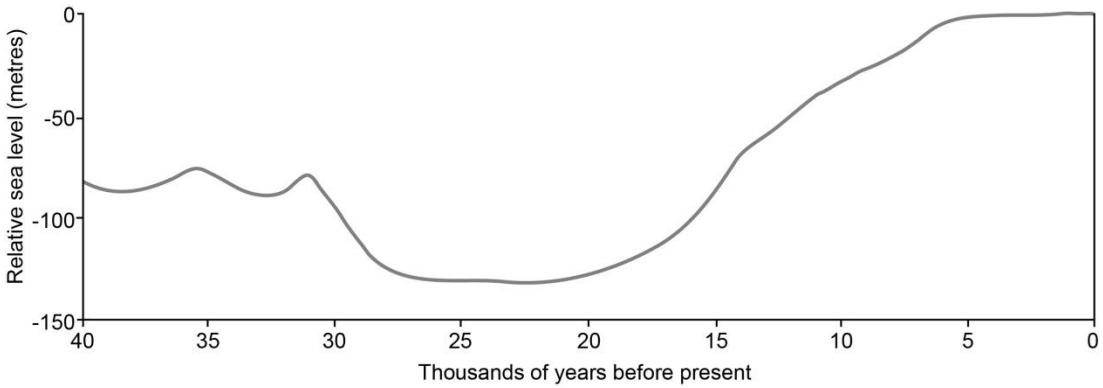

Figure 7.10 Relative sea level of Greater Australia (Sahul) during the last glacial cycle (after Coller 2007)

7.2.2. Summary of environmental and climatological changes in the Kimberley since the late Pleistocene

Following is a summary of environmental and climatological changes based on recent research by Denniston *et al.* (2013a; 2013b), McGowan *et al.* (2012), and Wyroll and Miller (2001). Wyroll and Miller (2001) presented a long term climate record of the Kimberley region through extensive dating of dune building and flood events, as well as the isotope analysis of stalagmite specimens from two separate drainage basins (Fitzroy and Lake Gregory) in the southern Kimberley. Denniston *et al.* (2013a) presented a stalagmite oxygen isotopic time series from Ball Gown Cave, located in the Napier Range also in the southern Kimberley. Denniston *et al.* (2013b) presented a record of IASM variability based on oxygen isotopic ratios of calcite and aragonite stalagmites from cave KNI-51, located in the Ningbing Range in the north-eastern Kimberley. This record represented the first absolute-dated, high-resolution speleothem record of the Holocene IASM from the Australian tropics. McGowan *et al.* (2012) presented palynological and sedimentological evidence from a sediment core collected from Black Springs, a mound spring in the northwest Kimberley. These climate records further our understanding of the environmental context for the early Kimberley inhabitants.

The climate record presented here is limited to the last 25,000 years as this is the oldest date (24,000±2,000 BP) for an *in situ* painted motif in the northwest Kimberley (and Australia).

Late Pleistocene climate variability (25,000 – 11,000 years ago)

The late Pleistocene was characterised by active summer monsoons during interglacials and a climate more arid than present during the LGM (22,000 – 19,000 years ago), which transitioned to humid conditions around 14,000 years BP. During the LGM, Sahul was colder and drier than at present, with a much-expanded arid zone covering perhaps 65% of the continent (Allen and O'Connell 1995). The palaeo-discharge record of the Fitzroy River in the southern Kimberley and the onset of a high lake-level event in Lake Gregory, both of which are proximal to Ball Gown

Cave, demonstrate the onset of the IASM by 14,000 years ago, and that from this time, monsoon moisture across the basin was greater and more reliable than at present (Wyrwoll and Miller 2001).

Early Holocene climate variability (9,000 to 7,000 years ago)

Similar conditions are also seen in the KNI-51 oxygen isotopic record during the early Holocene at the southern margin of the IASM system. Here, stalagmite $\delta^{18}O$ values decreased between 9 and 7 ka, marking increases in monsoon rainfall attributed to flooding of the Sahul and Sunda continental shelves as sea level rose (Denniston *et al.* 2013b:162).

Mid Holocene climate variability (7,000 to 5,000 years ago)

Later, a gradual shift toward higher $\delta^{18}O$ values from 7 to 5.5 ka marks a period of reduced IASM strength at KNI-51, followed by a return to peak monsoon rainfall from 5 to 4 ka (Denniston *et al.* 2013b:162). Other regional records indicate that the IASM was weakened and/or variable during this time. Pollen and sedimentological records from Black Springs (west of KNI-51) indicate that the region underwent rapid environmental change in the mid-Holocene starting around 6,300 years BP, when it transitioned from the tropical humid climate with intense summer monsoon activity to a much drier climate with increased aridity (McGowan *et al.* 2012:3). The IASM became less active or intermittent and total rainfall diminished at the time (Wyrwoll and Miller 2001:125-6). It was during the mid Holocene that the sea level off the coast of the Kimberley stabilised at its current position, at a generalised date 6,000 years ago. Obviously such dramatic sea level changes make a big difference to land area, and to inhabitants of the Kimberley.

Late Holocene climate variability (5,000 years ago to the present)

Change in pollen assemblages and an increase in fluvial sedimentation at Black Springs led McGowan *et al.* (2012:4) to suggest that the re-emergence of more active summer monsoons and increased rainfall occurred around 4,600 to 4,400 years BP.

Such changes have been attributed to the onset of an ENSO dominated climate system by various researchers (for example, Denniston *et al.* 2013b; Schulmeister and Lees 1995). Palaeo-environmental evidence of ENSO forced changes in climate around these times is supported by coupled ocean-atmosphere climate modelling studies (e.g. Liu *et al.* 2000; McGowan *et al.* 2012:4).

The transition from the mid to late Holocene is marked by the most prominent feature of the KNI-51 time series, 'a dramatic and sustained weakening of monsoon rainfall marked by a 2% increase in $\delta^{18}O$ values from 4.2 to 1.5 ka, with peak aridity centered from 1.5 to 1.2 ka', the signature of a severe drought (Denniston *et al.* 2013b:163). McGowan *et al.* (2012:3) agreed (although the timing differs slightly) that the climate of the Kimberley became much drier at this time due to an El Niño related drought, until around 1,300 to 1,100 years BP when it transitioned abruptly to conditions similar to today.

The Ball Gown Cave data reveals that a close and continuous link between the IASM and northern hemisphere climate variability prior and during the LGM was broken at the Pleistocene-Holocene transition as 'regional controls on the IASM became enhanced and ice cover at the high northern latitudes decreased in association with the early phases of deglaciation' (Denniston *et al.* 2013a:166-7). Ultimately, regional ocean conditions including sea-surface temperatures and flooding of the continental shelf broke the link of North Atlantic forcing of IASM dynamics during the LGM, thereby allowing the onset of the ENSO dominated system.

Overall, although the Holocene climate is not characterised by extreme climate fluctuations it has been significantly variable (Anderson *et al.* 2007:5). This enhanced variability has a close association with ENSO dominated system (Reeves *et al.* 2013:109). Records at KNI-51 (Ningbing Range, eastern Kimberley) present a dynamic Holocene IASM which strengthened in the early Holocene, decreased in strength by 4 ka, with a further decrease from around 2 to 1 ka, before strengthening again at 1 ka to years to levels similar to those between 4 and 2 ka (Denniston *et al.*

2013b:155). Denniston *et al.* (2013b) argued that ENSO may have played a dominant role in driving IASM variability since at least the middle Holocene.

7.3. The deposit sequence

Importantly, the rock art sequence is interrelated with other cultural elements, not just its climatic and environmental contexts. An understanding of the '…nature of rock art in relation to other cultural practices therefore needs closer examination if rock art studies are to be integrated meaningfully into archaeological analyses' (Rosenfeld 1997:291). Therefore, an outline of some of the results of the *Change and Continuity* excavations relevant to our understanding of the changes in the ways people behaved are presented below. Publications pertaining to the full spectrum of excavation results are forthcoming.

7.3.1. The northwest Kimberley excavations

Overall, the excavations undertaken as part of the *Change and Continuity* project have revealed two major findings. First, the excavations revealed evidence for continuous occupation in the northwest Kimberley from ca. 36,000 BP and across the height of the LGM (Moore 2013a:1). Second, the excavations revealed that a number of cultural changes that took place during the mid-Holocene (around 5,000 years BP), including alterations in stone artefact technology and late the development of shell middens. In the following section, I discuss this new evidence, and correlate it with the results of previous archaeological investigations of the broader Kimberley region, and later to the rock art assemblage.

Six relevant archaeological excavations were undertaken within the study area, comprising: two rock shelters (LMR01A, previously known as Reindeer Cave, and Kangaroo Shelter), three sand sheets (Brremangurey [Y38], Collapsed Shelter, and LMR01B, previously known as Reindeer Rock), and one shelter site with midden (Brremangurey [K26]).

OSL was used to establish a chronology for the occupation deposits at each of these sites. The results indicate that, of these six sites, three reveal human occupation during the Pleistocene (Collapsed Shelter, Brremangurey [K26] and Brremangurey [Y38]). OSL established basal dates at Collapsed Shelter and Brremangurey unit Y38 of 36,000±6,000 years BP and 36,000±1,000 years BP respectively (Moore 2013a). Whilst these basal dates are not as old as the dated sequences in the limestone country of the southern Kimberley, they are currently the oldest known dates in the northwest Kimberley. Brremangurey (K26) was dated to the terminal Pleistocene, 12,303±44 years BP (Moore 2013a). The remaining three sites contain Holocene cultural sequences (Kangaroo Shelter, LMR01A and LMR01B). Both Kangaroo Shelter and LMR01A are rock shelters with shallow deposits. There are only two excavated sites in the study area whose sequences cover the period of the LGM, limiting our understanding of Pleistocene prehistory in the region. Also limiting our understanding of site settlement patterns for this period is the fact that sites located along the continental shelf are now submerged.

Notably, dates that indicate human occupation of the region during the Pleistocene, prior to the onset of the LGM, were only obtained from excavated units in the sand sheets outside the main area of the associated rock shelters. At these sites, few artefacts were recorded on the surface, although many were recovered from the deposits. Such a pattern is also found in the Keep River region of eastern Kimberley, where ‘there is evidence of occupation in the sand sheets dated to the LGM, whereas only Holocene sequences are preserved in the rock art shelters’ (Ward 2004:7). Sean Ulm discussed this issue, stating that researchers general focus on ‘a limited range of site types inhibits our ability to develop sophisticated understandings of temporal and spatial variability in past Aboriginal lifeways’ (Ulm 2013:187). A major limitation of rock shelter deposits is that they are heavily biased in favour of the limited range of behaviours likely to have taken place in rockshelter contexts (Ulm 2013:187).

7.3.2. Evidence of continuous occupation of the northwest Kimberley

At both Brremangurey (Y38) and Collapsed Shelter, stone artefacts were distributed throughout the deposits, and continuously across the period of the LGM, indicating continual human occupation of the northwest Kimberley.

Collapsed Shelter (LMR02D)

A 1x1 m square was excavated in the sand plain 2.5 m beyond the dripline on the southwest side of the shelter. The excavation reached a maximum depth of 2.22 m with stone artefacts to a depth of 1.84 m below surface. The excavation was terminated when it reached the water table even though bedrock had not been reached (Ross *et al.* 2010:60) (Figure 7.11).

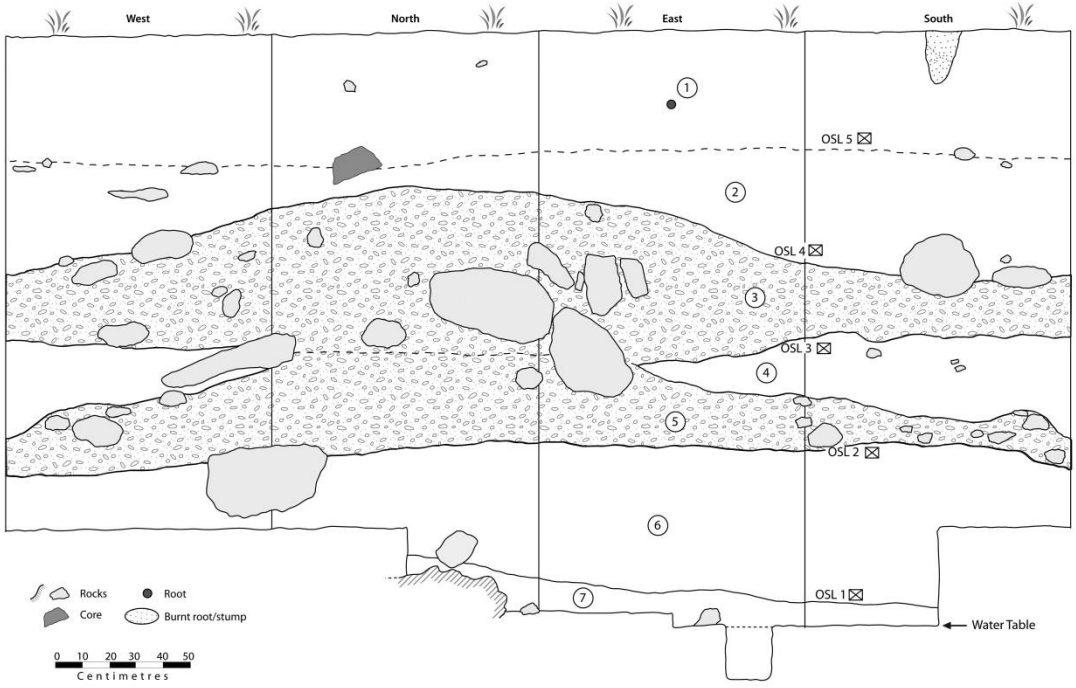

Figure 7.11 Collapsed Shelter stratigraphic units (from Ross *et al*. 2010, Figure 37)

Moore (2013a:3) reported that a total of 954 stone artefacts was recovered from the deposit. One artefact was recovered in sand dating between 28,000 and 36,000 years ago (OSL 2 and 1), however, this is a small, isolated find and the sand creates some

ambiguity. Artefacts have been securely dated from 28,000±6,000 years BP (OSL 2), where multiple artefacts are associated with the start of a rock lens. From this point, artefacts are distributed to the top of the excavation unit, including the period of the LGM (Moore 2013a:3). Within this deposit, the LGM is marked by the earliest layer of colluvial rocks (Moore 2013a:3). The continuous presence of artefacts within the deposit from around 28,000 years ago indicates that the site was occupied during the Pleistocene, over the period of the LGM and through to the late Holocene.

The rock art recorded within the shelter also attests to long use of the site. Collapsed Shelter contains rock art on all but the eastern side of the shelter. A total of 85 motifs were recorded and each of the identified stylistic periods is represented, including Irregular Infill Animal Period zoomorphic figures[66].

A major feature of the site is that the top of the outcrop has toppled to the northwest displacing and crushing some of the lower painted panels in the shelter on the west side (Ross *et al.* 2010:59). A pair of partial Gwion Period anthropomorphic figures (Yowna Gwions) are among the motifs affected. This suggests that these particular Yowna Gwion Period motifs were painted prior to the collapse of the shelter. In addition to this, motifs located on at least one rock art panel are aligned with the diagonal tilt of the shelter, while other panels and motifs are aligned horizontally, reflecting the shelters current position (Figure 7.12). This suggests that the diagonal motifs were painted prior to the tilting of the shelter. A Wararrajai Gwion Period anthropomorphic figure is located on one such panel. Disturbance is also evident on the western walls of the shelter where the matrix of the substrate appears to be softer. Panels here are broken and actively eroding and motifs have been painted onto newly exposed sections and fallen slabs indicating that some of the assemblage post-dates the major subsidence (Ross *et al.* 2010:63).

[66] In this case, stylistic periods have been identified for both zoomorphs and anthropomorphic figures.

Figure 7.12 Collapsed Shelter

a) Horizontal panel (LMR02D-10), scale is 10 cm

b) Diagonal Wararrajai Gwion Period anthropomorphic figure (LMR02D-13-6310)

If an age estimate for the collapse of the shelter could be established (assuming it occurred in one event), a minimum age estimate could be provided for the above motifs. Within the excavation unit, two lenses of colluvial rocks were encountered, relating to rockfall inside the nearby shelter, and perhaps correlating with the tilting of the massif. OSL dates were taken near the two lenses. The base of the earliest lens was dated to 28,000±6,000 BP (OSL 2). The base of the more recent lens was dated to 13,000±2,000 BP (OSL 3), and the sand above the lens was dated to 5,000±1,000 BP (OSL 4). These dates are approximate ages for the lenses only, as they dated material not directly associated with the lens, but material above and below it.

If the association of the lenses and the collapse of the shelter are related, the Gwion and Wararrajai Gwion Period motifs mentioned are likely to have been before 13,000

years BP or prior to the LGM, around 28,000 years ago. Both dates are within the Pleistocene, adding extra weight to the consideration of a 'long' chronology. This also suggests that rock art production has likely occurred throughout the entire period of human occupation and use of the site.

Brremangurey (OTB01)

The second site that spanned the LGM is Brremangurey[67] (Figure 7.13). Brremangurey is a large rock shelter located about 70 m from the present day shoreline, on the eastern side of Admiralty Gulf. The shelter floor (approx. 1,200 m^2) is covered with a cemented layer of shell midden and ash.

Figure 7.13 Brremangurey site plan showing extent of midden deposit and location of excavation pits (from Ross *et al.* 2011, Figure 17)

A 1x1 m square was excavated in the sand sheet to the south of the shelter (Y38). The excavation was terminated at bedrock and reached a maximum depth of 1.44 m

[67] 'Brremangurey' is the *graa* name given by the Wunambal Gaambera for the area between the Lawley River and King Edward River, including the coastal area containing the site reported here. *Graa* is a subdivision of country looked after by a family group (WGAC 2010). As the first major archaeological site to be excavated in Brremangurey, the name has been given to the shelter.

(Moore 2013a). A total of 514 stone artefacts were recovered from the deposit, continuously distributed from bedrock to near the surface of the deposit. The artefact count indicates that the sand sheet was not inhabited intensely. However, there is evidence of an increase in artefact density *during the LGM* with densities peaking between dated samples of 17,000±1,000 BP (OSL) and 24,000±1,000 BP (OSL). There is nothing visible in the stratigraphic section or any anomalies in the particle size analysis (Haworth 2014) to suggest an occupational hiatus or depositional disconformity during this period.

Ochre processing at Brremangurey

Excavations at Brremangurey recovered evidence of ochre processing during the Pleistocene. A red haematite ochre crayon was recovered from Pleistocene deposit within Brremangurey (Y38) in the stratum between the dates 17,000±1,000 BP and 36,000±1,000 BP. This provides the earliest evidence for ochre processing in the northwest Kimberley (Moore 2013a:4). Additional evidence of ochre processing was found in Brremangurey (K26). Striated ochre was abundant within a sand layer situated between 10,867±39 BP and 12,303±44 BP. Here, a total of 47 ochre crayons were recovered (348.51g), an additional 46 g of possible ochre, three ochre-smeared stone artefacts and a large ochre-smeared core (Moore 2013a).

Within Brremangurey rock shelter, a total of 345 rock art motifs were recorded, representing all stylistic periods in the Kimberley sequence, including Irregular Infill Animal Period zoomorphic figures (Figure 7.14)[68]. Significantly, the Wararrajai Gwion, Painted Hand and Wanjina Periods all occurred in the same frequencies. The low number of motifs in the Irregular Infill Animal and Gwion Periods suggests that rock production was initially low at Brremangurey and increased from the Wararrajai Gwion Period onwards. As there was no definitive peak in rock art production between the stylistic periods, it is impossible to effectively correlate the presence of a large volume of ochre crayons in Brremangurey (K26) between 11,000 and 12,000 years ago to a style definitively. It is useful to consider here, that while these ochre crayons may have been used for the production of rock art, they may also have

[68] In this case, stylistic periods have been identified for both zoomorphs and anthropomorphic figures.

resulted from 'pigment preparation for body- or object-painting or other purposes' (Taçon and Brockwell 1995:683).

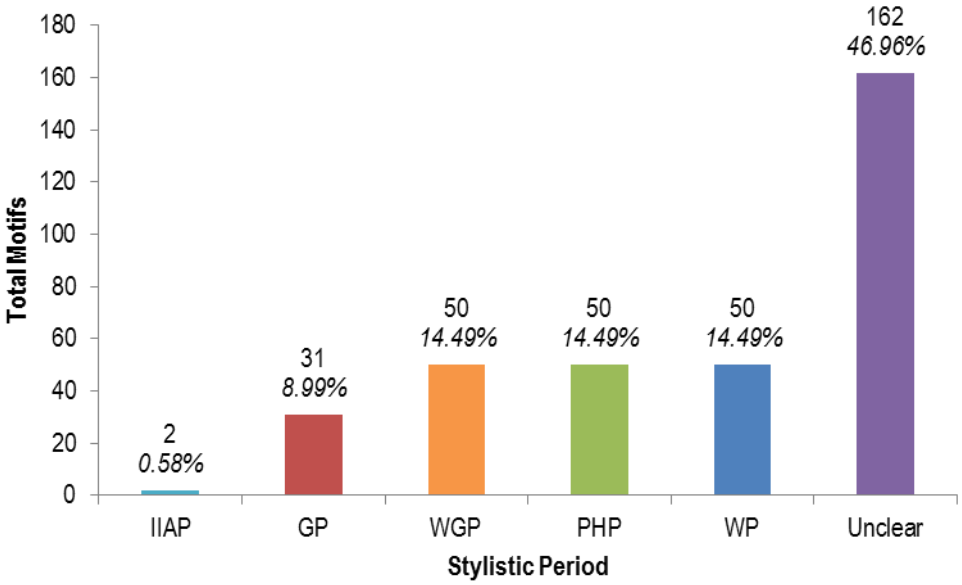

Figure 7.14 Motifs recorded by stylistic period at Brremangurey (n=345)[69]

The fact that Brremangurey rock shelter contains rock art motifs representing all stylistic periods in the Kimberley sequence indicates that the site has retained its significance for Aboriginal people over many thousands of years (Ross *et al.* 2011:40). The ongoing significance of the shelter to Aboriginal people is emphasised by the inclusion of ethnographic descriptions of some of the paintings in recent publications. Images of these paintings are provided in Figure 7.15.

> *The site was named as Woldjuar by Ian Crawford's informant (possibly Collier Bangmorra) after one of the prominent motifs painted on a low section of the ceiling (Crawford 1977). Crawford records that Woldjuar is a malignant spirit 'associated with the spirits of dead people which return to seduce living people away from their camp'. Traditional Owners also identified the salt-water Wanjina, Gayarra on the sloping ceiling near the front of the shelter (Ross et al. 2011:40).*

The Wunambal Gaambera people explain that the saltwater Wanjina, called *Gayarra* 'created the sea (saltwater country), coastal mountains, rivers, rocky shores, sandy

[69] The 'Unclear' motifs are largely indeterminate, meaning that they are too deteriorated to determine the subject matter and/or the stylistic period to which they belong.

beaches, mangroves and reefs and put all the things in our saltwater country' (Karadada *et al.* 2011:8). However, the site was not always located adjacent to the sea.

Figure 7.15 *Woldjuar* (left, OTB01-30-2107) and *Gayarra* (right, OTB01-19-2030) at Brremangurey, scale is 10 cm

Elsewhere within the study area, the significance of the Wanjina Period and its relationship to the complex myths of the local Aborigines is also evident. Located at Munurru, near the crossing of the King Edward River are two dominant bichrome Wanjina Period figures (Figure 7.16). These paintings tell the story of Wadjuwa and Dumbi who painted themselves in the small shelter. Wilfred Goonack explains the 'long one there is called a Wadjuwa, Dumbi (owl), come here and draw themselves. That Wadjuwa there, he's a spirit man…Yerremela, they travel together as companions' (WGAC 2000:29).

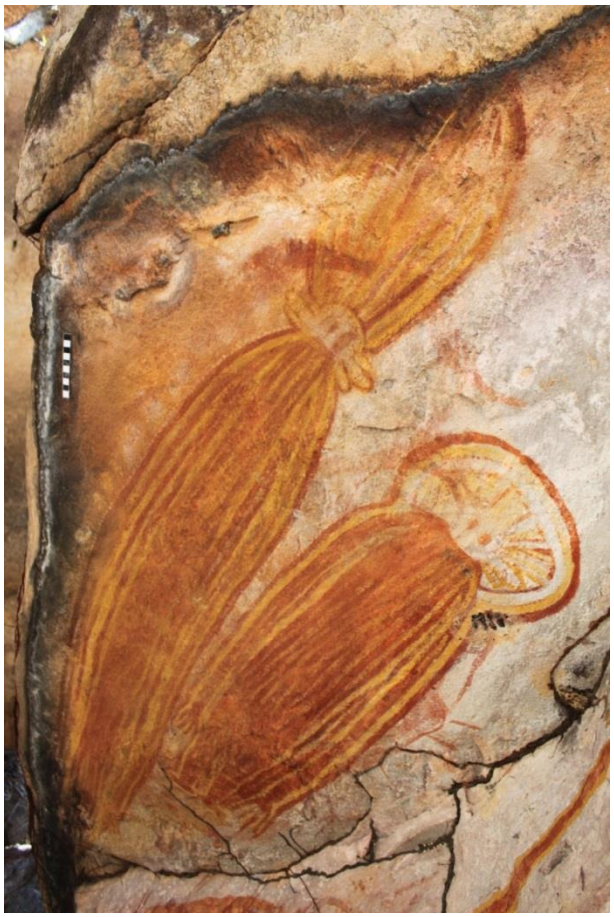

Figure 7.16 Wadjuwa and Dumbi at Munurru (KERC01), scale is 10 cm

Correlation with the results of other Kimberley excavations

The excavations undertaken as part of the *Change and Continuinty* project, alongside excavations at both Miriwun and Monsmont Shelters in the east Kimberley all indicate continuous occupation of the Kimberley throughout the LGM. The only area with a marked hiatus is the southern Kimberley, which is currently being re-examined.

Evidence shows that the climate and environment across the Kimberley varies both spatially and temporally, and conditions that appear to be occurring in parts of the southern region are not necessarily reflected further north. The fact that the southern region experienced increasingly arid conditions during the LGM, including 'increased windiness, mobile sand dunes, less vegetation cover, and for many areas a decrease in surface water availability' is due to its latitude; at the time of the LGM it

would have been within the continent's much-expanded arid zone, which may have affected people's ability to occupy the region (O'Connor 2007:75; O'Connor and Veth 2006:35). The same cannot be said of the northwest region of the Kimberley, and it may well have served as a refuge zone.

7.3.3. Holocene trends

In addition to continuous occupation of the northwest Kimberley, the *Change and Continuity* archaeological research revealed a number of changes that took place during the late-Holocene, including alterations in stone artefact technology (e.g. the appearance of bifacial and unifacial points) and the development of open-air and shelter shell middens. These changes replicate similar changes documented elsewhere in the Kimberley and across the Top End and are indicative of changing behaviours (see, for example, Balme 2000; David and Chant 1995; O'Connor 1996; O'Connor *et al.* 2014; Veitch 1996).

Alterations in stone tool technology

Brremangurey (K26) contained the earliest evidence for the introduction of point technology in the northwest Kimberley, at 3,394±25 BP (Moore 2013a:8). This is later than their occurrence in the southern Kimberley, but approximates the results of Bruce Veitch's archaeological investigations on the Mitchell Plateau. Veitch (1996:86) found that point technology appeared by 2,820±90 years BP at the rock shelter site of Ngurini, located approximately 20 km south-east of the Lower Mitchell River site complex, which includes Collapsed Shelter.

A shift in the raw materials used is also evident.

> *There seems to be a consistent pattern of abundant quartzite and volcanic/metavolcanic materials early in the sequences, a dominance of quartz crystal in the middle, and an influx of quartzite in the upper spits (Moore 2013a:9).*

As quartzite is the most abundant locally-available raw material at all of the excavated sites, this may indicate a possible shift in use of the landscape through

time, with patterns becoming more localised. This shift may also correspond with changing stylistic behaviour, particularly, the clear shift from overhangs to rock shelters, and also in panel and motif placement selection through time.

Formation of shell middens

The shell midden found in the Brremangurey rock shelter is approximately 85 cm thick and has a maximum basal date of 2,444±34 BP (Ross *et al* 2012:42). The establishment of the midden at Brremangurey ca. 2,500 years ago is 'contemporary with the development of the open-air middens excavated by Veitch' (Moore 2013a:8). Veitch (1996:85-6) found that from stabilisation of sea level around 6,000 years ago, there appears to have been an exponential increase in the number of occupied sites, which included shell middens along the newly established coast, particularly in the past 3,500 years. A heavy reliance on shellfish is evident at the shell midden site of Wundadjingangnari by 3,130±60 years BP, located on the opposite side of the Admiralty Gulf to Brremangurey (Veitch 1996:85-6). At a similar time, point technology had appeared for the first time at Ngurini in the same area.

David (2004:158) considered that the emergence of open-air shell middens at Princess Charlotte Bay during the late Holocene implies 'the emergence of new and intensive settlement, exploitation and consumption systems'. They attest to Aboriginal responses to changes in environmental conditions, involving a shift to high-intensity exploitation of an abundant food resource, and a centralised disposal pattern over a period of 2,500 years, which was used and reused until high mounds eventually formed (David and Chant 1995). The same patterns occur in the northwest Kimberley.

Increase in site use

Pollen and charcoal analysis undertaken by Simon Haberle (Australian National University) and Cassandra Rowe (Monash University) indicates that there is an increase in charcoal at Collapsed Shelter during the late Holocene (Figure 7.17).

Increased charcoal occurs within the first stratigraphic unit, from spit 10, with a peak in spit 1. *If* an increase in charcoal is indicative of increased site use, and *if* increasing site use can be used as a proxy for population growth then it appears that populations within the vicinity began to markedly increase around the last 900 years BP (OSL 5).

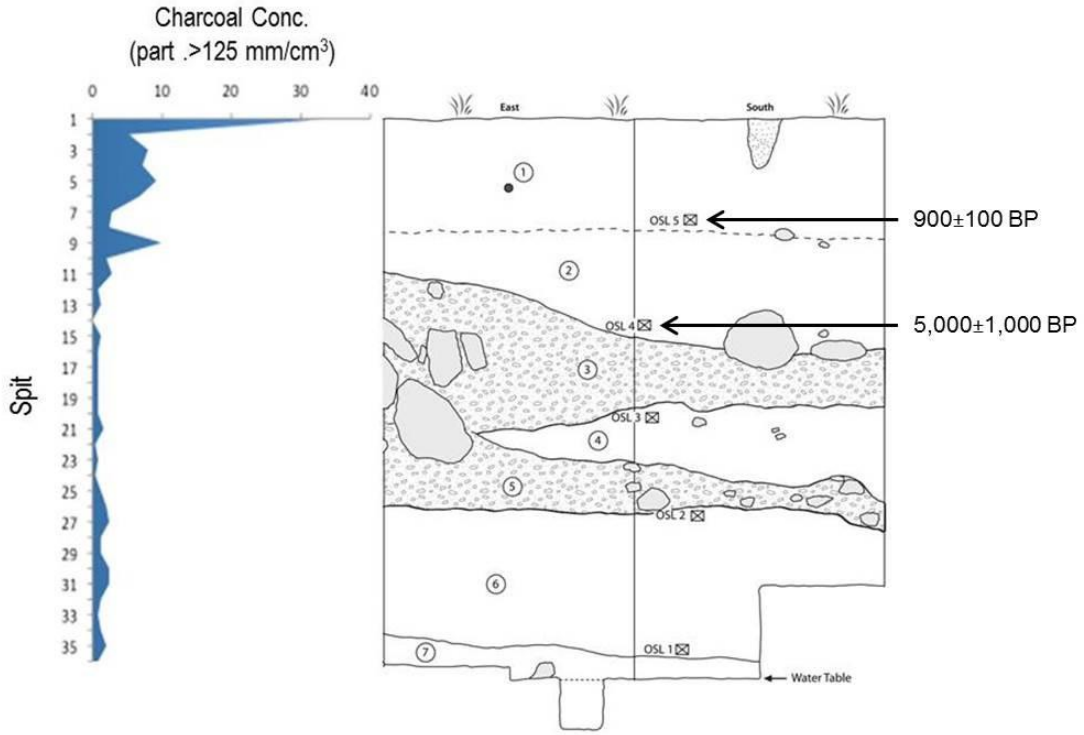

Figure 7.17 Charcoal concentration in Collapsed Shelter excavation unit (LMR02D)

Summary of deposit sequence

What is evident from the results of the excavations is continuity across the LGM at sites located on sand sheets, and a shift in cultural behaviour from the mid-Holocene onwards. I will now discuss the emerging demographic patterns of the Kimberley over the last 50,000 years. These demographic patterns have been formulated from the *Change and Continuity* excavations, Veitch (1996) and Williams (2013) and have been framed within our current understanding of climatic and archaeological change in the Kimberley, to provide a clearer understanding of the changing nature of human occupation in the Kimberley.

7.4. The demographic structure

Little is known about the Pleistocene population of the Kimberley. Recently, Alan Williams (2013) undertook an analysis of population levels and argued that time-series modelling of available radiocarbon dates from all Australian archaeological sites demonstrates that there were low populations throughout the late Pleistocene, before a slow stepwise increase in population growth beginning in the Pleistocene/Holocene transition, approximately 12,000 years ago (Figure 7.18). Williams (2013:5), outlined general trends evident in the uncorrected data-binned radiocarbon dates:

> *[L]ow numbers between 50 and 20 ka….before a decline to some of its lowest values between 16 and 12 ka; and finally constant increase from 12 to 0.4 ka. From 12 ka, the curve begins initially as a steady increase, within which there are a series of pulses (at approx. 8.3–6.6, 4.4–3.7 and 1.6–0.4 ka).*

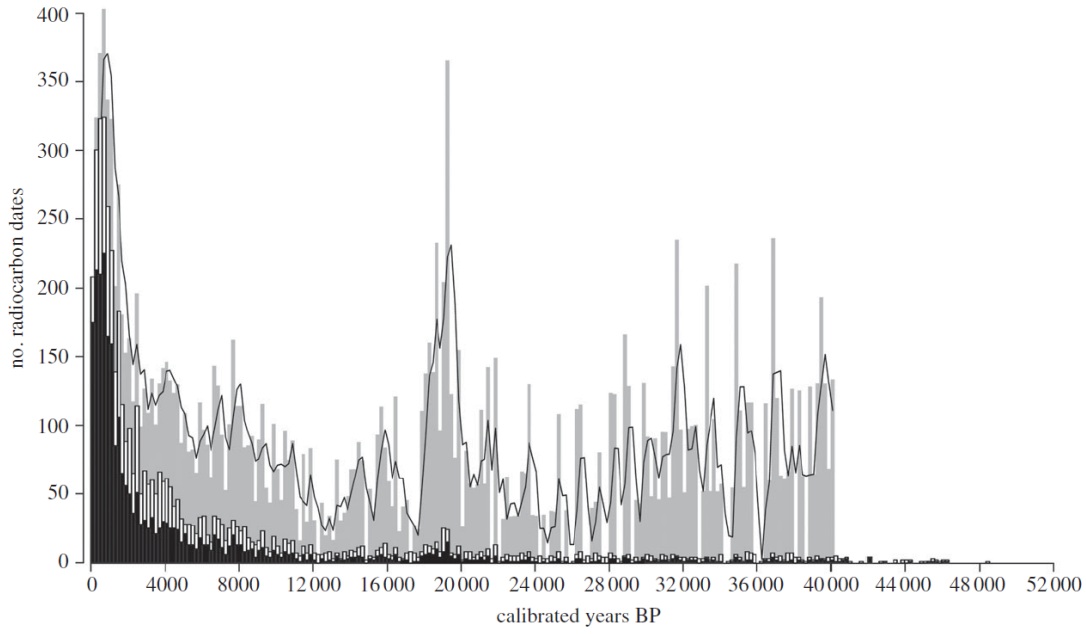

Figure 7.18 Entire dataset of radiocarbon dates from Australian archaeological sites [70] (from Williams 2013:4, Figure 2)

[70] 'The entire dataset (n = 4575; ΔT = 155) calibrated and data-binned into 200-year time intervals, uncorrected for taphonomic loss and presented as a stacked bar chart (white bars, rockshelter data; black bars, open site data). Grey bars present the same data-bins with open site data taphonomically corrected (after Williams 2012) and combined with uncorrected rockshelter site data; a 600-year moving average line is presented through the taphonomic data' (Williams 2013:4).

While not accepted by all, Williams (2013:2,8) postulated that changes in population levels over the last 50,000 years, reveal close correlations to a range of climatic and environmental factors. 'As population growth coincides with Holocene stabilisation of climate, it may be the case that high-amplitude environmental fluctuations kept population relatively low throughout the Late Pleistocene', for instance, during the LGM, 'where declines of up to 61 per cent are observed between 21 and 18 ka' (Williams 2013:8). Davidson (1990:50) supported climatic driven population hypotheses, stating that:

> *In the most unpredictable of continents, short term variations in environmental conditions would have frequently had catastrophic effects on small groups, and long term variations would have been more dramatic.*

Across Australia, the increase in population during the Holocene is evident through the activation of new sites (Ulm 2013); dense occupation deposits (Smith 2006) and rock engravings (Smith *et al.* 2009); the appearance of complex technology (e.g. fish traps) and food processing techniques (e.g. Macrozamia plants) (Ulm 2013). Increase in populations in the Holocene are thought to coincide with sea level stabilisation and strengthening of the northern monsoon as continental shelves were flooded (Williams 2013:8). This timing corresponds to changes in the archaeological excavations and the rock art assemblage of the northwest Kimberley such as the appearance of point technology, shell middens and the introduction of a new art style (Table 7.4). Additionally, artefacts densities were greatest in inland Holocene deposits (e.g. Kangaroo Shelter) (Moore 2013a).

Table 7.4 Timing of Holocene trends in the northwest Kimberley

Appearance	Holocene trends
2,444±34 BP	Maximum basal date of shell midden found in the Brremangurey rock shelter
2,820±90 BP	Lowest Kimberley point fragment in Ngurini excavation (Veitch 1996)
3,130±60 BP	Radio carbon date from the second lowest spit in Wundadjingangnari open shell midden site (Veitch 1996)
3,394±25 BP	Evidence for the introduction of point technology in the northwest Kimberley (Brremangurey [K26])
5,800±300 BP	OSL minimum age estimate of Wanjina Period macropod
6,000 BP	Stabilisation of current sea level (Coller 2007, see also Lambeck and Chappell 2001)

Such Holocene trends were also reflected in the work of Veitch in the northwest Kimberley. Archaeological research undertaken by Veitch (1996:86) on six sites in the Mitchell Plateau area provided evidence for a 'substantial increase in the regional rate of site usage during the last 3,500 years', corresponding with the onset of the ENSO dominated system. Veitch (1996:74,86) saw this as an amplification of regional developments incorporating the appearance of Kimberley point technology, increased rates of cultural discard, faunal remains and ochre, and reliance on intertidal shellfish. This was particularly the case at the rock shelter site Ngurini, located on the Mitchell Plateau, where increased rates of cultural discard are associated with the appearance of point technology (Veitch 1996:86).

7.5. The rock art sequence

Throughout this research, emphasis has been given to data that are relevant to an investigation of change and continuity in the northwest Kimberley prehistory. I will now draw together these findings in order to investigate the dynamics of cultural practices in northwest Kimberley prehistory. Using both the 'short' and 'long' chronological scenarios, the following chapters relate the changes in the rock art sequence to the multiple strands of contextual evidence outlined above, in order to develop an understanding of the driving factors of continuity and variation in the assemblage through time. As previously described, there is a 'short' chronology of

about 11,000 years based on radiocarbon dating, and a 'long' chronology of about 25,000 years based on luminescence dating.

I suggest that social, demographic, environmental, climatic and economic factors can be considered at least potentially inter-related drivers of cultural change and concomitant changes in the art assemblage. As Allen and O'Connell (1995) correctly stated 'local environments simply provide an arena in which the developments take place'. Central to this argument is the concept of art as a functional part of a social system, whereby art is not a passive symbol but a purposeful behaviour determined socially or culturally through complex behavioural processes, reflecting intentional choices made by individuals and/or groups to communicate particular messages.

As a visual aid, the temporal correlations between climatic variability, sea level change, appearance of the midden and points, dates for the rock art assemblage mentioned within this chapter are illustrated in Figure 7.19.

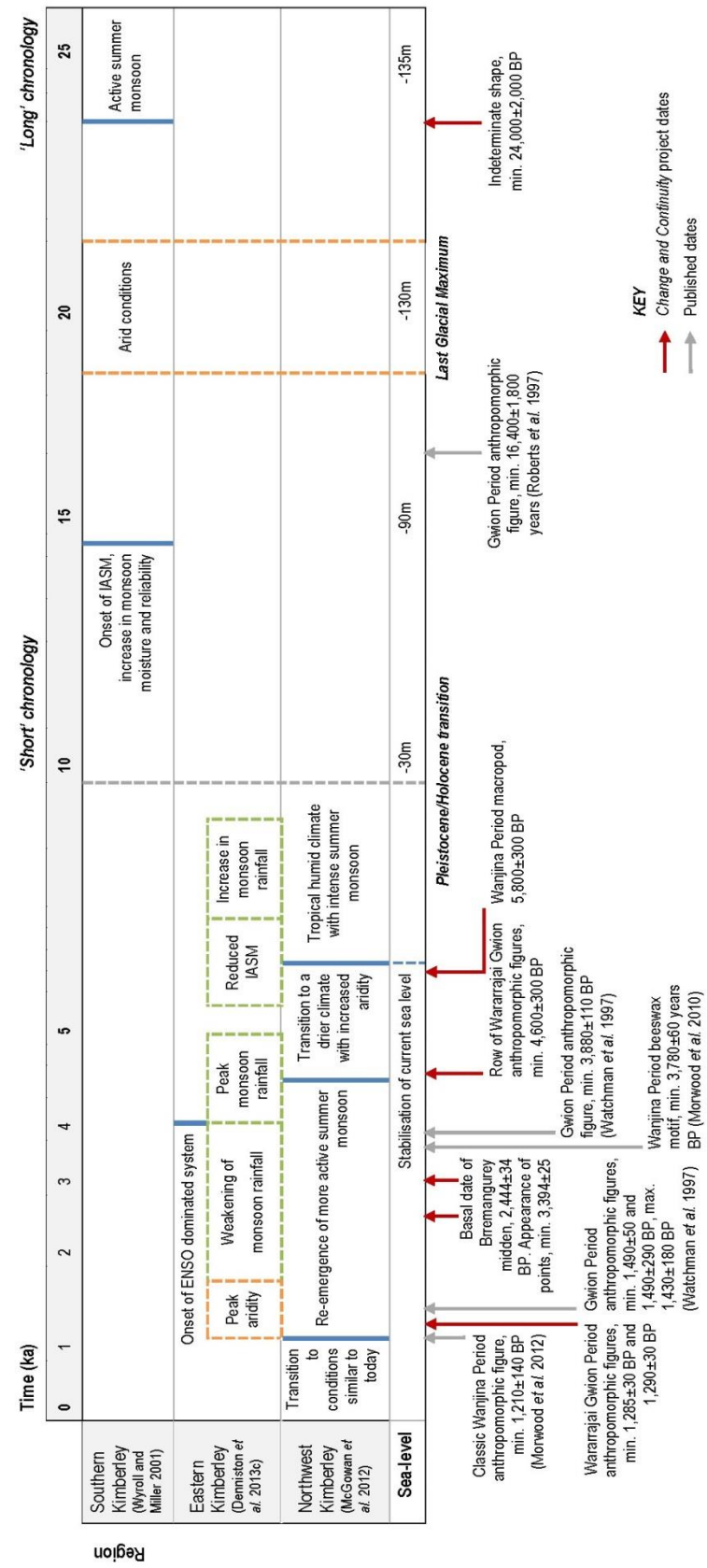

Figure 7.19 Climate variability and sea level since the late Pleistocene, with direct dates of the rock art sequence

Chapter 8. The 'Short' Chronology

Scenario one; the rock art sequence developed over a reduced timeframe. The 'short' chronology places the beginning of the rock art sequence to the terminal Pleistocene, as all but two dates are restricted to the Holocene, and only one of the Pleistocene dates relates to a specific stylistic period. Within this proposed chronology the Gwion Period is tentatively linked to the Pleistocene-Holocene transition (11,000-9,000 years ago), the Wararrajai Gwion Period to the early-Holocene (9,000-7,000 years ago), the Painted Hand Period to the mid-Holocene (7,000-5,000 years ago), and the Wanjina Period to the late-Holocene (5,000 years to the present).

In this chapter I discuss the spatial patterning of the anthropomorphic figures in the northwest Kimberley art assemblage. Once the variations in the structure of the assemblage have been identified, the contextual evidence is brought into the discussion, in order to identify the events that may have initiated or influenced the introduction of each stylistic period to discern the role rock art may have played in mediating social interactions and affiliations.

8.1. Spatial Patterning

As the results of this thesis have shown, gradual changes in attribute preferences through time are apparent. Importantly, change is also apparent in the spatial patterning of the art assemblage through time, including changes in site preferences and motif placement. Exactly how the spatial distribution of each stylistic period changed through time in conjunction with the shifting attribute preferences can be interpreted as symptomatic of differences in the social structure of the artists that produced them, as stylistic behaviour is considered here to be a 'referential context of social action' (Hodder 1982:8; Layton 1985:434). The ways in which these changes relate to the 'short' chronology will be discussed throughout this chapter.

8.1.1. Spatial distribution of stylistic periods

All stylistic periods were recorded throughout the study area. Conversely, outside the study area, the precise spatial distribution of stylistic periods in the Kimberley is poorly defined; however, Morwood and Hobbs (2000) have provided a preliminary diagram illustrating the known distribution of stylistic periods (Figure 8.1). Anecdotal evidence on the spatial distribution of stylistic periods suggests that this map needs refining.

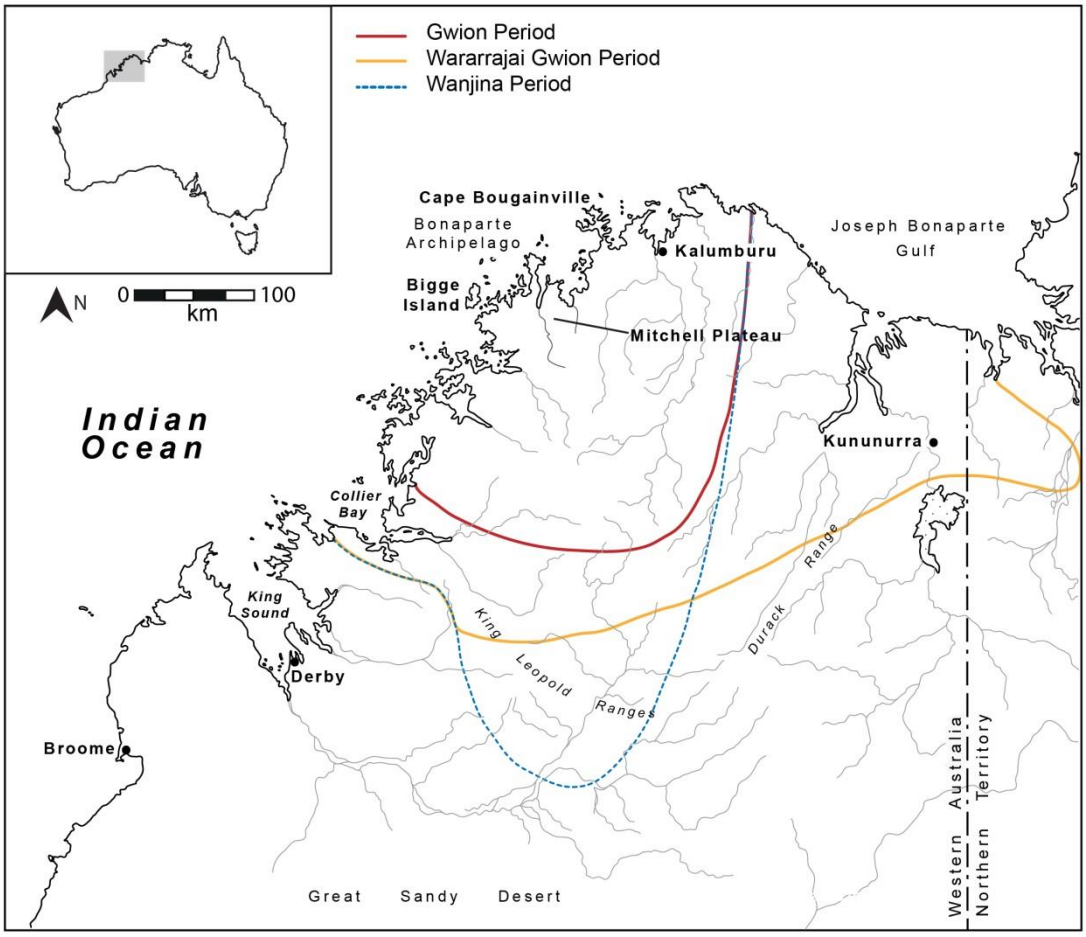

Figure 8.1 Distribution of stylistic periods (after Morwood and Hobbs 2000:35, Figure 29)

On a broad scale, spatial distribution of stylistic periods varies significantly through time. The Gwion Period is the most spatially limited period, restricted to the northern Kimberley, although isolated examples do exist outside the main distribution area

shown (Morwood and Hobbs 2000:35). The Wararrajai Gwion Period then spreads towards the east Kimberley, with examples also occurring in the Victoria River District in the Northern Territory (Morwood and Hobbs 2000:35). During the Gwion Period the coastline was up to 120 km to the northwest of its current position, therefore, the area utilised by the artists of the Gwion Period, may have been equal in size to that of the Wararrajai Gwion Period, but, the rising sea level is likely to have driven the population eastward. Evidence of the original extent of the Gwion Period catchment is available through appearance of Gwion Period anthropomorphic figures found on islands located off the coast of the Kimberley, e.g. Jar Island in Vansittart Bay, Wollaston Island and Bigge Island (Rainsbury 2009:232). These islands are likely to have been part of the mainland during times of lower sea level. According to Welch (1990:120), both the Gwion and Wararrajai Gwion Periods:

> *...were found from Manning Creek Gorge and Mt Elizabeth Station in the south to Kalumburu in the north. They extend from at least Mt Hann in the west to Kununurra in the east. However, no monochrome or bichrome figures are present among 22 art sites recorded in the Napier Range, south-west of Manning Creek Gorge. The Napier Range consists of limestone, and all paintings seen there are of the recent polychrome type.*

According to O'Connor *et al.* (2013:540), no Gwion Period motifs have been reported from the Napier Range of the southern Kimberley region, between Derby and Fitzroy Crossing 'where Wanjinas and associated graphics are the dominant rock art tradition' (Crawford 1968). This being said, Blundell (1975:221) has recorded the rare presence of a Gwion Period figure in the Napier Range.

Unfortunately, the distribution of the Painted Hand Period is not included in Figure 8.1 and therefore cannot be discussed. A major shift in distribution of stylistic periods occurs in the Wanjina Period, with a spread in the southerly direction. This signifies a dramatic change in human use of the landscape through time. At this time, a change in direction from an east-west cline to a north-south cline occurs. Interestingly, Crawford (1968:116) and Capell (1972:53,83) have both observed that the depiction of Wanjina figures becomes less frequent the further east you travel, where Wanjina figures are gradually displaced by paintings of pythons, relating to the cultural role of animals in the most recent stylistic period. At the time of the

establishment of the Wanjina Period c. 5,000 years ago, climatic amelioration resulted in the contraction of the arid zone and in effect, expanded the available area for resource procurement on the margins of the Kimberley region.

8.1.2. Change in site preferences

Spatial patterning also changed on a much finer scale. Analysis of the anthropomorphic figures recorded within the study area showed noticeable changes in relation to site preferences through time.

Nearly sixty percent (58.13%, n=726) of Gwion anthropomorphic figures are located in overhangs, while less than one quarter (24.18%, n=302) are located within rock shelters. This is in accordance with Walsh's observation that '[m]any of these finely detailed figures survive on exposed boulder faces, which are totally unsuited for any form of habitation or shelter' (Walsh 2000:173). Accessibility to sites is for the most part, easy (86.55%, n=1,081), well over half of the anthropomorphic figures (69.65%, n=870) are located near a reliable water source (including creeks, billabongs, rivers and rock holes). A strong preference for vertical panels is evident during the Gwion Period (72.38%, n=904), with just under half located in the middle section of the panel (49.95%, n=624). Panels at the entrance to shelters are frequently selected, although visual dominance does not seem to be a primary focus (2.80%, n=35). Anthropomorphic figures within the Gwion Period are placed in easy-to-see, easy-to-reach locations, typically located in the line of sight of passers-by.

Wararrajai Gwion Period anthropomorphic figures have a more varied spatial distribution although they are usually clustered with stylistically similar figures within individual sites. There is an increase in the association with rock shelters (32.70%, n=260), although, overhangs are still favoured (42.77%, n=340). Accessibility to the site remains for the most part easy (63.90%, n=508), however, moderate access peaks within this period (35.47%, n=282). A higher percentage of anthropomorphic figures are placed on the ceiling in comparison to the previous

Gwion Period (24.53%, 11.21% respectively), although the preference for vertical panels is still apparent (55.85%, n=444).

Within the Painted Hand Period, the preferential shift from overhangs to rock shelters is finalised, with over fifty percent (51.73%, n=194) of anthropomorphic figures located in rock shelters, and less than a quarter located in the previously preferred overhangs (23.20%, n=87). An increase in the preference of exposed boulders occurs within this stylistic period (16.53%, n=62). Accessibility to sites remains predominately easy (87.73%, n=329), although sites with difficult access are most common with the Painted Hand Period (7.20%, n=27). Panel orientation preference shifts to ceilings (48.80%, n=183), and preference for vertical panels is at its lowest (33.60%, n=126).

Over half of the Wanjina Period anthropomorphic figures are located within rock shelters (54.31%, n=372), and an almost equal number are distributed between overhangs and exposed boulders (15.33%, n=105 and 15.91%, n=109 respectively). Though a preference for rock shelters is clear, variation in site type is also evident. Hence, not all Wanjina Period anthropomorphic figures are located in habitable locations as previously thought (see Crawford 1977:363; Morwood *et al.* 1994:84). Accessibility remains easy (87.01%, n=596). Wanjina Period anthropomorphic figures are evenly distributed between ceiling and vertical panels (39.71%, n=272 for each).

Within the study area, most of the recorded sites include at least one depiction of an anthropomorphic figure (91.18%, n=186). Of these sites, just under fourteen percent (13.98%, n=26) depict anthropomorphic figures from each of the main stylistic periods (excluding the Irregular Infill Animal Period); no sites within the study area depict anthropomorphic figures in all five stylistic periods. Of the 186 sites depicting anthropomorphic figures, most incorporate a combination of stylistic periods, showcasing the continued use of sites through time (65.59%, n=122). It is interesting to note that just 64 sites (34.41%) are associated with a single stylistic period, i.e. Irregular Infill Animal Period (1.08%, n=2), Gwion Period (20.97%, n=39),

Wararrajai Gwion Period (3.23%, n=6), Painted Hand Period (2.69%, n=5), and Wanjina Period (6.45%, n=12).

Changes in site preferences through time are evident when comparing the characteristics of sites solely associated with Gwion Period anthropomorphic figures to those solely associated with Wanjina Period anthropomorphic figures. Within the Gwion Period, 39 sites contain anthropomorphic figures associated with this stylistic period alone. These sites are most frequently overhangs (74.36%, n=29) with easy access (92.31%, n=36), and are often located in close association to each other. Changes are noticeable when comparing these characteristics, to the characteristics of the 12 sites associated with anthropomorphic figures solely of the Wanjina Period. These sites vary between exposed boulders and overhangs (33.33%, n=4), rock shelters (25.00%, n=3), and one rock shelf. All but one site has easy access, with the other difficult to access as it was located on an elevated, narrow ledge. Two of these sites are associated with human skeletal remains, and five also include surface artefact scatters. Correspondingly, of the 12 rock art sites that house human skeletal remains in the study area (see Table 5.7), 83.33% (n=10) depict Wanjina Period motifs. This association correlates well with previous observations that human skeletal remains commonly occur in association with Wanjina paintings (see Crawford 1977:363; Morwood *et al.* 1994:84).

8.1.3. Change in motif placement

Overall, the most notable changes are shifts from overhangs to rock shelters, and change in the preferences for the placement of anthropomorphic figures across the stylistic periods, from vertical to ceiling panels. To further highlight this variation through time, I take a closer look at one of the sites, Brremangurey, which has a representation of anthropomorphic figures from each of the main stylistic periods (excluding the Irregular Infill Animal Period). Though it can be argued that the placement of more recent motifs is affected by the placement of earlier motifs, the frequency of superimpositions counteracts this argument. Of the 3,685 anthropomorphic figures recorded within the study area, 45.45% (n=1,675) are in a superimposed relationship with another motif.

Brremangurey (OTB01)

Forty-eight panels of rock art were recorded at Brremangurey. Art was recorded on vertical ledges at the entrance to the shelter, and across the entire sloping ceiling at the front and rear of the shelter, with a particularly dense panel of paintings on a large flat area of the ceiling above the excavations (Ross *et al.* 2011:41).

Within Brremangurey, the changing preferences of artists through time are well represented, particularly the changes in motif placement (Figure 8.2). Within Brremangurey Gwion Period anthropomorphic figures are predominately found on vertical panels at the front of the eastern and western ends of the shelter on vertical ledges (81.48%, n=22), whereas Wanjina Period motifs are dominantly found on ceiling panels within the shelter (67.57%, n=25). This clinal shift first occurs within the Wararrajai Gwion Period, as motifs are placed on both ceiling and vertical panels in similar proportions. The shift becomes most pronounced in the Painted Hand Period, with more motifs placed on the ceiling than vertical panels, and continues into the Wanjina Period.

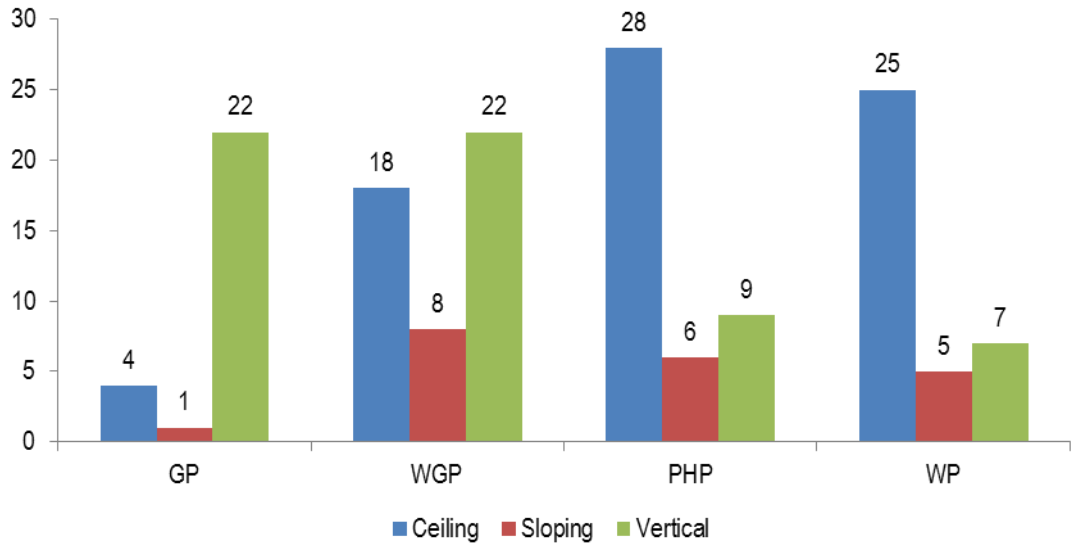

Figure 8.2 Panel orientation of anthropomorphic figures by stylistic period at Brremangurey (OTB01)

8.1.4. Implications of spatial patterning

Changes in the ways humans marked the landscape imply not just alterations in the use of specific sites through time, but a reorganisation of cultural practices. This is due to the understanding that, although cultures integrate themselves within and adapt themselves to their natural environments, changes to cultural practices involve *deliberate* 'decisions made within the context of established convention, social hierarchies and the interplay of various interest groups' (David 1994:14). For this reason, I believe that the pattern of variation through time demonstrated above is not purely responsive to environmental change e.g. due to changing access to resources caused by the changing sea levels and climatic conditions, but was determined socially or culturally.

Some predictions about stylistic behaviour

Rock art articulates social action. In order to understand why the spatial patterning of the art assemblage varies so greatly through time, I focus on how rock art is used as a medium in the pursuit of particular social strategies (Wobst 1992). Here, I am interested in how the paintings lend themselves to varying social contexts and social strategies. Wobst (1977) and Wiessner (1983; 1984; 1989; 1990) have both addressed the topic of stylistic behaviour and its articulation with cultural processes and social strategies.

Wiessner (1989) suggested that style is used as a means of communication through which people negotiate their personal and social identity *vis-à-vis* others, through identification via comparison. Wiessner suggested that social and personal identity can be switched on by certain situations, as social identity is the mechanism that makes group behaviour possible (Wiessner 1989:57). Specifically, Wiessner (1989:59) listed a number of situations that are likely to invoke a strong sense of social group identity, these include: 'fear, intergroup competition, and the need for co-operation to attain social, political or economic goals, or imposed political control'. Hence, any change in the amount of social expression in a region through

time should give some measure of changes in the social, economic and/or political conditions (Wiessner 1989:59).

Wobst (1977:327) agreed that the majority of functions of style should relate to processes of *social integration* and *social differentiation*. He argued that rock art is a product of human action, and action is informed by the social context in which the artist acts (Wobst 1992). In relation to social integration, Wobst (1977:327) stated that stylistic messages of 'identification, ownership, and authorship link efficiently those members of a community who are not in constant verbal contact and who have little opportunity to observe each other's behaviour patterns'. Following on from this he summarised an individual's economic and social situation by concluding that, 'stylistic messages may play a more active role in the integration of social groups' (Wobst 1977:327).

Conversely, stylistic messaging may also support processes of social differentiation, allowing individuals to express their social and economic group affiliation towards outsiders. Style helps to 'mark, maintain, and further the difference between these groups at little cost' (Wobst 1977:328). Wobst (1977) claimed that style would be most appropriate for expressing group affiliation under stressful conditions because of its efficiency for transferring recurrent messages to a socially distant segment of a population. Complex ideological systems and group specific features can be reduced to simple and unambiguous stylistic messages (Wobst 1977:328). He claimed that in an environment of intense competition, a premium is placed on processes of differentiation between interacting (and competing) groups, and boundary maintenance (Wobst 1977:332).

I interpret the observed changes in stylistic behaviour in the northwest Kimberley as indicating broader processes of social group identification and competition e.g. *social integration* during the Gwion Period, and *social differentiation* during the Wanjina Period (Wobst 1977:327, see also David 1994; Layton 1991; Lewis 1988, 1997; Smith 1992a).

8.2. Social Integration

Art assemblages that show widespread social expression (stylistic similarity) are thought to correspond with open social networks across interdependent groups (Gamble 1982:92, Wobst 1977, Wiessner 1989, see also Officer 1993:25, and Smith 1992a:34). In this situation, style is not being utilised as a means of stylistic comparison, rather it is being used as communication of unity. Smith (1992a:34) argued that 'relative stylistic homogeneity indicates the functioning of open social networks in areas of low population density or resource scarcity, or both'. According to Smith (1992a:34):

> *Such studies contend that groups of people living in environments with low population densities require social mechanisms that facilitate bonding between normally dispersed groups. These social mechanisms minimise the negotiations necessary to obtain access to the resources of neighbouring groups of people in times of resource stress, thus allowing a high level of mobility across the countryside.*

As well, low population densities are likely to participate in a larger social network in order to enhance chances of biological and cultural survival (Wobst 1974:152). In one aspect, open social networks constitute exogamous marriage networks, which:

> *...guarantees the biological survival of its members, since the members of a minimum band have to rely on a larger number of persons than their own membership in order to provide a member with a mate upon reaching maturity (Wobst 1974:152).*

This theory is based on the premise that style is actively employed and indicates intentional choices made by individuals and/or groups to communicate particular messages (Wobst 1977). Differences in style can thus be used to communicate messages about group affiliation and identity (see Wobst 1977 for a detailed discussion). Where attributes are relatively homogeneously patterned across space, it is assumed that continuity exists in social practice; 'the presence of contiguous traits implies some form of interaction between individuals or groups across space' (David 1994:15). An example of the correlation between stylistic homogeneity and a claim for relatively open social networks is provided by Gamble through his research on Upper Palaeolithic female figurines (Gamble 1982). Gamble argued that the stylistic similarity of Upper Palaeolithic female figurines indicates the existence of open

social networks, which he argued are a feature of poor environments, and perhaps an indication of the 'strains being placed upon alliances in the mating network' (Gamble 1982:103). He contrasted this to the stylistic heterogeneity of Magdalenian cave art, which he considered to be indicative of local, closed social interaction networks (Gamble 1982:104). A similar pattern occurs in the *Change and Continuity* data.

The Gwion Period is a relatively homogeneous stylistic period. The fact that the Gwion Period contains a large number of core characteristics (n=87), 36 (41.38%) of which were recorded within this stylistic period alone, combined with the clustered nature of the Gwion Period anthropomorphic figures in the CA plot (see Figure 5.20) suggests that this stylistic period has a high level of motif standardisation or homogeneity. This level of motif standardisation is thought to extend well beyond the boundaries of the study area. Published examples of Gwion Period anthropomorphic figures outside the study area are stylistically very similar to those within (Figure 8.3). Attributes displayed on the examples provided in Figure 8.3 from Drysdale River, located in the north central Kimberley, constitute a variety of the core characteristics within the study area. For example, a) 'Angled Slipper' feet, 'Angular Boomerang', 'Cummerbund Waistband', 'Feet in Same Direction', 'Paunch Detail', 'Rounded Chest Band', 'Triangle Hands', 'Triple Tassel', 'Triple Tassel Elbow Band', and b) 'Crescent Boomerang', 'Cummerbund Waistband', 'Paunch Detail', 'Plan Bending', 'Three Point Sash', 'Tuft Arm Band'. McDonald (2008:230) said stylistic similarities in items of material culture and body detail are among the signs for regional cultural cohesion.

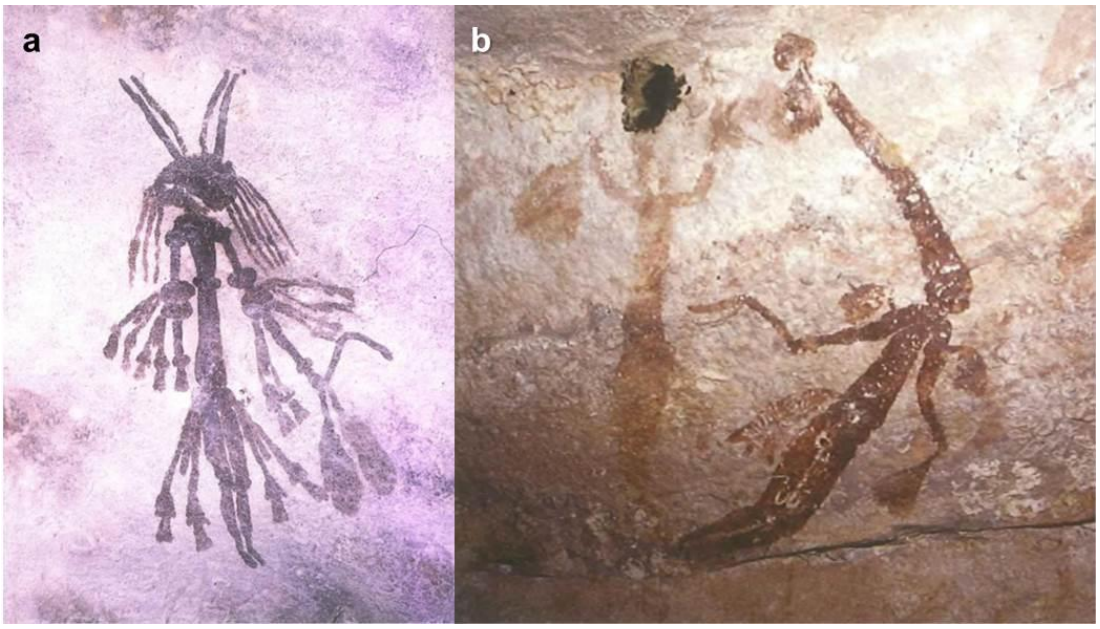

Figure 8.3 Example of Gwion Period anthropomorphic figure outside the study area

a) Drysdale River (from Welch 2007:88, Figure 5.14)

b) Drysdale River (from Donaldson 2007:15, Figure 1.28)

The distribution of stylistic similarities over great distances demonstrates the mobility of artists through extensive social networks (McDonald and Veth 2006:98). Moreover, the Gwion Period was a period of intense signalling, demonstrated by the fact that the production of anthropomorphic figures in the art assemblage was at its peak during this period (n=1,249). Although we will never know the exact function the art served during this period, the repeated placement of Gwion Period anthropomorphic figures in easily accessible and visible locations is symptomatic of the communication of messages relating to regional cultural cohesion.

I argue that the proposed lower population densities in the northwest Kimberley during the Pleistocene-Holocene transition may have been influential in creating a need for an open interaction network. Excavations undertaken as part of the *Change and Continuity* project suggest low population densities in the Pleistocene based on analysis of artefact numbers. This conclusion is supported by Williams (2013) who argued that time-series modelling of all available radiocarbon dates from all Australian archaeological sites demonstrates that there were low population densities throughout the late Pleistocene, before a slow stepwise increase in population

beginning during the Pleistocene-Holocene transition, approximately 12,000 years ago (see Figure 7.18). The proposed open interaction network is likely to have extended into western Arnhem Land.

One of the features of north Australian rock art remarked upon by many researchers is the apparent similarity between the art of the Kimberley and western Arnhem Land. This is particularly the case for the earlier periods, which regularly depict anthropomorphic figures (Figure 8.4). Among others, Berndt and Berndt (1964:357,365), Chaloupka (1984:55, 1993:118), Crawford (1968:82, 1977:357,369), Lewis (1988:84-5,93-5,104,111-12), Schulz (1956:12), Taçon and Chippindale (2008:75), Walsh (1994:55), and Welch (1990:121-3, 1993a:25-7) have all mentioned the similarities between the two art assemblages (Lewis 1997:1).

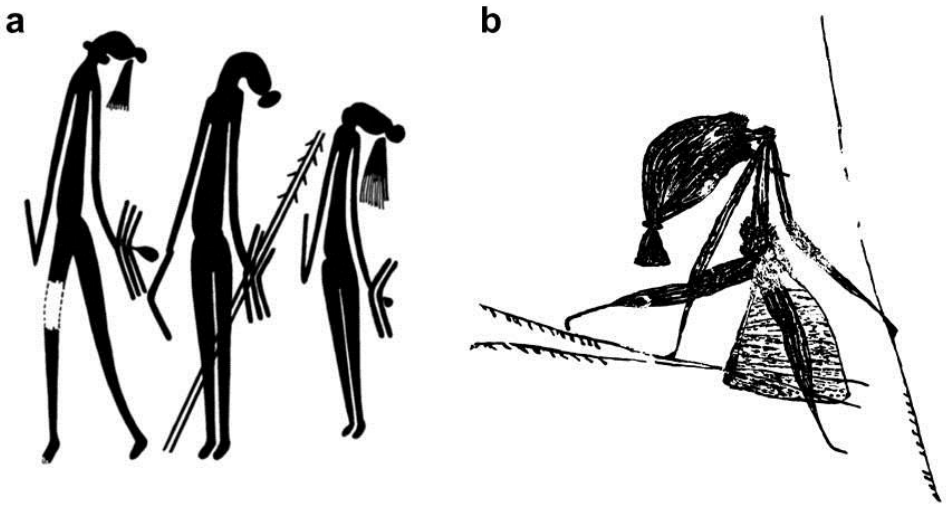

Figure 8.4 Similarity between the art of the Kimberley and western Arnhem Land[71]

a) Dynamic Gwion Period anthropomorphic figures of the Kimberley (from Walsh 2000:151, Figure 158)

b) Dynamic figures from Arnhem Land (from Lewis 1988:160, Figure 6)

[71] Within the literature there is much debate about the various terminology used to describe the stylistic periods of Arnhem Land rock art (e.g. Dynamic figures [Chaloupka 1993, Taçon and Chippindale 1994] versus Boomerang Period [Lewis 1988]), but 'the fundamentals of the manners of depiction, different periods, the sequence of changes, and the nature of particular forms of representation are essentially similar' (Taçon and Brockwell 1995:683).

The similarities between the Gwion Period of the Kimberley and the Dynamic figures of western Arnhem Land have been summarised by Barry and White (2004:42), as follows: both show small monochrome humans who bear many similar clothes and ornaments, males dominate, females are rare, children non-existent, and both groups commonly carry boomerangs and sometimes spears, and artefacts are often portrayed nearby figures. Lewis (1988, 1997) also saw parallels between the subsequent period, the Wararrajai Gwion Period and Post-dynamic figures, or using his terminology, the 'Hooked Stick' Period.

> *In both regions these [Dynamic/Boomerang Period] figures were replaced by a series of quite varied new styles marked by the addition of a 'hooked stick' to the old tool kit, by a decline in the complexity of ceremonial decoration, by figures with gaps in the red pigment where another colour or colours once existed, and by an increase in apparent 'aggression' (Lewis 1997:14).*

Lewis (1988, 1997) and Taçon and Chippindale (2008) considered the resemblances between the two regions so striking that a cultural connection between the regions existed, known by some as the 'Kimberley-Arnhem Land rock-art Province' (Taçon and Chippindale 2008:75). In particular, Lewis (1988, 1997) hypothesised that similarities between the art sequences in the Kimberley and western Arnhem Land indicated that these regions were once part of a single, open, late Pleistocene/early Holocene information network. Furthermore, Crawford (1977:357) considered the Gwion Period to be a local variant of an art form which extends into the Northern Territory, and quite possibly Queensland. According to Crawford (1981:25):

> *Along the southern margin of Kimberley the boundary between the Kimberley culture and the desert culture is clearly defined on material culture, language and marriage pattern, but the eastern boundary is not so distinct and cultural traits merge into the Northern Territory.*

In the absence of absolute dates for rock art styles in western Arnhem Land, researchers including Taçon and Chippindale (1994) have correlated the habitats of animal species depicted in the rock art superimposition sequence with dynamic environmental changes. In relation to Dynamic figures, Taçon and Chippindale (1994:216) claimed that:

> *An analysis of the material culture, extinct fauna and environmental adaptations depicted, as well as the dating of silica crusts that have formed over Dynamic Figures, indicate they are older than 6000 years BP and suggests they may be about 10,000 years old (see Watchman 1987, 1990).*

In relation to the age of Dynamic figures, Taçon and Brockwell (1995:684) argued that Dynamic figures 'can confidently be placed in the Pleistocene-Holocene transition period'. David *et al.* (in prep.) has recently indirectly dated a Post-Dynamic figure to between 9,000 and 13,000 cal BP. This new age determination for Post-Dynamic Figures (Chaloupka 1993; Taçon and Chippindale 1994), otherwise named the 'Hooked Stick' Period by Lewis (1988), which replace Dynamic figures in the Arnhem Land relative stylistic sequence further supports the proposed 'short' chronology within the northwest Kimberley. Alternatively, Lewis (1988) determined that they have a minimum age of 9,000 years BP, but may date to the LGM, which corresponds with the 'long' chronology.

8.2.1. Shifting cultural practices in the northwest Kimberley

The Wararrajai Gwion Period marks a shift in the cultural practices of the Kimberley. Notable changes in stylistic choices begin to occur within the Wararrajai Gwion Period, including the reduction in the naturalistic representation of human form, and a decrease in the amount and variety of Dress Detail and Body Decoration depicted. Another change that occurs in the Wararrajai Gwion Period is the increased appearance of bichrome anthropomorphic figures, from 13 in the Gwion Period to 107 (13.46%). Additionally, polychrome figures appear for the first time within this period (1.51%, n=12) (Figure 8.5). The unstable nature of the secondary pigments (i.e. yellow and white) lends weight to the 'short' chronological scenario, as the likelihood of white pigment enduring for up to 20,000 years is considered poor. Bichrome and polychrome figures increase markedly in the Wanjina Period (24.09%, n=165, 10.07%, n=69 respectively).

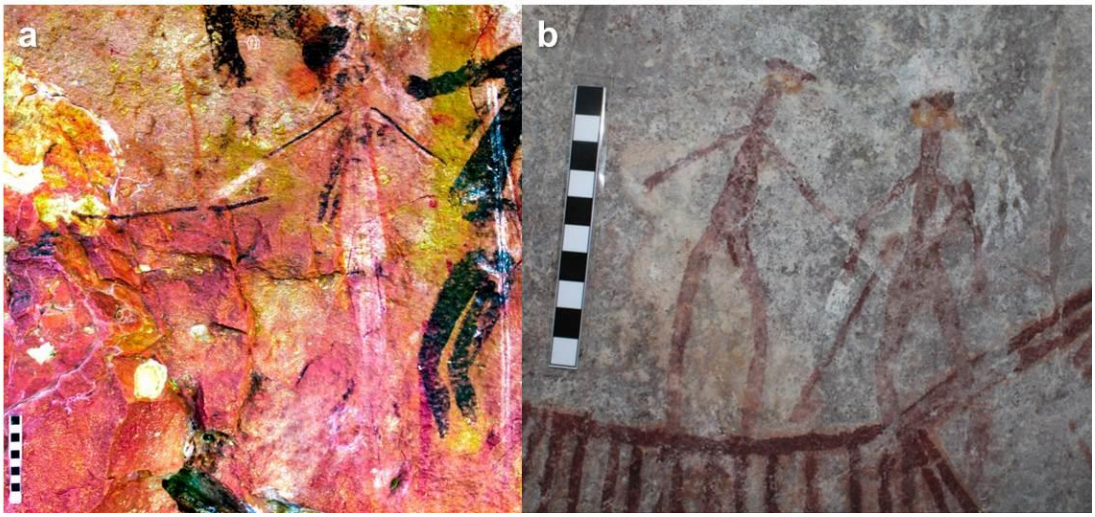

Figure 8.5 Polychrome Wararrajai Gwion Period anthropomorphic figures, scale is 10 cm

a) Light red, mulberry and white (BSC03-7-259), photograph digitally enhanced using DStretch
b) Red, yellow and white pigment (MP01-3-3056)

Changes in material culture items are also apparent within the northwest Kimberly rock art sequence from the Wararrajai Gwion Period onwards, including artefact preferences. Artefacts most commonly associated with the Wararrajai Gwion Period include multi-barb spears (singularly, in pairs or in groups), the 'Hooked Stick' and the 'Spatula Handle Spearthrower'. This is in contrast to the Gwion Period, where the most common artefact type is the boomerang. This shift, which may appear on the surface as abrupt, is actually clinal. For instance, 'Hooked Sticks' were also recorded in association with Gwion Period anthropomorphic figures (n=4), and boomerangs continue to be depicted into the Wararrajai Gwion Period (n=34). In addition to these stylistic changes, shifts in spatial patterns also occurred including an increase in the association with rock shelters, an increase in the placement of motifs on ceiling panels, and a general spread towards the east Kimberley.

During the Painted Hand Period, changes remain on a similar trajectory as in the Wararrajai Gwion Period. There is a marked decrease in the amount and variety of Dress Detail and Body Decoration depicted. However, there is also an increase in the depiction of Sexual Detail, which continues into the Wanjina Period. As outlined in Table 5.27, sexual characteristics are rarely depicted within the Gwion and Wararrajai Gwion Periods but of the sex depicted, higher frequencies of females

were recorded. There is an abrupt change within the Painted Hand Period, in which depictions of sex becomes more frequent; however, it is still only identifiable on 22.04% (n=151) of anthropomorphic figures within this period. In contrast to the Gwion and Wararrajai Gwion Periods, males predominate within the Painted Hand Period. Identifiable genitalia remains evident within the Wanjina Period, however, at a lower frequency, and males remains predominate.

Changing environmental conditions and demographic structures in the northwest Kimberley

Lewis has argued that the late Pleistocene/early Holocene information network stretching between the Kimberley and western Arnhem Land was severed by the rising sea levels that flooded what had once been a single catchment area.

> *Eventually the rising sea flooded into and broke up the single Pleistocene catchment, disrupting the old information/trade network and greatly reducing culture contact between the two regions. From that point on the art in the two regions began to diverge, and the differences became greater than the similarities (Lewis 1997:1).*

From this time onwards 'the mosaic of bounded clan territories that were evident by the time of European contact emerged' (Ross 2013:165). A similar pattern emerged in the northwest Kimberley, where major changes in cultural practices coincide with the flooding of Sahul and stabilisation of the sea level in the mid to late Holocene.

It is during the Wararrajai Gwion Period when increases in monsoon rainfall are attributed to the flooding of the Sahul and Sunda continental shelves as sea level rose (Denniston *et al.* 2013b:162). Once the LGM began ameliorating 19,000 years ago, continental ice sheets started melting and the sea level began to rise in a non-uniform manner (see Figure 7.10). During this extended period of sea level rise (over 13,000 years), the available land mass contracted. Contraction of land mass would have significantly reduced the area available to the inhabitants of the Kimberley, thus pushing people from the flooded coastal areas further inland, a phenomenon referred to as 'population packing'. At its lowest level (minus 135 m), around 25,000 years ago, the coastline was approximately 200 km from its current position (O'Connor

1996:37). This vast area of land lost, coupled with the local effects of climate variability, would have impacted on the demographic structure and subsistence strategies of the human population of the Kimberley, particularly within the *Change and Continuity* study area, which is located in close proximity to the current coastline, with some site complexes located along the coastline. Additionally, the content and distribution of resources in the environment, including the distribution of permanent water sources would have changed, no doubt influencing patterns of human land-use (Dillehay 2012:33, Morwood and Hobbs 1995:750). Evidence of gradual stylistic change is likely to be more pronounced as this is where important cultural and demographic adjustments are likely to have been made by the human population – the artists of the northwest Kimberley, in comparison to sites further inland.

Changes in the demographic structure of the Kimberley, for instance, the increase in population density during the Holocene (see Section 7.4), would likely have resulted in a reorganisation of cultural systems in the northwest Kimberley. Williams (2013:5) has argued for a slow stepwise increase in population growth beginning approximately 12,000 years ago and ending approximately 400 years ago. Increase in populations in the Holocene are thought to coincide with sea level stabilisation and strengthening of the northern monsoon as continental shelves were flooded (Williams 2013:8).

I propose that stabilisation of the sea level occurred during the Painted Hand Period, in both the 'short' and 'long' chronologies. It is during the Painted Hand Period that the changing environment can be identified in the rock art of the northwest Kimberley. A shift from freshwater to saltwater environs, through the changing animal species depicted in the art assemblage is evident in Brremangurey; the large rock shelter located about 70 m from the present day shoreline in the Admiralty Gulf (Figure 8.6). Here, the abrupt appearance of estuarine fauna in the Painted Hand Period provides evidence for the transition from freshwater to saltwater about 6,000 years ago. Specifically, results of this preliminary case study indicate that of the 47 zoomorphic figures recorded, terrestrial zoomorphs are dominant throughout the

assemblage (68.09%, n=32). In the early stylistic periods terrestrial zoomorphs constitute the only species depicted. Examples of the terrestrial fauna depicted in the early styles include an Irregular Infill Animal Period echidna, and multiple Gwion Period and Wararrajai Gwion Period macropods. Estuarine species (making up 29.79%, n=14) of the assemblage, first appear in the Painted Hand Period (Figure 8.7). From here, a proliferation of estuarine/marine zoomorphs occurs in the Wanjina Period, in which their numbers almost match that of terrestrial fauna. Example species in the Wanjina Period include dugong, turtle/tortoises, echidnas, macropods and a fish described as a 'flat' saltwater fish by traditional owner Greg Goonack (pers. coms. 2/8/2011). The echidna and macropod depictions indicate the continued importance of terrestrial resources as saltwater encroached the area.

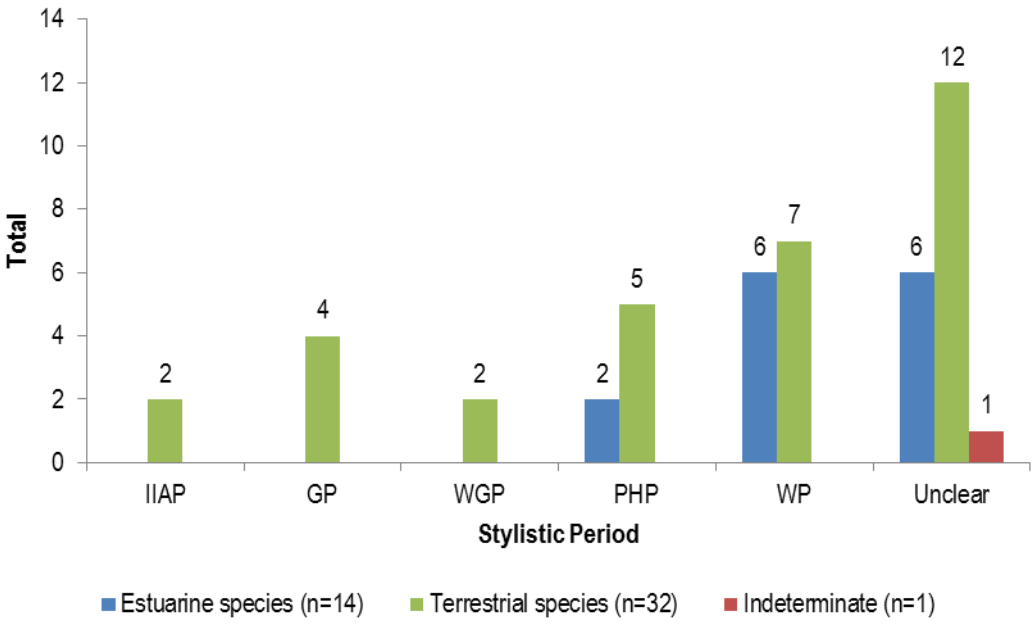

Figure 8.6 Identified estuarine and terrestrial zoomorphs by stylistic period at Brremangurey and surrounding sites

Figure 8.7 Example of saltwater crocodile (*Crocodylus porosus*) depicted in the Painted Hand Period (SBY01-17-2552), scale is 10 cm

8.3. Social Differentiation

Stylistic changes between the Gwion and the Wanjina Periods embody greater social changes, for example, change in the force of the message, in the meaning of the message, in the context of the message, in the social articulation of the message, and in the status of the message givers and message receivers (Wobst 1992). As Wiessner argued, style is a means of negotiating identity relative to that of your neighbours. Thus any change in the amount of social expression in a region through time (measured by relative stylistic heterogeneity or homogeneity) is indicative of changes in the social, economic and/or political conditions of the society (Wiessner 1989:59). The development of the Wararrajai Gwion Period therefore marks a reorganisation of cultural practices.

The reorganised cultural system or redefinition of social space is apparent within the study area through changes in:

- Economic strategies (shift in the raw materials utilised, the appearance of point technology, and new site types e.g. shell middens), and
- Site use (increases in discard of cultural materials, particularly stone artefacts, across the landscape and at long-term occupation sites), and
- Stylistic behaviour (the emergence of the Wanjina Period).

These changes are unlikely to have been independent of each other. I consider them to be inextricably linked and indicative of varying social contexts and social strategies through time, particularly the tightening of open social networks due to changes in demographic structures.

The shift towards the Wanjina Period, in tandem with other indices of archaeological change, indicates a restructuring of social relations consistent with a tightening of social networks. From around 5,000 years ago a transformation of relationships between people and the land appears to have taken place, with the flexible pattern giving way to one in which local territories were more visibly maintained, and inter-band relationships more highly structured (Layton 1997:384). As outlined in Chapter 7, the *Change and Continuity* excavations show that technological strategies which people used underwent substantial change, with the appearance of point technology at 3,394±25 BP, and an emphasis on the use of locally available stone (quartzite). Such changing frequencies of raw material preferences point to more restricted movement (McDonald and Veth 2006:100). This is also shown in the northwest Kimberley through an increase in charcoal at Collapsed Shelter, which may be indicative of increasing site use and/or population densities (see Figure 7.17).

Overall, the Wanjina Period marks a restructuring of social expression, involving an interrelationship between demographic structure (including population increase and patterns of dispersal), climate (relating to the onset of the ENSO dominated system and periods of weakened monsoon rainfall) and sociocultural factors (relating to the social, political aspects of territoriality) (David and Lourandos 1998:213). I propose that the stylistic behaviour motivating the shift towards the Wanjina Period relates to what Wiessner (1989:59) defined as 'the need for co-operation to attain social, political or economic goals'.

8.3.1. The shift towards the Wanjina Period

The emergence of the Wanjina Period heralded the addition of new elements into the art assemblage. This shift included an increase in the depiction of Limb Detail and

Face Detail attributes, increase in the depiction of sexual characteristics, notable lack of associated Artefact types, the appearance of prepared backgrounds (e.g. painted white background, n=45), and an increase in bichrome and polychrome paintings. Changes in the spatial patterning of the art assemblage also occur, with Wanjina Period anthropomorphic figures most commonly placed on ceiling panels within rock shelter sites. As shown in Figure 8.1, a notable shift in the spatial distribution of the art assemblage occurs during the Wanjina Period, with a spread in the southerly direction. The Wanjina Period also has a greater degree of stylistic heterogeneity than the earlier stylistic periods, as indicated by the dispersed nature of points in the CA plot (see Figure 5.23), and the large number of core characteristics (n=91). I argue, that this level of heterogeneity reveals the pursuit of different social strategies, than in the Gwion Period.

As discussed in Chapter 3, the Wanjina Period paintings are an integral part of the religious belief system of the traditional owners of the Kimberley. 'Classic' Wanjina paintings are 'visual representations of beings that are orally presented in the complex myths of the local Aborigines' (Blundell 1982:4, see also Crawford 1968; Elkin 1930; Love 1930). Unlike Dynamic Gwion figures, they are not representations of humans undertaking utilitarian tasks; they are Ancestral Beings from the Dreaming. As such, each Wanjina Period anthropomorphic figure is different in at least one stylistic detail, as they represent a particular Ancestral Being.

One attribute of the Wanjina Ancestral Beings is that they have control over the monsoonal cycle and the associated torrential rain, lightning and thunder (Akerman 2014:36). As Utemara and Vinnicombe (1992:25) explained 'Wanjina looks after all things that grow; people, plants and animals, and he looks after the rain that makes them grow'. Petrie (1954:156), documented details during the Frobenius expedition of 1938:

> *The Wóndjina's [Wanjinas] close connection with rain becomes clear from the following notions also: If one dreams Wóndjina [Wanjina], then that means rain coming soon. Everything living is like water, and can be extinguished by the Wóndjina [Wanjina] only through rain. Perhaps this idea alludes to the great floods that are to be expected if the*

> *Wóndjina [Wanjina] were once to open their mouths. But the most important and momentous idea is that the paintings of the Wóndjina [Wanjina] and of Ungud too must be "touched", i.e. touched up, annually before the start of the wet season. This ritual act guarantees the regular fall of monsoonal rain, and with it fertility and growth in nature.*

Paintings were retouched (repainted) to ensure the continuation of world order, the coming of the monsoon and the regeneration of all life (Blundell 1974; 1980:106). Within the study area, an example of this repainting is presented at Munurru, where a 'classic' Wanjina Period anthropomorphic figure head displays at least four visible layers of pigment application (Figure 8.8). Outside of the study area, in some cases over fifty layers of pigment have been identified (Morphy 2012:301). Repainting events in the Kimberley have been recorded as recently as the last few decades (Mowaljarlai *et al.* 1988) Keeping the images 'bright' by repainting is seen as a means of ensuring the retention of the Wanjinas' powers (Ross 2013:163).

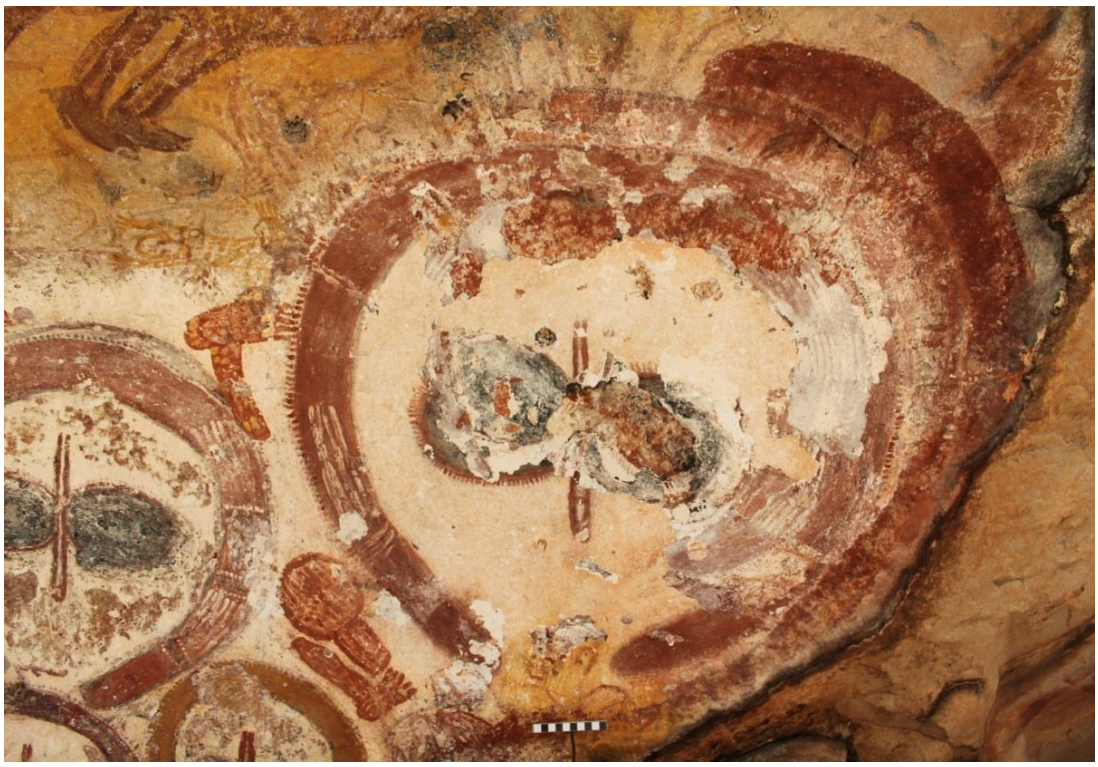

Figure 8.8 Retouched 'Classic' Wanjina Period anthropomorphic figure head (KERC02-2-3978), scale is 10 cm

A mud-wasp nest overlying a Wanjina Period macropod provided an OSL minimum age estimate of 5,800±300 BP, revealing that the Wanjina Period was in practice during the mid Holocene. Around this time the re-emergence of more active summer monsoons and increased rainfall occurred due to the onset of the ENSO dominated climate system (Denniston *et al.* 2013b; Schulmeister and Lees 1995). Simple Wanjina Period anthropomorphic figures may have appeared more recently, as an AMS radiocarbon minimum age of 3,780±60 BP (2,457-2,033 BCE calibrated) has been provided by a beeswax motif of simple Wanjina head (Morwood *et al.* 2010:5). Additionally, the earliest age estimate available for the production of 'classic' Wanjina Period anthropomorphic figures is from an 'Argula' figure. The 'Argula' figure returned an OSL minimum age estimate of 2,600±200 BP, and an AMS ^{14}C minimum age estimate of 1,230±35 BP (Ross *et al. in prep.*). This suggests that 'classic' Wanjina Period anthropomorphic figures developed at least 2,500 years ago, during this period of weakened monsoon rainfall caused by an El Niño related drought (Denniston *et al.* 2013b:163; McGowan *et al.* 2012:3) (see Section 7.2.2 for more details).

The fact that the 'classic' Wanjina paintings are concerned with monsoon cycle leads me to speculate that the development of these figures may be interrelated with the aforementioned periods of weakened monsoon rainfall during the late Holocene. Changes in social organisation and kinship systems evident in the ethnographic records would have facilitated subsistence patterns during drier times. After all, it is social factors, like a group's ability to migrate, and the strengths of its relationships with other groups in the area, that ensure security during and following natural disasters e.g. drought.

8.3.2. Territorial organisation in northwest Kimberley

As population densities continued to increase, there is likely to have been an increase in territorial behaviour. The meaning of territorial behaviour applied here is:

> *"Territorial" implies that the members of a given social group moved within an area which was more or less delineated by social factors, by the proximity of other such*

> *groups, by considerations of distance, by familiarity with the environment, and by natural obstacles (Wobst 1974:151).*

Hence, once the Wanjina Period was emerging, I argue that stylistic messaging within this period is linked to processes of social differentiation and territorial networks, that is, land owning and land using networks. Rock art was used to help mark, maintain, and further the difference between groups at minimal cost, with an emphasis on spacing populations across the landscape (Fisher 1997:20; Smith 1992a:34; Wobst 1977:328). That being said, social differentiation is also associated with the 'opening up' of relations at other levels, e.g. through ceremony and exchange, as an attempt at overcoming the social constrictions of territoriality (David and Lourandos 1998:198). Once in operation, processes of social differentiation are able to forge 'more dynamic social relations and formations, as "boundaries" and social relations, among other things, are negotiated and renegotiated' (David and Lourandos 1998:198). Importantly, David and Lourandos (1998:198) rightly pointed out that 'these processes are not solely the product of environmental change or population increase, but also of particular historical conditions, and can take place in any environment'.

Territoriality as expressed in the Wanjina Period is a central organising concept of western Kimberley cognition (Blundell 1980), but it is not the primary determinant of residence, mobility or foraging group composition (Rosenfeld 1997:293). As discussed in Chapter 3, clan interdependence was a feature of Wanjina Period territorial organisation. As outlined by Blundell (1980), people identified with small bounded clan territories in which they exercised rights over hunting and foraging as well as taking responsibility for religious practices and obligations within that area. However in practice, residential settlement and movement patterns were flexible. Core clan members, along with their dependents in the band, were allowed to visit and forage in the estates of other clans where secondary rights of access arise through ties of kinship, built up by exogamous marriage (Blundell 1980:109). This network of communication between clans, known as *wunan*, meant that clans were interrelated by reciprocity and exchange. The Wanjina paintings themselves symbolised the inter-dependence of the various Kimberley clans, and communicated

to people in a highly visible and evocative way the importance of reciprocity in assuring the continuity of the world order (Blundell 1982:14).

Boundaries were considered clinal and/or permeable rather than definitive. This refers to the fact that boundaries did not necessarily restrict the movement of people or exclude non owners, but modified the behaviour of people in some way (Ross 1997:130). This is similar in other parts of northern Australia. For example, Williams (1982:148) explained that for the Yolgnu in Arnhem Land the concept of boundaries is as a means to express *varying* categories of rights to both owners and users of the land. Thus, the recognition of a boundary confirms 'the solidarity and obligations of the owner group, while at the same time indicating that a particular type of behaviour is required from an outside user group' (Ross 1997:130). Such clinal boundaries would have been beneficial to the occupants of the northwest Kimberley during the late Holocene, when the El Niño related drought transpired. As outlined by Blundell (1982:10):

> *Prolonged dry periods or extended heavy rains would have meant that clansmen had to spend long periods outside their estates. Even when environmental conditions were optimal it is likely that clansmen "visited" several nearby estates in the course of their annual economic activities.*

8.3.3. Linguistic evidence of complexity

The complexity of the cultural practices in the Wanjina Period is also expressed in the linguistic record. Of the (possibly) 29 Australian Aboriginal language phylla, 28 are found only in Arnhem Land and the Kimberley regions, which also share many stylistic characteristics in their art assemblages (McConvell 1990:5) (Figure 8.9). Such linguistic diversity functions as a marker of discrete political units in northern Australia, and may also correlate with ecology, with greatest language diversity occurring in the richest environments of the north (Layton 1997:384). This point was made by Birdsell (1953), when he identified that the size of territories increased the further away from the north coast of Australia you went.

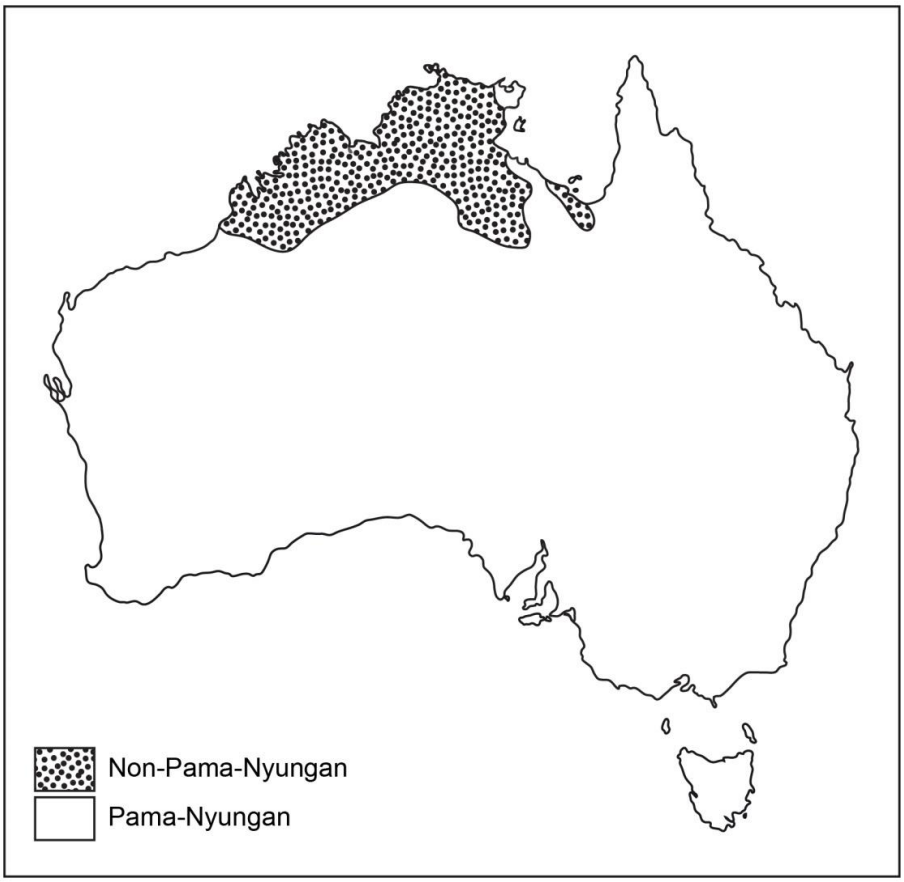

Figure 8.9 Pama-Nyungan languages – family distribution (after McConvell 1990, Figure 1)

8.4. Conclusion

This chapter has shown that changes in stylistic behaviour in the northwest Kimberley may be related to processes of social integration and social differentiation.

I have argued that the proposed lower population densities in the northwest Kimberley during the Pleistocene-Holocene transition may have been influential in creating a need for an open interaction network during the Gwion Period. This argument is based on the hypothesis that there is a correlation between stylistic homogeneity and a claim for relatively open social networks. Specifically, art assemblages that show widespread stylistic similarity are thought to correspond with open social networks across interdependent groups. This network is thought to extend to Arnhem Land.

Subsequent changing environmental and social conditions in the northwest Kimberley, e.g. the flooding of the continental shelves and subsequent stabilisation of the sea level around 6,000 years ago, causing an intrusion of estuarine environments into previously terrestrial habitats would have impacted on the occupants of the northwest Kimberley region, their resource procurement strategies and land use patterns. Additionally, these events would have had the effect of pushing people eastward, creating increased demographic pressures. Such climatic, environmental and demographic shifts are likely to have coalesced, in association with internal social dynamics, to produce the gradual changes evident in the relative rock art sequence, and the transition into the Wanjina Period.

The Wanjina Period marks a gradual reorganisation of the cultural system. Ultimately, this period is likely to have developed as 'a visual symbolic system used to legitimise a newly introduced mode of perceiving the world, a system that formalised social relationships and tied people to place' (Ross 2013:169). The Wanjina Period is consistent with the closure of social networks, with the previous flexible pattern giving way to one in which local territories were more visibly maintained, and inter-band relationships more highly structured. Such shifts are also expressed in the archaeological record, through changes in economic strategies, and site use.

The ways in which the context of rock art production in the northwest Kimberley differs in the 'long' chronology are discussed in the following chapter.

Chapter 9. The 'Long' Chronology

Scenario two; the rock art sequence developed over an extended timeframe. Within the 'long' chronology, the Gwion Period is tentatively linked to the late Pleistocene (approx. 25,000-20,000 years ago), and the Wararrajai Gwion Period to approximately 20,000-12,000 coinciding with the height of the LGM. Following this, the Painted Hand Period would have emerged as the climate ameliorated. The timing of the appearance of the Wanjina Period is consistent with the 'short' chronology.

Within this chapter, the interplay between the production of rock art in the face of changing climatic conditions of the LGM, and the emergence of new economic tools and social structures and practices is discussed. As the timing and context of the Wanjina Period remains the same as the 'short' chronology, this chapter focusses on drivers of cultural change and concomitant changes in the art assemblage during the Gwion, Wararrajai Gwion, and Painted Hand Periods.

Previous hypotheses concerning stylistic change over the height of the LGM are linked to the changing depictions of artefacts. Clear changes are evident in the artefacts associated with anthropomorphic figures throughout the region's rock art sequence. In particular, from the Gwion Period to the Wararrajai Gwion Period, there are distinctive changes in the depiction of associated artefacts; including developments in spear technology (i.e. the introduction of composite multi-barb spear), and projectile technology (i.e. the introduction of the spearthrower). Such technological developments provide important information about the associated culture and have led researchers to propose, often conflicting, hypotheses for their appearance and timing. In the words of Walsh (2000:312), '[t]he presence of weapons with anthropomorphs does not by itself determine the associated activity'. He goes on to state that the three most likely options for activities are:

1. Aggression,
2. Hunting, and
3. Ceremony.

Each of these activities will be discussed in this chapter. First, I identify and discuss evidence for aggression within the rock art of the study area. Specifically, I assess whether the changes in the artefacts depicted with anthropomorphic figures in the Wararrajai Gwion Period indicates an overall theme of aggression. Second, I discuss the option that changes in the artefacts depicted with anthropomorphic figures indicate a shift in the importance of portraying economic activities e.g. hunting. Finally, I discuss the role of status on the art assemblage of the northwest Kimberley.

9.1. Is there evidence for aggression in the rock art sequence?

The aim of this section is to assess previous hypotheses for the change in economic and social life during the LGM, and compare these with evidence from the Wararrajai Gwion Period.

Walsh (2000) suggested that changes evident in rock art sequence between the Gwion and the Wararrajai Gwion Periods may be indicative of increased tension and aggression within the associated society, 'possibly reflecting stress, threat or challenge to culture as a whole, rather than to an individual' (Walsh 2000:192). Walsh's hypothesis is based on the apparent increasingly challenging appearance of individual anthropomorphic figures within the Wararrajai Gwion Period that he considers 'evidence of aggression, clearly shown by the association of spear depictions with individuals' (Walsh 2000:195). Walsh (2000:197) proposed that the artists' intent in depicting anthropomorphic figures holding artefacts can be defined by the alignment of the body and the artefacts they hold, particularly spears. He described the most common challenging form as:

- Anthropomorphic figures in erect, plan view alignment (facing the viewer),

- Holding spears, often with one arm raised to hold a spear or spearthrower, and with
- Their feet firmly placed, with legs either slightly spread or closely aligned in rigid form (Walsh 2000:191) (Figure 9.1).

In relation to spears, upward facing spears are considered a passive mode indicator and downward facing spears are considered 'aggressive'. However, Walsh (2000:193,304) argued that only a single downward facing spear can be held in the 'aggressive' mode, as it is in a 'launchable' alignment.

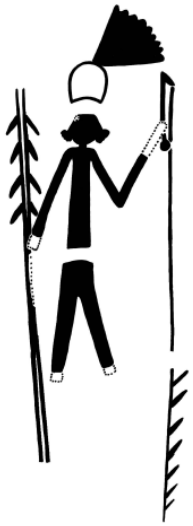

Figure 9.1 Challenging alignment of individual anthropomorphic figure with composite multi-barb spear loaded into a spearthrower in an aggressive alignment (from Walsh 2000:304, Fig 491 A)

Walsh (2000:192) considered such reoccurring challenging alignments in the Wararrajai Gwion Period as important as they are 'a remarkable change from the very passive body language common to the preceding "classic" Bradshaw [Gwion] Figures'. Walsh (2000:195) stated that '[a]ccompanying the increasingly challenging appearance of individual figures is evidence of aggression, clearly shown by the association of spear depictions with individuals'. It is these changes, corresponding with a decline in the complexity of dress decorations and the appearance of new projectile technology that led Walsh to hypothesise that there was increasing stress in the culture associated with Wararrajai Gwion Period, arising from increased

competition for diminishing resources during the LGM (Walsh 1994:72). Aggression resulted as part of a territorial imperative, ultimately leading to the 'apparent lengthy period of discontinuity following this late Erudite Epoch' (Walsh 1994:274, 2000:312).

To test this hypothesis the results of a detailed analysis of aggressive themes in the Wararrajai Gwion Period are discussed. If an overall theme of aggression is evident within the Wararrajai Gwion Period, recurring scenes of conflict should be apparent, in addition to challenging alignments. Without supporting evidence, the challenging alignment may just be the stylistic method chosen to depict the maximum amount of information about a figure in the simplest manner, and the frontal (face on) view facilitates this.

The number of individual anthropomorphic figures depicted with artefacts in the study area is 565; just 15.33% of the total number of anthropomorphic figures (see Table 5.28). The total number of artefacts associated with these anthropomorphic figures is 918 (see Figure 5.10). There is an overall decrease in the number of artefacts associated with anthropomorphic figures from the Gwion Period (582 artefacts associated with 347 figures) to the Wararrajai Gwion Period (249 artefacts associated with 175 figures). What is obvious is a marked change in the type of artefacts depicted in each stylistic period, from boomerangs to multi-barb spears and spearthrowers. The introduction of these new technologies first appeared in the Dynamic Gwion Period, a Group within the Gwion Period (see Table 5.29). Of the 795 identified Wararrajai Gwion Period anthropomorphic figures, only 22.01% (n=175) are associated with artefacts. However, more depictions of artefacts are likely to have existed, but weathering processes may have rendered them invisible. Of those that are visible, only eight can be considered to have been depicted in an 'aggressive' challenging alignment, with a down-facing multi-barb spear loaded into a spearthrower (e.g. Figure 9.2). This is 4.57% of the Wararrajai Gwion Period anthropomorphic figures associated with artefacts and only 1.01% of the total Wararrajai Gwion Period anthropomorphic figures in the study area, a figure not supportive of an overall theme of aggression.

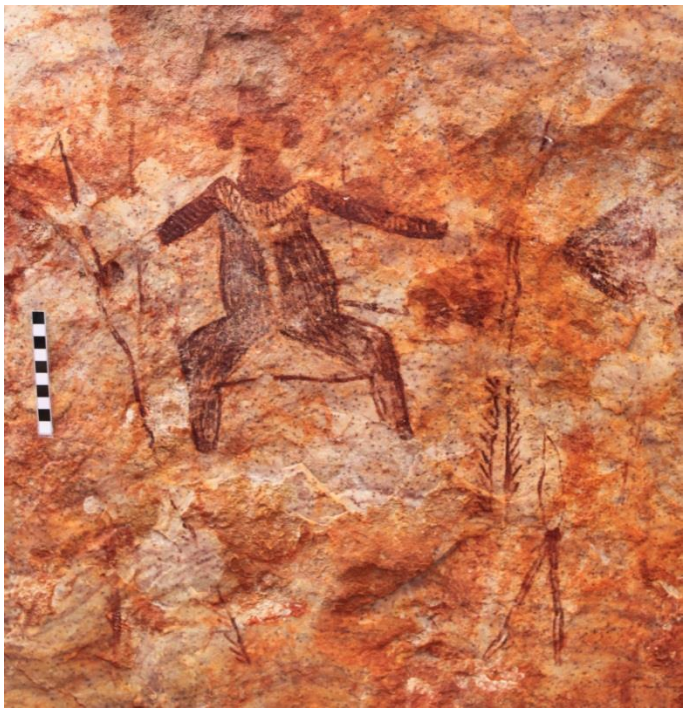

Figure 9.2 Wararrajai Gwion Period anthropomorphic figure in an 'aggressive' challenging alignment (BSC01-12-134-87), scale is 10 cm

Within the Wararrajai Gwion Period, 56.00% (n=98) anthropomorphic figures are associated with a single artefact and 44.00% (n=77) are associated with multiple artefacts. Of the 98 depictions of multi-barb spears in the Wararrajai Gwion Period, 32.65% (n=32) are single down-facing multi-barb spears that might be considered 'aggressive'. However of these only eight are identified as possibly loaded into an associated spearthrower. Six figures have both a single down-facing multi-barb spear and a spearthrower. These artefacts are held in each hand, and thus not in the 'launchable' alignment. There are nine single upright multi-barb spears that can be considered 'passive'. Over half (52.04%, n=51) are pairs or groups of multi-barb spears, considered to be in a held 'reserve' position. As such, the majority of artefact depictions are in a 'reserve' position. Moreover, of the 72 depictions of spearthrowers in the Wararrajai Gwion Period, 42 are single depictions, and 30 are associated with other artefacts. Thus, more are depicted singularly than in association with other artefacts. This may in some cases be due to the deterioration of the motifs.

Notably, only one of the Wararrajai Gwion Period anthropomorphic figures associated with artefacts has sexual characteristics. Wararrajai Gwion figures

depicted with sexual characteristics in the study area include one male figure with a 'Knobbed Penis', and 17 females that have either: 'Stacked Profile Breasts, (n=3), 'Underarm Breasts' (n=4), or 'Profile Breasts' (n=10). Significantly, the only depiction of a Wararrajai Gwion Period anthropomorphic figure associated with artefacts and depicted with sexual characteristics is a female holding a 'Hooked Stick' (Figure 9.3). This is surprising as it is sometimes assumed, based on ethnographic evidence, that hunting was a male occupation.

Figure 9.3 Female Wararrajai Gwion Period anthropomorphic figure holding 'Hooked Stick' (MP03-1-3239), scale is 10 cm

I have quantified evidence for a theme of aggression within the Wararrajai Gwion Period in the *Change and Continuity* study area and found that there is no conclusive evidence to support Walsh's hypothesis. More anthropomorphic figures are depicted without artefacts, than with, and of these, just eight of the 3,685 individual anthropomorphic figures recorded have both a challenging body and an 'aggressive' artefact alignment. The majority of artefact depictions are in a 'reserve' position. This is especially the case for multi-barb spears. Within the Wararrajai Gwion Period, multi-barb spears are often depicted in pairs (n=22); often closely aligned back-to-back pairs, an arrangement considered 'an aesthetic, artistic composition

reserved for "held" reserve spears' (Walsh and Morwood 1999:50). What this means is that Walsh's argument for the challenging appearance of individual figures within this period as evidence of increased aggression within the associated culture is unsatisfactory. As stated previously, the challenging face on alignment may just be the stylistic method chosen to depict the maximum amount of information about a figure in the simplest manner. Such alignments may also indicate a purely economic use of the artefact, for example, a hunting technique. As such, an anthropomorphic figure need not be considered as being depicted as aggressive because a multi-barb spear is loaded into a spearthrower. Evidence for hunting in the rock art record will be discussed in section 9.2. It is also important to note that the onset of the LGM would have been gradual (incorporating the timing of the Gwion Period), and as such, is an argument against climate as a driver of increased aggression within the Wararrajai Gwion Period.

9.1.1. Scenes of conflict

The only other evidence for aggression within the associated culture comes from rare scenes of inter-group conflict, referred to as battle scenes, and individual anthropomorphic figures that appear to be impaled by multi-barb spears. Scenes that, at least superficially, may be interpreted as conflict are extremely rare (n=5) in the *Change and Continuity* study area and are also highly contested (Lewis 1997:11).

The scene in Figure 9.4 is one of the most well-known and debated battle scenes. According to Crawford (1977:361) it is a possible spear fight. To Welch (1997:90) it is a ceremony/dance, and to others, it depicts two groups of figures swimming towards each other across a pool with reed vegetation growing at either bank (Walsh 2000:196). Walsh (1994:274-5, 2000:196) argued that this is a spear-throwing scene recording inter-group conflict. Specifically, Walsh (2000:196) considered that the scene shows:

> *…two small opposing groups of seven and eight individuals. It typically shows the spent missiles scattered behind the targeted force…The solitary figure positioned between the two groups is shown struck by a spear and a boomerang, with alignment suggesting his association is with the lower group.*

Figure 9.4 Possible conflict scene from the northwest Kimberley (MP03-1-3242), scale is 10 cm

Does the scene provide enough evidence to consider it a battle scene recording inter-group conflict? My analysis leads me to conclude that this is not the case. It is difficult to identify conflict in rock art, especially in the case of the Wararrajai Gwion Period – as demonstrated by the opposing interpretations for this single scene. In relation to the composition of this motif, it has been argued that the arrangement of spears depicts spent missiles. According to Walsh (2000:196), the 'depiction of spent missiles behind the targeted force is a typical convention for conflict depictions', and the 'extended arm on all figures presumably indicates missile launching actions, with their spears and boomerangs shown passing to the rear of the opposing group' (Walsh 1994:274).

Alternatively, based on the composition of the figures and artefacts it could also be considered a passive scene. According to Welch's assessment, such scenes are

related to 'people taking part in dance or ceremony' (Welch 1997:90). He claimed that artefacts can have both a functional and ceremonial use (Welch 1996:121). Welch (1997:109) argued that the spears:

> *…are approximately evenly spaced and some point to the right, which may indicate they have been placed on the ground rather than representing a volley of thrown spears….The section of opposing figures shows them all in the same position, consistent with a choreographed dance or ritual. In a battle scene we would expect uncoordinated movement and chaos.*

Specifically, within this scene:

- No spears are poised ready for launching,
- No anthropomorphic figures are depicted holding 'reserve' spears,
- Only one anthropomorphic figure of the 16 is depicted as potentially wounded, and
- None of the other 20 multi-barb spears has found their target.

Additionally, there are no stylistic attributes applied to the human forms that differentiate them as two opposing groups, which might indicate inter-group conflict. Walsh (2000:198) has stated that '[a]rtists frequently use subtle details to define opposing groups'. This is supported by Wobst (1977) who considered that style is most appropriate for expressing group affiliation under stressful conditions, and also Hodder (1979) who found that style is accentuated by socioeconomic stress. Overall, I argue that there is no direct evidence to confirm that this supposed battle scene depicts inter-group conflict. Even if the composition of the scene did correspond with it depicting conflict or a battle, there are still a number of factors that need to be considered. First, aggression and warfare may be depicted in many different forms; it need not reflect inter-group conflict. Second, such scenes are social as opposed to mythological or ritualistic. These notions will be discussed in Section 9.1.2.

Other evidence of conflict recorded in the study area relate to anthropomorphic figures that appear to be impaled by multi-barb spears. Four such scenes were recorded (Figure 9.5). These scenes could support an interpretation of aggression, as the bodies are identifiably pierced with spears. However, they do not depict groups

of opposing anthropomorphic figures. Interestingly, two of these scenes are within the same site as the supposed battle scene. As mentioned above, the various hypotheses for the intended meaning/s of aggression and violence in prehistoric societies will be discussed in Section 9.1.2.

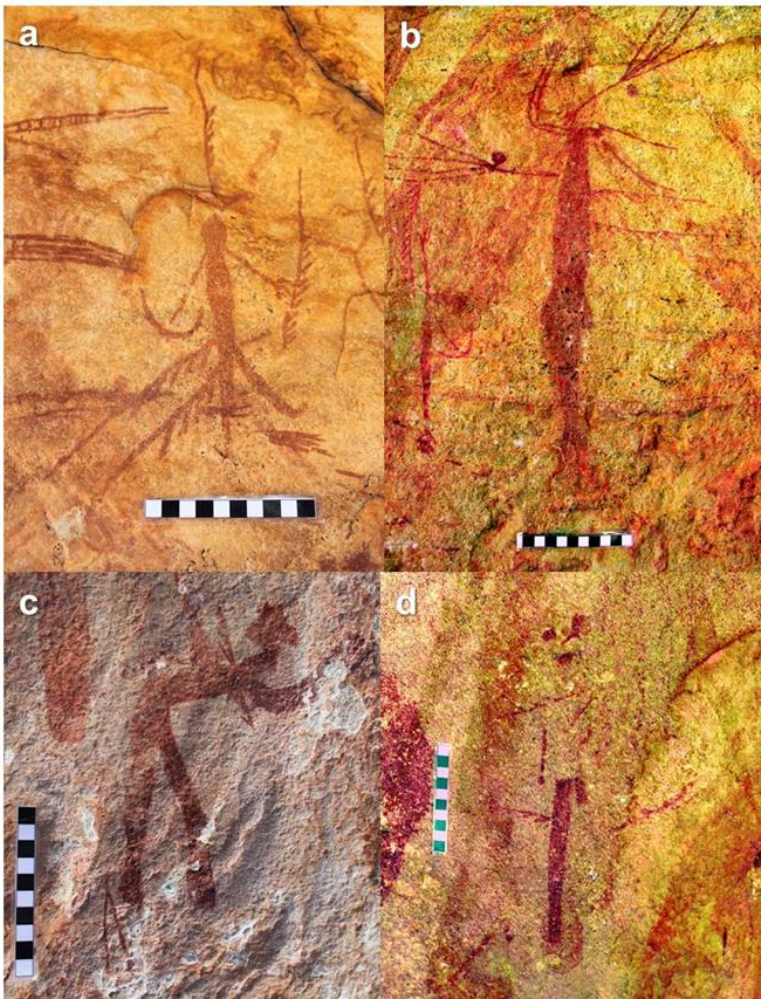

Figure 9.5 Examples of anthropomorphic figure pierced by multi-barb spears interpreted as conflict scenes, scale is 10 cm

a) Anthropomorphic figure holding a boomerang and associated with four multi-barb spears. Two of the spears located next to left leg may be piercing the body. All the spears are aligned towards the body (MP03-2-3305)
b) Anthropomorphic figure pierced by two multi-barb spears (MP03-3-3322), photograph digitally enhanced using DStretch
c) Anthropomorphic figure pierced by multi-barb spear through back (OTB01-33-2154)
d) Anthropomorphic figure appears to be pierced in the chest by a horizontal multi-barb spear located in the upper centre, and in the leg or hip by a horizontal multi-barb spear located in the middle left (OTB04-1-2298), photograph digitally enhanced using DStretch

While our *Change and Continuity* sample does not provide definitive evidence of inter-group conflict, it may not be truly representative of the number of depictions identified by others as conflict scenes, and as such there is a need to look at other assemblages to see what other researchers conclude. For this reason, I compare the evidence for scenes of conflict depicted in the rock art of the northwest Kimberley with western Arnhem Land, and also discuss North America, Europe, and southern Africa, in order to identify elements that other researchers have used to flag conflict.

Comparison with scenes of conflict in Arnhem Land

Overall, scenes of conflict are rare within the northwest Kimberley (n=5). In contrast, in western Arnhem Land the art assemblage provides more decipherable 'clues to fighting, wounds, death and the social organization of combat' (Taçon and Chippindale 1994:214). This conclusion is supported by two main differences. First, in contrast to the northwest Kimberley where it is extremely rare (n=1) to find loaded multi-barb spears held horizontally above the head, as if poised for launching, this alignment is a common depiction in Arnhem Land (Walsh 1994:49) (Figure 9.6). Second, 'spears fly overhead and some figures appear to be striking each other. Other figures lie or fall wounded with long barbed spears protruding from their bodies' (Taçon and Chippindale 1994:221).

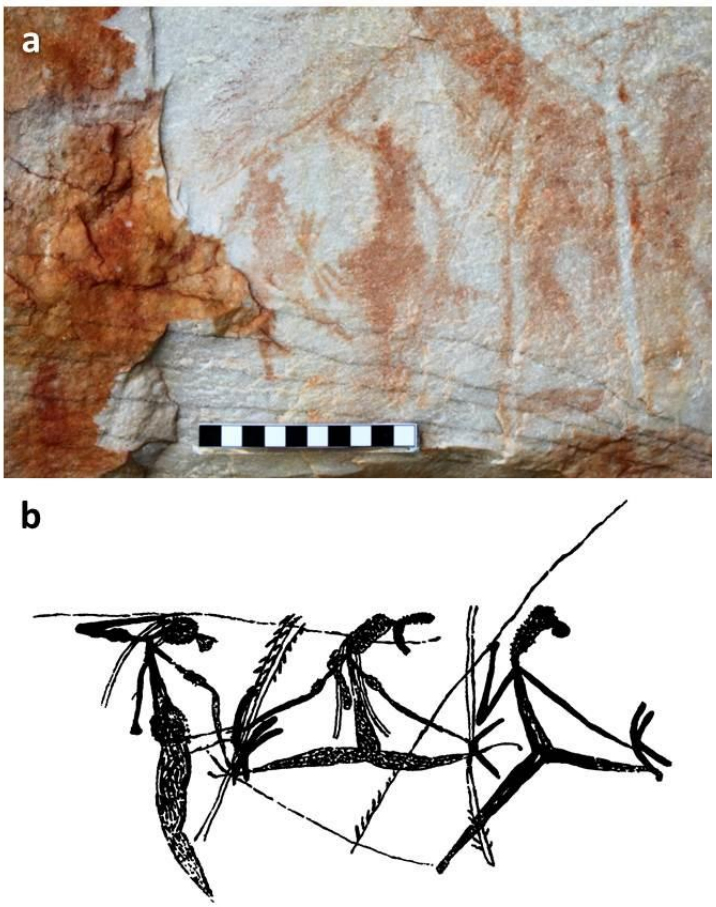

Figure 9.6 Examples of multi-barb spears held horizontally above the head poised for launching

a) Dynamic Gwion Period anthropomorphic figure (CC13-7-3829-1875), scale is 10 cm
b) Boomerang Period/Dynamic Period anthropomorphic figures from Arnhem Land (from Lewis 1988:187, Figure 33)

An example is provided in Taçon and Chippindale (1994:222, Figure 7), which depicts over 68 figures arranged in a conflict scene. The figures:

> *...are arranged in two opposing groups with figures that have large, rounded headdresses at the front of each side. At the back of the left hand group figures have small round heads/headdresses while those at the back of the right hand side have small elongated heads/headdresses. Figures hold a variety of weapons, including barbed spears, hooked stick/spearthrowers and a hafted stone axe. Volleys of spears fly overhead or are shown menacingly close to figures. The leading figure on the right hand side has a barbed spear through its abdomen and four spears in flight approaching other parts of its body* (Taçon and Chippindale 1994:221-2).

While there are definite parallels between the rock art of the Kimberley and Arnhem Land (see for example Barry and White 2004; Berndt and Berndt 1964; Chaloupka 1984, 1993; Crawford 1968, 1977; Lewis 1988, 1997; Taçon and Chippindale 1994; Walsh 1994; and Welch 1990) such clues to inter-group conflict are lacking in the northwest Kimberley. This is not to say examples of conflict do not exist (see previous discussion), only that, a theme of aggression and conflict is not present. The majority of Wararrajai Gwion Period anthropomorphic figures depicted with artefacts are static and not engaged in any identifiable activity. Depictions of artefacts in use are rare in the Wararrajai Gwion Period, and few potential conflict scenes have been recorded.

International scenes of conflict

The presence of conflict scenes in rock art is not unique to Australia. Here, I will briefly discuss evidence for scenes of conflict in North America, Europe, and southern Africa. What these case studies show is that, like the Kimberley, the intended meaning of these scenes remains unknown. There is a common dichotomy between literal and symbolic interpretations of conflict art highlighting the need for contextual information on the possible drivers of stylistic behaviour.

North America

Within North America, Polly Schaafsma (2000:4) has studied evidence for Pueblo warfare in the rock art assemblage. In Schaafsma's work 'warfare' as a term is understood in its broadest sense.

> *Although 'warfare' is used to refer to social conflict between villages or outside ethnic groups, the word does not imply standing armies or even encounters between all able-bodied men of opposing towns, and there is no indication that hostile engagements were perpetrated for the purpose of gaining territory or for the domination or elimination of other villages. Fighting often took place on a limited scale between small numbers of individuals and was frequently instigated by feuds, for purposes of reven*ge, or in the context of raids *(Schaafsma 2000:3).*

Evidence directly related to Pueblo warfare first appears in a limited form in the rock art of the Kayenta Anasazi around A.D. 1250 (Schaafsma 2000:9). The most convincing element of warfare in the rock art assemblage is the shield, both as an image in its own right or carried by a warrior (Schaafsma 2000:112). Supporting archaeological evidence is present in the remains of the earliest Anasazi populations in the Four Corners regions. 'This evidence includes skeletal material with broken or smashed bones, projectile points embedded in bones, mummies that show evidence of slashing, and the location of sites in defensive locations' (Schaafsma 2000:3-4).

Conventionally, Pueblo warfare has been understood in terms of climatic factors, economic stress, population growth, and the resulting social adaptations. Schaafsma (2000:4), however, considers the rock art to be a record of the ideology of warfare; as 'a set of beliefs concerning warfare and conflict and the relationship of these activities to the cosmos and Pueblo religion'.

> *In the Pueblo case, as elsewhere, conflict is written into the workings of the cosmos; elements from the natural world are infused with supernatural significance and powers to ensure success in warfare, and a portion of the reward for winning is the power to maintain a balance with nature (Schaafsma 2000:5).*

Europe

Antonio Beltrán (1982) discussed scenes of conflict within the art assemblage of the Spanish Levant (see also Nash 2000; O'Connell 1995). As well as scenes of conflict 'which show archers raising their bows over the dead, or those of archers who have been wounded, undoubtedly intentionally' (Beltrán 1982:50).

Beltrán (1982:49) description of one scene at Les Dogues is as follows:

> *Les Dogues shows the meeting of two bands of archers. The eleven men in the one group have elongated bodies, and hold their legs moderately far apart. Their leader has high plumes on his head, others projecting from the small of his back, and wears a loincloth. Two of his followers also have feathered caps. The group is sustaining an attack by some twenty*

> *warriors, all of slighter build, who are rushing at them, their legs stretched apart into a horizontal line.*

According to Beltrán, a significant aspect of this and other scenes is the apparent marked physical differences between the two opposing groups. He argued that some paintings are a record of conflicts between racial groups.

> *…we do find arrays of distinct physical types, showing marked physical differences, but who nonetheless belong within a single scene. We may cite Les Dogues, Ares del Maestre (p.44), El Molino las Fuentes, Nerpio, or El Polvorin at La Cenia. Here, two armed bands confront each other in battle, and the scenes appear to indicate that it is racially distinct groups which have come together in conflict (Beltrán 1982:40).*

Beltrán postulated that such scenes 'can represent actual or simulated fighting as well as war dances' (Beltrán 1982:48). He claimed that the artists of the Spanish Levantine were no doubt familiar with the 'disposition and deployment of armed men…deeply versed in fighting with the bow and arrow; and also that war-like encounters between native groups and invaders were being commemorated' (Beltrán 1982:50). Thorpe (2003:150), however, warned that there are many who question the straightforward approach to interpreting rock art. This juxtaposition is also recognised in the rock art research of southern Africa.

Southern Africa

Campbell (1986:255) claimed that San (Bushman) rock paintings depicting conflict are not uncommon in southern Africa. Conflict scenes are graphic and highly detailed, with a variety of artefacts/weapons and different forms of conflict portrayed (Campbell 1986).

Campbell (1986:256), following the work of Lewis-Williams (1981, 1983, 1984, 1986) proposed that these paintings may be 'essentially shamanistic, that is, associated with the activities of medicine men, being essentially hallucinatory and portraying the world of trance experience'. This is in contrast to earlier research that interpreted the detailed record of conflict literally. On the most part, the art was

assumed to be an accurate record of stone age life and its confrontation with herders, farmers and colonists, in which paintings 'comprises clearly recognisable and detailed scenes which there is no reason to doubt depict actual events' (Willcox 1978:60,63). Campbell's contrasting hypothesis does not exclude the preposition that the San witnessed and were actively involved in the various forms of conflict depicted in the art. He stated:

> *Indeed the paintings were presumably inspired by events the artist either witnessed or took part in. The paintings are certainly an interweaving of the 'real', such as the horsemen at Beersheba, and the 'non-real' as typified by the hallucinatory figure from the same site…In some instances the dividing line between the 'real' and the 'non-real' is not obvious (Campbell 1986:265).*

Four things are clear from these case studies. First, it is apparent that these differing conclusions drawn from analyses of scenes of conflict in North America, Europe and southern Africa, show that any notion of literal interpretation of rock art is hazardous. Second, scenes may have multiple functions within the associated culture; functions which as researchers we may never identify or understand through the study of rock art in isolation. Third, researchers need contextual information in order to understand the mechanisms influencing the artist's choices. Finally, in order to correctly identify conflict in an art assemblage, we need an understanding of the function of aggression and conflict in prehistoric societies.

9.1.2. Functions of aggression in prehistoric societies

Conflict is a significant area of current study in both archaeology and anthropology, and the causes of violence have been a prime subject matter for all branches of the social sciences (Thorpe 2003). Thorpe (2003:147) identified the three main competing theories for warfare situated within evolutionary psychology, and claimed that they should all be susceptible to archaeological analysis from the evidence of early prehistory:

1. Territorial,
2. Reproductive, and
3. Status competition.

He noted, however, that many other causes of wars among gatherer-hunters have been noted. '[w]arfare in early prehistory may well have arisen from matters of personal honour - such as slights, insults, marriages going wrong, or theft' (Thorpe 2003:160).

Andrew Vayda (1968:86) outlined the main hypotheses concerning the varying functions of what he designated as '"primitive war", i.e., organized armed conflict among members of the relatively small, stateless societies traditionally studied by anthropologists'. First Vayda (1968:86-9) identified that functions of primitive warfare fall into four main categories, those that are concerned with:

1. Maintaining or regulating certain economic variables;
2. Regulating demographic variables;
3. Deterrence or 'preventative war'; and
4. Regulating psychological variables.

Second, Vayda (1968:88) acknowledged that each of the above mentioned hypotheses are concerned with the regulation of a single variable and that a more elaborate hypothesis than those previously given would be the following:

> *(1) a diminishing per capita food supply and increasing intra-group competition for resources generate intense domestic frustrations and other in-group tension; (2) when these tensions reach a certain level, release is sought in warfare with an enemy group; (3) a result of the warfare is reduction of the pressure of people upon the land, either because of heavy battle mortality or because of the victorious group's taking its defeated and dispersed enemy's territory; (4) the reduced pressure on the land means that the diminution of per capita food supply and the increase in intra-group competition over resources are arrested and that domestic frustrations and other in-group tensions can be kept within tolerable limit (Vayda 1968:88-9).*

It can be seen that, according to this hypothesis (or set of hypotheses), 'psychological, demographic, and economic variables are all being regulated, with the regulation of one variable being dependent upon the regulation of another' (Vayda 1968:88-9).

In another study, McCall and Shields (2008) attempted to evaluate the main theoretical positions concerning the causes of violence among human societies using data from small-scale, radically non-Western societies and archaeological evidence from early hominids. They found that there is significant evidence for some evolutionary basis for violence due to its ubiquity in both the present as well as the deep archaeological past (McCall and Shields 2008:1). They noted that violence has deep evolutionary roots as there is no modern human society in which both aggression and violence is unknown (see Walker 2001), and no species of primate that never engages in some form of aggression (see Wrangham and Peterson 1996) (McCall and Shields 2008:4).

McCall and Shields (2008:2) defined the difference between aggression and violence as a matter of degree, with aggression defined as 'behavior intended to produce deliberate harm to another and violence having extreme harm as its intent (such as murder)'. They made the important point that aggression without violence does not result in archaeologically investigable remains. Within many stratified forager societies, for example, those in the northwest of America, that historically had very high rates of violence, also had culturally sanctioned, institutionalised violence as legitimate social activity (Ferguson 1983; Kelly 1995). Further, an examination of ethnographic societies found that:

> *...many variables contribute to the ultimate patterns of aggression and violence observed. Some of these variables concern the specifics of social structure, political organization, economic conditions, and specific cultural norms or scripts (McCall and Shields 2008:5-6).*

What this shows is that the cultural norms in terms of the practice of violence are different from western society; as well as the social, political, and economic structures that underlie them (McCall and Shields 2008:5). While, aggression or violence might be occurring, it might not be conflict the way we understand it. Based on available ethnographic evidence, this is certainly the case in Australian Aboriginal societies. There is an abundance of literature on conflict in Aboriginal societies (see, for example, Haas 1990; Hiatt 1965; Lommel 1997; McKnight 1986; Meggitt 1962),

which shows that conflict takes many forms, including highly formalised and ritualised conflict (see Taçon and Chippindale 1994 for an in-depth discussion).

According to Taçon and Chippindale (1994:217) scenes of conflict in the rock art record may 'represent ceremonies, glorified fights or battles, myths, or have some other metaphorical meaning'. Additionally, as Davidson (1994:235) argued:

> *Who is to say, then, whether the symbolic representation of paintings of humans bearing "arms" juxtaposed with other paintings of humans bearing "arms" represents humans at all, represents symbolic violence, mythical events, a sporadic event of individual conflict, a repeated pattern of conflict interaction, or warfare?*

Overall, this highlights the need to be very cautious with applying literal readings of rock art. As Hiscock (2008:113) pointed out:

> *Indeed archaeologists cannot be sure whether scenes of combat depict real or imagined events, or whether they were viewed as history or metaphor, but it seems that the Pleistocene artists of the north could at the very least conceive of conflict and war.*

The fact that scenes of conflict may be misinterpreted is supported by research undertaken by Warner. Warner (1931) identified that for Murngin people from north-east Arnhem Land, warfare is an important social activity. This research provides one of the most detailed accounts of warfare beliefs and practices available for any indigenous Aboriginal society (Knauft 1994:229). Warner (1931:457) identified that for the Murngin, warfare is closely related to the structure of the society, particularly the kinship system. There are six distinct varieties of warfare among the Murngin, each with its own name and pattern of behaviour, and another form only undertaken by women:

1. *Nirimaoi yolmo*, a fight within a camp,
2. *Narrup* or *djawarlt*, a secret method of killing,
3. *Maringo* (death adder), a night attack in which the entire camp is surrounded,
4. *Milwerangel*, a general open fight between at least two groups, this is a prearranged semi-ritualised fight,

5. *Gaingar* (ghost spear), a pitched battle, and
6. *Makarrata*, a ceremonial peace-making fight (Warner 1931:457, 1937:156-61).

Warner (1958) observed that most warfare resulted from revenge over previous killings of or the loss of women through stealing or their obtainment through illegal means.

Within the discipline of archaeology, there are three main areas of possible evidence of conflict: 'the existence of weapons, depictions of warfare, and skeletal remains demonstrating conflict' (Thorpe 2003:150). Weapons may seem the most straightforward category, but here we encounter immediately the issue of symbolism (Thorpe 2003:150). To determine the function of weapons in conflict, we need to 'demonstrate the actual use of objects to cause harm' (Thorpe 2003:150). I have already discussed the issues involved in depictions of conflict, and the problems of dealing with symbolic violence. This brings us to the third area of possible evidence of conflict, skeletal trauma caused by interpersonal violence.

In relation to hunter-gather societies, besides scenes in the rock art record and ethnographic evidence, skeletal material is considered one of the most reliable indicators of violence in the archaeological record. As Thorpe (2003:151) argued, '[s]keletal evidence is more reliable, in at least avoiding the issue of symbolic violence'. Unfortunately, 'warfare is usually hard to identify with confidence in the more ancient eras of the archaeological record, and especially among hunter-gatherer societies' (Taçon and Chippindale 1994:212). This is especially the case in the Kimberley where the paleoanthropological record is absent due to the acidic nature of deposits.

Summary

What this information indicates is that within the *Change and Continuity* study area Walsh's hypothesis concerning the change in economic and social life during the LGM is unlikely. While there is identifiable technological change within the

Wararrajai Gwion Period, such changes may not necessarily indicate increased tension and aggression or inter-group conflict within the associated society. As demonstrated, few Wararrajai Gwion Period anthropomorphic figures can be considered 'aggressive', although the stance of most figures is 'challenging'. There is also the consideration that the supposed conflict scenes may not reflect inter-group conflict, but one or a combination of the forms of warfare outlined by Vayda (1968).

Moreover, the evidence for gradual stylistic change from the Gwion Period through to the Wanjina Period, combined with the archaeological evidence of continual human occupation of the northwest Kimberley across the period of the LGM, at both Brremangurey (Y38) and Collapsed Shelter (both sites contain rock art from all five stylistic periods), does not support notions of an 'apparent lengthy period of discontinuity following this late Erudite Epoch' (Walsh 1994:274, 2000:312). While the gradual stylistic changes that occur between the Gwion and Wararrajai Gwion Periods may have been driven by stresses related to the *gradual* onset of the LGM, e.g. changes in rainfall, temperature and surface water availability, this does not necessarily correlate with a natural shift towards aggression. As this section has outlined, there are other, more formal ways of dealing with stress that do not lead to full-scale conflict. When stresses are not overt they can lead to changes in politics and communication structures, rather than violent patterns. The argument I am making here is that while climate and environment determined local resource patterns, especially food, people still created the conditions and organisations in which they lived, which largely dictated their responses to climatic changes (Dillehay 2012:26).

One alternative scenario is that the major changes in Wararrajai Gwion Period artefacts, including the appearance of spearthrower technology, indicates technological developments within the cultural sequence and the economic context of rock art production. The shift from the Gwion Period to the Wararrajai Gwion Period may simply be a shift in the importance of portraying economic activities, for instance, hunting. If economic activities are being emphasised, they need not be associated with the LGM, and may also support the 'short' chronology hypothesis.

Another alternative is that the gradual stylistic changes relate to social adjustments, in hierarchical structures and the status of individuals. Below I discuss these alternative options.

9.2. Evidence for economic activities e.g. hunting

Hunting scenes, where animals are depicted with spears protruding from their bodies are rare (n=12) within the study area (Table 9.1). Hunting scenes begin to appear within the Irregular Infill Animal Period, and continue within the Gwion and the Wararrajai Gwion Periods. This is in opposition to Walsh's statement that '[t]he developing evidence of aggression is accompanied by an abandonment of hunting depictions' (Walsh 2000:312). Instead, this shows that the changes that were occurring within the associated cultural sequence prior to the appearance of the Wararrajai Gwion Period, again, may not be entirely attributable to aggression and conflict.

Table 9.1 Identified hunting scenes in the *Change and Continuity* database

Motif ID	Stylistic Period	Zoomorph	Artefact/s	Description of activity
BSC01-8-35	Unclear	Macropod	Multi-barb spear	Possible multi-barb spear through abdomen
BSC02-2-163	Gwion Period	Macropod	Multi-barb spear	Multi-barb spear appears to be protruding macropod body, just under the forearm
BSC02-2-165	Gwion Period	Macropod	Spear (no barbs)	Multi-barb spear protruding macropod back, just above tail
BSC05-3-406	Gwion Period	Macropod	Spear (no barbs)	Two back-to-back macropods attached to a spear shaft
CC13-4-3806	Gwion Period (Dynamic Gwion)	Macropod	Multi-barb spear	Two running anthropomorphic figures and a macropod speared in the rear by a multi-barb spear
KCC01B-14-2766	Unclear	Fish	*n/a*	At least nine fish attached to a line. Appears to be illustrating a catch.
LR03C-9-1401	Wararrajai Gwion Period	Macropod	Multi-barb spear, Hooked Stick	Anthropomorphic figure in running position with spearthrower and a macropod pierced by a multi-barb spear
MB04-2-5624	Wanjina Period	Macropod	Multi-barb spear	Multi-barb spear protruding rear of macropod. Joey in pouch
MP02-1-3163	Irregular Infill Animal Period	Macropod	Spear (no barbs)	Upside down macropod with spear in back
OTB04-2-2310	Wararrajai Gwion Period	Macropod	Spear (no barbs)	Running human figure facing macropod with a single arm raised holding a possible spearthrower, spear has been launched and has pierced macropod
OTB04-2-2314	Wararrajai Gwion Period	Macropod	Multi-barb spear	Two horizontal multi-barb spear are piercing macropod
UL22-7-4777	Gwion Period (Dynamic Gwion)	Macropod	*n/a*	Camp scene. Two Dynamic Gwions sitting with macropod, query fire and plants

Within the study area, the only animals depicted as part of hunting scenes are macropods (n=11) and one scene, which appears to be illustrating a catch of nine fish attached to a line. The reason for the dominance of macropods is unknown. One scene was recorded that shows the hunter with his/her prey. In this scene, an anthropomorphic figure (with no identifiable sex) is in a running position facing the game, holding a spearthrower with the hooked end raised, and the game has been pierced by a single multi-barbed spear (Figure 9.7). This scene is one of the few examples that illustrate the spearthrower in use and its purpose (or one of its purposes) in the economy of the associated culture. This is supported by ethnographic information that documents this form of short spearthrower being used for hunting. 'Local people now distinguish between short and long forms of the spearthrower – the former, known as *yungari*, is used mostly for hunting' (Walsh and Morwood 1999:51).

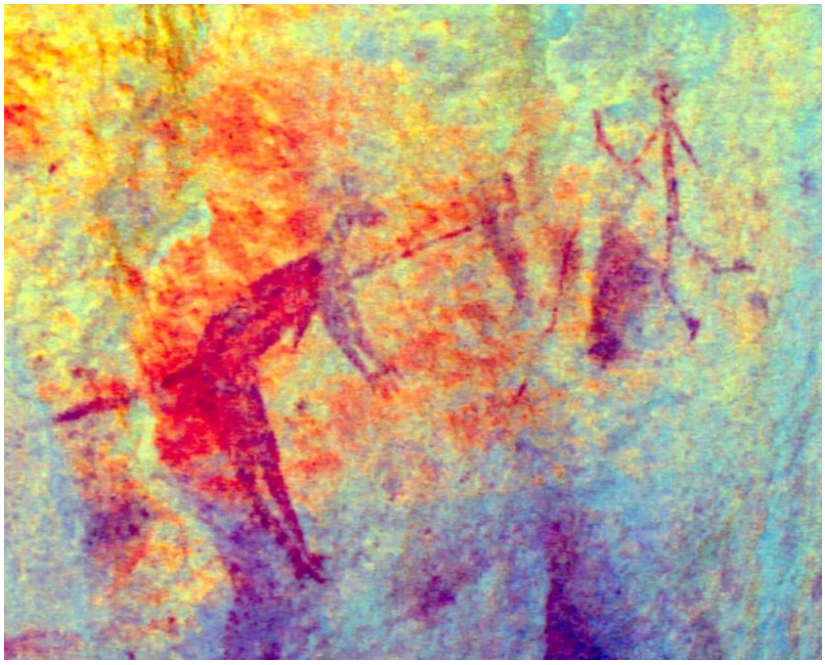

Figure 9.7 Hunting scene (LR03C-9-1401), photograph digitally enhanced using DStretch

Outside of hunting scenes, the depiction of animals within the Wararrajai Gwion Period is uncommon (n=14, Figure 9.8). This suggests that the intention of these painted scenes is economic, illustrating the value of improved spear technology (i.e. the composite multi-barb spear), and projectile technology (i.e. the spearthrower). A

description of these technologies is provided below. I do not go into detail here as this information is readily available elsewhere (see, for example, Cundy 1989; Davidson 1934; Lewis 1988; Palter 1977; Walsh 1994, 2000; Walsh and Morwood 1999; Welch 1996, 1997).

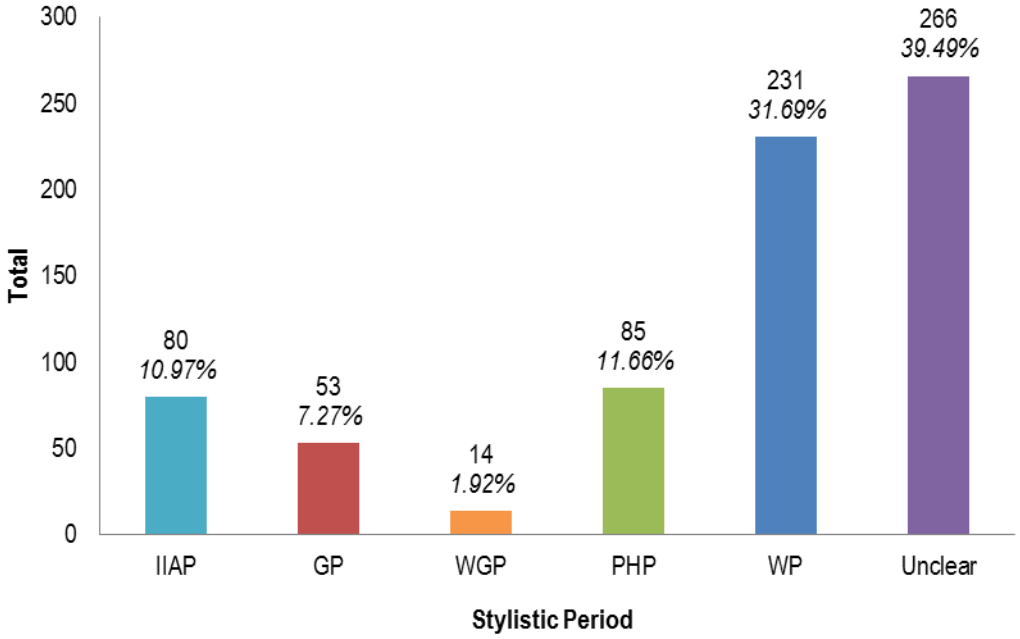

Figure 9.8 Zoomorphic figures by stylistic period (n=729)[72]

The spearthrower is an implement used for launching composite spears, and results in increased speed, range and accuracy. It is not practical to use with extremely heavy spears (Davidson 1936:445). Walsh and Morwood (1999:46) described spearthrowers depicted in the assemblage as linear and relatively short (13-46% height of associated humans), with a distinctive hook/peg shown at one end, and a possible knob or grip at the other. Spearthrowers appear in two forms in the study area: the 'Hooked Stick' and 'Spatula Handle Spearthrower'. Composite spear manufacture, suggested by the depiction of bichrome multi-barb spears with red multi-barb head sections and traces of white shafts, appear for the first time in the Wararrajai Gwion Period, corresponding with depictions of the spearthrower.

[72] The large percentage of 'unclear' zoomorphic figures relate to the fact that more research needs to be done on the core characteristics of animals in each period, in order to determine where they belong. Additionally, a number of zoomorphic figures were too indistinct to be able to properly relate them to a stylistic period.

Composite multi-barb spears consist of a shaft made of two sections of about equal length; a hard wooden head hafted on to a light wood or bamboo shaft. Like the multi-barb spear, the composite multi-barb spear has distinctive barbs along one end, designed to retain the spear in the wound (Cundy 1989:36). As outlined by Kim Akerman (pers. comm. 25/03/2014) 'the barbs would hold the spear into a wound hampering targets' movement and making it easier to kill'. The effectiveness of barbs is determined by three factors:

1. The height of the barb perpendicular to the long axis of the head,
2. Its proximity to the next barb, and
3. Its overall shape (Cundy 1989:36-7).

The lack of hunting scenes in the following Painted Hand and Wanjina Periods also indicates the changing role of rock art through time. Here, we also see resurgence in the depiction of animals in the art assemblage. The mythological importance of animals within the Wanjina Period has long been acknowledged by ethnographers. Animals, such as the snake called *Ungud*, are known to feature in particular mythic creation events and the exploits associated with individual Wanjinas. Many animals depicted are the totems of a particular clan, and their replenishment in the natural world is the specific responsibility of the clan. The paintings were retouched to ensure the regeneration of all life, including the increase of animal species depicted – the clan's totems.

9.3. Evidence for social functions of artefacts

The use of artefacts was not restricted to economic activities. In fact, the spearthrower, which is best known for its use as an implement for launching composite spears, is also known to be associated with various ceremonial activities within Australia. In Central Australia, 10 secondary functions of the spearthrower have been recorded, i.e. tray to mix ochre, fire stick, musical instrument, area (ground) scraper, haft for an adze, club, map surface, spear deflector, digging implement, and/or a hook for reaching (Cundy 1989:91). Elsewhere, based on ethnographic research, Warner (1958:259-334) identified around 14 uses of the

spearthrower among the Yolngu tribe in Arnhem Land. Additionally, Welch (1997:106) divided the use of the spearthrower in song, dance and ceremony into the following five groups:

1. As a musical instrument,
2. As a baton or symbolic object,
3. Ceremonially decorated spearthrowers,
4. Mock fights and battles as part of a ceremony, and
5. Mock hunting scenes.

Finally, within the Kimberley, Akerman (pers. comm. 25/03/2014) identified that spearthrowers were also used 'in the hands of learned persons to divert or direct storms rain clouds. They could be used for sorcery purposes'. Welch (1997) considered this, alongside the fact that many anthropomorphic figures are depicted holding spearthrowers without spears, and concluded that there is a relationship between the spearthrower and ceremony, and that many scenes featuring the spearthrower represent dance, rather than aggression.

In addition to spearthrowers, it was noted in the 1930s that composite multi-barb spears were 'not used by the Kimberley tribe in a fight, but are valued as objects of exchange for the intricacy of their workmanship' (Kaberry 1939:163). This is supported by Akerman (pers. comm. 25/03/2014) who stated that the ethnographic records indicate that multi-barbed spears were usually used for ceremonial purposes only and were traded in from the Victoria River and Daly River areas of the Northern Territory. Whist, multi-barb spears were clearly used in hunting as depicted in scenes in the art assemblage, artefacts such as these, 'which we may regard solely as a weapon, can in fact, be traded and treasured as a prized object, or may not be even used as a weapon' (Welch 1996:118).

Nearly all cultures have objects, which are traded and prized beyond their practical value (Renfrew and Bahn 2004:362). The demonstration that an object is highly valued by society also implies that the individuals with whom the objects were associated had a high social status (Renfrew and Bahn 2004:412). Examples of this are found in Aboriginal societies across Australia, and within the Kimberley.

One such example is the circumstances of production and distribution of greenstone artefacts in south-eastern Australia. Examination of ethnohistorical and anthropological evidence conducted by Isabel McBryde (1984:282, see also McBryde and Harrison 1981) indicate strong social determinants operating on both the production of stone from quarry outcrops on Mount William and on its distribution through the exchange networks. Specifically, access to the quarry outcrops on Mount William was strictly limited, and its stone could be worked only by specialists (individuals with the requisite social status and kin affiliations) (McBryde and Harrison 1981:191). McBryde and Harrison (1981:194) suggested that the likely motive for exchange was social and ceremonial rather than economic or utilitarian; they were used to fulfil, cement or create social ties or ritual obligations. In such cases, a high value good is required, and within this scenario, the greenstone artefacts prestige 'increased with distance from the source quarry until they acquired almost a spiritual quality' (McBryde and Harrison 1981:194).

Similarly, in the Kimberley a notable example concerns finely retouched Kimberley points, which are time-consuming to make, but fragile (Mulvaney and Kamminga 1999:267). Kimberley point technology was innovated around 1,000-1,400 years ago and was restricted to members of Kimberley language groups (Moore 2013b, 2014). Ethnographic and historic sources provide accounts of the production and exchange of Kimberley points both as 'functional spearheads and as exchange goods within one of the large networks across the Kimberley, known as *wunan*' (Akerman *et al.* 2002:29-30). It has also been proposed that Kimberley points were loaded with social/symbolic references for Kimberley people, and that they were 'high-visibility markers of social identity and status' (Moore 2013b:145). Further, Moore (2014) proposed that this technology of bifacial thinning 'ultimately arose in response to social forces operating across Kimberley Aboriginal societies in response to demographic pressures from neighboring Aboriginal groups'. Indeed, the emergence of this technology 'may be a material signal of a sudden increase in between-clan solidarity as part of an accretion of wunan-like obligations within the Kimberley region' (Moore 2014).

What these examples show is that artefacts can be symbol-laden objects that mediate complex social interactions, valued well beyond their practical function. As such, artefacts depicted in the art assemblage of the northwest Kimberley may also be valued beyond their practical application.

9.3.1. The role of status in northwest Kimberley rock art

Some motifs, including a number of repeated motifs in the Painted Hand Period suggest that artefacts depicted may have had significance beyond their practical application (Figure 9.9). This is particularly evident when 'reserve' or surplus artefacts are depicted. The depiction of multiple spearthrowers attached to the waist and clusters of multi-barb spears suggests these artefacts might have been valued beyond their practical application and may well relate to the elevated status of the anthropomorphic figure associated with them. Social status is apportioned through a number of culturally determined criteria, and consists of the 'rights, duties, privileges, powers, liabilities, and immunities that accrue to a recognized and named social position' (Thomas 1991:202). The number of spears and/or spearthrowers depicted with a human may have played a role in coding personal identity and showing the relative position of the person within the community.

Figure 9.9 Example of Painted Hand Period anthropomorphic figure with spearthrowers attached to waist (MM15-1-7270), scale is 10 cm

Fourteen anthropomorphic figures were recorded with up to seven spearthrowers attached to their waist. These figures are depicted with wide spread legs, sloping arms and multiple spearthrowers held at the waist by a form of waist band, seemingly in a reserve or transporting position. It is likely that within these scenes the function of this object is something other than for the launching of spears, as only one is necessary for such as task. Considering the harsh topography of the northwest Kimberley, it does not seem practical to be carrying surplus spearthrowers whilst hunting or fighting as an individual's agility would be compromised. Similar anthropomorphic figures also occur in Arnhem Land.

> *When the artefact in the art is shown worn in the belt of a person the hooked end projects upwards from the waist. This occurs in both the Kakadu and Kimberley examples, and is consistent with the hooked end of a spearthrower being small and light weight (Welch 1997:107).*

The depiction of 'reserve' artefacts is also evident with multi-barb spears and boomerangs. Thirty-five anthropomorphic figures were recorded with clusters of multi-barb spears (>2) (see Table 5.29). Of these clusters, 27 are groups of down-facing multi-barb spears, and eight are groups of upright multi-barb spears. The anthropomorphic figures associated with 'reserve' multi-barb spears are all static. By static, I refer to the fact that they are not noticeably engaged in any activity, unlike Dynamic Gwions that are commonly portrayed in action, e.g. running, walking or sitting. Dynamic Gwions depicted in what appear to be everyday scenes are not considered to be linked with the status of individuals, as they are deemed to be associated with secular activities. Of the Dynamic Gwions recorded within the study area, only one is holding more than one spear in either hand (Figure 9.10). This anthropomorphic figure, which is in a walking position is carrying a pair of down-facing multi-barb spears in their right hand, along with a pair of 'Angular' boomerangs in right hand, and a single down-facing multi-barb spear in left hand.

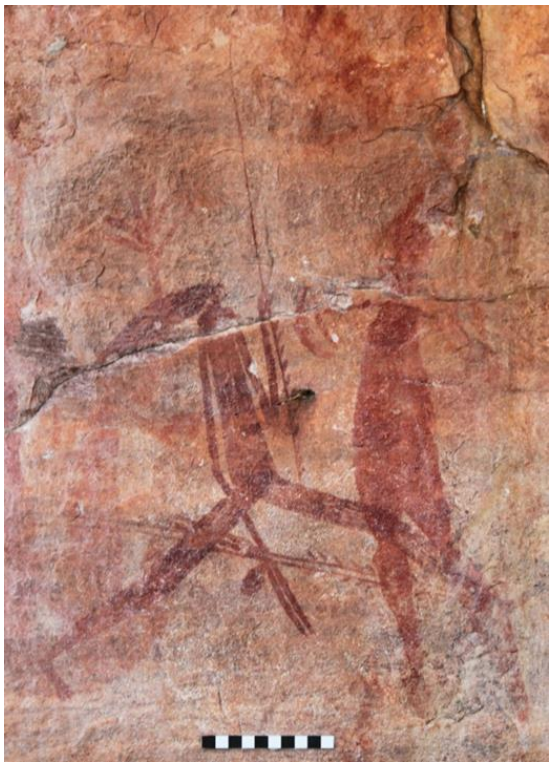

Figure 9.10 Dynamic Gwion figure holding a pair of down-facing multi-barb spears and a pair Angular boomerangs in right hand and a single down-facing multi-barb spear in left hand (LMR01B-3-5794), scale is 10 cm

A similar pattern occurs in relation to boomerangs, where 170 instances of multiple boomerangs associated with anthropomorphic figures were recorded within the study area, with no signs of fighting or hunting. It is likely that boomerangs were used for clapping during ceremonies.

Additionally, of the 12 recorded hunting scenes, only one multi-barb spear or spear with no barbs is depicted in each. Where a spearthrower is present, again only one is depicted. In the conflict scene mentioned in section 9.1.1, no anthropomorphic figures are depicted holding artefacts, let alone 'reserve' artefacts. Overall, of the motifs engaged in hunting or aggressive activities, groups of 'reserve' artefacts are not depicted. As Walsh (2000:194) outlined:

> *It is neither logical nor efficient for individuals to carry large bundles of reserve spears on hunting forays…There is insufficient time to load, align and hurl a second spear missile before an animal, startled by the missed first spear, has become highly mobile.*

Therefore, I conclude that depictions of 'reserve' artefacts are likely to be indicative of the social values of the artefact/s, rather than their practical application.

What is also evident in the art assemblage is the artist's emphasis on repetition. Boomerangs are repeated and emphasised in the Gwion Period, multi-barb spears in the following Wararrajai Gwion Period and spearthrowers in both the Wararrajai Gwion and Painted Hand Periods. This repetition of technology may highlight the relative importance of the artefact in society, in the elevated status of the associated anthropomorphic figure.

The fact that the majority of anthropomorphic figures associated with artefacts have a headdress (n=418, 73.98%) may be significant (Table 9.2). The high percentage of figures with this combination occurs in all four of the main stylistic periods. As Welch (1997:94) has highlighted, headdresses were rarely worn by Aborigines during day-to-day life and it was only during ceremonies that large headdresses were seen. He claimed that '[n]owhere in Australia did Aborigines traditionally wear elaborate costume as everyday dress' (Welch 1997:94). While we cannot justly correlate ethnographic material to paintings with a significant time depth, it is worth considering the practicalities of wearing an elaborate headdress when fighting or hunting.

Table 9.2 Appearance of headdresses with anthropomorphic figures associated with artefacts

	Total	**%**	**GP**		**WGP**		**PHP**		**WP**	
			n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
With Headdress	418	73.98	278	80.12	118	67.43	13	65.00	2	100.00
Without Headdress	147	26.02	69	19.88	57	32.57	7	35.00	-	-
Total	**565**		**347**		**175**		**20**		**2**	

Overall, the distinctive changes in the depiction of associated artefacts including developments in spear technology and projectile technology may not be entirely attributed to increased tension and aggression within the associated society. Whilst there are instances of conflict, which relate to anthropomorphic figures that appear to

be impaled by multi-barb spears, there are also instances where artefacts are likely to have been valued beyond their practical application. The care taken to portray 'reserve' artefacts may express status, authority and/or position of individuals. Additionally, material culture that is depicted relates more to stylistic choice than replication of lifestyle. This is demonstrated by the fact that artefacts are noticeably absent from the Wanjina Period, although were recorded in ethnographic times.

9.4. Conclusion

In this chapter I have explored the context of rock art production in relation to the proposed 'long' chronology. I have shown that previous hypotheses concerning the change in economic and social life over the height of the LGM are not supported by the analysis of the *Change and Continuity* sample. Specifically, stylistic changes between the Gwion and Wararrajai Gwion Periods may not necessarily indicate increased tension and aggression or inter-group conflict within the associated society related to stresses driven by the onset of the LGM. While climatic and environmental factors would have played a significant role in the movements and decisions made by past human populations, viewing stylistic behaviour in purely environmental terms should be avoided as social factors, among others, would also have mediated these events (David and Lourandos 1998:197).

Additionally, this research has clearly shown that there is no evidence for an 'apparent lengthy period of discontinuity' between the Wararrajai Gwion and Painted Hand Periods (Walsh 1994:274, 2000:312). Instead, changes in stylistic behaviour between the Wararrajai Gwion and Painted Hand Periods probably represent s*hifts* in the social organisation of the population, rather than the passing of the Gwion culture, dispelling diffusionist hypotheses. Indeed, the emergence of new economic tools and shifting social structures and practices are likely to have driven the observed changes in stylistic behaviour.

Adjustments to a new array of economic opportunities, including developments in spear technology and projectile technology, and the varying social functions of

artefacts are apparent throughout the art assemblage through depictions of economic activities, e.g. hunting scenes, and the repetition and emphasis of 'reserve' artefacts. Social adjustments, e.g. the hierarchical structure and status of individuals, are likely to have occurred. These changes imply not only alternations in economic practices but a 'very reorganisation of life itself, a rethinking of one's place in the world, of a scheduling of life, of the relationship between people and the world' (David 2004:158).

Overall, while climatic and environmental change associated with the LGM may have provided the catalyst, major changes in human behaviour resulted, which were likely to have been socially and/or culturally determined.

Chapter 10. Conclusions and Suggestions for Future Research

This thesis set out to investigate the stylistic transitions in the anthropomorphic figures of the northwest Kimberley rock art assemblage and the varying contexts of rock art production. This was done in order to examine the ways in which stylistic change can contribute to our understanding of past shifts in cultural, technological, social and economic activities in the northwest Kimberley. Throughout this thesis, five main research areas were explored: 1) the core characteristics of anthropomorphic figures in each of the stylistic periods; 2) evidence in the art assemblage to support notions of an abrupt discontinuity of art between the Wararrajai Gwion and Painted Hand Periods; 3) chronological evidence to support a pre-Last Glacial Maximum (LGM) age range for the Gwion Period; 4) factors that drove gradual stylistic changes in the art assemblage; and 5) information on the social and physical contexts of rock art production that inform us about social and economic lifeways in the northwest Kimberley. The following provides an overview of the main outcomes of this research and their broader implications.

10.1. Main outcomes of research

My research began with the development of a custom-built *Microsoft Access* database, which now stores information from 15 site complexes, including 215 archaeological sites, 204 rock art sites, and a total of 7,579 motifs (including 3,685 individual anthropomorphic figures). A thorough recording of each site complex was undertaken. This meant that no matter the amount of rock art, or the condition of the substrate within the site, each rock art site was comprehensively recorded. Sites with small assemblages were not ignored and I was not selective in the types of motifs recorded. This recording strategy provided an accurate and comprehensive sample of the study area for analysis.

Analysis focused on the form and pace of stylistic change between the anthropomorphic figures of the four main stylistic periods: the Gwion, Wararrajai Gwion, Painted Hand and Wanjina Periods. Although these periods have previously been flagged and discussed by both Walsh (1994, 2000) and Welch (1993a, 1993b, 1993c, 1996, 1999), this thesis has provided the first comprehensive *archaeological* analysis of the art assemblage of the northwest Kimberley. Conclusions have been informed by contextual analyses in order to facilitate an understanding of the function of past art systems and gain insight into past human behaviour. The original intent and meaning of the art assemblage was not sought. Rather, I have used the concept of style in two ways: first, as an analytical tool to 'observe' the rock art assemblage from an external viewpoint, by providing a morphological description of the rock art assemblage; second, as a means of understanding stylistic behaviour, in order to examine how the observable patterning might be generated, and to develop understandings of past cultural systems in the northwest Kimberley, their development, change, and likely function/s.

The relative stylistic sequence proposed by previous researchers was tested through an analysis of superimpositions and confirmed that the overall order of the sequence matched that found in the northwest Kimberley sample. The core characteristics for each of the main stylistic periods were established by classifying attributes within a period that occurred at a rate of seventy percent or greater based on frequencies in the *Change and Continuity* database. It is the first time that the characteristics of each of the main stylistic periods have been quantified rather than described, and provides a set of clear criteria for assessing the style of an anthropomorphic figure in the northwest Kimberley.

Correspondence analysis was used to test Walsh's hypothesis that there was an *abrupt* discontinuity of art between the Wararrajai Gwion and Painted Hand Periods. The analyses undertaken focused on the stylistic attributes of anthropomorphic figures identified and concluded that there was *no* evidence to support notions of an abrupt discontinuity of art through time. Rather, attribute preferences changed

gradually, existing as clines of variation rather than discrete units, with identifiable threads of *continuity*. An argument for continuity was supported by the identification of 43 re-occurring stylistic attributes that articulate evidence for graduated change in the rock art sequence, from the Gwion Period onwards. Combined with the core characteristics of each stylistic period, together these analyses indicate that there are stylistic clines within the art assemblage, with periods when certain attributes were preferentially selected. Therefore, elements of continuity *and* change are both apparent in the northwest Kimberley rock art assemblage.

The way change is represented in the art assemblage (e.g. abrupt or transitional) provides significant information on the cultural context of its production as changes evident in rock art mediate adjustments occurring within other conventions of the associated cultural system. Clearly, changes in the cultural context of production were driven by factors such as social and demographic change, technological introductions and environmental change, including sea level rise. However, throughout the period of rock art production in the northwest Kimberley strong evidence of continuity has been established, demonstrating that some aspects of cultural life were linked over an extended period. This evidence counters notions of a non-Aboriginal origin for the Gwion painting tradition and confirms the concept of gradual change espoused by both Crawford (1977) and Welch (1996, 1999).

Additionally, stylistic variation in the rock art assemblage observed over time in the selection of attributes and spatial patterning was also analysed. Results showed significant changes amongst the anthropomorphic figures over time. There was a clear shift from overhangs to rock shelters, and in the location of panels selected, where the shift was from visible vertical panels to ceiling panels. Unlike the broader regional distribution models (see Morwood and Hobbs 2000), this study constituted the first fine-grained analysis of changes in the spatial distribution of stylistic attributes in the northwest Kimberley. The results are considered important because unlike other archaeological evidence, rock art remains where it was produced. As such, changes in site preferences provide significant information about the changing role of rock art in society.

Hypotheses about the *actions* of the artists and explanations for the patterns observed in the rock art were formulated. Environmental and social evidence was used to contextualise the rock art in its broader archaeological setting. In order to effectively situate the art assemblage in its correct context, new dates provided by the *Change and Continuity* dating program were utilised. Unfortunately, due the lack of appropriate samples (e.g. mud-wasp nests associated with a motif clearly belonging to a specific stylistic period), problems of chronometric hygiene with U/Th sampling, and an uncertainty about the origin of carbon sources, the success of the *Change and Continuity* dating project was limited. The oldest date, an OSL minimum age estimate of 24,000±2,000 BP for a mud-wasp nest superimposing a dark red indeterminately-shaped motif, provided the oldest potential date for an *in situ* painted motif in Australia. Unfortunately, as the motif could not easily be assigned to one of the recognised stylistic periods, it could not assist in anchoring stylistic shifts in the relative sequence. As there was only one other Pleistocene date for the stylistic sequence (see Roberts *et al.* 1997) and the validity of this claim has been disputed (Aubert 2012; Bednarik 2014), it was necessary to proceed with caution. There remains no conclusive evidence to support a pre-LGM age range for the Gwion Period. The remaining minimum age estimates provided by the *Change and Continuity* dating program, related to the Wararrajai Gwion and Wanjina Periods and were restricted to the late Holocene.

As current dating of the Kimberley rock art assemblage was insufficient to anchor the sequence in any meaningful way beyond the late Holocene, two scenarios were proposed for the temporal framework: a 'short' chronology of around 11,000 years, and a 'long' chronology of at least 25,000 years. At present, the only evidence to support a pre-LGM age range for the Gwion Period has been provided by OSL dating of quartz grains from a mud-dauber wasp nest possibly overlying a Gwion Period anthropomorphic figure, which produced a minimum age of 16,400±1,800 years (Roberts *et al.* 1997); and an OSL minimum age estimate of 24,000±2,000 BP for a mud-wasp nest superimposing a dark red bell-shaped motif provided by the *Change and Continuity* project. Basing cultural interpretations on such a small

sample of dates is highly problematic; therefore, I consider the 'short' chronology more likely at this time.

In relation to the 'short' chronology I argued that changes in the way humans marked the landscape implied not just alterations in the use of specific sites through time, but a reorganisation of cultural practices over time. I hypothesised that the observed changes in stylistic behaviour in the northwest Kimberley were likely to be related to broader processes of social group identification and competition, such as social integration during the Gwion Period, and social differentiation during the Wanjina Period. This hypothesis is based on the understanding that style was *actively* employed and facilitates intentional choices made by individuals and/or groups to communicate particular messages.

The concept of social integration related to the correlation between widespread stylistic homogeneity and a claim for relatively open social networks across interdependent linguistic groups. This has been attributed to low population densities and the need to enhance chances of biological and cultural survival, through exogamous marriage networks. Subsequent changes in the population of the Kimberley (as population density increased during the Holocene), as well as increases in monsoon rainfall (attributed to the flooding of the Sahul and Sunda continental shelves as sea level rose and stabilised), and the contraction of the available landmass, are likely to have resulted in a reorganisation of cultural systems in the northwest Kimberley.

The shift towards the Wanjina Period, in tandem with other indices of archaeological change, indicates this restructuring of social relations is consistent with a tightening of social networks, correlating with increased demographic pressure and variability in climatic conditions, including periods of extended drought. It is known from the ethnographic literature that the Wanjina Period paintings were an integral part of the religious belief system of the traditional owners of the Kimberley. They formed part of a highly structured network of communication between three interdependent linguistic groups (the Worora, Ngarinjin and Wunambal Gaambera), known as

wunan. Each clan within these groups was totemically associated with a discrete and named area of land. 'Classic' Wanjina Period paintings define the totemic point for a clan members ritual obligations and for the expression of their socially constituted identity (Rosenfeld 1997:293). Within these areas, clan members exercised rights over hunting and foraging, as well as taking responsibility for religious practices and obligations within that area. However, core clan members, along with their dependents, were allowed to visit and forage in the estates of other clans where secondary rights of access arose through ties of kinship. As such, social differentiation during the Wanjina Period did not assume closed boundaries, but rather the highly structured 'opening up' of relations at other levels, e.g. through ceremony and exchange, as an attempt at overcoming the social constrictions of territoriality (David and Lourandos 1998:198).

The nexus between the production of rock art in the face of changing climatic conditions of the LGM, and the emergence of new economic tools and social structures and practices, were significant factors in explaining the 'long' chronology. Walsh's hypothesis concerning stylistic change over the height of the LGM was linked to the changing depictions of artefacts. He suggested that changes between the Gwion and the Wararrajai Gwion Periods were indicative of increased tension and aggression within the associated society. This hypothesis for abrupt change during the LGM was not supported by the results of my analysis. Distinctive changes in the depiction of associated artefacts including developments in spear technology and projectile technology were not entirely attributable to aggression or inter-group conflict within the associated society related to stresses driven by the onset of the LGM. There were other, more formal ways of dealing with stress that did not lead to full-scale conflict. I have argued that when stresses were not overt they could lead to changes in politics and communication structures, rather than patterns reflecting violence. While climatic and environmental conditions determined local resource use patterns, especially food, *people* still created the organisations in which they lived, which largely dictated their responses to climatic changes (Dillehay 2012:26).

Two alternative explanations for the emergence of new economic tools were proposed. First, that changes in the artefacts depicted with anthropomorphic figures indicated a shift in the importance of portraying economic activities. Second, the prominence of 'reserve' or surplus artefacts and the repetition of depictions of new economic tools related to social function/s of the artefacts. Artefacts were likely to have been symbol-laden objects valued beyond their practical application and related to the elevated status of the anthropomorphic figure associated with them.

In conclusion, within both the 'short' and 'long' chronologies, no single factor could be isolated as a driver of change in the art assemblage. Instead, I have argued that the interplay of the varying environmental changes, shifting social structures, beliefs and practices, alongside the introduction of new technologies influenced and mediated the contexts and form of the rock art through time.

10.2. Suggestions for future research

This thesis represents a significant step forward in our archaeological understanding of the northwest Kimberley rock art assemblage. In particular, the potential of an analysis of anthropomorphic figures in contributing to our understanding of past shifts in cultural, technological, social and economic activities throughout the region has been demonstrated. The topics studied in this thesis could be replicated, expanded and developed.

First, while I have identified core characteristics for the main stylistic periods and provided evidence that attribute preferences changed gradually through time with identifiable threads of continuity, I suggest that analyses such as those undertaken in this thesis could be expanded. Building on what I have done, the subtleties of stylistic transitions need to be teased out and the main stylistic periods need to be further dissected to identify sub-styles. Whether sub-styles vary spatially, temporally, or are contemporaneous will be important as the association of two overlapping motifs could have been a deliberate action of the artists. There can be both symbolic and neuropsychological reasons for this kind of locational association, representing

different functions of the art within society. Such research will expand on my current work and further inform us about the changing function/s of rock art production through time. Additionally, many anthropomorphic figures do not fit comfortably into any of the current stylistic periods and so our understanding of styles and change need to be further dissected.

Second, a major problem with anchoring the rock art sequence in any meaningful way is dating. There are still very few absolute dates available to situate stylistic changes against the excavated and environmental evidence of the past. The results of the *Change and Continuity* dating program are not absolute, they provide minimum age estimates for the associated motifs only. Without absolute dates, the timing of the introduction of social and economic practices evident in the art and the associated archaeology cannot be confidently correlated or set into a temporal framework and remain poorly understood. In order to secure results and implications, multiple similar age estimates will need to be obtained (Bednarik 2014:227).

Third, multi-disciplinary projects similar to the *Change and Continuity* project and the *Lifeways of the First Australians* project led by O'Connor and Balme in the southern Kimberley will be vital to improve our understanding of long term trends in human occupation throughout the Kimberley. We still need to refine our understanding of human occupation of the Kimberley over the gradual onset of, and height of the LGM. Particularly important will be assemblage-based projects that are informed by contextual evidence, gained from associated excavations, environmental and geomorphological research, dating programs, and ethnographic and linguistic studies. Excavations will tell us more about developments in stone tool technologies and ochre procurement strategies. Environmental and geomorphological research will help clarify major climatic events and provide us with a more realistic understanding of our archaeological material. Furthermore, comparative studies that explore regional similarities and differences throughout the Kimberley are necessary, e.g. within Worora and Ngarinjin country. Further afield, observed cultural links between the Kimberley and Arnhem Land require comprehensive investigation.

Fourth, the Kimberley art assemblage contains a variety of subject matter that is worthy of further attention. Other subject matter recorded within the *Change and Continuity* study area includes: zoomorphic motifs, tracks and trails, yams/plants, stencils, prints or the associated rock art traditions. Additionally, there are a number of composite beings that could be analysed, for example, therianthropes that consist of animal-headed humans with beaks (see Taçon and Chippindale 2001 for a discussion of therianthropes in Arnhem Land). The convention of painting anthropomorphic figures with three fingers, or the environmental implications of changes in the selection of plants depicted are other topics that would reward investigation.

Zoomorphic motifs, in particular, are a promising avenue for future research. Within the *Change and Continuity* study area, zoomorphic motifs are the second most common motif after anthropomorphic figures, and make up nearly ten percent of the assemblage, although they remain almost totally ignored in the published literature. Depictions of animals in our study area include a range of birds, macropod species, crocodiles, dingoes, echidnas, emus, fish, dugong, flying foxes, lizards, possums, snakes, thylacines and turtles. The significance of this research lies in its potential to inform us about changing environments (by using animals as a proxy for environment), and the changing relationships between people and animals. The mythological importance of animals within the Wanjina Period has long been acknowledged by ethnographers. Animals, such as the snake called *Ungud*, are known to feature in particular mythic creation events and the exploits associated with individual Wanjinas. Many animals depicted are the totems of a particular clan, and their replenishment in the natural world is the specific responsibility of the clan. The paintings were retouched to ensure the regeneration of all life, including the increase of animal species depicted.

Finally, major projects with international implications could be developed. The links between the figurative art of Sulawesi and the Irregular Infill Animal Period of the Kimberley is marked. New evidence from Sulawesi shows that figurative art was already part of the cultural repertoire of the first modern human populations to reach

the Indonesian region more than 40,000 years ago (Aubert *et al.* 2014:226). Specifically, 12 hand stencils and two zoomorphic figures, from seven cave sites in the Maros karsts of Sulawesi, have provided minimum ages ranging from 17,400 to 39,900 years ago (Aubert *et al.* 2014:225).

One painting of a babirusa ('pig-deer') was dated to at least 35,400 years ago. This 'pig-deer' that is among the earliest dated figurative depictions worldwide, was painted in profile as irregularly infilled outlines, which on initial inspection, appears very similar to the earliest figurative art phase in the Kimberley, the Irregular Infill Animal Period. Additionally, the minimum ages provided for the 12 hand stencils may indicate stylistic links between the regions (although hand stencils, being ubiquitous are not ideal indicators of interaction). One hand stencil was dated to a minimum age of 39,900 years. Walsh (2000:114-5) considered that hand stencils were amongst the earliest motifs produced in the Kimberley, and were dominant during the Irregular Infill Animal Period. These similarities may prove to be a significant factor as the proximity of the Kimberley to island Sulawesi makes the Kimberley a potential beachhead for migrating populations. If the 'long' chronology is correct and links between these regions can be confirmed, these factors have enormous implications for our understanding of the evolution of symbolic behaviour amongst modern humans. Similar large naturalistic fauna is depicted in the Arnhem Land rock art assemblage and should be studied alongside the Kimberley and Sulawesi rock art.

The potential of rock art research in the Kimberley and surrounding regions, alongside complementary archaeological, environmental and linguistic research is likely to provide the means to address major questions concerning the arrival, adaptations and lifeways of the first Australians.

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Appendices

Appendix 1. Attribute Illustrations

a) Stylistic periods as defined by Walsh

b) Stylistic attributes as defined by Walsh

Please note: The document titled 'Terminology of Australian Rock Art – G.L. Walsh', which contains the stylistic periods and attributes defined by Walsh is no longer presented within this thesis. This document was included in my thesis for the examination process, which under Australian copyright law is considered fair dealing for the purpose of research or study. The research and study provision, however, does not extend to making the thesis accessible publically, such as online in e-publications@UNE, the University's institutional repository. My request to the copyright holder to include this material in the electronic copy of my thesis was denied. For this reason, please refer to the abbreviated version available in Walsh 2000:93-96.

c) Artefact typologies throughout the stylistic sequence (after Walsh 2000)

Boomerang Types

Angular Boomerang

Crescent Boomerang

No7 Boomerang

Spear Types

Multi-Barb Spear

Spear no barbs

Spearthrower[73] Types

Spearthrower/Hooked Stick

Spatula Handle Spearthrower

Other

Catscradle String

Dilly Bag

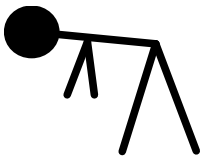
Whisk

[73] Although terminology and function over this type of depicted artefact is disputed (see Lewis 1988 and Welch 1990:121-2), I refer to it consistently as a Spearthrower within this thesis.

d) Stylistic attributes added to the *Change and Continuity* database

Body Positions

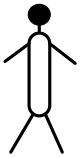

Bent Elbows


Bent Forward


Plan Bending

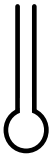

Walking Profile

Body Detail


Barrel Body


Dumbbell Neck Decoration

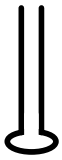
Limb Detail


Circle Feet


Crab Claw Feet


Foot Base


Missing Limb


Oval Feet


Slim Arms

Dress Detail


Broad Tassel

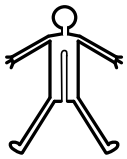

Broad Tassel Elbow Band


Pendulum Waist Decoration

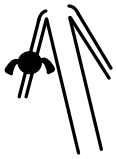

Ribbon Chest Band


Track Armpit

Body Decoration



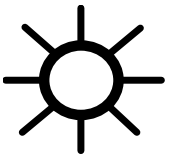
Negative Centre Body Bar



Ribbon Band

Underarm Tussock

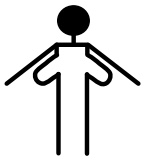
Sexual Detail



Bar Anus

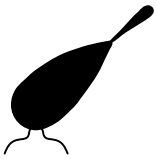
Profile Breasts

Split Penis



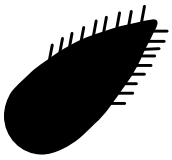
Underarm Beasts

Headdress

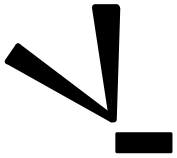


Acorn with Exclamation Mark

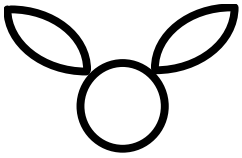
Bangled Dunce Cap with Ray Additions



Barred Accorn



Cap with Ribbons

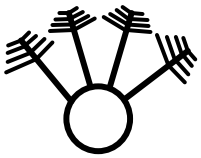


Double Feather

Droop Dunce Cap with Pom Pom

Helmet

Helmet with Additions



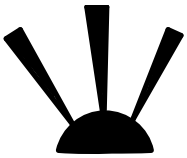
Multiple Broad Fernleaf

n/a

None

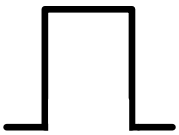
n/a

Unclear



Windmill

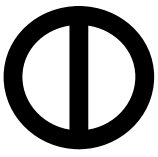
Head Detail



Rectangle Head

Face Detail

Hollow Eyes



Round Outline Mouth

Appendix 2. Attributes in the *Change and Continuity* database and used in the correspondence analysis, grouped by type

Total attributes in the *Change and Continuity* database: 399

Total attributes used in the correspondence analysis: 400[74]

The following 51 attributes were recorded only once in the *Change and Continuity* database and for this reason were left out of the correspondence analysis:

1. Armcurve Breasts
2. On-Body Pendulous Breasts
3. Bag Elbows
4. Oval Side Penis
5. Bar Anus
6. Pin Eyelashes
7. Bar Mouth
8. Pin Head
9. Barbed Star Sash
10. Profile Spanner Head
11. Barred Yam Head with Feathers
12. Profile Spanner Head with Beard
13. Bean Head
14. Rayed Barrel
15. Bent Side Penis
16. Ribbon Chest Band
17. Bifurcated Penis
18. Side and Vertical Bars
19. Blunt Cone
20. Single Willow Leaf
21. Broad Plume Fan with Perimeter
22. Sinuous Body
23. Broad Tassel Elbow Band
24. Spectacle Eyes
25. Bulbous 'U' Nose
26. Spoon Penis
27. Bump Shoulder-blades
28. Stamen Fingers
29. Bumpy Joint
30. Tap Handle
31. Buns Buttocks
32. Trident Penis
33. Busby and Tussock
34. Trimmed Busby
35. Erect Barred
36. Triple Broad Fernleaf
37. Extended Lips Head
38. Two Finger
39. Fish Mouth
40. Vertical Oval Eyes
41. Five Finger
42. Widespread Toes
43. Fringe Chest Band
44. X-ray Spine
45. Inverted Keyhole Nose
46. Catscradle
47. Knock Kneed Limbs
48. Double Boomerangs (No 7)
49. Mask Variation Face
50. Triple Boomerangs (Angular)
51. Neck Tussocks

[74] This total is one greater than the total in the *Change and Continuity* database as the attribute type 'Hooked Stick attached to waist' was added.

All attributes have been tabulated by category below[75]. The percentages in the following tables represent the proportion of anthropomorphic figures (total n=3,685) that contain each individual attribute type.

Body Position

Table A2.1 Body Position attributes

Attribute	n	%
'E' Angled Arms	89	2.42
'M' Angled Arms	15	0.41
'W' Angled Arms	303	8.22
Arms folded behind head	4	0.11
Bent Elbows*	49	1.33
Bent Forward*	20	0.54
Closed Leg Plan	382	10.37
Consistent Width Leg Spacing	733	19.89
Crossed Legs	11	0.30
Drooped Hanging Arms	182	4.94
Hands-In-Pockets Stance	6	0.16
Hanging Arms	405	10.99
Horizontal	97	2.63
Horizontal Arms	177	4.80
Horizontal Legs	6	0.16
Kneeling Profile	3	0.08
Plan Bending*	267	7.25
Profile Bending	35	0.95
Profile Bent-Knee	73	1.98
Reverse Bent Elbows	13	0.35
Reverse Upswept Legs	7	0.19
Running Profile	54	1.47
Semi-Squatting	91	2.47
Single Raised Arm	151	4.10
Sitting Cross-legged	20	0.54
Sitting Outstretched Legs	26	0.71
Sloping Arms	1,604	43.53
Square Crutch	16	0.43
Squatting	10	0.27
Squatting Angled Legs	28	0.76
Squatting Curved Legs	22	0.60
Standing Bow Legged	7	0.19

[75] * indicates that the attribute was added to the *Change and Continuity* database, and is not a Walsh defined category. These attributes are illustrated in Appendix 1.

Attribute	n	%
Standing Plan	767	20.81
Standing Profile	159	4.31
Standing Spread-Legged	186	5.05
Upraised Arms	254	6.89
Upside Down	34	0.92
Upswept Legs	11	0.30
Walking Profile*	20	0.54
Waving Arm	4	0.11

Body Detail

Table A2.2 Body Detail attributes

Attribute	n	%
Barrel Body*	311	8.44
Bottle Tree Body	16	0.43
Broad Shoulders	49	1.33
Bump Shoulder-blades	1	0.03
Buns Buttocks	1	0.03
Dumbbell Neck Decoration*	6	0.16
Ellipse/Centreline Body	3	0.08
Elliptical Body	15	0.41
Elongated Body	270	7.33
Fat Body	150	4.07
Funnel Neck	5	0.14
Hunched Shoulders	104	2.82
Lattice Body	11	0.30
Long Neck	60	1.63
Narrow Chest	197	5.35
Obese Body	35	0.95
Paunch Detail	433	11.75
Pearshape Body	8	0.22
Plan Buttocks Detail	5	0.14
Shoulder Spikes	29	0.79
Sinuous Body	1	0.03
Skeleton Body	5	0.14
'T' Shoulders	22	0.60
Tapering Elliptical Body	116	3.15
Three Line Body	63	1.71
Two Line Body	64	1.74
X-ray Spine	1	0.03

Limb Detail

Table A2.3 Limb Detail attributes

Attribute	n	%
Angled Slipper Feet	225	6.11
Angled Tick Feet	127	3.45
Ankle Wings	4	0.11
Bag Elbows	1	0.03
Bar Fingers	373	10.12
Boot Feet	3	0.08
Bumpy Joint	1	0.03
Circle Feet*	11	0.30
Conventional Hand	67	1.82
Crab Claw Feet*	2	0.05
Crab Claw Hands	6	0.16
Curved Feet	5	0.14
Downfacing Feet	60	1.63
Elegant Fluid Limbs	4	0.11
European Boot Feet	108	2.93
Extended Fingers	43	1.17
Feet in Either Direction	463	12.56
Feet in Same Direction	248	6.73
Fine Fingered Hands	46	1.25
Fluid Limbs	9	0.24
Foot Base*	9	0.24
Forward Curving Legs	4	0.11
Frill Elbows	2	0.05
Frill Toes	179	4.86
Gauntlet Arms	37	1.00
Hand Type Feet	21	0.57
Heeled Feet	179	4.86
Heeled Slipper Feet	22	0.60
Hooked Fingers	3	0.08
Jodhpur Legs	4	0.11
Knobbed Elbows	22	0.60
Knobbed Knee	32	0.87
Knock Kneed Limbs	1	0.03
Large Hands	27	0.73
Missing Limb*	2	0.05
Oval Feet*	14	0.38
Oval Hands	5	0.14
Paw Hands	7	0.19
Petal Fingers	61	1.66
Petal Toes	63	1.71
Round Hands	3	0.08

Attribute	n	%
Round Tip Limbs	36	0.98
Sausage Upper Arms	2	0.05
Slim Arms*	26	0.71
Slipper Feet	55	1.49
Square-Tip Legs	200	5.43
Stamen Fingers	1	0.03
Stick Arms	1,341	36.39
Teardrop Limbs	7	0.19
Three Finger Hands	175	4.75
Tick Feet	84	2.28
Toed Feet	179	4.86
Toffee Apple Hands	22	0.60
Topboot Feet	2	0.05
Triangle Hands	35	0.95
Triangle Legs	5	0.14
Widespread Toes	1	0.03
Wrist Barbs	2	0.05

Dress Detail

Table A2.4 Dress Decoration attributes

Attribute	n	%
Baggy Pubic Apron	16	0.43
Ball Hip Decorations	2	0.05
Barbed Sash	3	0.08
Barbed Star Sash	1	0.03
Barbed Tassel*	12	0.33
Broad Tassel Elbow Band*	1	0.03
Corded Tussock	3	0.08
Double Sloping Bar Hip Decoration	5	0.14
Dumbbell Elbow Band	3	0.08
Flyswat Neck Decoration	10	0.27
Four Chili Armpit	20	0.54
Fringe Chest Band	1	0.03
Knobbed Three Point Sash	5	0.14
Long Pubic Apron	21	0.57
Multiple Thin Bangles	5	0.14
Neck Tussocks	1	0.03
Pendulum Waist Decoration*	13	0.35
Plume Sash	14	0.38
Pompom Arm Band	7	0.19
Pubic Tassel	55	1.49

Attribute	n	%
Ribbon Chest Band*	1	0.03
Round Cummerbund	15	0.41
Rounded Chest Band	4	0.11
Short Pubic Apron	102	2.77
Single Broad Tassel Elbow Band	2	0.05
Single Parallel Bar	4	0.11
Single Sloping Bar Hip Decoration	5	0.14
Single Tassel Elbow Decoration	3	0.08
Single Tram Track	8	0.22
Spray	4	0.11
Spray of Cords	4	0.11
Three Chili Armpit	9	0.24
Three Point Sash	94	2.55
Toffee Apple Elbow Band	10	0.27
Toffee Apple Hip Decoration	4	0.11
Track Armpit*	9	0.24
Trident Tassel	5	0.14
Trimmed Sash	6	0.16
Triple Tassel	61	1.66
Waist Sparse Tassels	7	0.19
Waist Tussocks	31	0.84
Willow Leaf Armpit	2	0.05

Body Decoration

Table A2.5 Body Decoration attributes

Attribute	n	%
Ankle Bands	19	0.52
Arm Bands	75	2.04
Bangles	24	0.65
Breast Cross Straps	2	0.05
Broad Tassel*	22	0.60
Calf Bands	6	0.16
Cartridge Belt Waistband	3	0.08
Centre Body Bar	18	0.49
Centre Body Line	17	0.46
Chest Band	36	0.98
Chest Plate	17	0.46
Crutch Band	72	1.95
Cummerbund Waistband	220	5.97
Dancing Balloon	36	0.98
Double Tassel Elbow Band	7	0.19

Attribute	n	%
Double Three Point Sash	12	0.33
Elbow Bands	196	5.32
Elongated Oval Chest Decoration	3	0.08
Foot Bands	15	0.41
Fore And Aft Bands	37	1.00
Knee Bands	6	0.16
Large Pompom (on waistband)	14	0.38
Neck Band	17	0.46
Negative Centre Body Bar*	7	0.19
Parallel Spike	3	0.08
Pubic Fringed Apron	15	0.41
Ribbon Band*	26	0.71
Rounded Bangles	4	0.11
Sash Armpit	16	0.43
Single Broad Tassel	110	2.99
Single Pendulum	19	0.52
Single Willow Leaf	1	0.03
Stlylised Triple Tassel	41	1.11
Thigh Bands	2	0.05
Thin Tussock Elbow Band	8	0.22
Triple Tassel Elbow Band	9	0.24
Tuft Arm Band	98	2.66
Underarm Tussock*	26	0.71
Waist Fan	7	0.19
Waistband	13	0.35
Wrist Bands	24	0.65
York Line	8	0.22

Sexual Detail

Table A2.6 Sexual Detail attributes

Attribute	n	%
Armcurve Breasts	1	0.03
Bar Anus*	1	0.03
Bent Side Penis	1	0.03
Bifurcated Penis	1	0.03
Curved Paddle Penis	3	0.08
Erect Side Penis	17	0.46
Knobbed Penis	20	0.54
Low Silhouette Testicles	3	0.08
Meandering Penis	2	0.05
On-Body Pendulous Breasts	1	0.03

Attribute	n	%
On-Body Vulva	9	0.24
Oval Side Penis	1	0.03
Paddle Penis	11	0.30
Profile Breasts*	17	0.46
Prominent Nipple Breasts	5	0.14
Pubic Hair	4	0.11
Reverse Curved	2	0.05
Short Rounded Penis	7	0.19
Split Head Penis	3	0.08
Split Penis*	3	0.08
Spoon Penis	1	0.03
Stacked Profile Breasts	10	0.27
Stamen Testicles	10	0.27
Suspended 'U' Vulva	10	0.27
Suspended Divided Vulva	7	0.19
Suspended Vulva	8	0.22
Trident Penis	1	0.03
Underarm Breasts*	59	1.60
Upswept Breasts	2	0.05
Vertical Bar Penis	65	1.76

Headdress

Table A2.7 Headdress attributes

Attribute	n	%
Acorn with Exclamation Mark*	12	0.33
Acorn Headdress	36	0.98
Balloon Tip	16	0.43
Bangled Acorn with Ray Additions*	19	0.52
Bangled Dunce Cap	11	0.30
Bar Ray Additions	5	0.14
Barred Acorn*	15	0.41
Blunt Cone	1	0.03
Blunt Stovepipe	2	0.05
Bob Tail	5	0.14
Broad Fernleaf	10	0.27
Broad Plume	7	0.19
Broad Plume Fan	4	0.11
Broad Plume Fan with Perimeter	1	0.03
Broad Sweptback	39	1.06
Broad Teardrop	8	0.22
Broom	6	0.16

Attribute	**n**	**%**
Busby	11	0.30
Busby and Tussock	1	0.03
Cap with Ribbons*	23	0.62
Cobweb Wandjina	4	0.11
Concentric Arc	11	0.30
Crab Eye Pom Pom Erect	2	0.05
Crew Cut	2	0.05
Crewcut Fan	4	0.11
Cross Hatched Busby Headdress	3	0.08
Cross Hatched Melon	7	0.19
Disk	11	0.30
Divided Mop	20	0.54
Double Feather*	10	0.27
Droop Dunce Cap	63	1.71
Droop Dunce Cap with Pom Pom*	312	8.47
Dunce Cap	70	1.90
Elephant	4	0.11
Elongated Teardrop	5	0.14
Erect Barred	1	0.03
Exclamation Mark	10	0.27
Extended Acorn Headdress	44	1.19
Fernleaf	6	0.16
Five Finger	1	0.03
Halo	113	3.07
Hand	8	0.22
Hat	5	0.14
Helmet*	32	0.87
Helmet with Additions*	4	0.11
Hollow Acorn	3	0.08
Horizontal Barrel	3	0.08
Horse Shoe Head	2	0.05
Kidney	2	0.05
Melon	8	0.22
Mop	5	0.14
Multiple Broad Fernleaf*	3	0.08
Multiple Drooped Arc	4	0.11
Multiple Drooped Bar	10	0.27
None*	1,984	53.84
Onion Headdress	12	0.33
Pin Ray Additions	16	0.43
Pole	3	0.08
Pole Addition	3	0.08
Prong Antennae	6	0.16
Propeller	19	0.52

Attribute	n	%
Pumpkin	2	0.05
Rayed	36	0.98
Rayed Barrel	1	0.03
Rayed Oval	4	0.11
Shocked	73	1.98
Side and Vertical Bars	1	0.03
Skull Cap	50	1.36
Solid Disk	15	0.41
Stovepipe	7	0.19
Tap Handle	1	0.03
Tapered Busby	2	0.05
Three Finger	3	0.08
Trimmed Busby	1	0.03
Triple Broad Fernleaf	1	0.03
Tulip Ray Additions	4	0.11
Turban	2	0.05
Two Finger	1	0.03
Umbrella	15	0.41
Unclear*	339	9.20
Wandjina	51	1.38
Windmill*	9	0.24

Head Detail

Table A2.8 Head Detail attributes

Attribute	n	%
Barred Circle Head	51	1.38
Barred Oval Head	10	0.27
Barred Yam Head with Feathers	1	0.03
Bean Head	1	0.03
Concentric Circle Round Head	7	0.19
Cross Circle Head	2	0.05
Dome Head	32	0.87
Donut Head	44	1.19
Extended Lips Head	1	0.03
Inverted Teardrop Head	41	1.11
Line Infill Yam Head	4	0.11
Melon Head	11	0.30
Mushroom Head	6	0.16
Oval Head	132	3.58
Pin Head	1	0.03
Profile Spanner Head	1	0.03

Attribute	n	%
Profile Spanner Head with Beard	1	0.03
Quinkan Head	4	0.11
Rectangle Head*	79	2.14
Round Head	268	7.27
Rounded Head	113	3.07
Rounded Triangle Head	30	0.81
Rounded Triangle with Shocked Hair Head	3	0.08
Small Head	27	0.73
Small Round Head	50	1.36
Solid Round Head	1,006	27.30
Vertical Oval Head	269	7.30

Face Detail

Table A2.9 Face Detail attributes

Attribute	n	%
Bar Eyelashes	20	0.54
Bar Forehead Nose	16	0.43
Bar Mouth	1	0.03
Bar Nose	75	2.04
Beard	5	0.14
Broad Beak Mouth	8	0.22
Bulbous 'U' Nose	1	0.03
Dot Eyes	52	1.41
Earring Feature	4	0.11
Fish Mouth	1	0.03
Goggle Dot Eyes	8	0.22
Goggle Eyes	96	2.61
Hollow Eyes*	24	0.65
Inverted Keyhole Nose	1	0.03
Jug Ears	16	0.43
Leaf Ears	2	0.05
Mask Variation Face	1	0.03
Outlined Solid Eyes	28	0.76
Oval Eyes	30	0.81
Pin Eyelashes	1	0.03
Pointed Ears	9	0.24
Rabbit Ears	2	0.05
Round Outline Mouth*	3	0.08
Round Solid Eyes	85	2.31
Side Bun Feature	10	0.27
Spectacle Eyes	1	0.03

Attribute	n	%
Vertical Oval Eyes	1	0.03

Artefact Detail

Table A2.10 Artefact Detail attributes

Attribute	n	%
Angular Boomerang	59	1.60
Catscradle String	1	0.03
Crescent Boomerang	121	3.28
Dilly Bag	16	0.43
Double Boomerangs (Angular and Crescent)	2	0.05
Double Boomerangs (Angular)	36	0.98
Double Boomerangs (Crescent)	97	2.63
Double Boomerangs (No7 Boomerang)	1	0.03
Hooked Stick	61	1.66
Hooked Sticks attached at waist	14	0.38
Multi-Barb Spear	4	0.11
Multi-Barb Spear (Downfacing)	41	1.11
Multi-Barb Spear (Upright)	13	0.35
Multi-Barb Spear Group (Downfacing)	27	0.73
Multi-Barb Spear Group (Upright)	7	0.19
Multi-Barb Spear Pairs	2	0.05
Multi-Barb Spear Pairs (Downfacing)	14	0.38
Multi-Barb Spear Pairs (Upright)	10	0.27
Quadruple Boomerangs (Crescent)	3	0.08
Spatula Handle Spearthrower	16	0.43
Spear (no barbs)	8	0.22
Triple Boomerangs (Angular)	1	0.03
Triple Boomerangs (Crescent)	12	0.33
Unidentified	134	3.64
Whisk	108	2.93

Appendix 3. Supplementary Results

Table A3.1 Assemblage size of each recorded rock art sites

Small (<20 motifs)		Medium (20 - <50 motifs)		Large (50 - <100 motifs)		Very Large (>100 motifs)	
Site	**Motif Total**	**Site**	**Motif Total**	**Site**	**Motif Total**	**Site**	**Motif Total**
BSC09	1	LMRNOR2	20	LMR02T	51	UL28	107
BSC12	1	LMRNOR3	20	UL04	53	LRW01	108
CC01	1	OTB08	20	MM15	54	MB03	108
KERC07	1	UBSC01	20	BSC20	55	BSC03	109
KERC20	1	KERC03	21	UL01	55	UL22	111
LMR02R	1	KERC10	21	UL09	55	UMR01A	113
LR09	1	LR05	21	CC13	57	BSC18	136
MM12	1	LR06	22	LMR02X	57	BSC14	143
UL06	1	UL02	22	LMR02A	58	BSC01	145
UL25	1	BSC13A	23	LMR02J	58	LMR02P	145
BSC21	2	MM22	23	KERC02	59	MP01	159
CC06	2	CC09	24	BSC02	62	SBY01	164
CC07	2	OTB04	24	OTB02	66	CC04	219
KERC15	2	BSC15	25	BSC04	68	LR03C	250
KERC18	2	LMR02W	25	KERC09	69	UMR01B	279
LMR02E	2	LMR02S	26	LR07	69	KCC01B	319
LMR02V2	2	LR03A2	26	MP02	72	LMR02C	337
OTB10	2	UL03	26	UMR01C	72	OTB01	345
OTB11	2	BSC22	28	LR03B	74		
UL05B	2	MM07	28	KCC05	76		
BSC07	3	CC15	29	LMR02D	85		
BSC16	3	MM27	29	LMR02K	89		
KERC04	3	CC14	30	LMR01A	90		
LMR02N	3	KERC11	30	LR03D	92		
LMR02U2	3	KERC19	30	MP03	93		
LR12	3	LMR02L	32				
LR15	3	MM03SOU	32				
MM01	3	UL20	32				
MM03B	3	LMR01B	33				
MM05	3	MM19	33				
MM06A	3	UL11	33				
MM17	3	LMR02B	34				
MM24	3	OTB05	34				
MM28	3	UL23	34				
OTB03	3	BSC06	35				
OTB06	3	KERC06	35				
OTB09	3	MM06B	35				

Small (<20 motifs)		Medium (20 - <50 motifs)		Large (50 - <100 motifs)		Very Large (>100 motifs)	
Site	**Motif Total**	**Site**	**Motif Total**	**Site**	**Motif Total**	**Site**	**Motif Total**
UL28B	3	LR04	36				
BSC13C	4	UL29	36				
CC08A	4	BSC13B	37				
KCC02	4	MB05	37				
KCC04	4	BSC08	38				
LMR02V1	4	MM13	38				
LR03A4	4	MB01	39				
LR08	4	CC08B	40				
LR13	4	CC12	40				
MM32	4	MM03	40				
UL17	4	MM26	40				
KERC16	5	UL05	40				
LR03A1	5	CC02	41				
MM11	5	MM04	42				
MP04	5	LMR02O	43				
MP06	5	MM25	43				
UL13	5	LR10	44				
CC03A	6	BSC17	45				
CC10	6	CC03B	45				
LMR02F	6	BSC11	47				
MM10	6	MM20	47				
OTB07	6						
UL19	6						
KCC08	7						
KERC05	7						
MM31	7						
KCC01A	8						
KCC06	8						
LMR02H	8						
MP05	8						
UL10	8						
UL15	8						
KERC13	9						
KERC17	9						
LMR02U	9						
UL18	9						
BSC05	10						
KERC08	10						
MM09	10						
MM18	10						
BSC10	11						
KCC03	11						

Small (<20 motifs)		Medium (20 - <50 motifs)		Large (50 - <100 motifs)		Very Large (>100 motifs)	
Site	**Motif Total**	**Site**	**Motif Total**	**Site**	**Motif Total**	**Site**	**Motif Total**
KCC07	11						
LR11	11						
BSC13D	12						
LMR02M	13						
LMRNOR1	13						
LR14	13						
MMCAMP1	13						
LMR02Q	14						
LR03A3	14						
KERC14	15						
MM14	15						
UL08	15						
UL16	15						
BSC19	16						
CC05	16						
KERC01	16						
LMR02I	16						
MM02	16						
MB04	17						
UL07	17						
UL14	17						
MM21	19						
MM23	19						
UL12	19						

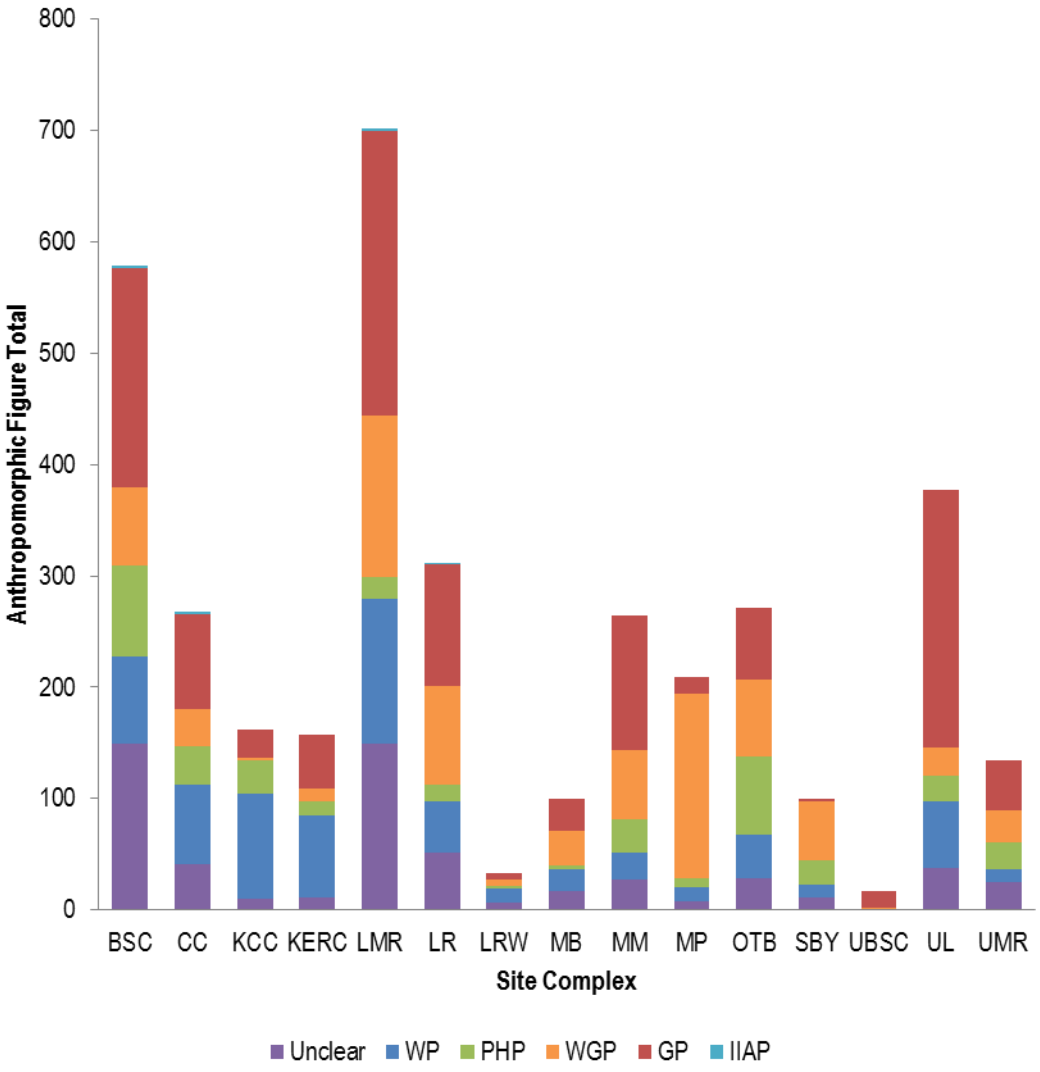


Figure A3.1 Number of anthropomorphic figures by stylistic period at each site complex

Table A3.2 Bichrome anthropomorphic figures recorded colour combinations

Bichrome combinations	n	%
Black, Dark red	2	0.61
Black, Red	1	0.30
Black, White	1	0.30
Brown, Dark red	2	0.61
Brown, Red	1	0.30
Brown, White	1	0.30
Brown, Yellow	4	1.22
Dark red, Grey	1	0.30

Bichrome combinations	**n**	**%**
Dark red, Light red	4	1.22
Dark red, Mulberry	4	1.22
Dark red, Orange	6	1.82
Dark red, Red	15	4.56
Dark red, White	21	6.38
Dark red, Yellow	24	7.29
Light red, Orange	1	0.30
Light red, Red	1	0.30
Light red, White	18	5.47
Light red, Yellow	2	0.61
Mauve, White	1	0.30
Mulberry, Red	6	1.82
Mulberry, White	6	1.82
Mulberry, Yellow	24	7.29
Orange, Red	8	2.43
Orange, White	2	0.61
Orange, Yellow	6	1.82
Pink, Red	3	0.91
Red, White	110	33.43
Red, Yellow	46	13.98
White, Yellow	8	2.43

Table A3.3 Polychrome anthropomorphic figures recorded colour combinations

Polychrome combinations	**n**	**%**
Black, Dark red, Red, White	1	1.16
Black, Dark red, White	1	1.16
Black, Grey, Red	1	1.16
Black, Grey, Red, White	2	2.33
Black, Grey, Red, Yellow	1	1.16
Black, Light red, Red, White	1	1.16
Black, Orange, White	1	1.16

Polychrome combinations	**n**	**%**
Black, Red, White	14	16.28
Black, Red, White, Yellow	3	3.49
Brown, Grey, Light red, Mauve, Red	1	1.16
Brown, Grey, Red, White	1	1.16
Brown, Red, Yellow	1	1.16
Dark red, Grey, Red	1	1.16
Dark red, Grey, White	1	1.16
Dark red, Grey, Yellow	3	3.49
Dark red, Light red, White	1	1.16
Dark red, Light red, White, Yellow	1	1.16
Dark red, Light red, Yellow	2	2.33
Dark red, Mulberry, Orange	4	4.65
Dark red, Mulberry, Orange, White	1	1.16
Dark red, Orange, Red, White, Yellow	1	1.16
Dark red, Red, White	2	2.33
Dark red, Red, White, Yellow	1	1.16
Dark red, Red, Yellow	5	5.81
Dark red, White, Yellow	5	5.81
Grey, Red, White	3	3.49
Light red, Mulberry, White	1	1.16
Light red, Red, White	1	1.16
Light red, White, Yellow	1	1.16
Mulberry, White, Yellow	10	11.63
Orange, Pink, White, Yellow	1	1.16
Orange, Red, White	3	3.49
Red, White, Yellow	10	11.63

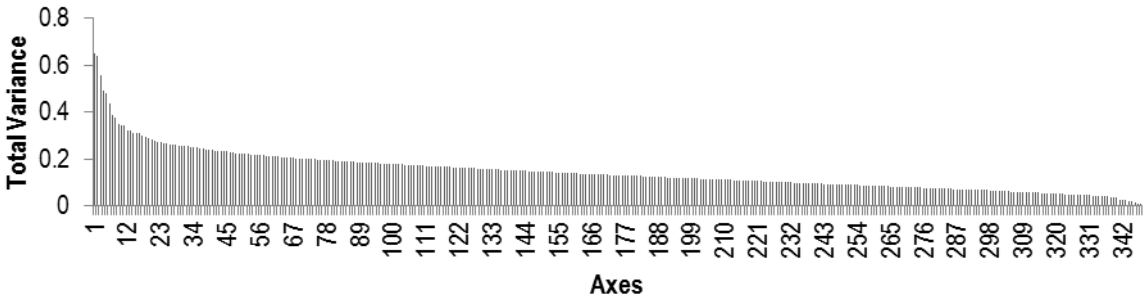


Figure A3.2 Eigenvalue for each 348 principal axes in Analysis 1, CA of the complete dataset

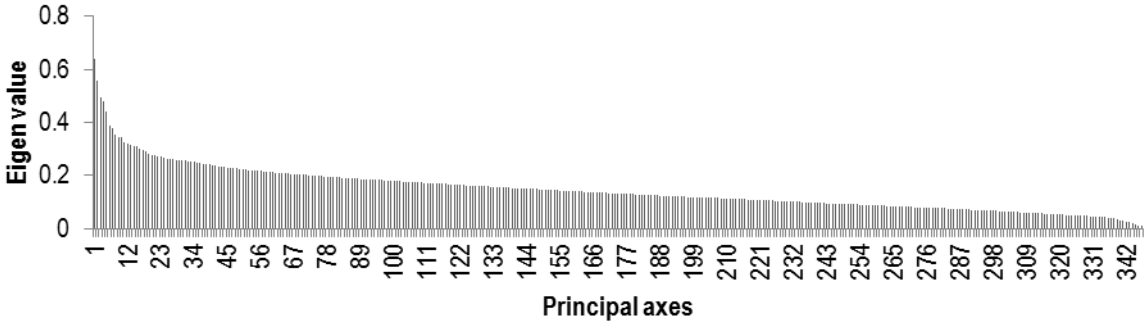


Figure A3.3 Eigenvalue for each 347 principal axes in Analysis 2, CA of dataset minus extreme outliers

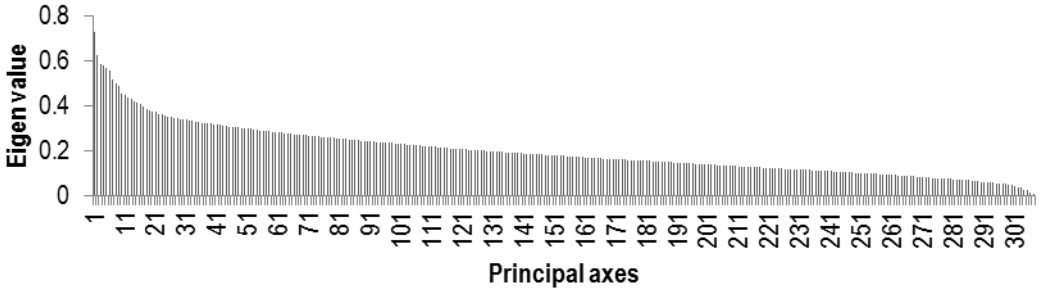


Figure A3.4 Eigenvalue for each 307 principal axes in Analysis 3, CA of dataset minus extreme outliers and Body Position attributes

Appendix 4. Attribute frequencies by stylistic period

The percentages in the following tables represent the proportion of anthropomorphic figures in each stylistic period that contain each individual attribute type.

Body Position

Table A4.1 Body Position attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Blank	-	34		6		70		116	
'E' Angled Arms	89	34	38.20	8	8.99	2	2.25	30	33.71
'M' Angled Arms	15	2	13.33	3	20.00	2	13.33	5	33.33
'W' Angled Arms	303	133	43.89	26	8.58	24	7.92	83	27.39
Arms folded behind head	4	4	100.00	-	-	-	-	-	-
Bent Elbows	49	39	79.59	6	12.24	-	-	-	-
Bent Forward	20	10	50.00	4	20.00	-	-	-	-
Closed Leg Plan	382	56	14.66	275	71.99	15	3.93	7	1.83
Consistent Width Leg Spacing	733	345	47.07	119	16.23	71	9.69	132	18.01
Crossed Legs	11	5	45.45	6	54.55	-	-	-	-
Drooped Hanging Arms	182	59	32.42	19	10.44	26	14.29	49	26.92
Hands-In-Pockets Stance	6	2	33.33	-	-	-	-	3	50.00
Hanging Arms	405	240	59.26	43	10.62	25	6.17	68	16.79
Horizontal	97	15	15.46	26	26.80	8	8.25	28	28.87
Horizontal Arms	177	37	20.90	47	26.55	21	11.86	33	18.64
Horizontal Legs	6	-	-	1	16.67	2	33.33	3	50.00
Kneeling Profile	3	3	100.00	-	-	-	-	-	-
Plan Bending	267	249	93.26	8	3.00	3	1.12	1	0.37
Profile Bending	35	10	28.57	18	51.43	-	-	1	2.86
Profile Bent-Knee	73	46	63.01	12	16.44	1	1.37	3	4.11
Reverse Bent Elbows	13	7	53.85	5	38.46	-	-	1	7.69
Reverse Upswept Legs	7	-	-	-	-	-	-	5	71.43
Running Profile	54	31	57.41	16	29.63	-	-	2	3.70
Semi-Squatting	91	35	38.46	17	18.68	4	4.40	13	14.29
Single Raised Arm	151	51	33.77	79	52.32	1	0.66	11	7.28
Sitting Cross-legged	20	14	70.00	5	25.00	-	-	-	-
Sitting Outstretched Legs	26	12	46.15	9	34.62	1	3.85	1	3.85
Sloping Arms	1604	517	32.23	535	33.35	149	9.29	155	9.66
Square Crutch	16	1	6.25	4	25.00	7	43.75	1	6.25

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Squatting	10	2	20.00	2	20.00	-	-	3	30.00
Squatting Angled Legs	28	6	21.43	-	-	2	7.14	17	60.71
Squatting Curved Legs	22	-	-	-	-	2	9.09	15	68.18
Standing Bow Legged	7	-	-	-	-	1	14.29	3	42.86
Standing Plan	767	171	22.29	173	22.56	104	13.56	150	19.56
Standing Profile	159	88	55.35	43	27.04	7	4.40	14	8.81
Standing Spread-Legged	186	-	-	25	13.44	46	24.73	46	24.73
Upraised Arms	254	52	20.47	27	10.63	31	12.20	108	42.52
Upside Down	34	4	11.76	19	55.88	-	-	10	29.41
Upswept Legs	11	-	-	-	-	3	27.27	6	54.55
Walking Profile	20	12	60.00	3	15.00	-	-	1	5.00
Waving Arm	4	-	-	-	-	-	-	4	100.00

Body Detail

Table A4.2 Body Detail attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Blank	-	628		443		212		361	
Barrel Body	311	35	11.25	36	11.58	43	13.83	158	50.80
Bottle Tree Body	16	1	6.25	1	6.25	1	6.25	13	81.25
Broad Shoulders	49	35	71.43	8	16.33	-	-	3	6.12
Bump Shoulder-blades	1	-	-	-	-	-	-	1	100.00
Buns Buttocks	1	-	-	-	-	-	-	1	100.00
Dumbbell Neck Decoration	6	-	-	-	-	6	100.00	-	-
Ellipse/Centreline Body	3	-	-	2	66.67	-	-	1	33.33
Elliptical Body	15	3	20.00	6	40.00	1	6.67	4	26.67
Elongated Body	270	57	21.11	61	22.59	40	14.81	62	22.96
Fat Body	150	12	8.00	9	6.00	30	20.00	58	38.67
Funnel Neck	5	1	20.00	1	20.00	-	-	3	60.00
Hunched Shoulders	104	54	51.92	25	24.04	-	-	23	22.12
Lattice Body	11	1	9.09	3	27.27	6	54.55	1	9.09
Long Neck	60	4	6.67	24	40.00	10	16.67	17	28.33
Narrow Chest	197	168	85.28	23	11.68	2	1.02	1	0.51
Obese Body	35	1	2.86	-	-	10	28.57	20	57.14
Paunch Detail	433	398	91.92	23	5.31	-	-	1	0.23
Pearshape Body	8	2	25.00	1	12.50	1	12.50	4	50.00
Plan Buttocks Detail	5	-	-	-	-	1	20.00	4	80.00
Shoulder Spikes	29	3	10.34	18	62.07	4	13.79	2	6.90
Sinuous Body	1	-	-	-	-	-	-	1	100.00

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Skeleton Body	5	-	-	1	20.00	2	40.00	2	40.00
'T' Shoulders	22	11	50.00	10	45.45	-	-	-	-
Tapering Elliptical Body	116	23	19.83	90	77.59	-	-	-	-
Three Line Body	63	3	4.76	34	53.97	15	23.81	6	9.52
Two Line Body	64	4	6.25	38	59.38	18	28.13	-	-
X-ray Spine	1	-	-	1	100.00	-	-	-	-

Limb Detail

Table A4.3 Limb Detail attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Blank	-	522		202		30		213	
Angled Slipper Feet	225	183	81.33	9	4.00	14	6.22	7	3.11
Angled Tick Feet	127	39	30.71	19	14.96	43	33.86	12	9.45
Ankle Wings	4	2	50.00	-	-	1	25.00	-	-
Bag Elbows	1	-	-	-	-	1	100.00	-	-
Bar Fingers	373	23	6.17	14	3.75	109	29.22	177	47.45
Boot Feet	3	-	-	-	-	-	-	3	100.00
Bumpy Joint	1	-	-	-	-	-	-	-	-
Circle Feet	11	1	9.09	-	-	9	81.82	-	-
Conventional Hand	67	1	1.49	-	-	59	88.06	3	4.48
Crab Claw Feet	2	-	-	-	-	-	-	2	100.00
Crab Claw Hands	6	2	33.33	-	-	-	-	4	66.67
Curved Feet	5	-	-	1	20.00	-	-	2	40.00
Downfacing Feet	60	50	83.33	4	6.67	-	-	3	5.00
Elegant Fluid Limbs	4	-	-	-	-	1	25.00	3	75.00
European Boot Feet	108	1	0.93	-	-	5	4.63	93	86.11
Extended Fingers	43	1	2.33	1	2.33	16	37.21	15	34.88
Feet in Either Direction	463	54	11.66	27	5.83	95	20.52	217	46.87
Feet in Same Direction	248	183	73.79	10	4.03	14	5.65	24	9.68
Fine Fingered Hands	46	41	89.13	1	2.17	2	4.35	1	2.17
Fluid Limbs	9	-	-	-	-	-	-	5	55.56
Foot Base	9	-	-	9	100.00	-	-	-	-
Forward Curving Legs	4	2	50.00	-	-	1	25.00	-	-
Frill Elbows	2	-	-	-	-	-	-	2	100.00
Frill Toes	179	3	1.68	3	1.68	19	10.61	116	64.80
Gauntlet Arms	37	1	2.70	28	75.68			8	21.62
Hand Type Feet	21	2	9.52	-	-	11	52.38	6	28.57
Heeled Feet	179	4	2.23	2	1.12	5	2.79	146	81.56

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Heeled Slipper Feet	22	-	-	1	4.55	4	18.18	15	68.18
Hooked Fingers	3	-	-	1	33.33	2	66.67	-	-
Jodhpur Legs	4	-	-	3	75.00	-	-	-	-
Knobbed Elbows	22	2	9.09	-	-	2	9.09	17	77.27
Knobbed Knee	32	11	34.38	-	-	1	3.13	18	56.25
Knock Kneed Limbs	1	1	100.00	-	-	-	-	-	-
Large Hands	27	-	-	-	-	2	7.41	24	88.89
Missing Limb	2	1	50.00	-	-	-	-	-	-
Oval Feet	14	3	21.43	11	78.57	-	-	-	-
Oval Hands	5	4	80.00	-	-	-	-	-	-
Paw Hands	7	-	-	1	14.29	2	28.57	3	42.86
Petal Fingers	61	-	-	-	-	-	-	60	98.36
Petal Toes	63	-	-	-	-	2	3.17	56	88.89
Round Hands	3	2	66.67	-	-	1	33.33	-	-
Round Tip Limbs	36	3	8.33	5	13.89	14	38.89	2	5.56
Sausage Upper Arms	2	-	-	-	-	-	-	2	100.00
Slim Arms	26	20	76.92	2	7.69	1	3.85	1	3.85
Slipper Feet	55	25	45.45	4	7.27	6	10.91	9	16.36
Square-Tip Legs	200	11	5.50	182	91.00	3	1.50	1	0.50
Stamen Fingers	1	-	-	-	-	1	100.00	-	-
Stick Arms	1341	387	28.86	401	29.90	190	14.17	75	5.59
Teardrop Limbs	7	3	42.86	4	57.14	-	-	-	-
Three Finger Hands	175	10	5.71	19	10.86	76	43.43	51	29.14
Tick Feet	84	14	16.67	5	5.95	34	40.48	10	11.90
Toed Feet	179	3	1.68	8	4.47	8	4.47	132	73.74
Toffee Apple Hands	22	11	50.00	-	-	11	50.00	-	-
Topboot Feet	2	2	100.00	-	-	-	-	-	-
Triangle Hands	35	33	94.29	1	2.86	-	-	1	2.86
Triangle Legs	5	-	-	1	20.00	-	-	4	80.00
Widespread Toes	1	-	-	-	-	-	-	1	100.00
Wrist Barbs	2	-	-	1	50.00	1	50.00	-	-

Dress Detail

Table A4.4 Dress Detail attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Blank	-	876		681		354		682	
Baggy Pubic Apron	16	6	37.50	10	62.50	-	-	-	-
Ball Hip Decorations	2	-	-	-	-	-	-	-	-

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Barbed Sash	3	3	100.00	-	-	-	-	-	-
Barbed Star Sash	1	1	100.00	-	-	-	-	-	-
Barbed Tassel	12	12	100.00	-	-	-	-	-	-
Broad Tassel Elbow Band	1	1	100.00	-	-	-	-	-	-
Corded Tussock	3	-	-	3	100.00	-	-	-	-
Double Sloping Bar Hip Decoration	5	4	80.00	1	20.00	-	-	-	-
Dumbbell Elbow Band	3	1	33.33	-	-	2	66.67	-	-
Flyswat Neck Decoration	10	3	30.00	5	50.00	1	10.00	1	10.00
Four Chili Armpit	20	20	100.00	-	-	-	-	-	-
Fringe Chest Band	1	1	100.00	-	-	-	-	-	-
Knobbed Three Point Sash	5	4	80.00	1	20.00	-	-	-	-
Long Pubic Apron	51	49	96.08	1	1.96	-	-	-	-
Multiple Thin Bangles	5	3	60.00	-	-	2	40.00	-	-
Neck Tussocks	1	1	100.00	-	-	-	-	-	-
Pendulum Waist Decoration	13	10	76.92	-	-	-	-	-	-
Plume Sash	14	14	100.00	-	-	-	-	-	-
Pompom Arm Band	7	3	42.86	4	57.14	-	-	-	-
Pubic Tassel	55	29	52.73	25	45.45	-	-	-	-
Ribbon Chest Band	1	1	100.00	-	-	-	-	-	-
Round Cummerbund	15	-	-	2	13.33	12	80.00	-	-
Rounded Chest Band	4	4	100.00	-	-	-	-	-	-
Short Pubic Apron	102	55	53.92	43	42.16	-	-	-	-
Single Broad Tassel Elbow Band	2	1	50.00	1	50.00	-	-	-	-
Single Parallel Bar	4	4	100.00	-	-	-	-	-	-
Single Sloping Bar Hip Decoration	5	-	-	5	100.00	-	-	-	-
Single Tassel Elbow Decoration	3	1	33.33	2	66.67	-	-	-	-
Single Tram Track	8	7	87.50	1	12.50	-	-	-	-
Spray	4	4	100.00	-	-	-	-	-	-
Spray of Cords	4	3	75.00	-	-	1	25.00	-	-
Three Chili Armpit	9	9	100.00	-	-	-	-	-	-
Three Point Sash	94	92	97.87	2	2.13	-	-	-	-
Toffee Apple Elbow Band	10	2	20.00	-	-	8	80.00	-	-
Toffee Apple Hip Decoration	4	-	-	-	-	2	50.00	2	50.00
Track Armpit	9	9	100.00	-	-	-	-	-	-
Trident Tassel	5	4	80.00	-	-	-	-	-	-
Trimmed Sash	6	5	83.33	-	-	-	-	-	-
Triple Tassel	61	60	98.36	1	1.64	-	-	-	-
Waist Sparse Tassels	7	4	57.14	3	42.86	-	-	-	-
Waist Tussocks	31	16	51.61	15	48.39	-	-	-	-
Willow Leaf Armpit	2	1	50.00	-	-	-	-	-	-

Body Decoration

Table A4.5 Body Decoration attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Blank	-	727		674		296		581	
Ankle Bands	19	9	47.37	-	-	5	26.32	5	26.32
Arm Bands	75	66	88.00	3	4.00	-	-	5	6.67
Bangles	24	19	79.17	-	-	5	20.83	-	-
Breast Cross Straps	2	-	-	-	-	-	-	1	50.00
Broad Tassel	22	9	40.91	12	54.55	-	-	1	4.55
Calf Bands	6	1	16.67	-	-	1	16.67	4	66.67
Cartridge Belt Waistband	3	-	-	1	33.33	1	33.33	1	33.33
Centre Body Bar	18	1	5.56	11	61.11	2	11.11	4	22.22
Centre Body Line	17	-	-	8	47.06	5	29.41	3	17.65
Chest Band	36	-	-	1	2.78	9	25.00	25	69.44
Chest Plate	17	-	-	-	-	-	-	17	100.00
Crutch Band	72	-	-	35	48.61	11	15.28	23	31.94
Cummerbund Waistband	220	175	79.55	6	2.73	26	11.82	5	2.27
Dancing Balloon	36	35	97.22	1	2.78	-	-	-	-
Double Tassel Elbow Band	7	5	71.43	1	14.29	-	-	1	14.29
Double Three Point Sash	12	12	100.00	-	-	-	-	-	-
Elbow Bands	196	170	86.73	4	2.04	11	5.61	9	4.59
Elongated Oval Chest Decoration	3	-	-	-	-	1	33.33	2	66.67
Foot Bands	15	-	-	-	-	1	6.67	14	93.33
Fore And Aft Bands	37	-	-	-	-	8	21.62	27	72.97
Knee Bands	6	3	50.00	1	16.67	-	-	2	33.33
Large Pompom (on waistband)	14	14	100.00	-	-	-	-	-	-
Neck Band	17	-	-	1	5.88	5	29.41	10	58.82
Negative Centre Body Bar	7	-	-	6	85.71	1	14.29	-	-
Parallel Spike	3	3	100.00	-	-	-	-	-	-
Pubic Fringed Apron	15	14	93.33	1	6.67	-	-	-	-
Ribbon Band	26	12	46.15	13	50.00	1	3.85	-	-
Rounded Bangles	4	4	100.00	-	-	-	-	-	-
Sash Armpit	16	15	93.75	1	6.25	-	-	-	-
Single Broad Tassel	110	104	94.55	4	3.64	-	-	1	0.91
Single Pendulum	19	13	68.42	5	26.32	-	-	1	5.26
Single Willow Leaf	1	1	100.00	-	-	-	-	-	-
Stylised Triple Tassel	41	34	82.93	7	17.07	-	-	-	-
Thigh Bands	2	-	-	-	-	-	-	2	100.00
Thin Tussock Elbow Band	8	3	37.50	5	62.50	-	-	-	-
Triple Tassel Elbow Band	9	9	100.00	-	-	-	-	-	-

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Tuft Arm Band	98	96	97.96	-	-	-	-	-	-
Underarm Tussock	26	18	69.23	8	30.77	-	-	-	-
Waist Fan	7	7	100.00	-	-	-	-	-	-
Waistband	13	-	-	6	46.15	2	15.38	5	38.46
Wrist Bands	24	22	91.67	-	-	1	4.17	1	4.17
York Line	8	-	-	-	-	-	-	8	100.00

Sexual Detail

Table A4.6 Sexual Detail attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Blank	-	1,234		776		346		534	
Armcurve Breasts	1	-	-	-	-	1	100.00	-	-
Bar Anus	1	-	-	-	-	-	-	1	100.00
Bent Side Penis	1	-	-	-	-	-	-	-	-
Bifurcated Penis	1	-	-	-	-	-	-	1	100.00
Curved Paddle Penis	3	-	-	-	-	-	-	3	100.00
Erect Side Penis	17	-	-	-	-	7	41.18	10	58.82
Knobbed Penis	20	-	-	1	5.00	3	15.00	9	45.00
Low Silhouette Testicles	3	3	100.00	-	-	-	-	-	-
Meandering Penis	2	-	-	-	-	-	-	2	100.00
On-Body Pendulous Breasts	1	-	-	-	-	1	100.00	-	-
On-Body Vulva	9	-	-	-	-	-	-	9	100.00
Oval Side Penis	1	-	-	-	-	-	-	1	100.00
Paddle Penis	11	-	-	-	-	-	-	9	81.82
Profile Breasts	17	5	29.41	10	58.82	-	-	2	11.76
Prominent Nipple Breasts	5	-	-	-	-	-	-	4	80.00
Pubic Hair	4	-	-	-	-	-	-	3	75.00
Reverse Curved	2	-	-	-	-	-	-	2	100.00
Short Rounded Penis	7	-	-	-	-	-	-	7	100.00
Split Head Penis	3	-	-	-	-	-	-	2	66.67
Split Penis	3	-	-	-	-	-	-	3	100.00
Spoon Penis	1	-	-	-	-	-	-	1	100.00
Stacked Profile Breasts	10	3	30.00	3	30.00	-	-	1	10.00
Stamen Testicles	10	-	-	-	-	-	-	9	90.00
Suspended ‘U’ Vulva	10	-	-	-	-	-	-	10	100.00
Suspended Divided Vulva	7	-	-	-	-	-	-	7	100.00
Suspended Vulva	8	-	-	-	-	-	-	7	87.50
Trident Penis	1	1	100.00	-	-	-	-	-	-

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Underarm breasts	59	1	1.69	4	6.78	9	15.25	39	66.10
Upswept Breasts	2	-	-	-	-	1	50.00	1	50.00
Vertical Bar Penis	65	6	9.23	-	-	8	12.31	42	64.62

Headdress

Table A4.7 Headdress attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
None	1,496	479	24.14	432	21.77	238	12.00	347	17.49
Acorn with Exclamation Mark	12	10	83.33	2	16.67	-	-	-	-
Acorn Headdress	36	20	55.56	12	33.33	2	5.56	1	2.78
Balloon Tip	16	8	50.00	-	-	-	-	8	50.00
Bangled Acorn with Ray Additions	19	18	94.74	-	-	1	5.26	-	-
Bangled Dunce Cap	11	11	100.00	-	-	-	-	-	-
Bar Ray Additions	5	-	-	1	20.00	-	-	3	60.00
Barred Acorn	15	-	-	12	80.00	-	-	1	6.67
Blunt Cone	1	1	100.00	-	-	-	-	-	-
Blunt Stovepipe	2	1	50.00	1	50.00	-	-	-	-
Bob Tail	5	1	20.00	4	80.00	-	-	-	-
Broad Fernleaf	10	1	10.00	2	20.00	-	-	7	70.00
Broad Plume	7	-	-	4	57.14	1	14.29	1	14.29
Broad Plume Fan	4	-	-	-	-	-	-	4	100.00
Broad Plume Fan with Perimeter	1	-	-	-	-	-	-	1	100.00
Broad Sweptback	39	7	17.95	11	28.21	19	48.72	-	-
Broad Teardrop	8	8	100.00	-	-	-	-	-	-
Broom	6	-	-	3	50.00	-	-	1	16.67
Busby	11	1	9.09	10	90.91	-	-	-	-
Busby and Tussock	1	-	-	1	100.00	-	-	-	-
Cap with Ribbons	23	-	-	23	100.00	-	-	-	-
Cobweb Wandjina	4	-	-	-	-	-	-	4	100.00
Concentric Arc	11	-	-	-	-	6	54.55	4	36.36
Crab Eye Pom Pom Erect	2	1	50.00	-	-	-	-	1	50.00
Crew Cut	2	1	50.00	1	50.00	-	-	-	-
Crewcut Fan	4	-	-	1	25.00	-	-	1	25.00
Cross Hatched Busby Headdress	3	-	-	3	100.00	-	-	-	-
Cross Hatched Melon	7	-	-	4	57.14	3	42.86	-	-
Disk	11	-	-	1	9.09	7	63.64	2	18.18
Divided Mop	20	5	25.00	9	45.00	5	25.00	-	-
Double Feather	10	6	60.00	-	-	-	-	3	30.00

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Droop Dunce Cap	63	59	93.65	1	1.59	-	-	-	-
Droop Dunce Cap with Pom Pom	312	302	96.79	3	0.96	-	-	-	-
Dunce Cap	70	66	94.29	3	4.29	-	-	-	-
Elephant	4	-	-	-	-	-	-	4	100.00
Elongated Teardrop	5	5	100.00	-	-	-	-	-	-
Erect Barred	1	-	-	-	-	-	-	-	-
Exclamation Mark	10	-	-	-	-	-	-	10	100.00
Extended Acorn Headdress	44	34	77.27	7	15.91	1	2.27	-	-
Fernleaf	6	2	33.33	4	66.67	-	-	-	-
Five Finger	1	-	-	1	100.00	-	-	-	-
Halo	113	1	0.88	-	-	18	15.93	93	82.30
Hand	8	-	-	5	62.50	-	-	1	12.50
Hat	5	-	-	4	80.00	-	-	-	-
Helmet	32	2	6.25	30	93.75	-	-	-	-
Helmet with Additions	4	-	-	4	100.00	-	-	-	-
Hollow Acorn	3	-	-	1	33.33	1	33.33	-	-
Horizontal Barrel	3	-	-	1	33.33	2	66.67	-	-
Horse Shoe Head	2	-	-	-	-	2	100.00	-	-
Kidney	2	-	-	-	-	2	100.00	-	-
Melon	8	1	12.50	7	87.50	-	-	-	-
Mop	5	-	-	-	-	-	-	-	-
Multiple Broad Fernleaf	3	-	-	-	-	1	33.33	2	66.67
Multiple Drooped Arc	4	1	25.00	3	75.00	-	-	-	-
Multiple Drooped Bar	10	-	-	9	90.00	1	10.00	-	-
Onion Headdress	12	-	-	-	-	12	100.00	-	-
Pin Ray Additions	16	-	-	-	-	2	12.50	13	81.25
Pole	3	-	-	-	-	-	-	3	100.00
Pole Addition	3	2	66.67	1	33.33	-	-	-	-
Prong Antennae	6	5	83.33	-	-	-	-	1	16.67
Propeller	19	-	-	1	5.26	2	10.53	16	84.21
Pumpkin	2	-	-	-	-	2	100.00	-	-
Rayed	36	-	-	1	2.78	1	2.78	29	80.56
Rayed Barrel	1	-	-	-	-	-	-	1	100.00
Rayed Oval	4	-	-	-	-	1	25.00	3	75.00
Shocked	73	5	6.85	9	12.33	6	8.22	36	49.32
Side and Vertical Bars	1	-	-	-	-	-	-	1	100.00
Skull Cap	50	1	2.00	49	98.00	-	-	-	-
Solid Disk	15	1	6.67	9	60.00	1	6.67	2	13.33
Stovepipe	7	6	85.71	-	-	-	-	-	-
Tap Handle	1	-	-	-	-	-	-	1	100.00
Tapered Busby	2	-	-	1	50.00	-	-	-	-

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Three Finger	3	1	33.33	-	-	1	33.33	1	33.33
Trimmed Busby	1	-	-	1	100.00	-	-	-	-
Triple Broad Fernleaf	1	-	-	-	-	1	100.00	-	-
Tulip Ray Additions	4	-	-	-	-	1	25.00	3	75.00
Turban	2	1	50.00	1	50.00	-	-	-	-
Two Finger	1	-	-	-	-	-	-	1	100.00
Umbrella	15	-	-	-	-	15	100.00	-	-
Unclear	339	175	51.62	93	27.43	19	5.60	25	7.37
Wandjina	51	-	-	-	-	1	1.96	50	98.04
Windmill	9	1	11.11	8	88.89	-	-	-	-

Head Detail

Table A4.8 Head Detail attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Blank	-	519		379		194		133	
Barred Circle Head	51	-	-	1	1.96	-	-	44	86.27
Barred Oval Head	10	-	-	4	40.00	1	10.00	5	50.00
Barred Yam Head with Feathers	1	-	-	-	-	1	100.00	-	-
Bean Head	1	1	100.00	-	-	-	-	-	-
Concentric Circle Round Head	7	-	-	-	-	2	28.57	5	71.43
Cross Circle Head	2	-	-	-	-	-	-	-	-
Dome Head	32	-	-	1	3.13	3	9.38	22	68.75
Donut Head	44	1	2.27	-	-	9	20.45	22	50.00
Extended Lips Head	1	-	-	-	-	1	100.00	-	-
Inverted Teardrop Head	41	3	7.32	13	31.71	5	12.20	15	36.59
Line Infill Yam Head	4	-	-	2	50.00	2	50.00	-	-
Melon Head	11	-	-	1	9.09	1	9.09	8	72.73
Mushroom Head	6	2	33.33	1	16.67	2	33.33	-	-
Oval Head	132	45	34.09	21	15.91	10	7.58	49	37.12
Pin Head	1	-	-	-	-	-	-	-	-
Profile Spanner Head	1	-	-	-	-	-	-	1	100.00
Profile Spanner Head with Beard	1	-	-	-	-	-	-	1	100.00
Quinkan Head	4	2	50.00	-	-	1	25.00	-	-
Rectangle Head	79	10	12.66	59	74.68	-	-	3	3.80
Round Head	268	2	0.75	16	5.97	50	18.66	149	55.60
Rounded Head	113	1	0.88			6	5.31	96	84.96
Rounded Triangle Head	30	2	6.67	15	50.00	6	20.00	2	6.67
Rounded Triangle with Shocked	3	-	-	-	-	-	-	-	-

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Hair Head									
Small Head	27	9	33.33	10	37.04	-	-	-	-
Small Round Head	50	14	28.00	19	38.00	5	10.00	3	6.00
Solid Round Head	1006	592	58.85	165	16.40	32	3.18	107	10.64
Vertical Oval Head	269	47	17.47	87	32.34	44	16.36	19	7.06

Face Detail

Table A4.9 Face Detail attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Attribute	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Blank	-	1,242		788		351		385	
Bar Eyelashes	20	-	-	-	-	-	-	20	100.00
Bar Forehead Nose	16	-	-	-	-	1	6.25	15	93.75
Bar Mouth	1	-	-	-	-	-	-	1	100.00
Bar Nose	75	-	-	-	-	-	-	75	100.00
Beard	5	-	-	-	-	5	100.00	-	-
Broad Beak Mouth	8	-	-	-	-	1	12.50	7	87.50
Bulbous 'U' Nose	1	-	-	-	-	-	-	1	100.00
Dot Eyes	52	-	-	1	1.92	10	19.23	38	73.08
Earring Feature	4	1	25.00	2	50.00	-	-	1	25.00
Fish Mouth	1	-	-	-	-	-	-	1	100.00
Goggle Dot Eyes	8	-	-	-	-	-	-	8	100.00
Goggle Eyes	96	-	-	-	-	2	2.08	90	93.75
Hollow Eyes	24	-	-	-	-	4	16.67	18	75.00
Inverted Keyhole Nose	1	-	-	-	-	-	-	1	100.00
Jug Ears	16	-	-	1	6.25	-	-	15	93.75
Leaf Ears	2	-	-	-	-	-	-	2	100.00
Mask Variation Face	1	-	-	-	-	-	-	1	100.00
Outlined Solid Eyes	28	-	-	-	-	-	-	28	100.00
Oval Eyes	30	-	-	-	-	1	3.33	29	96.67
Pin Eyelashes	1	-	-	-	-	-	-	1	100.00
Pointed Ears	9	-	-	-	-	-	-	9	100.00
Rabbit Ears	2	-	-	-	-	-	-	2	100.00
Round Outline Mouth	3	-	-	-	-	-	-	3	100.00
Round Solid Eyes	85	-	-	1	1.18	2	2.35	80	94.12
Side Bun Feature	10	7	70.00	1	10.00	1	10.00	1	10.00
Spectacle Eyes	1	-	-	-	-	-	-	1	100.00
Vertical Oval Eyes	1	-	-	-	-	-	-	1	100.00

Artefact Detail

Table A4.10 Artefact attribute frequencies by stylistic period

		GP		WGP		PHP		WP	
Artefact Type	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Boomerangs									
Angular Boomerang	68	58	85.29	6	8.82	-	-	-	-
Crescent Boomerang	150	116	77.33	18	12.00	7	4.67	-	-
Double Boomerangs (Angular and Crescent)	2	1	50.00	1	50.00	-	-	-	-
Double Boomerangs (Angular)	39	38	97.44	1	2.56			-	-
Double Boomerangs (Crescent)	114	105	92.11	7	6.14	2	1.75	-	-
Double Boomerangs (No7 Boomerang)	1	1	100.00	-	-	-	-	-	-
Triple Boomerangs (Angular)	1	1	100.00	-	-	-	-	-	-
Triple Boomerangs (Crescent)	12	10	83.33	1	8.33	-	-	-	-
Quadruple Boomerangs (Crescent)	1	1	100.00	-	-	-	-	-	-
Hooked Sticks									
Hooked Stick	104	4	3.85	56	53.85	44	42.31	-	-
Spatula Handle Spearthrower	16	-	-	16	100.00	-	-	-	-
Spears									
Multi-Barb Spear (Down facing)	41	7	17.07	32	78.05	-	-	-	-
Multi-Barb Spear (Upright)	12	2	16.67	9	75.00	-	-	-	-
Multi-Barb Spear (Sloping)	4	-	-	3	75.00	-	-	-	-
Multi-Barb Spear (Horizontal)	4	1	25.00	3	75.00	-	-	-	-
Multi-Barb Spear Pairs (Down facing)	15	3	20.00	12	80.00	-	-	-	-
Multi-Barb Spear Pairs (Upright)	10	2	20.00	8	80.00	-	-	-	-
Multi-Barb Spear Pairs (Sloping)	1	-	-	1	100.00	-	-	-	-
Multi-Barb Spear Pairs (Horizontal)	1	-	-	1	100.00	-	-	-	-
Multi-Barb Spear Group (Down facing)	27	4	14.81	22	81.48	-	-	-	-
Multi-Barb Spear Group (Upright)	8	1	12.50	7	87.50	-	-	-	-
Spear (no barbs)	9	5	55.56	4	44.44	-	-	-	-
Other									
Catscradle String	1	1	100.00	-	-	-	-	-	-
Dilly Bag	16	14	87.50	2	12.50	-	-	-	-
Whisk	111	108	97.30	2	1.80	-	-	-	-
Unidentified	150	99	66.00	37	24.67	3	2.00	3	2.00