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NEW INTERPRETATIONS FOR THE STONE ARTEFACT ASSEMBLAGE FROM NGAUT NGAUT (DEVON DOWNS), SOUTH AUSTRALIA

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Abstract

This paper presents the results of a technological analysis of the stone artefacts from the Ngaut Ngaut (Devon Downs) rockshelter, South Australia. In particular, this article presents new information and interpretations, via re-analysis of the stone tool assemblage, relating to the following areas: 1) Artefact numbers; 2) Raw materials; and 3) Manufacturing processes. These interpretations are also considered in relation to prior hypotheses about stone tools from Ngaut Ngaut and nearby sites, largely through comparison with the works of Tindale, Mulvaney and Smith.

The results show that discrepancies exist between researchers in relation to the identification of stone tools for the Ngaut Ngaut assemblage. It is argued that the predominant discrepancy between researcher artefact counts arises due the typological biases of past researchers with more minimal differences relating to the discovery of stone artefacts in other parts of the collection. A re-analysis of the raw materials in the stone assemblage also identified previously unrecorded materials including silcrete, mica schist and compressed limestone. Further, it is argued that there are changes in raw material use over time with some raw materials only present in certain stratigraphic layers.

Similarly the re-analysis undertaken in this research more adequately defined the range of core types present in the assemblage in comparison to previous studies. Aspects of the analysis, such as flake terminations, show that feathered terminations (which arguably reveal the greater control of force variables by knappers) may have increased through time thereby potentially conflicting with Mulvaney’s ‘degeneration’ theory. Similarly, the research also shows that retouch increases over time. If one considers retouch to be either the intensity of resharpening or as a result of deliberate manufacture, either scenario could be interpreted as an increase in stoneworking rather than a general decline as suggested in Mulvaney’s broader hypothesis. From the results of the research it can also be argued that neither of the latter aspects of the analysis show any observable dramatic changes in manufacturing processes over time which may be expected if one were to adhere to Tindale’s ‘cultural succession’ theory. Thus, whilst certain changes can be demonstrated through this research and reveal the dynamism and skills of people who occupied the site the interpretations stemming from these results differ from previous hypotheses.
Aims

The primary aim of the research summarised in this paper was to investigate what a technological analysis of the stone artefacts from Ngaut Ngaut could tell us about the people who used the rockshelter. In doing so a secondary aim was to reconsider prior research in this region, and resulting theories, and to compare any differing interpretations. Previous hypotheses, along with a brief description of Ngaut Ngaut, are detailed below.

Background and Literature Review

Ngaut Ngaut\(^1\) is located near Nildottie about 120km east of Adelaide (Figure 1). This heritage place is located within the Murray Basin and is situated at the base of Miocene limestone cliffs that surround the valley of the Murray River (Mulvaney et al. 1964:479). The shelter faces north and is partly the result of aerial erosion of the soft strata of the limestone cliff, which at this point is about 30-40m in height (Hale and Tindale 1930:174; Sheard 1927:18; Smith 1977:7). A wealth of archaeological material spanning a 5000 year period was excavated from this site in 1929, including stone artefacts, bone artefacts, ochre, human remains and faunal/floral remains (Hale and Tindale 1930; Roberts and MACAI 2012; Smith 1977). Rock engravings are also present at the shelter and surrounding area.

\(^1\) Whilst many non-Aboriginal people know of Ngaut Ngaut by its English name, Devon Downs, the Aboriginal community have and always will refer to this place by its traditional name. Even though the Aboriginal community have continued to use traditional names for places on their country, they also wish to see these names reinstated in the broader literature. In this paper we privilege these traditional names (after Roberts and MACAI 2012).
Hale and Tindale’s (1930) research at Ngaut Ngaut, which took place in 1929, was the first systematic excavation of a rockshelter in Australia (Mulvaney 1960:54; Roberts and MACAI 2012). The stratification of the deposits made it possible to order the artefacts in time, thus adding the temporal dimension that had been missing from previous studies of Australian stone artefacts. It was also commonly thought that excavated stone tools would not reveal any additional information that could not already be gained from studying surface scatters because it was generally held that Indigenous Australians were recent arrivals to Australia (Holdaway and Stern 2004; Mulvaney 1977; Mulvaney and Kamminga 1999:12; Roberts and MACAI 2012).

Tindale (1957) concluded that the Ngaut Ngaut assemblage (in conjunction with a number of other sites) reflected the immigration of new groups of people over time (cultural succession), which were termed, in ascending order,
Kartan, Tartangan, Pre-Pirrian, Pirrian, Mudukian and Murundian (see Figure 2 for an example of some of these phases as he interpreted them at Ngaut Ngaut) (see Holdaway and Stern 2004:289; Horton 1991:153; Mulvaney and Kamminga 1999:40; Roberts and MACAI 2012; Tindale 1957; Tindale 1968). In order to arrive at this theory Tindale was particularly focused on typological analyses.

Figure 2 Section of the Trench C Ngaut Ngaut excavation (from Hale and Tindale [1930:175] and adapted by Roberts and MACAI [2012] to include radiocarbon dates). Original image courtesy of the South Australian Museum.
Tindale attempted to apply his theory of cultural succession throughout Australia as a means of explaining changes in the archaeological record. However, after more excavations and analyses were conducted his hypotheses were challenged (see below). Although Tindale’s theory was ultimately rejected by the research community the results from the Ngaut Ngaut excavations laid the first solid foundations for scholarly research into the origins and trajectory of Indigenous Australian cultures (Holdaway and Stern 2004:287).

In response to Hale and Tindale’s (1930) research, and Tindale’s subsequent hypotheses, Mulvaney excavated rockshelters at nearby Tungawa (Fromm’s Landing) (Mulvaney 1960; Mulvaney et al. 1964). His research resulted in an alternative interpretation for stone tool working in the region – i.e., he suggested that there had been a ‘degeneration’ in knapping skills over time (Mulvaney 1960:74). He writes:

A striking characteristic of the stone industry is the marked degeneration in the craftsmanship of later occupants. Little in the upper levels compares with the pirris and microliths of earlier strata, which are equal to those of the best cabinet collections made on surface sites. At Devon Downs, also, the latest (Murundian) horizons contained only crudely made artefacts.

(Mulvaney 1960:74)

He argued that this ‘degeneration’ was due to a shift in the primary working material from stone (and bone) in the earlier layers to wood in the more recent layers and suggested that future researchers could consider whether “there is a general significance in the decline in stone working and the apparent neglect of bone as a raw material in more recent times” (Mulvaney 1960:74). Further, he argued that the changes he interpreted in the archaeological record could be explained by ‘cultural adaptation’ rather than cultural succession (Mulvaney 1960:75).

In 1977 Mike Smith conducted a re-analysis of the Ngaut Ngaut collection. Although Smith’s (1977, 1982) research was focused on re-analysing the faunal remains he did briefly record the stone artefacts. Smith (1982:110) identified a total of 1497 stone artefacts which weighed a total of 9.1kg. He also determined that the distribution of stone throughout the deposit showed considerable variation between layers (Smith 1982).
Smith (1982) argued that there was a correlation between the distribution of flaked stone and food refuse at the site and suggests that this was an indication of intensifying site use. Smith (1982:112) also stated that the ratio of producer artefacts (cores and flaked pieces) to products (flakes) was consistent throughout the assemblage (see additional discussion later in this paper on this issue). With the ratio consistent and the increase of stone artefacts in the middle layers this was interpreted as an indication of site intensification (Smith 1982). Thus, Smith (1982) concluded that the shelter was more intensively used between 2000 and 4000 years ago. Because Hale and Tindale’s (1930) excavation was in 12 unequal stratigraphic layers (see Figure 2) Smith decided to make six more or less equal analytical units each about 1000 years in duration to allow him to make these interpretations (Frankel 1991:61). Smith used “indirect evidence to argue that the rate of deposition was slower at first, then faster, and finally slower again, and drew his depth/age curve accordingly” (Frankel 1991:61). However, Frankel (1991:62) suggests that if the rate of deposition is consistent then it is possible to “draw a straight line correlating depth and age”. By doing so Frankel (1991:62) demonstrates that by grouping the original excavation units differently to make another set of six new analytical units this will result in a new depositional history. These different approaches show that without a range of new dates for the site answering questions relating to topics such as intensification can be problematic. As such, this research does not attempt to address such issues in any depth. Rather, general trends over time are investigated.

More recently Roberts and the Mannum Aboriginal Community Association Inc. (MACAI) have been conducting collaborative research in relation to various aspects of the Ngaut Ngaut cultural complex and associated collection (housed at the South Australian Museum) (e.g., see Roberts and Campbell 2012; Roberts and MACAI 2012; Roberts et al. 2010 – these publications also outline in detail the significance of Ngaut Ngaut for the community). Indeed, this research (the product of a thesis produced by Bland [2012]) continues the collaborative endeavour and has been conducted under the guidance of MACAI. In particular, specific measures were introduced to provide feedback about the research to the community.
Figure 3 A MACAI member holding a selection of stone artefacts from the Ngaut Ngaut collection. Photograph by Amy Roberts.

Given the importance of this collection to the Aboriginal community and its central role in the history of Australian archaeology it was timely that a re-analysis of the stone artefacts from the site was undertaken. Further, given the advances in stone tool studies it is appropriate that claims made about the site be reconsidered. Whilst Tindale’s hypotheses have been refuted there still remains the question as to whether or not changes can be observed in the stone tool assemblage over time (as Tindale, Mulvaney and Smith have purported for the region on differing grounds) and if so what any such changes may mean. Thus, this paper explores these issues using technological approaches (by recording and analysing variables such as raw material and manufacturing processes) in order to consider in more depth the range of activities undertaken and strategies used by the Aboriginal people who inhabited this rockshelter.
Materials and Methods

Whilst Hale and Tindale (1930) excavated three trenches at Ngaut Ngaut only the stone artefacts from their main trench (Trench C) were analysed for the purposes of this research. The Trench C excavation was chosen for investigation for a number of reasons including: 1) Because Hale and Tindale (1930:175) considered their earlier Trench B excavation to be preliminary; 2) The Trench B excavation results and analysis were not published in sufficient detail; and 3) The purpose of Trench D was to examine the underside of a fallen boulder for rock art.2

The recording scheme used in this analysis is based on a number of previous studies. The general categories were based on Roberts’ (1998) research (relating to the Shelter 2 assemblage from Tungawa) to ensure that this research could be comparable to recent research from a nearby site. Additional technological categories were adapted from Clarkson (2007) and Holdaway and Stern (2004) to ensure that this project was conducted using contemporary approaches. The final list of attributes recorded is reproduced below:

<table>
<thead>
<tr>
<th>General Information – All Artefacts</th>
<th>Technological Type – All Artefacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum Record Number</td>
<td>Flake</td>
</tr>
<tr>
<td>Museum Box Number</td>
<td>Flake Pieces</td>
</tr>
<tr>
<td>Stratigraphic Layer</td>
<td>Core</td>
</tr>
<tr>
<td>Heat Affected</td>
<td>Hammerstone</td>
</tr>
<tr>
<td>Breakage (Use/Taphonomic)</td>
<td>Anvil</td>
</tr>
<tr>
<td></td>
<td>Manuport</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Raw Material Type – All Artefacts</th>
<th>Cortex – All Artefacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silcrete</td>
<td>Present or Absent</td>
</tr>
<tr>
<td>Quartz</td>
<td>Amount</td>
</tr>
<tr>
<td>Quartzite</td>
<td>‣ 0-25% of dorsal surface</td>
</tr>
<tr>
<td>Chert</td>
<td>‣ 26-50% of dorsal surface</td>
</tr>
<tr>
<td>Chalcedony</td>
<td>‣ 51-75% of dorsal surface</td>
</tr>
<tr>
<td>Mica Schist</td>
<td>‣ 76-100% of dorsal surface</td>
</tr>
<tr>
<td>Compressed Limestone</td>
<td></td>
</tr>
</tbody>
</table>

2Trench A was excavated by Harold Sheard (see Roberts and MACAI [2012] for more detail about this aspect of the site’s history).
Dimensions and Attributes

**All Artefacts**
- Weight

**Flakes**
- Maximum Length
- Point of Percussion to Distal End (Whole Flakes)
- Maximum Breadth
- Breadth at Medial Point (Whole Flakes)
- Maximum Width
- Width at Medial Point (Whole Flakes)
- Overhang Removal (Presence or Absence)

**Flake Termination Type**
- Feathered
- Stepped
- Hinged
- Plunging

**Cores**
- Length
- Breadth
- Width

**Platforms**
- Breadth
- Width

**Platform Type**
- Cortical
- Flaked
- Abraded
- Crushed or Shattered

**Retouch**

**Present or Absent**

**Location**
- Dorsal Proximal End
- Dorsal Left Proximal
- Dorsal Right Proximal
- Dorsal Left Medial
- Dorsal Right Medial
- Dorsal Left Distal
- Dorsal Right Distal
- Dorsal Distal End
- Ventral Proximal End
- Ventral Left Proximal
- Ventral Right Proximal
- Ventral Left Medial
- Ventral Right Medial
- Ventral Left Distal
- Ventral Right Distal
- Ventral Distal End

Dimensions were measured using Kincrome digital vernier sliding calipers (recorded in millimetres) and digital pocket scales (recorded in grams). Raw materials were identified based on definitions and associated images as detailed in Holdaway and Stern (see 2004:23-24 and CD). Experts were also consulted to assist with raw material identification where necessary (see below and acknowledgments).
Results and Discussion

Total Artefact Counts

The total number of identified stone artefacts from the entire assemblage, as identified in this research, are presented in Figure 4. This graph illustrates that the layers with the most stone artefacts are layers 4 (n=407) and 6 (n=338). As may be observed the artefact counts for the other layers gradually increase and decrease through time.

![Graph showing total artefact numbers per layer](image)

**Figure 4** Total number of stone artefacts for each layer.

The total stone artefact count from Hale and Tindale’s (1930) research was 1252 which is 278 less than was recorded in this research (see Table 1). The reason for the discrepancy between artefact counts, whilst difficult to discern, could be due to the fact that modern researchers take a more wholistic approach to the investigation of stone tool assemblages rather than the typological focus that was predominant in the past. Indeed, the discrepancy between the artefact counts in this research are far closer to Smith’s counts than Hale and Tindale’s. The smaller
discrepancy of 33 between this research and Smith’s may have stemmed from the fact that additional stone artefacts were located in the storage boxes containing faunal remains during the initial stages of analysis.

Table 1 Comparison of stone artefact counts between researchers.

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Total Artefact Count</th>
<th>Discrepancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hale and Tindale 1930</td>
<td>1252</td>
<td></td>
</tr>
<tr>
<td>Smith 1977</td>
<td>1497</td>
<td>+ 245</td>
</tr>
<tr>
<td>Bland 2012</td>
<td>1530</td>
<td>+ 33</td>
</tr>
</tbody>
</table>

**Raw Materials**
Possibly the biggest variable that will influence the manufacture of stone artefacts is the availability of good siliceous raw material. In this assemblage 45.2% of the raw material was identified as silcrete, 19% as chert and 4.3% as chalcedony. Therefore 68.5% of the raw material identified at the site was of good quality. The remaining 31.5% of the stone assemblage was either poorer quality flaking material or were stone manuports – 21% was identified as quartz, 8.2% was identified as quartzite, 1% as mica schist and 1.3% was identified as compressed limestone. There were only a few examples of fine-grained, clear quartz; the vast majority of the quartz was coarse grained and of poor quality. This is the first research to identify all of the raw materials from the site and as a result silcrete, mica schist and compressed limestone provide new findings in this regard.

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3 It should be noted here that previous researchers have commented that the region generally lacks siliceous stone suitable for the manufacture of sharp tools (Pretty 1977:289). Pretty (1977:289) has noted that the “Murray is singularly poorly endowed with this material”. Stone in the region was therefore of value and “without doubt an item of exchange and a substance to be substituted for where possible and used up completely when available” (Pretty 1977:289).
Table 2 The total percentage of raw material types.

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Percentage of Assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silcrete</td>
<td>45.2%</td>
</tr>
<tr>
<td>Chert</td>
<td>19%</td>
</tr>
<tr>
<td>Quartz</td>
<td>21%</td>
</tr>
<tr>
<td>Quartzite</td>
<td>8.2%</td>
</tr>
<tr>
<td>Chalcedony</td>
<td>4.3%</td>
</tr>
<tr>
<td>Mica Schist</td>
<td>1.0%</td>
</tr>
<tr>
<td>Compressed Limestone</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

The range of raw materials are similar when compared to other studies within the local area (e.g., see Roberts’ [1998] stone artefact research at Tungawa). This finding could indicate that people using the two sites had access to the same sources or had similar trade networks.

Mica schist (present as a manuport), for example, is found at both Ngaut Ngaut and Tungawa and is restricted to layers 2, 4 and 5 at Ngaut Ngaut. Mica schist is found in layers 1, 2, 3, 4, 5, 6, 7 and the surface at Tungawa. Mica schist does not possess any flaking properties. Indeed, Roberts (1998) has suggested the function of this raw material could be ceremonial/decorative due to its glittery appearance.

The compressed limestone (as identified by Mr Markus Pichler and Associate Professor Eric Bestland – see Bland [2012]) is only present in layers 7, 8, 9, 10, 11 and 12 – i.e., in the older deposits at the Ngaut Ngaut rockshelter. This material was previously unidentified at the site and can provide new insights into the resourcefulness of the occupants at the shelter. It is possible that this material was utilised at the beginning of occupation and then as trade routes or sources for better flaking material became available it was no longer used. There is also an increase in the amount of quartz used in layers 6 and 7 – this may be due to a lack of access to chert or silcrete or better access to quartz during this time.
Manufacturing Processes

There are a total of 33 cores in this assemblage. Multidirectional manufacturing processes were the most frequent making up 60.61% (n=20) of the total cores identified. Multidirectional cores indicate decisions made by the knapper to rotate a core until an appropriate flakeable surface is found (Andrefsky 2005; Holdaway and Stern 2004). The second most common core manufacturing technique was unidirectional representing 27.27% (n=9) of the cores. Unidirectional cores indicate that the knapper was striking the core from one direction (Andrefsky 2005; Holdaway and Stern 2004). Bipolar (n=2) and bidirectional (n=2) each represent 6.06% of the cores identified at the site. Smith (1977:17) identified a total of 44 cores: 17 bipolar, 20 flaked pieces and 7 ‘other’. The lack of definitions for the cores assigned as ‘flake pieces’ and ‘other’ suggest that his recording scheme was not particularly well-defined – this seems to be further complicated by the way he discusses ‘producer artefacts’ and ‘products’ in his published article (Smith 1982). Thus, given the previous lack of well-defined analyses of cores, this study has revealed previously unrecorded manufacturing processes for this site.

The termination of a flake can inform us about the fracture path of the flake. The types of terminations found on flakes can be an indication of how successfully force variables and core geometry were controlled by the knapper (Clarkson 2007:32). Excluding the flakes with missing distal fragments, of which we will never know the original termination type (excluding possible conjoins), and which could have been broken either through the use-life of the flake or through taphonomic processes (see Hiscock 1985), the majority of the terminations were feathered which suggests that the variables and core morphology also were well-controlled. This can be stated because feathered terminations are the desired results of many lithic reduction techniques as they result in a sharp edge (see Andrefsky 2005). As can be seen in Table 3 feathered terminations, by percentage, are relatively consistent if not more common in the more recent layers. Thus, it could be argued that this result provides potential evidence for greater control over core morphology in recent times and may therefore be in conflict with Mulvaney’s theory of ‘degeneration’ of knapping skills over time. These results also do not support a significant disjuncture.
in manufacturing processes, which may be expected if one were to adhere to Tindale’s cultural succession theory. Roberts (1998) also argued against significant disjunctions in manufacturing processes at Tungawa.

Table 3 Percentages of flake termination types and amount of flakes missing the distal fragment for each layer.⁴

<table>
<thead>
<tr>
<th>Layers</th>
<th>Feathered Termination</th>
<th>Hinged Termination</th>
<th>Stepped Termination</th>
<th>Missing Distal Fragment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29.41% (n=5)</td>
<td>5.88% (n=1)</td>
<td>0.00% (n=0)</td>
<td>64.71% (n=11)</td>
</tr>
<tr>
<td>2</td>
<td>36.67% (n=11)</td>
<td>0.00% (n=0)</td>
<td>3.33% (n=1)</td>
<td>60.00% (n=18)</td>
</tr>
<tr>
<td>3</td>
<td>41.18% (n=7)</td>
<td>0.00% (n=0)</td>
<td>0.00% (n=0)</td>
<td>58.82% (n=10)</td>
</tr>
<tr>
<td>4</td>
<td>13.24% (n=38)</td>
<td>0.35% (n=1)</td>
<td>2.44% (n=7)</td>
<td>83.97% (n=241)</td>
</tr>
<tr>
<td>5</td>
<td>16.44% (n=12)</td>
<td>0.00% (n=0)</td>
<td>0.00% (n=0)</td>
<td>83.56% (n=61)</td>
</tr>
<tr>
<td>6</td>
<td>13.92% (n=43)</td>
<td>0.32% (n=1)</td>
<td>0.32% (n=1)</td>
<td>85.44% (n=264)</td>
</tr>
<tr>
<td>7</td>
<td>15.18% (n=17)</td>
<td>0.00% (n=0)</td>
<td>0.89% (n=1)</td>
<td>83.93% (n=94)</td>
</tr>
<tr>
<td>8</td>
<td>15.62% (n=25)</td>
<td>0.63% (n=1)</td>
<td>0.00% (n=0)</td>
<td>83.75% (n=134)</td>
</tr>
<tr>
<td>9</td>
<td>35.94% (n=23)</td>
<td>0.00% (n=0)</td>
<td>0.00% (n=0)</td>
<td>64.06% (n=41)</td>
</tr>
<tr>
<td>10</td>
<td>26.87% (n=18)</td>
<td>0.00% (n=0)</td>
<td>0.00% (n=0)</td>
<td>73.13% (n=49)</td>
</tr>
<tr>
<td>11</td>
<td>6.25% (n=2)</td>
<td>0.00% (n=0)</td>
<td>0.00% (n=0)</td>
<td>93.75% (n=30)</td>
</tr>
<tr>
<td>12</td>
<td>5.88% (n=1)</td>
<td>0.00% (n=0)</td>
<td>0.00% (n=0)</td>
<td>94.12% (n=16)</td>
</tr>
<tr>
<td>Total</td>
<td>17.05% (n=202)</td>
<td>0.34% (n=4)</td>
<td>0.84% (n=10)</td>
<td>81.70% (n=969)</td>
</tr>
</tbody>
</table>

⁴ No plunging terminations were identified in this research and as such are not included in this table.
The vast majority at 94.7% (n=1449) of the artefacts did not have any cortex. Cortex is the altered outer surface of a core which occurs as a result of weathering processes (Andrefsky 2005; Holdaway and Stern 2004:26). The amount of cortex can be used as an indication of the stage of reduction that the core was at when the flake was removed. Only 2.9% (n=45) of the artefacts had a small amount of cortex between 1-25% of the dorsal area. Only 1.8% (n=27) of artefacts contained between 26%-50% of cortex and 0.6% (n=9) artefacts contained more than 51% of cortex. The lack of cortex suggests that the artefacts present at the site were originally from extensively reduced cores. This is also supported by Roberts’ (1998) research on the Tungawa collection which concluded that the vast majority of artefacts were also at the later stages of reduction. This finding also supports previous claims about the surrounding area being poor in siliceous material (see Pretty 1977).

Retouch
Retouch indicates the intentional reworking and modification of an artefact by the knapper. In this research it was recognised by the identification of a series of small and regular flakes along a stone artefact’s edge (see Holdaway and Stern 2004:33). As the local area is poor in good siliceous material appropriate for stone working it is not surprising that the results show that good quality stone was more intensively worked. Table 4 demonstrates that retouch is more common on artefacts made from chert, chalcedony and silcrete. Artefacts made from the latter raw materials are being utilised and retouched to their maximal potential indicating that they were significantly reduced to prolong their use-life.
Table 4 The percentage of raw material types with evidence of retouch.

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage with Retouch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chert</td>
<td>31.72%</td>
</tr>
<tr>
<td>Chalcedony</td>
<td>30.30%</td>
</tr>
<tr>
<td>Silcrete</td>
<td>16.78%</td>
</tr>
<tr>
<td>Compressed Limestone</td>
<td>5.55%</td>
</tr>
<tr>
<td>Quartz</td>
<td>3.11%</td>
</tr>
<tr>
<td>Quartzite</td>
<td>2.75%</td>
</tr>
</tbody>
</table>

The percentage of artefacts with retouch generally increases as time progresses (see Figure 5). This increase in retouch over time could also suggest that Mulvaney’s ‘degeneration’ theory may not be an appropriate conceptual scheme for this region. Whilst Mulvaney did not argue that ‘degeneration’ occurred on the basis of retouch (rather he was focused on typological analyses – e.g., the presence or absence of particular forms such as pirris and microliths) one can suggest that a technological analysis, which examines attributes such as retouch, may reveal that rather than a decline in stoneworking the opposite may in fact be the case. If one considers retouch to be either the intensity of resharpening, or as a result of deliberate manufacture, either could be interpreted as an increase in stoneworking (see Holdaway and Stern 2004:156).
Figure 5 Percentage of artefacts with/without evidence of retouch for each layer.

Conclusions

This paper presents new interpretations about the stone artefacts from Ngaut Ngaut. These interpretations have been based on technological analyses rather than the predominantly typological approaches that have been used in the region in past studies. The methods employed in this research demonstrate how interpretations made as a result of different approaches can affect general theories about the Indigenous Australian past. Such findings are significant when considering a heritage place such as Ngaut Ngaut – a site often referred to as providing a turning point in Australian archaeology and which is regularly associated with changes over time (Flood 2010).
The results show that discrepancies exist between researchers in relation to the identification of stone tools for the Ngaut Ngaut assemblage. It is argued that the predominant discrepancy between researcher artefact counts arises due the typological biases of past researchers with more minimal differences relating to the discovery of stone artefacts in other parts of the collection.

A re-analysis of the raw materials in the stone assemblage also identified previously unrecorded materials including silcrete, mica schist and compressed limestone. Further, it is argued that there are changes in raw material use over time with some raw materials only present in certain stratigraphic layers.

Similarly the re-analysis undertaken in this research more adequately defined the range of core types present in the assemblage in comparison to previous studies. Aspects of the analysis, such as flake terminations, show that feathered terminations (which arguably reveal the greater control of force variables by knappers) may have increased through time thereby potentially conflicting with Mulvaney’s ‘degeneration’ theory. Similarly, the research also shows that retouch increases over time. If one considers retouch to be either the intensity of resharpening or as a result of deliberate manufacture (see Holdaway and Stern 2004:156), either scenario could be interpreted as an increase in stoneworking rather than a general decline as suggested in Mulvaney’s (1960) broader hypothesis. From the results of the research it can also be argued that neither of the latter aspects of the analysis show any observable dramatic changes in manufacturing processes over time which may be expected if one were to adhere to Tindale’s (1957) cultural succession theory. Thus, whilst certain changes can be demonstrated through this research and reveal the dynamism and skills of people who occupied the site the interpretations stemming from these results differ from previous hypotheses.
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