Measuring intensity of core reduction in the inland Pilbara, Western Australia

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Analyses of stone artefact assemblages investigating technological organisation commonly use measures of reduction intensity (Clarkson and O'Connor 2014). For cores, common measures of reduction intensity include reduction in size, amount of cortex, and core rotation. Preliminary exploration of the data from the Christmas Creek-Cloudbreak study area suggested that, in general, multiplatform cores were larger than single platform cores. This is a surprising result as rotated cores should be more reduced and thus smaller. More detailed analysis explored how core rotation and size actually interacted with cortex and raw material at a local level.

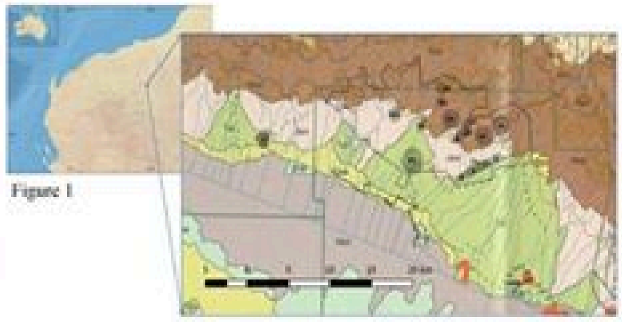


Figure 1

Background

Compliance archaeology at Fortescue Metals Group's Christmas Creek-Cloudbreak development resulted in intensive survey of more than 400 km^2 and recording of more than 2000 sites. We analysed all artefacts recorded from 13 sample areas, including six in the Chichester Range, four on the adjacent alluvial and colluvial plains and three samples from the edge of the Fortescue Marsh (Figure 1).

Nearly 2000 cores were recorded. A wide range of raw materials was represented, but 91% were local banded iron formation (BIF), basalt, chalcedony or chert. All raw materials occur widely in the study area. Sources in the ranges include quarried outcrops, exfoliated and heat fractured nodules, cobbles and pebbles in the creeks. On the alluvial plains raw material occurs as cobbles and pebbles along drainage lines and as heat fractured nodules. The Fortescue Marsh fringe is the only part of the study area where raw material is relatively scarce.

Technology was simple hard hammer percussion aimed at generalised flake production, typical of Pilbara assemblages in general (Figure 2). There was little evidence of core preparation. Most cores were single platform with about a third of cores flaked from two or more platforms.

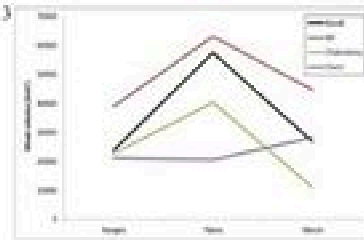
Cores were all recorded in the field, with length defined in relation to the most recent flake scar (Holdaway and Stern 2004: 189). Size was estimated in terms of volume, calculated from length, width and thickness measurements using the formula for an ellipsoid solid. Cores vary greatly in size, and the distribution is markedly skewed, but log transformation results in a normal distribution.

Figure 2

Results

Both single and multiplatform cores vary in size according to raw material. Cores also vary in size according to the land form they are associated with. The largest cores of BIF, basalt and chalcedony are found on the alluvial plains. Chert cores are similar in size throughout the study area (Figure 3).

Figure 3

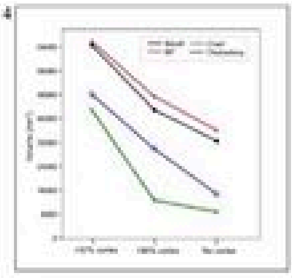


Most cores retain some cortex.

Basalt and BIF cores retain more cortex than chert and chalcedony cores, suggesting that the latter were more intensively worked.

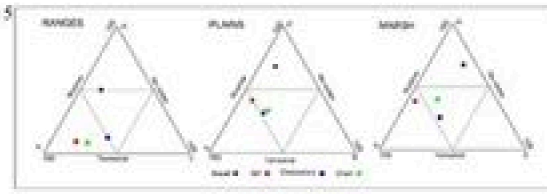
As size decreases so does the amount of cortex (Figure 4).

Figure 4



Terrestrial cortex dominates in the ranges, while cores from the alluvial plains and Fortescue Marsh margin have higher proportions of riverine cortex (Figure 5).

Figure 5



BIF, basalt and chert multiplatform cores are, on average, larger than single platform cores. Chalcedony single and multiplatform cores are similar in size.

Comparing the mean size of different core types for each of the three classes of cortex shows that both BIF and basalt multiplatform cores are larger than single platform cores. Chert single and multiplatform cores are similar in size. Only chalcedony single platform cores with more than 50% cortex are larger than multiplatform cores (Figure 6).

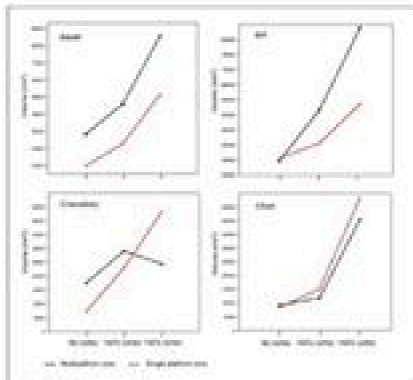


Figure 6

Conclusion

Clearly, in this situation of raw material abundance, most raw material use is local. Nevertheless, other evidence indicates some transport of cores, apparently as part of a strategy of provisioning places. The distribution of cortex type suggests that movement of raw material was mainly from the ranges to the plains and Fortescue Marsh. The smaller size of cores close to the Fortescue Marsh suggests more intensive reduction in that area, which is relatively stone poor. The reduced size of cores in the ranges is harder to explain; possibly larger cores, with more potential utility, were selected for transport, with discard of more heavily reduced cores where supplies of raw material could be replenished.

The larger size of multiplatform cores seems to reflect a situation of raw material abundance with varied original sizes of source boulders and cobbles, a generalised approach to flake production and little reason to conserve raw material. In the study area, rotation of cores is generally not associated with more intensive reduction but with variation in the original size of raw material. Larger pieces of raw material can be readily rotated to produce more flakes, while it may not be worth attempting to maximise the production of flakes from smaller pieces. As well, if cores act as a 'bank' of raw material at habitation sites, a second knapper might choose an existing core and begin a new episode of reduction from a new platform.

References

Holdaway S & Stern N 2004 *A record in stone*, Aboriginal Studies Press and Museum Victoria, Canberra and Melbourne

Clarkson, C & O'Connor S 2014 An introduction to stone artifact analysis, in J Balme & A Paterson (eds) *Archaeology in practice: a student guide to archaeological analyses*, pp. 151-206, Wiley Blackwell, Chichester

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