topics. This means having our sessions moved to Day 1 or Day 2. Placing us towards the end of the conference indicates that you are not interested in our contribution. Whilst our presentation might not be as scientifically oriented as yours we do have a contribution to make and wish to make it.

I hope my story has shed another light on events of the 1990 AAA conference. It is important to me to thank the ATSI people of northern Queensland for their hospitality. It is ATSI protocol of which we became a part. When we presented ourselves at the local conference we became recipients of ATSI protocol. This protocol is observed when we are in other people's country and is returned when ATSI people visit us. With effective communication, your people and my people can work towards changing harmful attitudes. We are interested in your contribution to Australia's indigenous past, we ourselves have an 'inner awareness' about the great antiquity of Aboriginal people and can relate to the scientific concerns to preserve cultural remains. Let us make an effort to understand each others cultural values and work through issues together.

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CONJOINS AND CHALLENGES: A REJOINDER TO PACKARD

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In a recent article Packard (1989) documented his reconstruction of a 47 piece conjoin. In bringing his report to an end, Packard posited two questions: 'is this a record? and does anybody care?'. Regarding the first query, the answer is NO. If one takes the world as a basis for comparison, it becomes obvious that larger conjoins have been refitted. For instance, Van Noten (1982: Plate 14) reported a 102 piece conjoin recovered from Gombe, Central Africa. Within Australia, conjoins exceeding 47 pieces have also been refitted. For example, a knapped boulder collected by Stephen Sutton near Mount Isa and conjoined by myself (Sutton and Huchet 1988) comprises, as far as I can remember, a minimum of 85 pieces and very possibly 100 pieces or more. The exact number is beyond recall since counting the number of pieces did not matter to me.

This last statement represents a personal answer to Packard's second query. That the number of pieces means little stems from my views about the rationale for conjoining in archaeology; similar views are shared by others (eg Fullagar 1990). I believe that a far more challenging aspect of conjoining is the amount of information one may be able to squeeze out of archaeological puzzles, whether the material be stone, bone, engraved art panels or pottery. Accordingly, it may be suggested that an appropriate means to measure the success of a conjoin is to calculate the ratio:

Amount of Information Extracted ÷ Number of Pieces Refitted

The higher the ratio, the more successful the conjoin can be considered. The amount of information may be established on the basis of the number in **types** of information that a given conjoin yields. I now briefly summarise the types of information one may derive from conjoins, although this list is by no means exhaustive.

1. The vertical distribution of conjoined pieces can indicate the extent to which post-depositional processes have occurred at sites, as reflected in the mixing of archaeological material from different occupation layers and their downward or upward movement (Cahen 1978:55; Villa 1982; Flood and Horsfall 1986:19; Richardson 1988; Huchet 1989:113–4, 166);

2. When no mixing has occurred between occupation layers, conjoins may be useful in establishing the thickness of individual layers (eg Conkey 1980:626–7);

3. Conjoins may present opportunities for summarising the reduction sequence followed in the knapping of a lump of stone. As such, information can be gauged regarding the manufacturing process of various types of tools including axes (Sutton and Huchet 1988), adzes (Leach 1984; Jones 1986:198); burin spalls (Alexander 1963:Fig.5), Juin knives (Knight 1990); unretouched tools (Fullagar 1990) and blades (Leach 1984) among other types (see also Fasham and Ross 1978:57; Luebbers 1978:Ch.6; Cahen et al. 1979; Huchet 1989:70; Packard 1989);

4. The size of refitted elements represented in conjoins may indicate whether or not artefacts are

in situ rather than re-deposited through fluvial or other activities (eg Luebbers 1978:101; Bunn et al. 1980:123–5);

5. Conjoining can reveal the type of breakage sustained by bones. This information may be useful to establish the cause of breakage (eg intentional breakage using a hammer – see Frison 1974:42; Bunn et al. 1980:124);

6. The presence of a large percentage of conjoinable pieces of bone, stone or other material found within a constricted area can be taken as a sign that deposition occurred within a limited time period or during a single event (eg Bunn et al. 1980:125; Villa 1982:280);

7. The incompleteness of a conjoin recovered within a given excavated area can be used as a basis for postulating that the occupation area extends beyond the confines of the excavated area (eg Bunn et al. 1980:125);

8. In situations whereby the conjoin is complete except for a discrete cavity, this empty space can be a useful indicator of the shape or type of artefact that has been removed from the site by the occupants. Artefacts may include axe blanks (Sutton and Huchet 1988), cores (Huchet 1989: 106) and choppers (Bunn et al. 1980:127, 128);

9. Refitting fragments of a broken artefact can help ascertain the status of a stone artefact type or skeletal element of an animal (eg Bunn et al. 1980:125–6). This is particularly important for parts of flakes or stone tools that are too small to carry diagnostic features required to enable their appropriate classification (pers. observ.);

10. Conjoins are useful for the delineation of discrete activity areas within sites (eg Schild 1976:89, 96–7) as well as for the identification of various kinds of activities such as the production of stone tools, the resharpening of tools and the deliberate discard of used tools (Cahen et al. 1979:663; Bunn et al. 1980:127; Van Noten et al. 1980; Leach 1984);

11. Conjoins from different layers within a single site may be used to make inferences about changes in the intensity of site usage over time. For instance, conjoins from different layers at Yam Camp rockshelter indicate more downward movement of artefacts in the uppermost layer relative to those from lower layers, suggesting more intense occupation of the upper layer (Huchet nd:6);

12. In cases whereby the examination of single stone artefacts makes it ambiguous to discriminate between natural and humanly-induced flaking, conjoins can ascertain the agent responsible for the flaking (eg see Jones and Johnson 1985:68);

13. Direct information about the source of raw materials used for artefact production can be established by refitting. This approach was used by Singer (1984:44) to ascertain the source of knapping by-products of quartzite artefacts, a quarry located some 63 km away from the artefacts;

14. Conjoining can help establish whether or not an artefact has been used as a tool. Frison (1974:53, 56), for instance, compared the edge of bone choppers made from bison tibia and femur with the conjoining edge of bone pieces recovered from the debitage to show that the choppers served as tools, on the basis of differences in the sharpness of edges;

15. Conjoining is a useful means of ascertaining the number of complete tools represented at a site, as shown by Frison (1974:71);

16. In some cases, refitting can be done to ascertain whether or not stone materials have been re-used over a significant period of time through the recycling of discarded raw material at a site. Cahen and Moeyersons (1977:813) suggested that re-use could not have been done at the Gombe Point site since the vertical distribution of knapped material did not follow the order of the reduction sequence;

17. Conjoining may be a useful method for dating rock art. A minimum age of engraved or painted rock art panels can be established by dating occupation layers in which detached fragments of the panel are found (eg see Conard et al. 1988:464). In order to ascertain that a given art panel is being dated, it is necessary to show that the fragments recovered from excavations conjoin with the panel.

I am sure that Packard is well aware of the importance of conjoining in archaeology. He should be congratulated for undertaking the enormous task of attempting to refit in excess of 5500 artefacts from Lake George. Conjoining is not carried out on a regular basis by archaeologists in Australia although it is an extremely basic method for establishing aspects of knowledge where other approaches have either failed or are poorly suited. This is particularly true for the detection of post-depositional disturbance of sites and the re-discovery of lost techniques of stone artefact manufacture. In addition, there is a wide range of artefacts that can be conjoined. Theoretically, any artefact that is breakable is potentially conjoinable. Since very few prehistoric artefacts found at Australian archaeological sites are not breakable, it follows that conjoining is a widely applicable method.

References

Alexander, H.L., Jr. 1963 The Levi site: a Paleo-Indian campsite in central Texas. **American Antiquity** 28(4):510–28

Bunn, H., J.W.K. Harris, G. Isaac, Z. Kaufulu, E. Kroll, K. Schick, N. Toth and A.K. Behrensmeyer 1980 FxJj50: an early Pleistocene site in

northern Kenya. **World Archaeology** 12(2):109–36

Cahen, D. 1978 New excavations at Gombe (ex-Kalina) Point, Kinshasa, Zaïre. **Antiquity** 52:51–6

Cahen, D. and J. Moeyersons 1977 Subsurface movements of stone artefacts and their implications for the prehistory of central Africa. **Nature** 266:812–5

Cahen, D., L.H. Keeley and F.L. Van Noten 1979 Stone tools, toolkits, and human behavior in prehistory. **Current Anthropology** 20(4):661–83

Conard, N.J., P. Breunig, H. Gonska and G. Marinetti 1988 The feasibility of dating rock paintings from Brandberg, Namibia, with 14C. **Journal of Archaeological Science** 15:463–6

Conkey, M.W. 1980 The identification of prehistoric hunter-gatherer aggregation sites: the case of Altamira. **Current Anthropology** 21(5):609–30

Fasham, P.J. and J.M. Ross 1978 A Bronze Age flint industry from a barrow site in Micheldever Wood, Hampshire. **Proceedings of the Prehistoric Society** 44:47–67

Flood, J. and N. Horsfall 1986 Excavation of Green Ant and Echidna shelters, Cape York Peninsula. **Queensland Archaeological Research** 3:4–64

Frison, G.C. 1974 Archeology of the Casper Site. In G.C. Frison (ed.), **The Casper Site**, pp.1–111. Academic Press: New York

Fullagar, R. 1990 A reconstructed obsidian core from the Talasea excavations. **Australian Archaeology** 30:79–80

Huchet, B.M.J. 1989 An analysis of the stone artefact assemblages from the Keppel Islands. Unpublished draft report. Heritage Section, Department of Environment and Conservation: Brisbane

Huchet, B.M.J. nd A taphonomic analysis of lithic and organic material from Yam Camp Rockshelter, SE Cape York. Unpublished paper. Department of Archaeology and Palaeoanthropology, University of New England: Armidale

Jones, K. 1986 Cunning conjoins: methodological considerations in refitting stone flakes. In G.K. Ward (ed.), **Archaeology at ANZAAS Canberra**, pp.198–202. The Australian National University: Canberra

Jones, R. and I. Johnson 1985 Rockshelter excavations: Nourlangie and Mt Brockman Massifs. In R. Jones (ed.), **Archaeological Research in Kakadu National Park**, pp.39–76. Australian National Parks and Wildlife Service Special Publication 13: Canberra

Knight, J. 1990 A broken Juin knife from Yandan Creek: some implications. **Archaeology in Oceania** 25:68–74

Leach, H.M. 1984 Jigsaw: reconstructive lithic technology. In J.E. Ericson and B.A. Purdy (eds), **Prehistoric Quarries and Lithic Production**, pp.107–18. Cambridge University Press: Cambridge

Luebbers, R.A. 1978 Meals and menus: a study of change in prehistoric coastal settlements in South Australia. Unpublished PhD thesis. The Australian National University: Canberra

Packard, P. 1989 Conjoin competition? **Australian Archaeology** 29:67

Richardson, N. 1988 Conjoin sets and chronological resolution at Kenniff Cave. Paper presented to the Second New England Archaeological Symposium: Technological Analysis and Australian Archaeology, January 1988. University of New England: Armidale

Schild, R. 1976 The final Paleolithic settlements of the European Plain. **Scientific American** 234(2):88–99

Singer, C.A. 1984 The 63-kilometer fit. In J.E. Ericson and B.A. Purdy (eds), **Prehistoric Quarries and Lithic Production**, pp.35–48. Cambridge University Press: Cambridge

Sutton, S. and B. Huchet 1988 Opportunistic axe manufacture near Mt Isa. Paper presented to the Second New England Archaeological Symposium: Technological Analysis and Australian Archaeology, January 1988. University of New England: Armidale

Van Noten, F. 1982 **The Archaeology of Central Africa**. Druck-u, Verlagsanstalt:Graz

Van Noten, F., D. Cahen and L. Keeley 1980 A Paleolithic campsite in Belgium. **Scientific American** 242(4):44–51

Villa, P. 1982 Conjoinable pieces and site formation processes. **American Antiquity** 47(2):276–290.

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REFLECTIONS ON REFUTATION

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It is an episode of some consequence that a discussion on epistemology has erupted in the pages of Australian Archaeology. The debate has covered many of the thornier issues of philosophy in archaeology, ranging from the sociology of the discipline to the vagaries of methodology. This was quite an unintended consequence of an article which was originally aimed at elucidating only a small aspect of this spectrum. The larger picture has since been shifted into focus in the debate with Murray, most recently with greater clarity in *AA* 31. It is clear that both of us previously had little understanding of each other's views. For example, I attacked Murray's argument on plausibility when he was talking about tradition, and Murray has chosen to discuss tradition when the focus of the original essay was on which of two advertised testing systems might be most appropriate; tradition and plausibility are relevant to this discussion, but all topics can be discussed independently. Murray is correct in noting that I focused overmuch on the context of justification