

BEYOND TYPOLOGIES: THE REDUCTION THESIS AND ITS IMPLICATIONS FOR LITHIC ASSEMBLAGES IN SOUTHEAST ASIA

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ABSTRACT

Stone artefact archaeology in mainland Southeast Asia has not enjoyed the same level of interest and productivity as studies of stone artefacts in other parts of the world. Although there are a number of reasons for this, a significant one is the use of essentialism as the underlying philosophy of lithic classification. Essentialism is a flawed approach to classifying stone artefacts because of the continuous nature of artefact reduction. Case studies are presented that show essentialism has additional problems, such as inefficiency, compression of variation and inability to explain historical change. An alternative approach, nominalism, is better suited to lithic classification and analysis. Existing nominalist approaches can easily be adapted for Southeast Asia assemblages and promises to live-up stone artefact archaeology in mainland Southeast Asia.

INTRODUCTION

This paper asks why flaked stone artefacts from mainland Southeast Asian archaeological sites have so far contributed relatively little to our understanding of past human behaviour in this region, compared to other parts of the world. Part of this can be explained by the smaller number of sites known from Southeast Asia, and smaller number of archaeologists working there. The comparatively smaller ranges of formal artefact types and distinct assemblages in Southeast Asia may also be contributing factors. However, in this paper I review previous work and suggest that an important reason for this difference in the two bodies of knowledge is because most stone artefact analyses in Southeast Asia are based on an inappropriate philosophy of classification. Here I propose an alternative philosophy of classification, present some data to demonstrate the advantages of this system of classification and outline a suite of existing methods based on this philosophy. This productive approach has potential to revitalise lithic analysis in Southeast Asia.

Background to artefact classification: essentialism and nominalism

Classification is an enduring and central concern of archaeology, as it is in many other disciplines. In particu-

lar, biology has a long tradition of working at the general problem of how to arrange phenomena to do useful analytical work. Since biologists have been thinking about this for much longer than archaeologists, it might be instructive to see how they have confronted the problems of grouping entities. Also, the processes of change in a flaked stone artefact over its use-life suggest that there is good reason to look to biology for ideas about classification. The nature of change for a flaked stone artefact is the flake-by-flake removal of mass that changes the size and shape of the artefact (Flenniken 1984). Although the flakes removed are discrete units, these flakes are typically much smaller than the artefact from which they are removed (for example a core or retouched flake) so the process of change of a stone artefact can be viewed as a *continuous* reduction of mass and morphological possibilities. This process of change by continuous reduction can be compared to natural selection of variation in a biological population. The artefactual equivalent to a biological population is an assemblage, when a group of artefacts in the same place from the same time are under consideration.

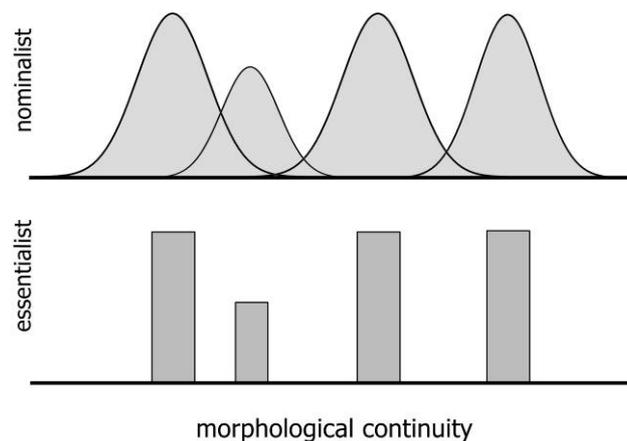


Figure 1. Schematic representation of essentialist and nominalist approaches to classification. The peaks represent kinds of artefacts in a hypothetical assemblage, with the height of peaks indicating their numerical dominance in the assemblage.

The process of natural selection in biological populations is reductive because variation in a biological population is reduced when less successful variants are removed

from the population by their failure to reproduce. The sources of variation in stone artefact assemblages and biological populations are, of course, very different but I suggest that the mechanisms of change are *conceptually* similar. Morphologies of both assemblages of flaked stone artefacts and biological populations change because of a process of continuous reduction. Even if an artefact is used by multiple people over different times and locations, morphological and size change of that piece can only occur through the flake-by-flake removal of mass.

This conceptual equivalence of the processes of change is significant because it means that the philosophical and methodological work of biologists on classification is relevant to archaeologists dealing with flaked stone artefacts. For example, one of the most prominent biologists writing on classification, Ernst Mayr (1959), identified two basic philosophies that underlie attempts to define concepts of biological species: 'typological' thinking versus 'population' thinking (Figure 1). Mayr's 'typological' thinking is similar to what archaeologists mean when they refer to typologies. It presumes the existence of discoverable and discrete kinds of things. Things are of the same kind because they share real and fixed 'essences' — and these essential properties dictate whether a specimen is of kind A or kind B (Lyman and O'Brien 2002). This approach to classification was dominant in biology from Plato and Aristotle until Darwin. Modern biologists are generally critical of this essentialism (Sober 1980), with Hull (1965a; 1965b) arguing that it was responsible for 2000 years of stasis in the development of the science of biology, and Popper (1966) similarly writing that

the development of thought since Aristotle could, I think, be summed up by saying that every discipline as long as it has used the Aristotelian method of definition has remained arrested in a state of empty verbiage and barren scholasticism, and that the degree to which the various sciences have been able to make any progress depended on the degree to which they have been able to get rid of this essentialist method.

Essentialism and stone artefact archaeology

Should essentialism also be criticised by archaeologists working with Southeast Asian stone artefacts? In this context there are three criticisms of essentialism. First, essentialism results in a method that uses only a very small fraction of the available sample. Typological thinking in stone artefact studies results in methods that classify assemblages into discrete groups of artefacts according to their shapes and sizes. The shapes and sizes of artefacts are explained by typologists as the result of an intentional design in the mind of the artefact maker (Dibble 1995). This results in a focus on the most visually striking artefacts in an assemblage, usually only a small proportion of most archaeological assemblages (Hiscock 2001). In the earliest published description of a typology of Southeast Asian flaked stone artefacts, Colani (1927) wrote that over 1000 artefacts were recovered from the excavations at Sao Dong, Vietnam, of which 82 artefacts

were classified into 28 types. Similarly, in Pookajorn's (1988) excavation of over 3000 artefacts from three rockshelters at Ban Kao, central Thailand, he classified 86 of those artefacts into 10 types. Excavations at Laang Spean, western Cambodia, recovered 8502 stone artefacts, of which 34 were classified into seven types (Mourer 1977). In these three examples the analysed samples are rather small for reliable statistics and convincing interpretation (cf. Shennan 1988), and there are a large number of artefacts that are not contributing to the analysis. Even if the unanalysed pieces really were waste from prehistoric tool-making, it is widely accepted by stone artefact analysts in other parts of the world that this kind of debitage has considerable analytical value (Andrefsky 1998: chapter six; Clarkson and O'Connor 2005; Collins 1975). This suggests that the typological approach to Southeast Asian stone artefact analysis results in an inefficient use of the available data.

A second criticism of essentialist approaches is that they hide or compress variation into a small number of groups. Artefacts that do not appear to fit comfortably into the typology are explained by the typologist as imperfections, flawed realisations of the ideal mental image or the result of variation in skill and raw materials that is usually viewed as having no explanatory value (Dunnell 1986; O'Brien and Lyman 2000:33). Colani (1927:56) dismisses the large number of artefacts that she does not analyse as 'among the rudest ever made by human hands.' Later archaeologists working in Vietnam have been similarly nonplussed by the 'great number of undefined [sic] tools' in Hoabinhian assemblages and are 'puzzled with the idea of how to find a suitable type for them' (Chung 1994:46).

In Thailand, van Heekeren observed that 'the overwhelming majority of the flakes from [Sai Yok] displayed no signs of edge-chipping from use or from planned retouch and typological examination of the flakes does not indicate intended production of any predetermined shapes. They may therefore be labelled as waste products' (Heekeren and Knuth 1967:23). The Sai Yok lithic assemblage was later revisited by Matthews (1964:188) who undertook a detailed and systematic analysis of the flaked stone artefacts, motivated by a concern that the Hoabinhian types focused on by other archaeologists were 'an arbitrary selection... being made from a continuous range of shapes'. Matthews was influenced by Spaulding's (1953) argument that types can be discovered in archaeological assemblages by using statistical tests such as chi-square to identify distinctive differences between groups of artefacts with similar combinations of attributes. Although Spaulding's approach cannot discover 'natural' types because the types discovered by statistical analysis ultimately depend on the choices made in the selection and weighting of variables (Dunnell 1971), Matthews was able to use Spaulding's method to test the idea that the Hoabinhian assemblage from Sai Yok contained the discrete types described by Colani.

Matthews (1964:230) analysed the Sai Yok assemblage to test his claim that Colani's Hoabinhian typology

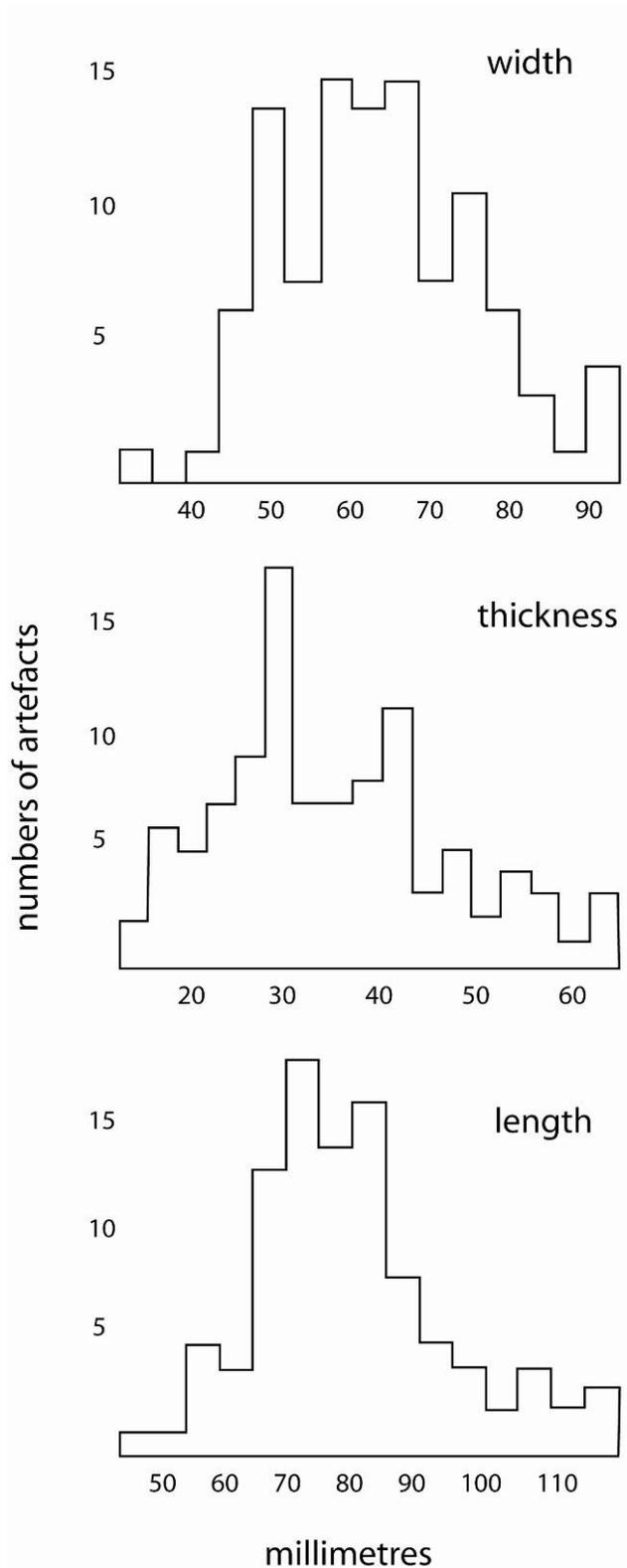


Figure 2. Matthews' metric analyses of flaked cobble artefacts from Sai Yok ($n = 100$). Redrawn from Matthews (1964).

was not justified and resulted in 'individual [artefacts] from continuous ranges [being] given typological significance they did not deserve.' Matthews collected data from the Sai Yok artefacts using measurements of continuous

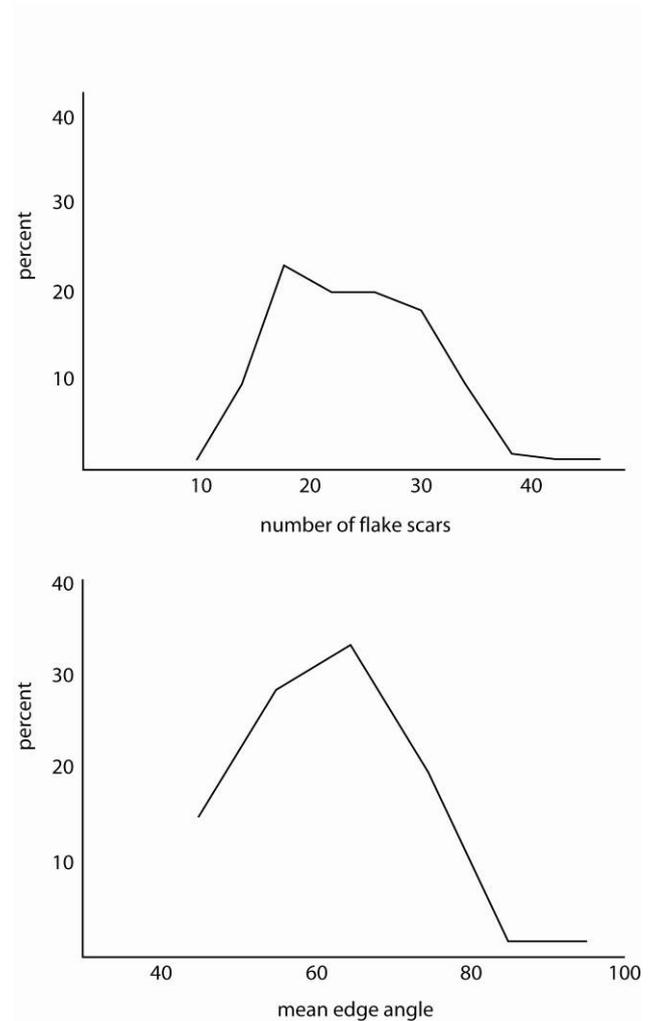


Figure 3. Matthews' analyses of flake scar numbers and edge angles on pebble tool artefacts from Sai Yok ($n = 183$). Redrawn from Matthews (1964).

variables to see if different artefact types would identify themselves by showing different and discrete modes in the results. On each artefact he recorded a suite of metric dimensions as well as observations about the quantity and distribution of flake scars and cortex as well as the shape of the artefact (Matthews 1964:150-3). Matthews' conclusion is unequivocal; the Sai Yok assemblage does not contain discrete types but only kinds of artefacts with measurements and attribute states that overlap on a continuum with other kinds. Figure 2 shows that metric variables for flaked cobble artefacts vary continuously rather than having discrete peaks. The same continuous variation is evidence in flake scar numbers and edge angles or cores (Figure 3) and metric variables on flakes (Figure 4). This result demonstrates that, in the case of the Hoabinhian, typological analysis ignores variation in lithic assemblages and instead focuses on a few forms that are not representative of numerically and technologically important aspects of the assemblage. Despite Matthews' early demonstration of how typological analysis compresses and neglects variation, typological methods have

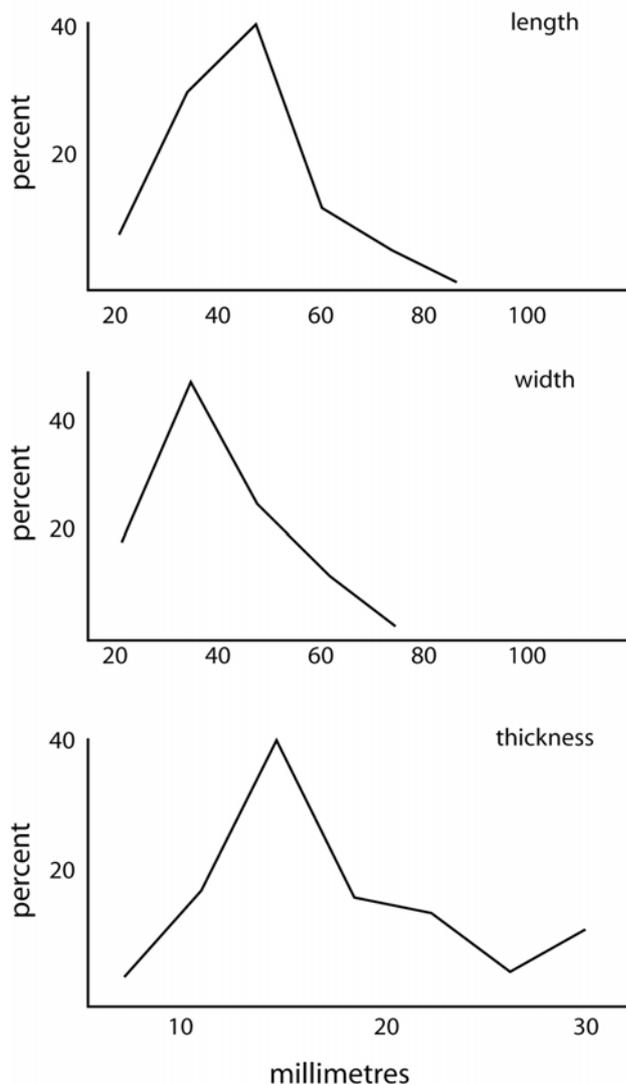


Figure 4. Matthews' metric analyses of flakes from Sai Yok (n = 100). Redrawn from Matthews (1964).

continued to be used in mainland Southeast Asian archaeology (eg. Pookajorn 1990; Santoni *et al.* 1990). Had Matthews presented his results more directly by stating that Hoabinhian types are not necessarily final products but visually distinctive forms resulting from different stages of reduction with overlapping attribute variation, then his results may have had a more immediate impact.

Matthews' study indicates that essentialist approaches to Southeast Asia stone artefacts are problematic because they are inefficient in their use of data and they fail to incorporate the full range of assemblage variation. In addition to these two specific issues, there is a third and more general problem with essentialist approaches, one that is common to the analysis of all kind of artefacts. This problem is that because typological analyses cannot measure gradual change in artefacts over time (because continuous morphometric variation is not tracked), only the difference between kinds of artefacts can be measured (Lyman and O'Brien 1997). If a kind of thing (such as a

stone artefact type) is based on discrete and exclusive essences, then for that thing to change it must drop one essence and take on another, so it must undergo a transformational step-like change rather than a gradual and continuous change (Mayr 1982). This means that a typologist can produce sequences of kinds of artefacts, showing that there are differences over time, but this sequence does not allow them to measure change in the sense of an empirical historical relationship with clear ancestor-descendant relationships (Dunnell 1980:38; O'Brien and Lyman 2000:35). Measuring historical change in artefact lineages is an increasingly important concern in artefact analysis with the growing interest in evolutionary theory in archaeology (Boone and Smith 1998; Lyman and O'Brien 2006; Lyman and O'Brien 1998; Marwick 2006)

An example of this problem in Southeast Asia is the numerous lithic industries named by Vietnamese researchers, such as the Sonvian, Bacsonian and Da But, that are defined according to the frequencies and presence or absence of certain lithic types and the geography of site location (Huu Nga 1994; Khac Su 1994; Ha 1997). These different industries are equated with cultures, for example the Sonvian and the Hoabinhian are regarded by Khac Su (1994:26-27) as 'independent, separated cultures' with some 'cultural interrelation'. The typological differences between the lithic industries are relatively clear but the historical relationships between these industries are unclear. For example, we do not know if they are divergent lineages from a common ancestor, ancestor-descendant industries or if the two industries really represent two points on continuum of a single industry where the changes in the lithic assemblages are best explained as adaptations to different ecological conditions (cf. Nishimura 2005).

To summarise, the use of essentialist approaches in Southeast Asian archaeology has three significant criticisms: first, it is an inefficient method, with large numbers of artefacts ignored because they do not fit into type categories; second, continuous morphometric variation at the assemblage level is largely ignored in favour of ideal specimens, despite the empirical reality that these ideal types are not representative of the assemblage; and third, that typological analyses cannot explain historical change in artefact lineages. That said, we should not completely abandon essentialism because typological thinking still has value as a system of classification for archaeologists. Metal, ceramic and many other kinds of artefacts, for example, often have discrete forms with no continuity between shape and size between different classes of artefact. These kinds of artefacts are built up from a plan, such as a metal cast or coil and slabs of pottery (Schiffer and Skibo 1987, 1997) and resharpening or repair need not involve the one-way reduction of mass like stone artefacts (Shott 2005). Broken metal artefacts can be melted and recast and broken ceramic vessels can be ground up and recycled as temper (Deal and Hagstrum 1995), rather than gradually moving through a spectrum of utility and changing morphology like flaked stone

artefacts. Typological classifications of ceramic, metal and other constructed (as opposed to reduced) artefacts can be valid and useful for answering a variety of questions about past human behaviours. These kinds of artefacts (and related attributes such as decorations) are especially well suited to analysis using frequency seriation, where the quantities of various kinds are tracked together over time (O'Brien and Lyman 2000:271-300). This often results in 'battleship curves' (also known as Markovian structures) that can be analysed to discover biases in the social transmission of artefact-related information and answer fundamental questions about the spread and persistence of cultural traits (Bentley and Shennan 2003; Neiman 1995). In addition to the analytical value of typological thinking, it is also a useful system for assemblage curation and public education, where things need names so that stories about them can be told, as well as having to be organised and displayed within discrete spaces.

Nominalism and the reduction thesis

If typological approaches to flaked stone artefacts in Southeast Asia are problematic, then how can the opposing philosophy of classification – Mayr's 'population' thinking – be employed in stone artefact analysis? This approach to classification holds that phenomena cannot exist as discrete entities because they are always in the process of becoming something else. No two things are ever exactly alike because similar things do not share an essence, they are just at similar points in the process of becoming something else. The nominalist sees individual things that are composed of unique features and when these things are grouped together they form populations that are described by statistical abstractions such as mean and measures of variation (Mayr 1959). Like essentialism, nominalism is a way of viewing the world that was familiar to the ancient Greeks as well as ancient Arab and Chinese authors (Bowler 2003), but was an unpopular philosophy until Darwin. Darwin's contribution is significant because he replaced typological thinking with population thinking though his collection of evidence supporting gradual rather than sudden change in animals and his proposal of natural selection as a mechanism for this gradual change.

The nominalist approach to stone artefact analysis recognises that morphological variation in stone artefacts reflect different stages along a continuum of change rather than the intentional creation of discrete types. This approach is supported by ethnographic studies that have recorded how tool morphology changes as the tool undergoes continuous resharpening throughout its use-life (Gallagher 1977; Gould *et al.* 1971; Hayden 1977, 1979). This approach is known as the 'continuum model', the 'Philadelphia School' or the 'reduction thesis' (Hiscock and Attenbrow 2003a, b; Shott 2005). Nominalist analyses are well-suited for classifying flaked stone artefacts because each flake that is removed, either during the manufacture, use or resharpening of an artefact, is a small step in the process of the artefact becoming a different

shape and size. Over the life of an artefact, this flake-by-flake change resembles a continuous process that can be measured with continuous measurement variables. Following from this, an assemblage of artefacts is a group of individual pieces that were in the process of becoming something else (through morphometric change resulting from use, reduction, breakage, discard, etc.) at the time they entered the archaeological record. Although individual artefacts may have noteworthy histories of manufacture and use, it is only when they are considered together at the assemblage level that meaningful statements about technological patterns can be made. Extrapolating technological schemas from single pieces risks confusing unique stochastic events with longer-term patterns of behaviour that are of greater archaeological interest.

Measuring the degree of this change in artefact shape and size is the focus of nominalist analyses (Clarkson and O'Connor 2005). Shott (2005) presents a catalogue of methods developed in the last twenty years for measuring artefact reduction in assemblages, including Dibble's (1987) comparison of relative numbers of Middle Palaeolithic scraper types, Kuhn's (1990) geometric index of unifacial reduction, Barton's (1988) perimeter retouch index and Clarkson's (2002) index of invasiveness. These methods are yet to be tested with assemblages from mainland Southeast Asia. Despite having been very illuminating elsewhere, they may be of limited use with mainland Southeast Asian assemblages because of the relatively low proportions of intensively reduced artefacts (White and Gorman 2004).

A more productive method is likely to be diacritical analysis, which includes all flakes and cores in an assemblage and ranks individual flake reduction according to simple changes in individual flake morphology that logically follow from changing core morphology as reduction intensity increases (Sellet 1993: 108). In this way, the assemblage can be described in terms of statistics based on the population of individual artefacts. For example, as an assemblage is reduced, it might be expected that the average number of flake scars on flakes and cores will increase, and the average amount of cortex will correspondingly decrease. Similarly, proportions of artefacts with overhang removal (the presence of a series of overlapping step-terminated flake scars at the intersection of the striking platform and the dorsal surface) will also increase as the knapper adjusts the core platforms to prepare them for the harder blows required to detach flakes from smaller cores (Macgregor 2005). Marwick (2005) presents experimental verification of the usefulness of this approach with Hoabinhian assemblages and concludes that robust data on the extent of assemblage reduction can be obtained from the measurement of the presence of overhang removal, interior platform angle and the percentage and location of dorsal cortex on flakes.

The advantage of this nominalist approach is that variation in assemblage reduction can be interpreted as a reflection of variation in behavioural responses to the conditions of lithic production and discard. This interpretation is possible because lithic production is not simply a

technical act, but a process of supplying functional tools at the same time as solving problems related to risk, cost, and efficiency in systems of time budgeting, mobility and land use (Bleed 2001; Clarkson and Lamb 2005). From this embeddedness of technology in other systems, the distribution of assemblages at different stages of reduction over space and time can be seen as a reflection of variation in planning, land use and settlement and subsistence patterns in the everyday life of hunter-gatherers (Binford 1979; Kuhn 1995; Nelson 1991).

At a higher level of explanation, variation in assemblage reduction can be used to identify fitness-enhancing adaptations to environmental variability. In this case, fitness is defined most generally as the propensity of individuals to survive and reproduce (Williams 1966). This explanation is based on the assumption that natural selection has resulted in people having the ability to weigh the costs and benefits of adopting particular behavioural and technological strategies to benefit their survival and reproduction (Borgerhoff Mulder 2005). A second assumption is that people tend to behave as if they are maximising some survival-related currency — even if they are not consciously attempting to — when interacting with biological, social and physical environments. Given these assumptions, models of the evolutionary ecology of human behaviour can provide frameworks to develop predictions about situation-specific behaviours (Bird and O'Connell 2006). One way to test these predictions is by measuring and comparing the degrees of reduction intensity in lithic assemblages. Mismatches between predicted and archaeologically inferred behaviours imply either that one or more of the predictions are wrong or that the model itself is inappropriate to the behavioural question being addressed (Bird and O'Connell 2006). Refinement of models and continued testing of predictions will eventually result in robust, realistic and precise understandings of historical and evolutionary processes (Winterhalder 2002).

A good Southeast Asian example of this kind of nominalist method and evolutionary modelling can be found in a study of flaked stone artefacts from three sites in northwest Thailand. Krajaejun (2006) collected lithic data from two rockshelters and one open site to examine how people adapted their patterns of movement and technological organisation to different environments. Krajaejun analyses the data using Kuhn's (1995) model of lithic provisioning that describes a spectrum of provisioning strategies representing solutions to the problem of maintaining a constant supply of tools under different conditions of mobility and accessibility and predictability of resources. The three sites are located within a rugged limestone karst region, with two sites, Ban Rai rockshelter and the San Khay open scatter, located in typical highland environments with strongly seasonal water availability and few sources of raw materials. The third site, Tham Lod rockshelter, is located in a lowland environment, very close to a permanent river and abundant raw materials for making artefacts.

Krajaejun (2006) reports that Ban Rai and San Khay have much higher proportions of resharpened, reworked and exhausted tools than Tham Lod. Similarly, Tham Lod has a very low proportion of waste and discarded pieces. While it is not clear what artefacts attributes were recorded from the tens of thousands of artefacts analysed, it is clear that Krajaejun suggests major differences in the degree of assemblage reduction between the highland sites and the lowland site. Following Kuhn, and considering the local environments, Krajaejun explains that the two highland assemblages with evidence of more intensive reduction reflect individual provisioning by small groups of people with high levels of mobility, probably occupying these sites during the wet season during times of abundant ephemeral water. The more extensive reduction of the artefacts is a solution to the relatively high uncertainty in raw material supply in the highlands. On the other hand, Tham Lod reflects place provisioning by larger groups who occupy the site for longer periods throughout all seasons, because they can rely on permanent water in the nearby river and the abundant supply of raw materials at the river banks for artefact manufacture.

There have been a few previous studies with similar methods and theoretical orientations, including Shoocondej (2000) and Nishimura (2005). Shoocondej's study of Lang Kamnan rockshelter in west-central Thailand relies mostly on biological remains, with only a relatively small lithic assemblage ($n = 874$). She concludes that occupation at Lang Kamnan can be characterised by a residential mobility strategy, especially during the wet season. Nishimura used even smaller samples of lithics from two rockshelters in northern Vietnam, Bung Cave ($n = 435$) and Xom Trai Cave ($n = 526$), to argue that people tended to use Xom Trai as a base camp while Bung Cave was more briefly occupied. Nishimura's study is an interesting but incomplete application of the nominalist approach because although he uses many continuous variables in his analysis, the analyses retains arbitrary divisions of artefacts into classes, which are then compared with each other. A more fruitful approach might have been to compare summary statistics of the variables, rather than compare classes that have no clear significance. For all three of the studies mentioned here, it is likely that ambiguities in the links between data and interpretation have delayed a widespread appreciation of their contribution in Southeast Asian archaeology.

CONCLUSION

In this paper I have asked why flaked stone artefacts from Southeast Asian archaeological sites have contributed relatively little to our understanding of past human behaviour in this region. I have suggested that the answer to this question, in part, lies in the choice of an essentialist classification philosophy. An assessment of some previous work on flaked stone artefacts from mainland Southeast Asia shows that this approach to classification has three important criticisms. First, it results in inefficient methods that ignore large numbers of artefacts because they do not fit into type categories; second, it results in

the neglect of assemblage variation in favour of unrepresentative idealised specimens; and third, it results in a failure to explain historical change in artefact lineages.

This third criticism suggests an important future direction for nominalist lithic analyses. The studies of Krajae-jun, Shoocondej, Nishimura and others have not considered change over time, for example by comparing different chrono-stratigraphic units within the same site. This kind of analysis, in conjunction with faunal and other environmental analysis, has excellent potential to contribute towards our understanding of how people have adapted to past environmental events such as the Last Glacial Maximum (LGM) and the Pleistocene-Holocene transition. Globally, some research suggests that the LGM required major behavioural reorganisation (Jochim 1987; Veth 1993) while others suggest that hunter-gatherers possessed a degree of cultural and technological pliancy to accommodate the stresses of LGM conditions with few archaeologically visible changes (West 1997; Williams 1998). Mainland Southeast Asia, with its unique seasonal forest ecologies, is currently a lacuna in our understanding of the range of hunter-gatherer responses to major climate changes.

The main aim of this paper has been to show the failure of essentialist approaches to classification in Southeast Asian lithic archaeology and suggest that more productive future directions can be found with nominalist approaches to classification. I have shown that although nominalist analysis are not entirely new to Southeast Asian lithic studies, its value is yet to be fully realised. A review of previous work suggests that future work would benefit from more robust methods, especially more explicit links between behavioural interpretations and attributes, especially of fracture surfaces (such as those discussed in Clarkson and O'Connor (2005)). A second future application is the use of reduction-based analyses to describe chronological change rather than simply generalised differences between sites over the entire duration of their occupation, as previous work has. A third future direction is richer interpretations of assemblage variation using models based on human behavioural ecology (e.g. Mackay 2005). Rather than just describing how the artefacts were made and used, we can take advantage of the embeddedness of technology in other systems to discuss how these systems vary over time and space. This will produce rich explanations of past behaviours, especially when incorporated with other lithic analytical techniques, such as raw material sourcing and refitting. Finally, in addition to providing robust methods for answering adaptive questions, nominalist approaches allow us to pursue socio-technical questions about social learning and cultural transmission of information (Bettinger and Eerkens 1999).

Changing the approach to lithic classification from essentialism to nominalism is not just an academic recreation, it is a vital requirement to liven up lithic analysis and improve the efficiency and productivity of lithic archaeology in mainland Southeast Asia. The recent spectacular finds on Flores and Java have revealed Southeast Asia to

be an important region for understanding human origins (Brown *et al.* 2004; Brumm *et al.* 2006). We must be technically and theoretically prepared for similarly important finds in mainland Southeast Asia. Otherwise we risk producing assemblage descriptions that, over time, will come to resemble Borges' (2000) fictional animal encyclopaedia, with its eccentric categories including 'those that have just broken a flower vase' and 'those that from a long way off look like flies'.

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