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– RESEARCH REPORT –

Differentiating Spinning Tops from Opportunistic Hammer-Dressing Tools: Examples from New Zealand archaeology and actualistic experiment

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ABSTRACT

Hammer-dressing– also known as *pecking*– is an important manufacturing technique for the production of stone tools in New Zealand and elsewhere in Polynesia. Little attention has been paid to the potential variety of hammer-dressing tool forms; this includes the prospect of expedient, curated, and opportunistic hammer-dressing tools. Such tool forms have previously been misinterpreted as spinning tops (*potaka*) or disregarded entirely. Specimens from two archaeological sites in the Otago region of New Zealand's South Island are examined: The coastal site of Shag River Mouth (J43/2) and Matarae rock shelter (H43/40), located approximately 55 kilometres from one another.

Keywords: Hammer-dressing; Spinning tops; Experimental Archaeology

INTRODUCTION

> *It is likely that the variability exhibited among different adzes from other Polynesian island groups may reflect similar differences in…the nature and quality of manufacturing tools like hammer stones.* (Turner 2005: 91)

Hammer-dressing is a lithic reduction technique in which a stone tool (adze, axe, etc.) is shaped by repeatedly impacting the surface with another stone – this technique is also referred to as *pecking* (Dickson 1981: 35–36). Ideal hammer-dressing tools must withstand repeated impact for prolonged periods of time; as such, Turner (2005: 70–71) suggested that the hardness of hydrogrossular garnet cobbles made them ideal tools for hammer-dressing adze head preforms in New Zealand. The recovery of such tools from areas naturally devoid of hydrogrossular garnets would constitute 'tool transportation' and would, therefore, constitute a curated (Nelson 1991: 62) hammer-dressing toolkit. The absence of archaeological hydrogrossular garnets in the Otago region of New Zealand suggests that a strategy other than curation was used to organise technology. Moreover, opportunistic hammer-dressing tool forms have seldom been the focal point of archaeology in New Zealand; such tool forms exhibit a unique convergence of attributes and can contribute to identifying discreet activity areas within archaeological sites.

Here, a new artefact type is proposed– the opportunistic *secondary concomitant* hammer-dressing tool. Nelson (1991:81) has described opportunistic toolkits as strategic responses to unanticipated circumstances (1991:84). *Secondary concomitant* tools are those that perform two different tasks simultaneously (Adams 2014: 24). This latter notion, as applied to hammer-dressing, requires a perspective that acknowledges the technological nuances of manipulating toolstone surfaces for effective reduction. Rather than being a crude means of shaping one rock with another, effective hammer-dressing consists of the skilful alternation between two complementary goals of toolstone modification: Pitting and levelling, as discussed below. Two archaeological specimens from two different sites are presented: The first of which was recovered from the coastal site of Shag River Mouth (J43/2) and was originally interpreted as a spinning top (*potaka*). The other specimen, recovered from Matarae rock shelter (H43/40) – a fossicked site located approximately 55 kilometres from Shag River Mouth – has not been the focus of archaeological research and is currently on display at the Middlemarch museum in the Otago region of New Zealand's South Island. The case is made for opportunistic secondary concomitant hammer-dressing tools in New Zealand in three ways: First, by referring to the ethnographic accounts referring to the manufacture and use of spinning tops to critically assess previous archaeological interpretations; next, by briefly characterising the technology and wear of the specimens in question; and lastly, by presenting the results of a loosely controlled archaeological replication (also known as an *actualistic experiment*; *sensu* Schenck 2011).

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BACKGROUND

Shag River Mouth (J43/2) is one of the better-known sites in the South Island of New Zealand. The site was intermittently excavated by David Teviotdale from 1915 to 1945 (Allingham 1996: 21) and was later excavated by faculty members and students from the University of Otago from 1988–1989 (Anderson and Allingham 1996). The latter excavations culminated in a published volume (Anderson *et al.* 1996), which included a chapter dedicated to the artefactual miscellanea – including perforated moa eggs, necklaces, schist files, etc. (McGovern-Wilson *et al.* 1996). Spinning tops were some of the featured artefact types reported from Shag River Mouth; six of which were illustrated in the publication. However, the artefacts depicted in the Shag River Mouth volume do not conform with ethnographic descriptions or historical photographs of Maori spinning tops. The most detailed account of these artefacts comes from Elsdon Best's (1925) *Games and Pastimes of the Maori*. He notes that the favoured material for making spinning tops is the heartwood of *Matai* (*Podocarpus spicatus*), and that stone was only occasionally seen as a suitable raw material (1925: 88). Although he lists 13 different Maori variants of the spinning top, he details two general forms: the whip top and the humming top. The former is named due to the aid of a flax whip used by the player to keep the top spinning on the *marae potaka* (or top-spinning ground) and often possessed an inlaid *pāua* shell disc (Hamilton 1901:381), whereas the latter possessed a long projection around which the cord was wound (Figure 1). These projections were often carved from a single piece of the aforementioned *Matai* wood (Best 1924:88). Wallace and Irwin (2004: 109–10) reported the recovery seven wooden tops from the North Island village site of Kohika: but six were made of *manuka* (*Leptospermum scoparium)* and one made of *totara* (*Podocarpus totara*). Nevertheless, none of the recovered tops from Kohika were made of stone and they all shared attributes identical to the photographed and ethnographic examples.

Culturally, spinning tops were playthings as well as an important part of war-related ceremonies:

> Sometimes when a tribe had been defeated in battle, they would adopt the following novel mode of lamenting the disaster. A dirge or lament (*tangi*) would be composed in the form of a *whakaoriori potaka* (song sung while tops are being spun). The people would collect in the *marae* (plaza), many of them being provided with humming tops (*potaka takiri*). The *tangi* would be commenced, and at the end of each couplet all the tops were started spinning at the same time, the result being a weird moaning hum which is said to be a lament in itself, not unlike the singular moaning sound made by natives when mourning for the dead. (Best 1902: 153)

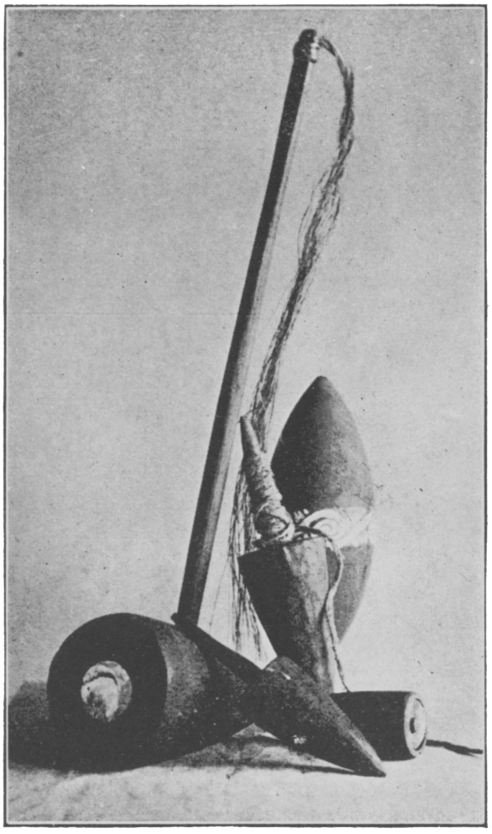

Figure 1. Wooden spinning tops and flax whip from Hamilton (1901: plate LXIV, Fig. 5). Note the inlaid paua shell on the wooden spinning top to the far right of the figure.

The ethnographic information of spinning tops coupled with the depictions featured in Best's account provide an excellent contrast to the artefacts from Shag River Mouth (all of which are illustrated in McGovern-Wilson *et al.* 1996: 174, see Figure 12.17). All of the spinning tops featured in *Games and Pastimes of the Maori* are consistent in form whereas the six specimens labelled as 'tops' in McGovern-Wilson *et al.* (1996: 176) vary in form and raw material type. Moreover, the invocation of this artefact type in the analysis of the Shag River Mouth assemblage suggests that this category had been used as a 'conceptual placeholder' for stone artefacts that could not clearly be placed in any other categories (Figure 2).

The Shag River Mouth Specimen

This piece (Figure 3a) is a water-rolled river cobble of coarse grained basalt that is mostly cortical and almost ovate with the exception of a rectilinear base; the bottom of the artefact exhibits a nearly linear delineation in profile. Additionally, small flakes have been detached from this rectilinear surface all around the circumference of the cobble – some of which have feather-terminated whereas others have step-terminated. These flakes have removed

Figure 2. Illustrations of the above artefacts were featured in McGovern-Wilson *et al*. (1996: see Figure 12.17 specimens b, d-g) and were classified as spinning tops. They are presented here in as similar a layout as the original illustration. The dotted rectangle indicates one of the artefacts in focus.

a small portion of cortex from around the specimen, but the flake scars have established ridges over which there is a macroscopically visible degree of 'rounding' or 'smoothing', a characterisation of usewear that affects prominent areas of the surface topography (Rots 2010:33). This attribute is not likely to have been caused by contemporary scrubbing, which has often been done with wire brushes that leave deep sets of perpendicular striations. The archaeological context of this piece was a multi-lensed oven-like feature of burnt shells, moa bone, oven stones, and other waste materials (Anderson and Allingham 1996:44; McGovern-Wilson *et al*. 1996:174).

The Matarae Rock Shelter Specimen

Matarae rock shelter (H43/40) was first discovered by a fossicker named Phillip George who donated his finds to the Otago Museum in 1935. They have since been moved to the Middlemarch museum and are currently on display. The fossicked assemblage consists of flakes and other discarded tools made mostly of locally abundant silcrete. In addition to silcrete flakes and tools, a fragmented basalt adze head was recovered by Phillip George (Figure 3b); the piece exhibits a hammer-dressed poll and a smooth ground surface. The latter exhibits oblique striations that are observable macroscopically and are likely the result of grinding. Like the Shag River Mouth specimen, this adze fragment contains a rectilinear base from which a series of circumferential flakes were detached (Figure 4).

A Note on Opportunistic Tools

The two artefacts have started with very different life histories, but they still retain a continuity of attributes that suggest a standardisation in the way these tools were used–which indicates a toolkit strategy of opportunism rather than expediency. Nelson (1991:64) notes that expedient technological strategies require the anticipation of materials and time in the landscape; and opportunistic strategies are responses to unanticipated conditions (Nelson 1991:65). As such, reusing a fragmented adze head to fulfil an immediate need for hammer-dressing would best be characterised as an opportunistic strategy rather than expedient strategy. Turner (2005:70–71) suggests that hydrogrossular garnet was used for hammer-dressing adze heads, but material availability was limited to Nelson/Marlborough (north of the South Island, approximately 480 kilometres from Shag River Mouth) and to Southland's rivers and beaches (approximately 180 kilometres from Shag River Mouth). Interestingly, no 'lime garnet' hammer-stones were recovered from Shag River Mouth (McGovern-Wilson *et al*. 1996:168); but Smith and Leach (1996:137) reported, '…an unusually large number (19) of hammers amongst the tools recycled from adzes.' The geographic limitations of curated lime garnet tools simply could not accommodate an immediate need to rework necessary tools. Therefore, a strategy of opportunism invoked readily available raw materials and dictated the use of those materials in a manner that optimised reduction despite their comparative weakness.

Substituting hydrogrossular garnet tools with readily available basalt tools would not be a seamless transition: How would opportunistic tools have to be used differently in order for them to achieve the desired result? Adams *et al*. (2009:48) discuss the importance of *surface topography* in the manufacture of ground stone tools. Hammer-dressing is often perceived as a conceptually simple manufacturing method; however, skilful hammer-dressing requires a systemic manipulation of the aforementioned surface topography to efficiently complete the manufacturing goal. It is possible for the artificer to alternate between creating a pitted surface on the hammer-dressed object and then crushing the elevations on that surface until levelled. These two separate goals (pitting and levelling), although nested within the singular act of hammer-dressing, allows the possibility of identifying *secondary concomitant* tools in the archaeological record. Any such tool would require

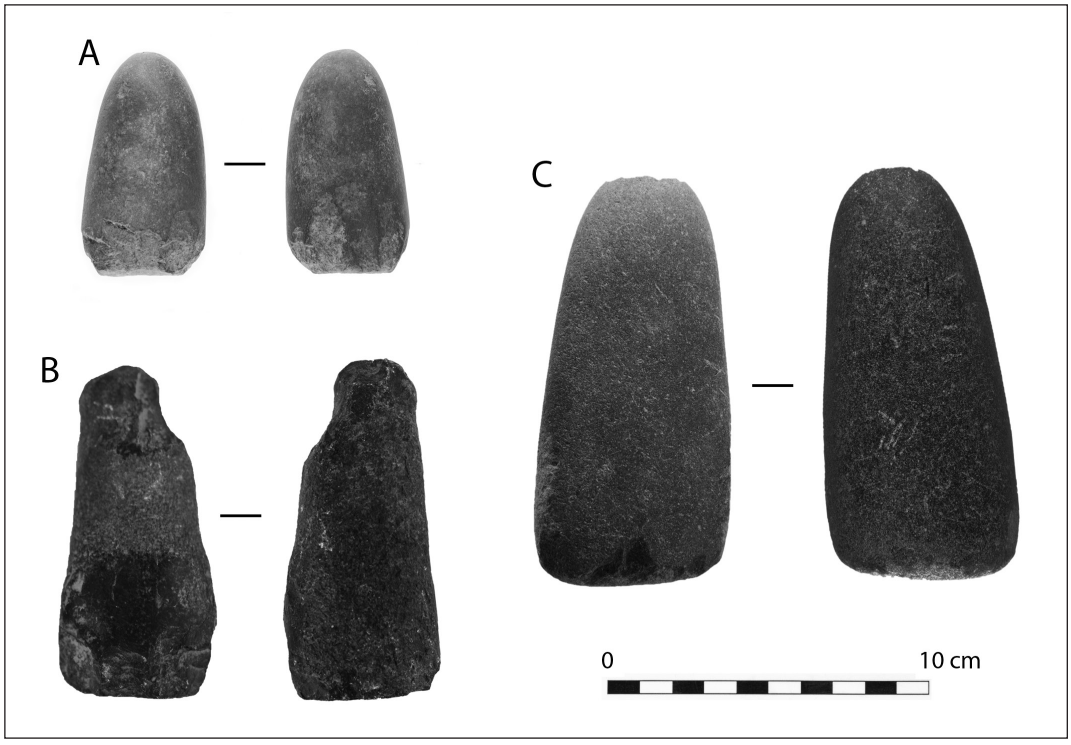

Figure 3. A) Artefact from Shag River Mouth, B) artefact from Matarae, and C) the replicated tool using a secondary concomitant hammer-dressing reduction. Obverse (L) and Reverse (R) surfaces are depicted for each example.

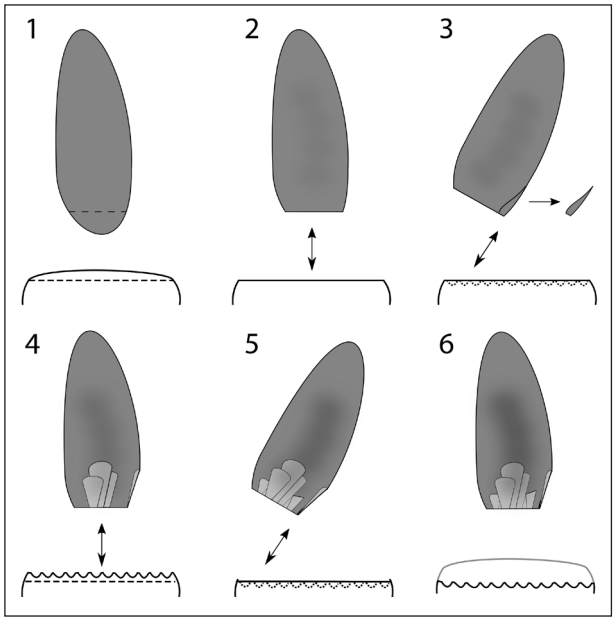

Figure 4. A proposed use-life for the opportunistic secondary concomitant artefact from Shag River Mouth. Dotted lines indicated the surface topography during reduction: Stage one depicts the unused water-rolled cobble. Stages two and four depict levelling. Stages three and five depict pitting, which satisfies the geometric conditions for ancillary flake removals. Stage six juxtaposes the final hammer-dressed surface (black line) with the initial surface (grey).

two specific edge morphologies: The first use-edge would be angular to create a pitted surface topography, and the second use-edge would be rectilinear to crush the aforementioned pitting and re-establish a level surface. The act of pitting satisfies the geometric conditions for ancillary flake detachments from the circumference of the rectilinear use-edge (Figure 4).

METHODOLOGY

Archaeological replication was used to assess the validity of this interpretation, but the parameters were not controlled with the conventional strictness of experimentation. Loosely controlled replications have been coined *actualistic experiments* (*sensu* Schenck 2011), which are named for their commitment to understanding the actual manufacturing conditions of antiquity rather than focussing on contemporary experimental protocols. This means hammer-dressing duration was not measured with precision (although it did occupy just under 10 cumulative hours); rather, replicative hammer-dressing stopped upon the completion of a behavioural analogue. In this case, stone working was considered complete when the analogue possessed the general features of an adze head ready to be ground (i.e. poll, bevel, chin, shoulder, etc.) (Figure 5). Raw materials for the experiment were selected in the same opportunistic manner as those observed archaeologically: A water-rolled cobble was available for replicative work, and

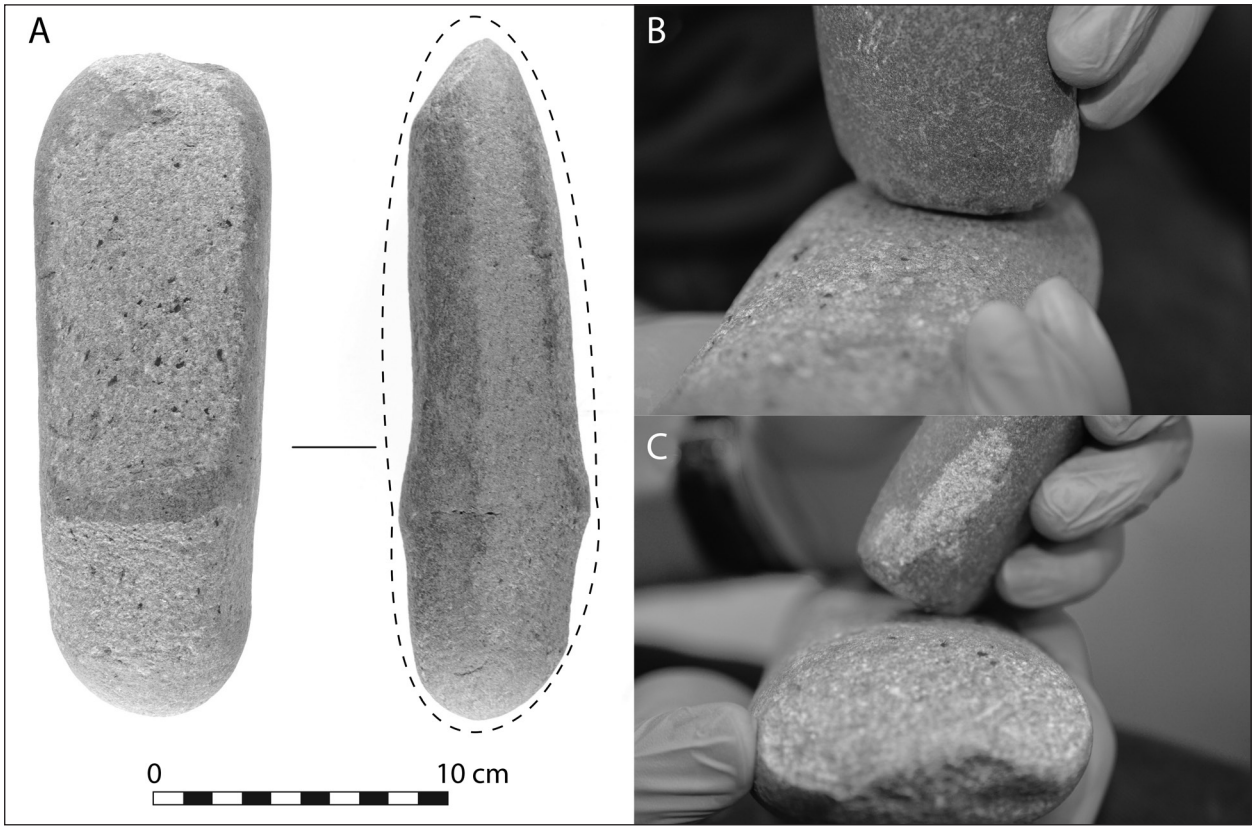

Figure 5. A) The front and profile views of an experimentally hammer-dressed 'adze head' analogue. The black dotted line (R) represents an approximation of cobble dimensions prior to hammer-dressing. B) Using the rectilinear use-edge to crush the surface elevations in the adze head (levelling). C) Turning the hammer-dressing tool approximately 45° to re-establish surface topography (pitting). Latex gloves were worn after the replication when handling the artefact. Photos B and C: Nick Sutton.

the tool was used in the aforementioned manner. Most of the flakes detached from 'pitting'– also known generally as use-flakes (Hayes *et al*. 2014:77) – were recovered and examined after the replication.

DISCUSSION AND CONCLUSIONS

The replicated specimen (Figure 3c) possesses the same combination of attributes as the artefacts from Shag River Mouth and Matarae: a rectilinear use-edge with circumferential use-flake detachments. Perhaps the most interesting attribute of the Shag River Mouth specimen was not properly accounted for by this replication: the 'rounding' or 'smoothing' (see Figure 3a, reverse surface). Rots (2004:13) has noted that hand-held bone and antler tools can easily accumulate prehension polish due to particulates from use-materials getting between the used tool and the artificer's hand. In the case of hammer-dressing, the worked toolstone can produce a large amount of powder in the reduction process– it is not inconceivable to think that the combination of rock powder and prolonged use can incur the same degree of smoothing observed on the Shag River Mouth specimen. Additionally, the use-flakes detached from pitting warrant proper use-wear analyses under controlled conditions; the platforms of these flakes should exhibit evidence of hammer-dressing. Macroscopic and microscopic characterisation of the wear should follow.

The results of this replication have provided two salient points for the epistemology of archaeology: 1) an actualistic study can provide an inductive basis from which more controlled experiments can be designed and 2) actualistic experiments can provide an empirical basis to challenge previously unchallenged interpretations about the archaeological record. Replicative studies are becoming increasingly utilized to understand Polynesian adze head technology: From diagnostic waste flakes (Turner and Bonica 1994:7–10) to hammerstones (Clarkson *et al.* 2015:74). Replicative studies facilitate the identification of discreet activity areas and aid in the characterisation of lithic toolkits.

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