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## **SOUTH EAST ASIAN INFLUENCES IN WESTERN ARNHAM LAND ROCK ART DECORATIVE INFILL**

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Daryl Wesley<sup>1, 2</sup> and Jessica Viney<sup>3</sup>

<sup>1</sup> Department of Archaeology, Flinders University, SA 5042, Australia

<sup>2</sup> Archaeology and Natural History, School of Culture History and Language, College of Asia and the Pacific, The Australian National University, Canberra, ACT 0200, Australia

<sup>3</sup> Docklands, VIC 3008, Australia

### **Abstract**

George Chaloupka was told by Indigenous informants that a particular 'diamond' and 'zigzag' decorative infill style found in north western Arnhem Land rock art could be attributed to a transfer of knowledge from Indigenous contact with South East Asian seafarers and their textiles. We examine the hypothesis that diamond and zigzag decorative infill was a recent innovation in rock art through an analysis of a sample of rock art motifs with decorative infill design from the Wellington Range, Arnhem Land. The aim is to test the hypothesis of whether some infill design elements can be attributed to the emergence of cultural contact with South East Asian mariners. The project assessed a sample of 458 rock art motifs from 182 rock art sites that could be both attributed to an identifiable Arnhem Land chronological style and also contained one or more internal decorative infill elements. A single beeswax radiocarbon date of 955–791 cal. BP over a female anthropomorphic figure with a segmented zigzag decorative infill design illustrates that this manner of painting was clearly an endogenous development by Indigenous artists in the late Holocene. We discuss the possibility that these zigzag and segmented body design patterns were independently developed by Indigenous artists during the late Holocene and may have been influenced from similar patterns produced in woven fibre material culture. On the other hand, the diamond decorative infill design is represented in a select few figurative anthropomorphic motifs and is most likely a design element resulting from exposure to South East Asian textiles owing to the long period of culture contact established in the local region since the early 1600s AD. The method for the incorporation of exogenous designs in Arnhem Land Indigenous rock art is examined through the theory of cultural transmission and payoffs.

## Introduction

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Research by Margaret Nobbs focused on understanding the interrelationships of rock art, the people that made them, and the chronology of artistic traditions. Her work explored the detail and design of Panaramitee engravings which is paralleled in this study of late Holocene rock art in Arnhem Land, Northern Territory (NT). It is within this tradition of analysing motif elements that this research investigates the possibility of cultural influences on rock art designs from Indigenous culture contact with island South East Asia. Owing to their proximity to the Arnhem Land coast, rock art sequences in the Wellington Range (Figure 1) have the potential to yield valuable information about the culture contact era encoded in motifs beyond the introduced imagery of ships, foreigners and their material culture as first identified in detail by Chaloupka (1993, 1996).

Chaloupka (1993:193, 1996:137) proposed that some internal decorative infill designs of figurative motifs specific to the Wellington Range may have been influenced by designs from Indonesian textiles introduced by early Macassan seafarers. He proposed that some female anthropomorphic rock art motifs are depicted as wearing sarongs (Figure 2) (Chaloupka 1993:193, 1996:137). The arrival of foreign people and their material culture is known to have had a profound impact on the introduction of new subject material into contact era rock art production throughout Arnhem Land and Groote Eylandt (Burningham 1994, 2000; Chaloupka 1988; Clarke 2000a, 2000b; Clarke and Frederick 2006, 2008, 2011; Cole 1980; May et al. 2009, 2010, 2011, 2013a, 2013b; Mountford 1956; Roberts 2004; Roberts and Parker 2003; Taçon et al. 2010, 2013; Turner 1973; Wesley et al. 2012). This body of work establishes the fact that Indigenous artists of Arnhem Land readily incorporated imagery associated with culture contact.

The adoption of designs and patterns in rock art production could be explained in part through the anthropological study of the processes of cultural transmissions within and between groups (Collard et al. 2006). Chaloupka's (1993:192–193) research into decorative elements of figurative rock art (as shown in Figure 2) suggested similarities with Indonesian woven textiles such as the 'hatching, diamond and lozenge designs as well as patterned parallel, horizontal and

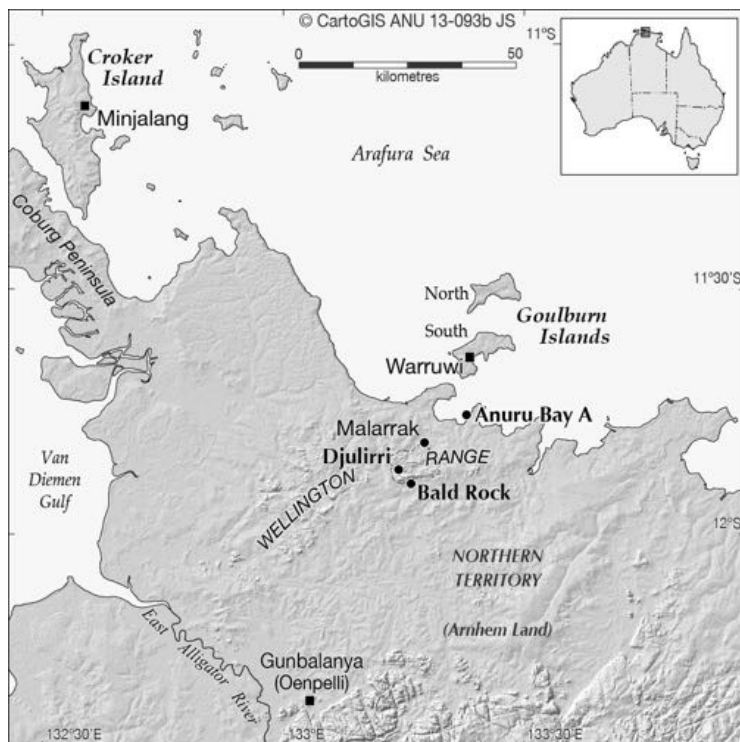
vertical blocks' which he stated were 'based on such fabrics'. Chaloupka (1996:137) made these inferences with the inclusion of unequivocal interpretations from his local Indigenous informants. Chaloupka (1996:137) stated explicitly that:

The painting is said to represent a Makassan woman, perhaps the artist's girlfriend. This assumption is quite likely because paintings representing Aboriginal women in this region are of a recurrent stylistic mode, quite different from this particular depiction...red pigment was used to outline the body's form and to detail the short patterned sarong...suggested how this garment was worn by indicating the fold and fastening of the cloth.

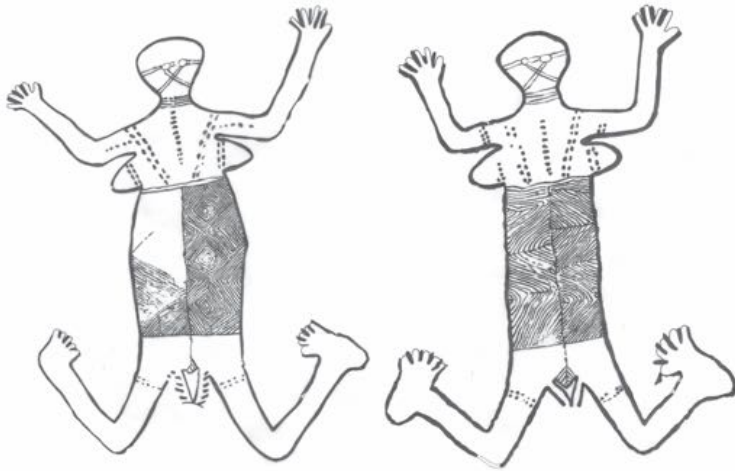
Joanna Barkmann (pers. comm. 2008), former Curator of South East Asia Textiles, Museum and Art Gallery of the Northern Territory, suggested this link warranted further study. Geometric motifs such as the diamond, hook-and-rhomb, and triangular patterns have appeared consistently on textiles across the islands of Indonesia for the past 700 years, dating back to the earliest preserved textiles with examples of these designs found in Sulawesi, the origin of the Macassans (Figure 3) (Barnes 2010; Maxwell 1990, 2003; Ruth 2010; Warming and Gaworski 1981).

Warming and Gaworski (1981:33) have illustrated traditional southern Sulawesi textiles that have identical patterns to those seen in this figurative rock art. Macknight (1972:311) on the other hand had cited there had been previous attempts to attribute the 'diamond-shaped patterning' to Macassan influence; however, there was no accompanying evidence to support this interpretation. During the archaeological study of the Wellington Range we coined the term 'Sarong Manner' for this decorative design as described by Chaloupka, where an anthropomorphic figure was painted with segmentation of the mid-section of the body and decoratively infilled with a range of diamond, zigzag or multidirectional lines. We were to discover that there was substantial variation in what we had originally termed the 'Sarong Manner', finding that figurative anthropomorphic and zoomorphic motifs, cultural objects and non-figurative geometric paintings were also painted in this manner and they appeared to be of greater

antiquity than the culture contact period. These observations lead to the need to test Chaloupka's original hypothesis regarding the extent to which Indonesian design elements influenced rock art production in the Wellington Range.



**Figure 1** Location of the study area, Wellington Range, Arnhem Land.



**Figure 2** Female anthropomorphic figures with diamond infill with segmented mid-section from Marligur, Wellington Range (courtesy of Virginia Das Neves).

The subtle incorporation of design elements in rock art can also reflect that a knowledge transfer relationship was occurring within the culture contact context alongside the transfer of goods and technological knowledge (Clarke and Frederick 2006, 2008). These goods include items such as dugout canoes, textiles, iron axes or hatchets, knives, cloth, rice and tobacco (Berndt and Berndt 1954; Macknight 1972, 1976, 1986, 2001, 2013; McCarthy 1957; Mitchell 1994, 1995, 1996, 2000; Russell 2004; Thomson 1939, 1949; Warner 1932, 1969; Wesley and Litster 2015a, 2015b). Clarke (2000a, 2000b) and Clarke and Frederick (2006, 2008, 2011) investigated how the Indigenous communities of Groote Eylandt negotiated the ideological and physical challenges of culture contact with Macassans.



**A**



**B**



**C**

**Figure 3** An example of traditional types of textiles and diversity of design elements from island Indonesia: (A) Timorese Tais Marobos Rarote ceremonial tubular skirt; (B) Hinggi man hip cloth; and (C) Semba Clan Elder shoulder cloth (courtesy Threads of Life).

Clarke (2002:175) identified that Indigenous 'social practices were re-negotiated in relation to the opportunities and challenges offered by the seasonal presence of the Macassans'. Collard et al. (2006:170) stated that various processes of cultural transmission are a crucial factor where 'humans have always interacted, and thus ideas, innovations, goods, and cultural practices...have constantly flowed from one community to another.' Cultural transmission is a process that leads to cultural traits transferring as a result of members of different groups coming into contact with each other through trade and exchange (Collard et al. 2006; Tehrani and Collard 2009). Furthermore, Efferson et al. (2008) showed that there are significant 'payoffs' for conformity between groups and individuals through cultural transmission. For example, the conversion of local populaces at trading entrêpôts to Islam throughout the world in order to conduct business with Islamic traders (Bernstein 2012; Curtin 1984; Gibson 2007; Ho 2004; Sosis 2005). Appropriating cultural traits, such as design elements from another group, can have social, cultural and economic benefits (Efferson et al. 2008).

It has been very thoroughly demonstrated that the Indigenous peoples of Arnhem Land gained significant 'payoffs' from their interactions with Macassans (Berndt and Berndt 1954; Clark and May 2013; Macknight 1972, 1976, 1986, 2001; Marika and West 2008; Mitchell 1994, 1996, 2000; Russell 2004; Thomson 1949; Warner 1932, 1969; Wesley and Litster 2015a, 2015b). Evidence for such 'payoffs' can be seen in the incorporation of metal hunting weaponry and dugout canoes which significantly changed Indigenous marine exploitation as demonstrated by Mitchell (1994, 1996) on the Cobourg Peninsula. He linked these changes to greater successful outcomes in hunting dugong and turtle with metal harpoons and dugout canoes. Likewise, tobacco was a consumable good that was 'greatly desired' where continued supply became a significant priority as it became incorporated not only into secular life, but also part of sacred and ceremonial traditions (Berndt and Berndt 1949:215). Morphy (1991:14) also noted that tobacco is established as currency in Yolngu exchange practices.



Textiles have also been recognised as a 'valued [author's emphasis] trade commodity in Yolngu society' and were incorporated into a variety of ceremonial contexts (Ryan 1998:11). Thomson (1949:82-94) particularly attributed the intensification and spread of the Yolngu ceremonial exchange cycle on the cultural contact with Macassans with transformative concepts of wealth. In western Arnhem Land, Berndt (1951:159) described the same intensification of ceremonial exchange arising from Macassan culture contact. The continued success of this emerging ceremonial exchange cycle was critically dependent on maintaining good trading relationships with Macassans to maintain a flow of introduced goods into this system. Like the significant change in marine exploitation, the introduction of the dugout canoe (*lipa lipa*) had other transformative impacts by increasing the mobility of groups over longer distances around the Arnhem Land coast line which in turn facilitated greater participation in ceremonial cycles (Thomson 1949:85). Consequently, there was a significant incentive for Indigenous people to maintain effective relationships with Macassans with the payoff consisting of continual access to introduced materials.

Testing whether rock art design elements are endogenous or exogenous is a difficult exercise when the painting is not a replica of introduced subject matter. In order to test the proposition decorative infill elements are representative of exogenous influence we examine whether the design elements observed by Chaloupka (1996) occur contemporaneously with the culture contact period or occur earlier in the rock art record. This is followed with a discussion examining possible vectors of influence from endogenous and exogenous sources.

An examination of the ethnographic and ethnohistorical literature shows Indigenous people had extensive access to textiles brought to Arnhem Land by Macassans and possibly pre-Macassans (Berndt and Berndt 1954; Ryan et al. 1998; Thomson 1949). Clarke (2000a, 2000b) and Clarke and Frederick (2006) have emphasised the importance of considering the Indigenous narratives within customary rock art production that was occurring parallel to the painting of introduced imagery. Local Indigenous material culture sources that could have influenced the development of these designs include string, bags and basketry work. An extensive array of material culture has been

noted from the time of European entry into western Arnhem Land (Hamby 2005, 2007; Hodgson 1995, 1997; Keller 2010; Spencer 1914; West 1980, 2015). String bags and nets were produced with a wide variety of knotting and stitching that in turn produces a variety of shapes (West 1980:162–213). In particular, the knotted looping with a spiralling form technique of single element fabric structures produces the characteristic diamond shape seen in bags and nets was in widespread use in Arnhem Land (West 1980). Therefore this study investigates the likelihood of the incorporation of design elements into rock art before and after culture contact with island South East Asian maritime communities including pre-Macassan mariners and the later Macassan trepang industry.

Recent radiometric dating of Indigenous and Macassan archaeological features (i.e., Macassan burials) at the Anuru Bay Macassan trepang processing site and Wellington Range Indigenous archaeological sites have confirmed that culture contact with mariners from the Indonesian archipelago was occurring by the early 17<sup>th</sup> century in western Arnhem Land (Taçon et al. 2010; Theden-Ringl et al. 2012; Wesley et al. 2016). This evidence supports a long model of culture contact with island South East Asian mariners followed by the later proliferation of Macassan trepang exploitation which is consistent with Indigenous views expressed regarding a pre-Macassan time (McIntosh 1996a, 1996b, 2006, 2008, 2011, 2013; Wesley et al. 2016). In view of the long model of culture contact with South East Asia we examine the history of textiles, design and trade in the Indonesia archipelago to establish the likely source of textiles that may have been made available to Indigenous people in Arnhem Land from the 16<sup>th</sup> to the 20<sup>th</sup> century. There has been a considerable amount of research exploring the narratives of the contact history through introduced imagery in rock art in Arnhem Land and Groote Eylandt (Clarke 2000a, 2000b, 2002; Clarke and Frederick 2006, 2008, 2011; May et al. 2009, 2010, 2011, 2013a, 2013b; Roberts 2004; Roberts and Parker 2003; Taçon et al. 2010, 2013; Wesley et al. 2012). Presumably due to its close proximity to Macassan activity along the nearby coast, rock art of the Wellington Range

has depictions of introduced Macassan subject matter, notably interpreted as huts, objects (kris or knife) and praus (Chaloupka 1996; May et al. 2010, 2013; Taçon et al. 2010; Wesley et al. 2012).

## **Methods**

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### ***Sampling***

A total of 182 rock art sites were recorded in the Wellington Range in surveys undertaken by the 'Picturing Change' project team (21.4%), the 'Baiyini, Balanda and Bininj' project team (55%), and collaboratively by both teams (20.3%) between 2008 and 2010. This research sampled 179 of these rock art sites. In order to test the 'sarong manner' hypothesis we had to have: (1) motifs that were complete; (2) some form of painted infill; and (3) motifs reliably identifiable to a chronological style from the Arnhem Land rock art sequence (these requirements applied significant constraints on the number of motifs available for such a study). Chippindale and Taçon (1993) found that only 18–35% of the rock art paintings at two rock art sites in Kakadu could be assigned to the Arnhem Land stylistic sequence. As such, 458 motifs out of thousands recorded from the Wellington Range were able to meet these three criteria for the examination of change in decorative infill through time. Therefore we needed to test whether this number of motifs provided a suitable sample size to test the hypothesis of infill change. It was calculated from the estimated average number of motifs per recorded site that the minimum total assemblage of individual rock art motifs located in the Wellington Range consists of at least 10,000 motifs inclusive of the large rock art complex of Djulirri. By utilising the Australian National Statistic Service (1996) Sample Size Calculator, we calculated that 361 motifs would be necessary to be sampled from 10,000 motifs to achieve a statistically valid sample with a level of accuracy at a 95% confidence interval and a standard error of 0.02551. As such we concluded that the 458 rock art motifs that contained a form of decorative infill and could also be assigned to a stylistic chronological period provided an adequate sample size to address the research question regarding decorative infill style and change over time in the Wellington Range.

***Defining Decorative Infill Elements***

Much late Holocene rock art has already been subjected to such analytical discussions (cf. Chaloupka 1993; Lewis 1988; Taçon 1989). These previous researchers have provided major discussions on stylistic subject interpretations and meanings that incorporate a range of elements such as complex decorative infill methods and x-ray paintings. In order to discuss the context of rock art motifs, it is necessary to break down the motif into content which may elucidate patterns and relationships. The cultural meaning of the final art work is generally unknown without the artist to provide the interpretation in rock art studies; however, the production of rock art can be said to require cultural energy. Concepts of the Dreaming, totemism, kinship, and traditional ecological knowledge can all contribute to the production of a rock art painting (Chaloupka 1993; Taçon 1989). More evidence can be found in the analysis of contemporary bark paintings across Arnhem Land, where complex cultural meanings are embedded in artistic production through geometric designs rather than solely relying on iconic or figurative motifs (Morphy 1991; Taylor 1996). In western Arnhem Land, geometric designs and elaborate line infill patterns were a means for the Kunwinjku to encode 'inside' knowledge about ancestral beings and clan associations (Taylor 1996). Similarly, Morphy (1991) discussed the importance of geometric design and decorative infill, as well as 'brilliance', in eastern Arnhem Land art work. Taylor (1996:30) suggested that early bark painting from east and west Arnhem Land shared similarities in artistic traditions prior to being commercialised.

Specific definitions for the content of rock art motif decorative infill elements were developed for this research to create a list that could avoid subjectivity regarding meaning or intent. An important aspect of this research was to attempt to analyse decorative infill elements without bias or subjectivity in the meaning of a 'manner' or 'style' to test Chaloupka's textile influence hypothesis. Therefore for the decorative infill in the Wellington Range rock art assemblages we utilised the following naming conventions for infill elements: Chevrons, Circles, Crossed lines, Dashes, Diagonal lines, Diamond, Dots, Horizontal lines, Multidirectional (i.e., hatching), Segmentation (of the body of a motif), Vertical lines and Zigzag lines. Solid infill was also noted but is not particularly informative for this study as it is one of the most well-known types of motif infill and present throughout all periods of the Arnhem Land chronological sequence and therefore less informative regarding change.

Site locations, size of sites and rock art densities were included to create context for the database. The data recorded for each motif includes an inferred description, the type of figure (zoomorphic, anthropomorphic), the method of rock art production (e.g., outline with line/solid infill) and pigment colours used. The chronology is divided into Early, Middle and Late Periods as per Chippindale and Taçon (1998), building on the chronology proposed by Chaloupka (1993). Cases of superimposition were noted, and the condition of the motif (whether partial or complete). Finally, whether the motif infill was segmented within the motif, which areas contained infill (i.e., body, head, arms, leg, all), and the individual patterns present were recorded. ImageJ and the D-Stretch plugin were used to enhance heavily weathered images. Both the original photo and enhanced image were then linked to the motif description. Visualisation and analysis was undertaken in Tableau 9.3. Tableau uses a live data approach which allowed continual additions to the database. The interactive features of Tableau's visualisations assisted in exploration of the data, such as the ability to filter or group individual attributes, for example, vertical infill which was extremely common in the Middle Period could be removed from a graph in order to see the variations between the other infill elements, which were otherwise obscured.

***Chronology***

Previous rock art research in Arnhem Land has provided an excellent basis for identifying the major stylistic rock art chronologies within the region (e.g., Brandl 1970, 1980; Chaloupka 1984, 1985, 1993; Chippindale and Taçon 1998; Edwards 1979; Lewis 1988; Taçon 1989). These attempts at defining regional stylistic chronologies have generally not utilised absolute chronometric dating methods, except on beeswax figures as per the study undertaken by Taçon et al. (2004). Although Rosenfeld and Smith (1997:407) noted that using style can be problematic when applied as a chronological framework in rock art research, they also emphasised that style can provide value if there is a rigorous system of applying context to the research. This assessment primarily uses a revised Chippindale and Taçon (1993, 1998) stylistic chronology to document rock art motif types. The identification of late Holocene rock art assemblages by Chaloupka (1993), Chippindale and Taçon (1998), Lewis (1988) and Taçon (1988), has significantly informed researchers about stylistic conventions for this period. The overall resulting chronological framework is largely set out in Table 1 with Early, Middle and Late Periods and corresponding estimated age ranges. This has been developed through the presence and absence of fauna associated with changing environmental conditions (Chaloupka 1993; Taçon 1988) and weaponry (Lewis 1988). Furthermore, when added to this schema the analysis of Rainbow Serpents, yam figures and x-ray motifs, which have significant links to climate and environmental change, strengthens the chronology (Chaloupka 1993; Chippindale and Taçon 1998; Taçon 1994; Taçon and Brockwell 1995; Taçon et al. 1996). There is now also evidence from David et al. (2012) in the form of applied pigment to a rock fragment recovered from Nawarla Gabarnmang that illustrates painting activities were occurring ca 27,000–28,000 cal. BP.

## Results

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A total of 458 motifs from 182 rock art sites in the Wellington Range were recorded as containing one or more decorative infill elements. Of these, 210 (45%) contained only solid infill. Motif classes recorded in this study included anthropomorphic, zoomorphic, botanical, geometric, therianthrope and objects (Table 2). The majority of analysed motifs consisted of anthropomorphic (39.7%) and zoomorphic motifs (53.05%). The latter included a diversity of animals including macropods, turtles, barramundi, bats, birds, blue tongue lizards, catfish, freshwater and saltwater crocodiles, dolphins, eel tailed catfish, emu, fish, goannas, lizards, long necked turtles, marsupials, brush tail possums, snakes and stingrays.

Of the decorative infilled figurative anthropomorphic motifs, sex could not be assigned to 111 motifs, but female motifs (67) were very common, with only four motifs able to be identified as male. Table 2 shows the distribution of the 458 motifs by class and chronological period. Decorative infilled zoomorphic motifs dominate the Early Period rock art assemblage. The majority of motifs were from the Late (58.9%) and Middle (35.8%) Periods illustrating an increasing trend for the inclusion of decorative elements in painting over time. The adoption of a wide range of new infill elements begins during the Middle Period and increases during the Late Period as demonstrated by the box and whiskers plot with greater incidences of infill elements per motif (Figure 4).

**Table 1** The temporal phases identified for use in this assessment of decorative infill after Chippindale and Taçon (1998:107). \*Prints and stencils for which there is slight evidence of date are excluded except for the distinctive 3MF hand stencils which are associated with Dynamic Figures.

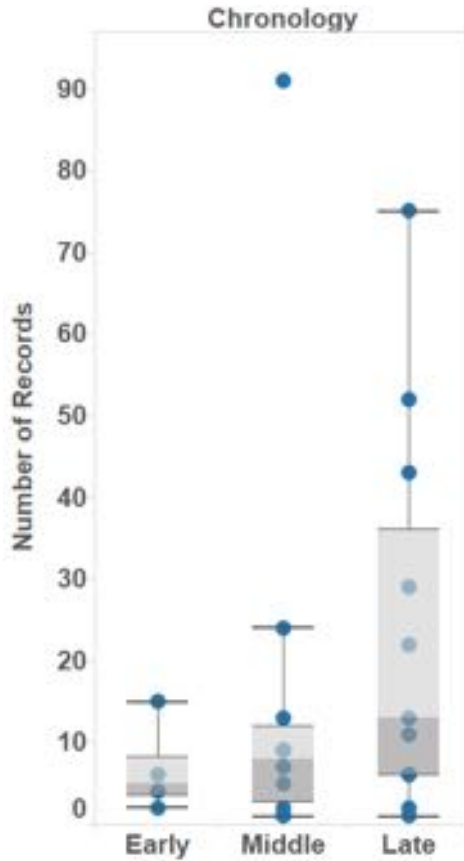
<b>Age</b>	<b>Nature</b>	<b>Years before Present</b>	
<b>LATE</b>	Rare rock paintings + bark and paper paintings	Present Day	
	'Complete Figure Complex' rock paintings + some rock engravings + beeswax figures	About 4000–3000 up to the 1960sAD	
	'Simple Figures' + 'Yam Figures' + large human style + some large fauna + 'Early X-Ray' rock paintings	About 6000	
<b>MIDDLE</b>	'Northern Running Figures' rock paintings	Simple Figures with Boomerangs' + some large fauna rock paintings	Unknown
	?	Post-Dynamic Figures' rock paintings	Unknown
	?break	'Dynamic Figures' rock paintings + '3MF' Stencils	?10,000 years
<b>EARLY</b>	?break	'Large Naturalistic' fauna rock paintings	Unknown
		Panaramittee-like rock engravings Pigment in shelter deposits	Unknown ≥ 30,000–50,000



**Table 2** Distribution of motif classes by chronology.

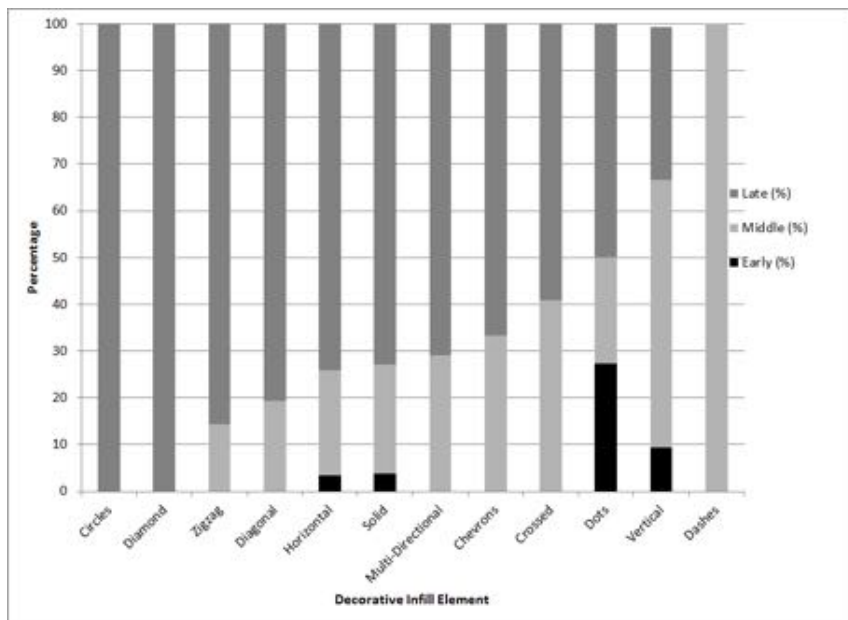
Motif Classes	Period			Total
	Early	Middle	Late	
Anthropomorphic	4	57	121	182
Botanical	0	19	0	19
Geometric	0	0	6	6
Object	0	2	2	4
Therianthropic	0	0	4	4
Zoomorphic	23	86	134	243
Total	27	164	267	458

The percentage distribution of decorative infill elements by chronological period is shown in Figure 5. This is elaborated upon in Figure 6 which illustrates the distribution of each decorative element grouped by chronological period. Only four types of decorative infill elements were observed in Early Period paintings, including horizontal and vertical lines, dots and solid infill. These four decorative elements continue throughout the entire rock art sequence.

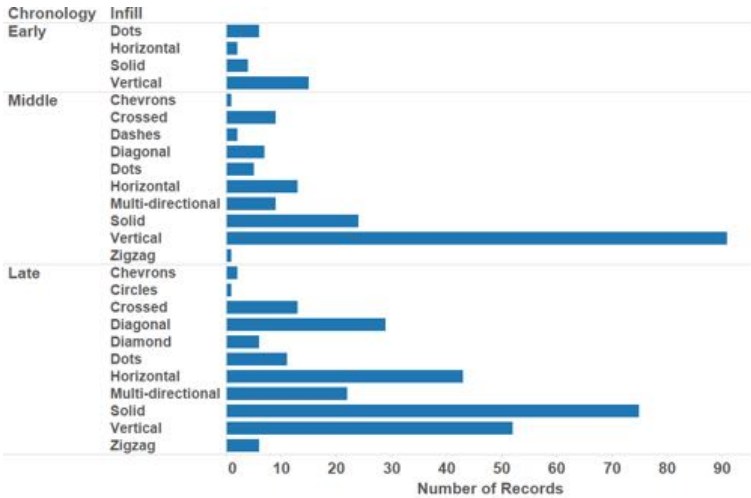


**Figure 4** Box and whiskers plot demonstrating incidences of decorative infill elements.

The use of vertical lines as a method of decorative infill dominates all three chronological periods. The diversity of decorative infill elements increases in the Middle Period with the introduction of zigzag, diagonal, multidirectional, chevrons and dashes, with the continuing use of horizontal and vertical lines, dots, and solid infill. The Late Period sees the inclusion of circles and diamond elements with the continuation of all other decorative infill designs except for dashes. Decorative infill element diversity is at its highest during the Late Period. The most commonly occurring decorative infill elements in the Late Period motifs are solid, vertical, horizontal, diagonal and multidirectional. During the Middle Period the most common decorative infill elements are vertical, solid, horizontal and crossed. Crossed and zigzag type infill elements appear in the Middle Period and become more formalised with a further use into the Late Period. Late Period motifs also incorporate combinations in the use of multidirectional, crossed, zigzag and diamond elements in single motifs.



**Figure 5** Percentage of infill element usage in Early, Middle and Late Periods.



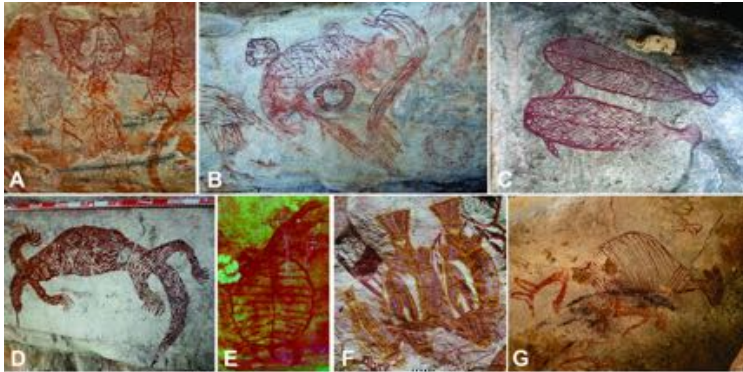
**Figure 6** Distribution of infill elements for each chronological period.

The distribution of decorative infill elements by rock art subject is illustrated in Figure 7. Vertical, solid and horizontal infills are the dominant elements utilised in both anthropomorphic and zoomorphic motifs. The diamond pattern appears almost exclusively in anthropomorphic motifs ( $n=5$ ) with one example in a zoomorphic figure. The distinctive zigzag and crossed pattern appears in both anthropomorphic and zoomorphic motifs. Zoomorphic figures displayed significant variation in the way decorative infill was applied as demonstrated in Figure 8. Segmentation of the mid-section, which was suggested by Chaloupka (1996) as being reminiscent of sarong wearing, is observed in Middle Period motifs but shows a significant increase in Late Period motifs. Segmentation was noted in zoomorphic, anthropomorphic and object motifs (see Figures 8 and 9). In particular it was noted that the use of the segmentation style in the late Holocene in zoomorphic and anthropomorphic figures would demarcate a separation within the body from the head, arms and legs, and define the mid-torso areas (see Figures 8 and 9).

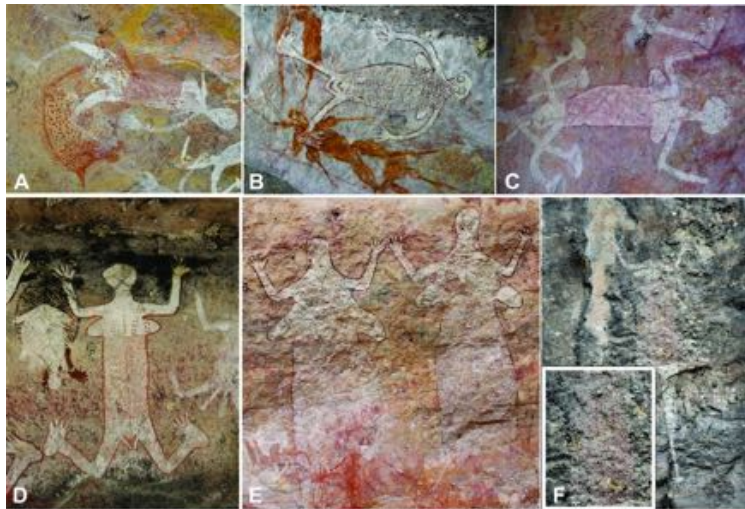
Analysis of the rock art motifs clearly demonstrates change over time in the style and combination of decorative infill elements being used. Segmentation within each motif also becomes more prevalent over time. Changes were occurring in decorative infill layout and design throughout the mid- to late Holocene. Diamond infill elements combined with the mid-section segmentation as described by Chaloupka (1996) is only present in Late Period rock art motifs. Figure 9 illustrates the diversity of decorative infill used in female anthropomorphic figures from a range of Wellington Range sites which have the characteristic body segmentation as described by Chaloupka (1996). This figure particularly illustrates the variation of mid-torso segmentation and infill design from zigzag to the more elaborate diamond design. Female anthropomorphic figures with the less elaborate zigzag and segmentation patterns are widely distributed throughout the Wellington Range, whereas the diamond design is less prevalent than previously noted by Chaloupka (1996).

Figures	Infill											
	Chevrons	Circles	Crossed	Dashes	Diagonal	Diamond	Dots	Horizontal	Multi-directional	Solid	Vertical	Zigzag
Anthropomorphic		1	12	1	15	5	12	18	9	45	57	4
Botanical								2			17	
Geometric								1	2	2	1	
Object								1	1	2		
Therianthrop								1		1	2	
Zoomorphic	3		10	1	21	1	10	35	19	53	82	3

Figure 7 Decorative infill elements distribution by Rock Art Motif Class.



**Figure 8** Decorative infill elements present in zoomorphic rock art motifs in the Wellington Range: (A) Dots; (B) Dashes, Lines; (C) Segmented Multidirectional; (D) Segmented Zigzag; (E) Segmented, Lines; (F) X-Ray with Segmented, Multidirectional, and Line; and (G) Line.



**Figure 9** Examples of female anthropomorphic figures each with varying depictions utilising the Segmented, Zigzag, Multidirectional, Crossed, and Diamond element infill: (A) WR10-034; (B) WPT174; (C) Maliwawa 2; (D) Marligrur; (E) Maliwawa 1; and (F) Malarrak (with inset of the internal design).

**Chronology**

Beeswax has been found to be a highly reliable material for providing accurate radiocarbon dates (cf. Nelson 2000; Nelson et al. 1995; Taçon et al. 2004, 2010; Watchman and Jones 2002). Site WR10-010 includes female anthropomorphic figures with segmented bodies and zigzag decorative infill elements that also had beeswax dot motifs applied over the top of these paintings and therefore allowed for absolute dating to be undertaken. The ceiling in WR10-010 contained a rock art panel approximately 6.3 m in length by 0.6 m in width and 0.9 m (Panel 1) above a solid sandstone bedrock floor. It provided a well preserved surface of approximately 41 rock art motifs mostly painted in white pigments, including eight motifs with decorative infill consistent with the segmented zigzag design similar to Motif A in Figure 9. These included one male anthropomorphic figure, three female anthropomorphic figures, two fish and two snakes. Motif 14 is a female anthropomorph measuring 102 cm in length by 55 cm in width with a thin red pigment outline over solid white pigment background. The figure was decorated with fine red lines in a zigzag pattern in the mid-section of the torso. Motif 14 was painted over four other motifs. A line of beeswax dots from a partially preserved beeswax motif had several beeswax dots on top of Motif 14. A radiocarbon age for a sample from one of these beeswax dots returned an estimate of 955–791 cal. BP (995–1159 cal. AD) (Table 3). This provides a *terminus ante quem* age for when Motif 14 (with the segmented zigzag decorative infill) was painted on this panel.

**Table 3** WR10-010 beeswax 14C sample data. \*Calibration using Oxcal v4.2.3; 95.4% Probability, IntCal13 (Reimer et al. 2013).

Sample	Sample#	d13C	Percent Modern Carbon	14C Age	Cal BP*	Cal AD*	Material	Motif	Comments
WR10-010	S-ANU 21434	-31.8	88.614	970±40	955–791	995–1159	Beeswax	#014 Female anthropomorphic figure with fine red lines in a Zigzag pattern	Beeswax dot over Motif #014

## Discussion

Endogenous and exogenous influences have been debated and discussed in the development of ancient cultural practices, from the domestication of animals and agriculture, to the development of technologies at local and global scales (cf. Gosden and Hather 1999; Kiple 2007; Kristiansen and Rowlands 1998; Sauer 2004; Stahl 2005; Stark 2006). Rock art has also been acknowledged for its autobiographical character when pictures are made by their artists depicting objects, events, and entities important to them in their own lives, in their own understanding of the world in which they lived (Faulstich et al. 2003; Layton 1992, 2012; Shore 1996).

This study set out to establish whether there has been a cross-cultural influence on a specific manner of Indigenous rock art. The results of this study have shown that throughout the Holocene there was the emergence of a wide diversity of decorative infill elements used in the production of rock art. Individual decorative infill elements were then combined in the late Holocene to create complex patterns and designs which were in development before the currently established timeframe for contact with traders from island South East Asia. The hypothesis being tested regarding the extent to which we can determine whether Chaloupka's (1993, 1996) observations on the external influence of Macassan cultural contact can be found in the rock art is difficult to support outright.

This study has shown that late Holocene Wellington Range rock art displays great diversity in the application of decorative infill elements. Decorative infill techniques utilised in the segmentation of the motif body, zigzag and multidirectional lines characteristic of the 'sarong manner' were certainly in use in the Wellington Range in the late Holocene. The beeswax radiocarbon date of 955–791 cal. BP from WR10-010 over a female anthropomorphic figure with segmented body and zigzag lines is evidence of greater antiquity in the use of this manner of painting female figurative motifs. This date is 600 years earlier than the beginning of the proposed long model of island South East Asian culture contact (Wesley et al. 2016). The emergence



of complex decorative infill during the late Holocene may have been influenced by designs found in the highly diverse Indigenous fibre technologies of northern Australia which have similar antiquity (Clarke 1985; Hamby 2005, 2007; Keller 2010; West 1980). The Wellington Range female anthropomorphic figures that have this manner of decorative infill can be assigned to the Complete Figure complex of the late Holocene as identified by Chippindale and Taçon (1998) (see Table 1).

On the other hand, the results of this study have shown that the specific diamond decorative infill element design is only present in (very) Late Period rock art motifs and, furthermore, is identified in only a small number of rock art motifs. With the exception of a single zoomorphic figure, the motifs with diamond elements consist only of female anthropomorphic figures. Lycett (2014:5) found that 'where new ideas come into contact with older ones, longstanding ideas within communities may yet influence the shape that these new patterns take'. This is an apt interpretation for the rock art production phenomena occurring in western Arnhem Land, where South East Asian textile design elements could have become incorporated into some Indigenous artistic practices. Berndt and Berndt (1954:34) found that their Yolngu Indigenous informants differentiated between pre-Macassan, Macassan and European types of textiles and cloth, with different language terms for each period. Furthermore, both Western researchers in the field of Indigenous arts and textiles and Indigenous artists recognise the significant influence of Macassan designs in past and present Indigenous artistic practices (Ryan et al. 1998).

As Lycett (2014:5) found in his study of Great Plains Native American inter-group cultural transmission, pre-existing and culturally inherited ideological factors dominated how new ideas and materials were incorporated into groups rather than just new ideas merely permeating through intercommunity contact. The incorporation of design elements from South East Asian textiles into artistic practices can also be seen as part of the 'payoff' system as described by Efferson et al. (2008), whereby taking on cultural elements from the foreigner's material culture builds on securing the trading relationship. Tellingly, the diamond element design as described in this study is also found elsewhere in contact era rock art of decorative infill hand paintings and firearm paintings in the western Arnhem

Land region (Chaloupka 1993; Roberts and Parker 2003; Wesley 2013). Therefore, the diamond element manner appears to have become incorporated and stylised within an existing system of artistic production in western Arnhem Land during a process of cultural transmission and anchoring messages about new encounters.

There is also the direct evidence of Macassan influence on rock art production in western Arnhem Land (May et al. 2013:52). As May et al. (2013a) observed in the culture contact era rock art assemblage from Malarrak in the Wellington Range, introduced Macassan objects are painted in x-ray, but not in the decorative infill techniques as discussed in this study. May et al. (2013a:52) also proposed that introduced contact subject matter paintings do not only occur where the cross-cultural encounters take place, but also at places where this knowledge is able to be incorporated elsewhere into Indigenous social networks, such as the Malarrak, Djulirri and Maliwawa sites in the Wellington Range. Through these encounters Indigenous people had an opportunity to not only include introduced imagery such as praus and knives, but equally were able to draw on the designs from objects and textiles into their rock art practice. Occupation of the Malarrak rockshelter intensified in the last 1000 years, especially after the time of culture contact when it has been assumed that the majority of rock art in this shelter was produced and contains one of these female anthropomorphic figures (Motif F, Figure 9) (May et al. 2013a; Wesley and Litster 2015a). The inclusion of the diamond design element in only a small number of motifs, the localised distribution in Arnhem Land, and the specific relationship with a small range of motif subjects (female anthropomorphic figures, decorated hand paintings, decorated firearms) all indicate the possibility this manner of painting emerged at the cusp of when cultural contact with South East Asian mariners began in the 17<sup>th</sup> century (Taçon et al. 2010; Wesley et al. 2016).

Early encounters with such pre-Macassan seafaring groups were not part of the well documented industrial-scale enterprise of Macassan trepang fishing (Bilous 2015a, 2015b; McIntosh 1996a, 2008, 2012; Wesley et al. 2016). Cultural contact with pre-Macassans who may have been exploiting natural resources such as turtle shell and mother-of-pearl would have been fleeting and cautious (Berndt and Berndt 1954; McIntosh 1997, 2012; Wesley et al. 2016). Amongst the foreigners' material culture, textiles would have been a significant point of difference, along with metal tools and weaponry, especially considering the significance of textiles within Indonesian maritime communities such as the Bugis (Pelras 1996). As originally documented by Berndt and Berndt (1954), the Yolngu specifically differentiated between cloth from pre-Macassans, Macassans and Europeans. Also, the growth and intensification of textile trade and production after the 15<sup>th</sup> century in island South East Asia closely coincides with the proposed timings of contact with South East Asian mariners in western Arnhem Land (Barnes 2010; Maxwell 1990, 2003; Pelras 1996; Ruth 2010; Warming and Gaworski 1981). Therefore linking these chains of evidence together, Chaloupka and his Indigenous informants may have been correct to assume that there was some level of influence from cultural exchanges with South East Asian mariners and subsequent exposure to textiles.

## **Conclusions**

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An issue that this study emphasises is the fugitive archaeological record for evidence of early cultural engagements between Indigenous people of Arnhem Land and traders from island South East Asia. Island South East Asian maritime-based communities were highly mobile and, until the advent of Macassan shore-based trepang processing, there was little need to establish occupation sites on land. Therefore, like many of these fleeting frontier encounters in history, the evidence is scarce and usually involves trade items being found in the recipients' cultural sites. Cloth was a significant material for Indigenous people in Arnhem Land and an important trade item throughout island South East Asia, suggesting a history of interaction with pre-Macassans followed by the later trepang

fishing Macassans. Cloth is also an important component of Indonesian secular and ritual life and has been noted as a significant trade item from Macassans. Cloth is also a material that is extremely susceptible to the vagaries of detrimental taphonomic factors in the wet-dry tropics and therefore difficult to find archaeologically. This study has established that some of the rock art design elements observed by Chaloupka were in use in the late Holocene at least by 1000 years ago. The diamond design element and its particular decorative elaboration in female anthropomorphic figures in the Wellington Range is likely to have developed after culture contact was established with island South East Asian mariners. Chaloupka's Aboriginal informants told him that these paintings were influenced by 'sarongs'. Through the cultural transmission and knowledge of cloth it is highly likely that the diverse designs of Indonesian textiles would have been incorporated into other areas of Indigenous cultural life including rock art. Therefore we conclude that the elaborate diamond pattern found in the Wellington Range is very likely to be a proxy indicator of culture contact arising from early contact with island South East Asian mariners.

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