Landscapes of Human Evolution

Contributions in honour of John Gowlett

edited by

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Foreword

James Cole, John McNabb, Matt Grove and Rob Hosfield

In 1984's *Ascent to Civilisation* John Gowlett observed: 'As the present is but an instant, we [must] depend upon past experience for strategies [to] cope with the future' (Gowlett 1984: 196). John's reflection on the value of our collective past is especially relevant in regards to the challenges that humans as a global society face today. The impacts of rapid, and in some senses unpredictable, climate change are global issues that impact us all. In this regard, the study of human evolution remains an exciting, and important, field of study to help humanity navigate the challenges of the future.

As the seemingly deeply interconnected origins of our species are being realised at a geographic, genetic and cultural level, understanding these relationships with regard to other human ancestral species (e.g. the Neanderthals), and appreciating how they navigated periods of climatic and social instability in the past, must underpin our strategies for the global future and our notions of 'self' and 'other'. Furthermore, gaining insights into the origins of the complex social and cultural behaviours that underline our entire way of life in the present (e.g. language, symbolism, landscape manipulation, social networks, and the creation of distinct cultural identities) are fundamental to charting a more sustainable and inclusive future for ourselves and our planet. This *Landscapes of Human Evolution* volume is therefore highly timely in its drawing together of some of the world's leading scholars in human evolution and related disciplines in order to present cutting-edge research papers, and is in honour of Prof. John Gowlett, who has played a pivotal, although often typically understated, role in developing the fields of human origins research, spanning lithic material culture, Plio-Pleistocene landscapes and environments, pyrotechnologies, and the archaeology of the social brain, through projects across Europe and Africa. The landscapes of human evolution covered in this volume are therefore broad; incorporating physical topography, socio-cultural and cognitive structures that stretch back into the past and before us into the future.

Landscapes of Human Evolution has therefore invited contributions that fit within four main themes that John has pioneered throughout his career. (1) The biological development of early hominins, especially members of the genus *Homo*, and their characteristic features of large brains, bipedal locomotion and behavioural adaptation. Within this theme the volume addresses how encephalisation is related to increasing behavioural and cultural sophistication, and how this trajectory can be mapped throughout the course of human evolution (Du and Wood; Bilsborough and Wood; Crompton). (2) The strategies employed for dealing with, and ultimately manipulating, heterogeneous landscapes and environments, with a particular focus on how the changing environments of the Plio-Pleistocene have influenced hominin adaptation, and how this might have impinged on early hominins' biological development (Kübler et al; Hoare et al; Gamble). (3) The origins of controlled use of fire as a mechanism for survival and an incubator of increasing social complexity within hominin groups, clarifying how the use and control of fire accords with other cultural developments, and how it changed the dynamics of hominin society (Dunbar; Shankland). (4) The role of lithic technologies in developing hominin behavioural complexity, and the ways in which the contemporary classification of these technologies frames the understanding of the past in the present. This final theme seeks to address how data on lithic technology – the most durable record of ancestral human behaviour – can be mined to elucidate changes in hominin cognition, behaviour, and their interactions with ancestral environments (McNabb; de la Torre and Mora; Caruana and Herries; Wynn; Foley and Lahr). Finally, Sinclair presents a citation network analysis from two major areas of human evolution research (*Palaeolithic Archaeology*; *Evolutionary Anthropology*) that serves to explicitly demonstrate the tremendous impact that John has had on the discipline of human origins research.

As well as having a profound impact in framing the way current researchers seek to engage with and interpret the complex behaviours of our human ancestors with his research, John has always been a champion of early career researchers and has left a valuable legacy of friendship and training networks in the many corners of the world in which he has worked. John is always ready to give his time and knowledge to any who ask for it and it is this generosity of spirit that has been recognised time and again by all who come into contact with him, and which has inspired this collection of papers. In return we, the editors, hope that this volume goes some way in demonstrating the high professional and personal standing in which Prof. John Gowlett is held.

Thank you John.

A Good Man in Africa: John Gowlett's Writings on Africa and its Hominin Archaeology from the Late 1970s to the Early 2000s

John McNabb

Introduction

This overview of selected aspects of John Gowlett's work from the first two decades of his research career is not intended to be definitive or comprehensive. It is a personal perspective on Gowlett's thinking and writing focusing on just a few of the many aspects of archaeology that he is interested in. Topics like fire and chronology I will barely touch on, nor will I discuss the papers arising from his Beeches Pit excavations in the 1990s.

I have elected to review aspects of Gowlett's thinking prior to the formal beginning of the British Academy's Centenary Research Project, '*Lucy to Language: the Archaeology of the Social Brain*', in 2003. He was one of the principle investigators, and along with Clive Gamble, he was invited to participate by Robin Dunbar. My choice of selected themes and time frame is a result of the strong synergy between the aspects of cognitive evolution that the Social Brain project was focused upon, and the fact that Gowlett was writing about these themes in the quarter of a century prior to the formal beginnings of the project. In a sense the Social Brain project brought together what were an already coalescing group of related research interests under a single umbrella, uniting them via the idea of sociality as the driver for evolutionary change. This latter had been implicit in Gowlett's own theory building long before the Millennium, but it was only in the middle-late 1990s that sociality became an explicit element in the development of his ideas.

I should point out that my interpretations of John Gowlett's work are not necessarily ones he would agree with; nor does he necessarily hold the same views today as he once did.

Theory and mind in the African years

1978 to the late 1980s saw Gowlett's entry into the research culture of the East African Pleistocene with excavations at Kilombe (Gowlett 1978), Kariandusi (Gowlett and Crompton 1994) and Chesowanja (Gowlett, et al. 1981; Harris, et al. 1981), all in Kenya. The first two were Acheulean sites and represented major contributions to his Ph.D (Gowlett 1979b), whereas the last was primarily an Oldowan site, with a later intrusive Acheulean component. Chesowanja became a significant element in the debates on early fire that Gowlett was heavily involved with in the 1980s. Kariandusi was considered a disturbed factory site and did not really contribute much to discourse during this first decade of Gowlett's research .

Across this decade Gowlett's writings broadly fall into two camps. Firstly, those that represent a basic *reportage* of sites, descriptions of assemblage character and composition, and interim site reports. Secondly, those which tackle broader theoretical concerns. Right from the outset it is clear how data from his excavations fed directly into his theory building. The influence of other thinkers is evident too; Glyn Isaac, in particular his work on the reasons for variation in assemblage composition (Isaac 1977), and artefact character (Isaac 1972); Mary Leakey at Oldupai Gorge (Leakey 1971), but also of Julian Huxley (Huxley 1955) and Ralph Holloway (Holloway 1969), two names that repeatedly crop up in the more theoretical papers and whose theory building has persistently informed Gowlett's own ideas across these two decades . It is worth pointing out that younger researchers today may assume that theory building is synonymous with 'theoretical archaeology'. However in the Palaeolithic archaeology of the 1970s and early 1980s it was usually focused on practical epistemology; what should we call so-and-so, why and how do we know so-and-so is real; what does the reality of so-and-so mean for everything else?

From the decade 1978 - 1988, these are the major themes that to my mind thread their way through Gowlett's work. I have parsed them out here, but they are clearly interlinked.

- The human way of thinking has deep roots and this can be seen in stone tools and through the analysis of their manufacture.
- The nature of the relationship between culture, the mind and material culture. This engaged Huxley's concept of the psychosocial (Huxley 1955), which in today's terminology might equate with cognitive evolution and its relationship with sociality.
- Arising from the previous point, Gowlett argued passionately that stone tools provided key insights into the 'psychosocial sector', stemming from both the tools themselves but also their patterned distribution in time and space.

- Developing from the last, epistemological concerns about the recognition, description and quantification of temporal and spatial variability seen in stone tools. This was exemplified by the Acheulean vs Developed Oldowan debate.

From the late 1980s to the beginning of the Social Brain project in 2003, these basic themes continued to underwrite much of Gowlett's research output, although in some cases the themes changed as the research questions of the decade changed. Whether topics were in or out of the frame, the primary data and theoretical foundations behind Gowlett's work remained the same, although many were progressively developed through the 1990s.

The main themes, as I see them for the late 80's to the early 2000s, are as follows.

- Elucidating the procedural templates / rule sets behind handaxe production and handaxe assemblages. This continues the focus on variability and cognitive evolution, as well as addressing questions about the way the human mind worked. However, concerns with demonstrating the deep roots of human thought processes were less visible.
- A stronger interest in the relationship between culture and cognition – with cognitive development providing the bridge between biological and cultural evolution.
- As the Developed Oldowan / Acheulean debate faded, Gowlett championed the continued study of stone tools and their spatio-temporal context. This was in the face of strong epistemological challenges to the information potential inherent in Palaeolithic artefacts. Isaac's own students were arguing that the tool types of the older typologies were not genuine design norms, while others advocated the position that shaped tools were actually just cores; functional arguments had challenged cultural interpretations of variability, and the concept of a 'finished artefact' was under the microscope of critique.
- Although allometry (adjustments to shape with changes in size) was a technique for engaging with some of the above themes, it was also a reflection of the increasing sophistication (maturity?) with which these research questions were being interrogated as the Millennium approached. Gowlett was an early enthusiast of the use of complex multivariate analysis.

Deep roots to the human way of thinking

As noted, the research questions of the post-Millennium Social Brain project were already being addressed by Gowlett from the late 1970s onwards. He was responding directly to the negative views of a number of colleagues who were downgrading the importance of stone tools (a reaction to excessive typological studies), in addition to denying any real evolutionary significance to pre-modern humans (Gowlett 1984; Gowlett 1986). The view advocated was that important changes in human evolution all happened with modern humans in the last one hundred thousand years. Gowlett championed the importance of Early Pleistocene stone tool analysis by demonstrating that the fundamental basis of how humans think – the foundations of our thought processes - had a long evolutionary history and they were present in earlier *Homo*.

He argued that modern humans conceptualise the external world through the creation of internal mental visualisations, images in the mind's eye. In modern terminology - we construct an internalised mental model of external reality (Gowlett 1982; Gowlett 1984; Gowlett 1986). Hominins possessed the same capacity and it was demonstrable through material culture. The process of making Oldowan core tools and Acheulean handaxes showed that hominins possessed different *templates* (mental models) for both procedure (process of making) and form (final product). These models were unitary – one internal visualisation for one aspect of the outside world. These unitary representations were then chained together to form the procedural templates themselves, and were embedded in a visualisation of the final tool – the form template. So the stone tools of early *Homo* were proof positive of the ancient roots of modern human thought processes.

The psychosocial link to culture was that these unitary internal visualisations were ideas, but they were generated and learnt in a social context, as was the construction and maintenance of the various procedural and form templates.

Without these unitary internal models the ability to make tools would not exist. These templates or routines guided and informed the knapper's actions (Gowlett 1982). However, Gowlett was also clear that the stages of tool production had to be embedded within (evolving) concepts of space and time (Gowlett 1984), as these too were key features in the way modern people thought. So here, procedural templates were embedded in forward planning, anticipation of need, resource procurement and the distribution of activity across landscapes.

A key early insight of Gowlett's into cognitive evolution was the recognition of the degree to which the different stages within the procedural template were integrated with each other (Gowlett 1986). One of the defining traits of the psychosocial sector was management of complexity. It was the level at which this occurred that really characterised hominins and humans. This was clearly emphasised by the differences between

ourselves and our nearest cousins in nature, the apes (another recurrent theme of Gowlett's (Gowlett 1986; Gowlett 1993)). Our extant relatives show occasional glimpses of these traits. They make tools, they curate anvils, and modify sticks to make termite fishing tools, all of which suggests that they have procedural and form templates of their own. However, they do not possess the complexity in manipulating and integrating the elaborate procedural templates that we and our Acheulean and Oldowan making ancestors share. Knapping an Oldowan tool shares basic procedural and form templates with a chimp's termite fishing stick, but the utility of the comparison stops there. Integration of the templates is what makes hominins different. This is evident in the following quotation.

> 'We have seen that early human beings, over a million years ago, had minds that could handle extents of time and space, much as we can, and construct long chains of activity through them, using set routines, but able to rewrite these flexibly in detail.' (Gowlett 1984, 214)

Complexity in one area of hominin behaviour bespoke the potential for complexity in other areas too. Fire making (Gowlett, et al. 1981; Harris, et al. 1981) and the skilful butchery of animal tissue (Gowlett 1984), even the very fact of the imposition of arbitrary form (Holloway 1969) on the world (Acheulean handaxes and cleavers, discoids from Oldupai's site DK; i.e. form templates): all of these provide evidence of the complex integration of elaborate internalised mental visualisations of the external world.

Across the second decade of Gowlett's research career this emphasis on the deep roots of cognition receded. This is curious as the context of Gowlett's polemic, the belief that advanced cognition was restricted only to modern humans, had crystalized into a formal and popular theory - the Human / Upper Palaeolithic Revolution (Mellars and Stringer 1989) in the late 1980s. Nevertheless, the psychosocial element and the notion of the procedural templates continued to inform Gowlett's ideas (Gowlett 1984; Gowlett 1995a; Gowlett 1995b). Responding to the challenges of Nick Toth's work (Toth 1985) which argued that the shapes of Oldowan cores were fortuitous, Gowlett asserted that even if this was the case, they were still knapped to a complex procedural template (termed instruction sets by the mid-90s) which structured them from acquisition of the cobble to use of the flake as a tool (Gowlett 1995a).

Explaining variability – taxonomies and spatio-temporal patterning – the Developed Oldowan/ Acheulean debate

From the initial publication of Kilombe (Gowlett 1978) questions concerning assemblage composition, artefact taxonomy and what the variability sampled across time and space actually meant, were major elements in Gowlett's thinking for the simple reason that they informed so many other aspects of our understanding of the deep past. An upper horizon at Kilombe, post-dating the main Acheulean floor at locality EH, revealed a flake assemblage associated with a palaeosol, prompting the possibility of a non-handaxe Acheulean facies, accompanied by all the definitional chaos that that concept entailed (Gowlett 1978; Harris, et al. 1981). On two occasions Gowlett predicted the Lomekwian (Gowlett 1986; Gowlett 1996b) as an earlier facies of the Oldowan.

Mary Leakey (Leakey 1971) had interpreted Oldupai Gorge in terms of the monolithic conception of culture that she had grown up with in the 1930s (de la Torre and Mora 2014). Artefacts were realisations of specific design forms, and consequently culture had a somewhat fixed and invariant character. Almost by definition significant variability in assemblage composition would imply different cultures or industrial traditions. Glyn Isaac had challenged this (Crompton and Gowlett 1993; Isaac 1972), arguing that there was considerable handaxe variability in the supposedly broadly contemporary localities revealed in his Olorgesailie excavations (Isaac 1977). Earlier, Isimila had also raised the spectre of spatial variability across contemporary localities (Howell 1961; Howell, et al. 1962). The Developed Oldowan (DO) vs Acheulean debate encapsulated the problems that emerged when an overlap in tool types was present in a rigidly imposed cultural framework. Following Maxine Kleindienst's scheme (Kleindienst 1962), Mary Leakey had allowed for a small number of handaxes (albeit smaller and cruder than Acheulean ones) in the DO.

From the outset, Gowlett eschewed a typological and even a technological definition of a handaxe, preferring instead a psychosocial narrative. It is the long axis of the tool (point to base) that is the key to differentiating the Acheulean handaxe, with both bifacial flaking and bilateral symmetry arranged laterally in respect of the long axis. Whether the concept of the axis came first, and then big flakes were made to accommodate this, or it was the other way around was not clear. The reason for distancing the understanding of these large cutting tools from a typo-technological one was the very evident presence of bifacial flaking on cores (and handaxes) in the DO, and Leakey's acceptance of a small handaxe component to the DO. Gowlett's 1979 paper on the DO/Acheulean debate, *Complexities of Cultural Evidence* (Gowlett 1979a), offered no solution to the question but noted how variability in terminology, definition and artefact taxonomy, and even in the theory and practice of sampling at inter- and intra-site levels made answering the question of whether the DO and Acheulean were culturally distinct phenomena, or activity variants within the same tradition, impossible.

(The philosophy and practice of sampling threads its way through many of Gowlett's papers in the 1980s although I will not delve any deeper into them here.)

The topic was back on the menu in 1986 and 1988 but with more sophisticated analytical procedures; multivariate statistical techniques in the form of principle components analysis (PCA) and cluster analysis (CA). This was also the time that acronyms became more noticeable in archaeology. Using the frequency of occurrence of different tool types (assemblage composition) across a range of Acheulean and DO sites, Gowlett demonstrated that there was a real difference between the Oldupai Gorge DO sites when compared to Acheulean sites from elsewhere in Eastern Africa (Gowlett 1986). As well as frequency differences, the PCA & CA showed that there was a decrease in the use of core tools at DO sites over time. However, a particular type of CA conducted on measured data demonstrated the presence of two sub-groups of LCTs at Kilombe (Gowlett 1982; Gowlett 1986), one with large handaxes more classically Acheulean, the other with smaller handaxes which on examination were often cruder in finish – more akin to those of the DO at Oldupai. Gowlett's interpretation was typical, arguing in favour of a more nuanced approach suggested by both sets of results (Gowlett 1988). At Oldupai the DO/Acheulean distinction was real (whatever its explanation), but at Kilombe the distinction was in all likelihood functional because the two handaxe variants occurred on a single contemporary land surface. He speculated that It might be possible to trace a development from the shorter Oldowan discoid, through the short-ish DO biface, to the elongated axis and bilateral symmetry of the handaxe proper.

The DO/Acheulean debate did not continue into the 1990s as other non-cultural research questions took centre stage. In some respects the DO vs Acheulean debate was a ripple from earlier debates on culture vs function from other areas of Prehistory, debates that by the 1980s had already been played out, or had just ground to a halt. Nevertheless, it was a valid exercise in the epistemology of how archaeologists quantify, describe and analyse variability in stone tool assemblages.

Explaining variability – taxonomies and spatio-temporal patterning in handaxe manufacture – allometry

On the other hand the question of artefact variability as revealed by the size distinctions in the Kilombe handaxes did persist into the 90s. The implications of a series of allometric studies (size-related variation in shape) on handaxes from Kariandusi, Kilombe and elsewhere unexpectedly exposed some of the procedural templates (Gowlett 1982; Gowlett 1984; Gowlett 1986) already described. Gowlett had always been a little uncomfortable with the label 'procedural template' believing it to be too rigid, and open to misinterpretation. From the start of the new decade he began to reformulate the terminology and its implications, preferring to see them as sets of shared instructions or 'reference routines' held in the brain (Gowlett 1990). This had coalesced into 'instruction sets' by the middle of the decade (Gowlett 1996b), with the old form template now subsumed within the concept.

The psychosocial element of ideas being culturally learnt and passed on remained implicit in this.

The presence of standardization in handaxe making - as an indicator of the existence of instruction sets - had been a theme of Gowlett's work on the Kilombe handaxes from early in the 80s. He identified a consistently reoccurring handaxe width/length ratio of c. 0.6 from all the different contemporary areas on the Kilombe land surface. He argued this recurrent pattern was a deliberately imposed design feature – part of an instruction set, and akin to the 'golden ratio' of artists and architects (Gowlett 1982). It indicated the dawning of a sense of proportion in hominin psychology, another instruction set and a further insight into the origins of the modern human thought process.

Gowlett was joined by his Liverpool colleague Robin Crompton in the early 1990s to conduct an allometric analysis of the Kilombe bifaces (Crompton and Gowlett 1993). Allometry added to the list of instruction sets that could be identified in handaxe making and provided independent proof of their validity. The concept originates in biology (Crompton is a specialist in bipedalism). When the physical size of an organism changes, and all aspects of the organism change in direct proportion, this is akin to geometric scaling and the organism and its various component parts are said to be in isometry. However when size changes but some elements do not scale appropriately (i.e. they are bigger or smaller than they should be) then this is allometric scaling. The size of the human brain may be thought of as allometrically scaled as it is far larger than it should be for a mammal of our average body size.

The presence of allometric scaling at Kilombe (Crompton and Gowlett 1993) demonstrated that the handaxe knappers did not share a single common handaxe template or design norm which they imposed on every handaxe. This in itself this was a significant observation for cultural interpretations. Rather, allometric differences in various measured features of handaxes (width of the tip, thickness of the base etc.) were imposed by the knappers as size changed. The two basic groups of handaxes, large and small, identified in the earlier analysis, were confirmed in this new research. Even if no site-wide handaxe template existed,

what was clear was that allometric adjustments to handaxe shape and thickness were applied in a similar way across the site. So the knappers in different parts of the site were responding in the same ways to changes in handaxe size, making some aspects of the axes thinner and others narrower as size altered. In particular, the larger handaxes tended to be thinner and the tips were always thinner than isometry would require; the larger specimens were narrower in plan at the tip; and the most isometrically stable part of the handaxe was always the base probably because it was the handle for use. So even if there was no one culturally generated signature handaxe type at the site, there were commonly shared understandings (instruction sets) of how to adjust shape when size changed. But there were important differences too. One locality at Kilombe, Z, had LCTs that were significantly thicker than isometry predicted.

The explanation of these various allometric changes was cautiously accepted as functional.

The following year allometry was applied to Kariandusi (Gowlett and Crompton 1994). Its assemblages were in secondary context, but unlikely to have been moved far. Both levels of the site were dated to a similar time range to Kilombe, c. 0.7 – 1.0 mya. A series of obsidian bifaces from Louis Leakey's upper site were compared with lava examples from the excavated lower site recovered by Gowlett. These data sets were then compared with Kilombe and with lava LCTs from the Kapthurin Formation, also in Kenya. This latter site dated to about 0.5-0.4 kya and its LCTs were made on Levallois blanks. There were some strong similarities between the LCTs from all three sites, despite the fact that Kapthurin post-dated the other two by many hundreds of thousands of years. Intriguingly the obsidian artefacts from Kariandusi upper site were allometrically similar in many respects to the Kapthurin lava axes. The lava axes from Kariandusi lower also showed some similarities but were markedly more asymmetric with thinner tips, these being interpreted as two allometric changes in the procedural templates for handaxes in that assemblage. The Kariandusi lava axes were noted for their butt size - another example of allometric scaling, in this case specific to the knappers of that assemblage. Once more function was seen as potentially a driver for these allometric differences.

In summing up Gowlett and Crompton noted that across the East African Acheulean (at least for their data) allometry was a significant factor in LCT production, and across a significant time depth. This meant that *Homo erectus* at Kariandusi and Kilombe, and early *Homo sapiens* (now more likely African *Homo heidelbergensis)* at Kapthurin, were applying similar rule sets to their material culture in similar ways. The pervasiveness of the pattern was proved when allometric adjustments similar to those in East Africa were found in the handaxes of the Acheulean Casablanca sequence in Morocco (Crompton and Gowlett 1997). The Casablanca sites showed *Homo erectus* (STIC quarry possibly similar in age to Kilombe and Kariandusi) adapting to size changes as they did in East Africa; a later Casablanca handaxe site (Cunette) continued this pattern. Heading southwards, allometry was clearly at work in the handaxes of the Zambian site Kalambo Falls (Gowlett, et al. 2001). Here allometric analysis was able to confirm the old typological distinction between handaxes and the bigger picks of the Sangoan, showing that these remained deliberately thicker and heavier. This may have been related to function and the way they were held – two handed with the extra weight for increased power.

Why was allometry important to John Gowlett? In a decade when form templates were out of fashion and tools as finished forms were a 'fallacy', it was hard to convince people that stone tools were a worthwhile pursuit. Allometry provided an objective answer, one that was independent of typology, and squarely rooted in the psychosocial. Allometric changes were knappers adjusting their instruction sets (or perhaps accessing sub-sets) to ensure that what they made was still a viable tool. Allometry proved the existence of instruction sets, and showed that lithic analysis could contribute to the new research agendas emerging in the 1990s. I suspect there was also a pleasing 'human' element here too. We can empathise with an Erectine knapper more than a million years ago that has to make allowances to keep edges sharp and tips thinner, at the same time as trying to keep the handaxe's butt big enough to hold on to.

Individuals, their societies and their psychosocial worlds

I will finish this rather personal overview of selected aspects of Gowlett's earlier work by looking a little at the glue that held it all together – the relationship between culture and the psychosocial. During the 1990s Palaeolithic archaeology saw the acceleration of two sub-disciplines within the field of human origins research, cognitive evolution and hominin social archaeology. At the risk of generalising, culture had been out of fashion across the 1980s (Gowlett 1990) and hominin 'behavioural' interpretations had taken its place. The broad umbrella of behaviour could be broken down into specific sub-sets of behaviours and empirically tested. The concept of behaviours had a more scientific and contemporary feel to it. Behavioural studies offered the chance to promote single causes for later social patterns (Gowlett 1984) – food sharing for Glyn Isaac, or the hunting hypothesis for other researchers. Single behavioural solutions had a simplicity to them, and they were more amenable to empirical testing than 'culture'. While acknowledging the importance of these

questions Gowlett kicked back against the trend for downgrading the importance of culture as a concept, if for no other reason than that stone tools were cultural artefacts, and allometry was proving their worth in the emerging studies of cognitive evolution.

From almost the beginning of his research output Gowlett had combined Julian Huxley's notion of the psychosocial (Huxley 1955) with Ralph Holloway's insight that culture reflected an 'imposition of arbitrary form' on the natural world (Holloway 1969). These are frequent references in Gowlett's papers of the 1980s and 1990s. 'Form' did not just mean modifying elements of the natural world to make material culture, it also meant imposing ideas on lives lived in the outside world to structure the actions carried out by those lives - culture or sociality in our terms. 'Arbitrary', in this sense, meant imposing something that was not 'known in nature' (Gowlett 1995a) i.e. not present in the outside world – so it originated within the mind.

A quotation will suffice to make this point.

> 'Further insights come from Julian Huxley's view that cultural development represents a fundamental change of evolutionary level, from ordinary biological evolution to psychosocial evolution, in which change can happen much more rapidly and in which, ideally, it can be guided by the species concerned. In this sense, culture, as a concept, embodies not just material objects but all the abstracted rule systems ...[Holloway's imposed arbitrary form]...by which human beings operate, and which are handed down from individual to individual. It has become widely accepted that in such a system, biological evolution and cultural evolution affect one another in a positive feedback relationship, thus providing both change and its cause. This view has never been effectively challenged...' (Gowlett 1984, 202; my square brackets).

I sense a strong gene-culture co-evolution element to Gowlett's theory building in these years (Gowlett 1984; Gowlett 1986; Gowlett 1990; Gowlett 1996b), and it is interesting that in his *Mental Abilities of Early Homo* paper in 1996 he explicitly rejects such a link (p193), but the rejection is more about that stripe of co-evolution promoted by E.O Wilson in his now renowned (or infamous) *Sociobiology* book (1975). My gut feeling is that Gowlett's early writings are more in line with the modern gene-culture co-evolution of Joseph Henrich (Henrich 2016), or perhaps more specifically with Cecilia Heyes (Heyes 2018) since she and Gowlett both place social learning at the very heart of the socio-cognitive relationship (Gowlett 1984, 1986; see below).

Going out on a limb, I suggest that Gowlett eschewed behavioural archaeologies in favour of more psychosocially orientated ones because for him these were synonymous with culture. This was implicit in his 1984 *Mental Abilities of Early Man* paper; culture was an integral part of biology and the mind mediated between the two (Gowlett 1984). Evolution in one meant evolution in the other, and so evolution of the mind that linked them. It was through the internalised mental models that this was achieved. They were adaptive. Increase the effectiveness of internal representations and the effectiveness of instruction sets in the outside world increased. This enhanced the inclusive fitness of an organism as it made it better equipped to be successful in demanding environments. This was clearly reiterated in his 1995 paper *Psychological Worlds Within and Without* (Gowlett 1995b). Gowlett also added an evaluative element to this, mentalising future possibilities:

> 'To experiment in the head is cheaper than to experiment in actuality.' (Gowlett 1995b, 37)

And more specifically,

> 'Efficiency can only be ensured through mental simulation – that is a planning of activities in which alternatives can be evaluated, and discarded if found wanting.' (Gowlett 1995b, 38)

In this sense Gowlett effectively tied culture and biology together through selection pressures on cognition.

Paraphrasing Gowlett's (1990) interpretation, Julian Huxley (1955) characterised evolutionary biology by an 'interlocking trinity of subject matter':

- The mechanisms of maintaining existence
- The basis of reproduction and variation
- The modes of evolutionary transformation

Gowlett (*ibid*, 90) argued that modern culture need not reflect each of these individually (Julian Huxley's paper was on the relationship between culture and biology, and was the T.H. Huxley memorial lecture for 1955), but it nevertheless achieves the same result as they do, although I suspect the modern gene-culture co-evolutionists would have little trouble in tying these biological principles directly to cultural activities.

> '...my conclusion is that at its most basic the cultural system is an adjunct system of living, set up through process that are genetically controlled, and dependent for its operation on brain store, brain process, and coded electrical signals. This reduction does little to reach towards the higher

> levels of mind, but it does suggest the possibility of analysing objectively the information content of ancient technology.' (Gowlett 1990, 90)

This 'objective analysis' is made possible because the reductionist view of culture sees it as a way of storing, processing and transferring information. The information is located in the brain, which as it evolves (i.e. more effective mental models and improved instruction sets which are culturally learned), is able to process and store ever more information and to transfer it to subsequent generations through learning (imposed arbitrary form is the channel through which processing is made relevant, and transfer is facilitated). Hence the evolving mind is the mediator of culture and biology (*ibid* 1990).

It is interesting to note, in concluding, that sociality and the individual did not really come to prominence in Gowlett's work before the mid-1990s. Both I think were implicit in his thinking but they had not been formally expressed as such. Both of course were key elements in the Social Brain project. They were inherent to the concept of the psychosocial and cultural learning; allometry allowed the individual to be recognised as a thinking actor. Of the papers I have had access to, the individual is only acknowledged as such from 1996 onwards (Gowlett 1996b); and sociality as a structuring factor also occurs first in the same year (Gowlett 1996a). It is therefore perhaps not so surprising to discover that the year before, Gowlett actually anticipated sociality as the key driver for brain expansion, what would become the core theory of the Social Brain,

> 'How then can we justify the very expensive human brain, that uses so much energy? I can think of two solutions:
>
> 1. That it is necessitated by an environment which is largely the human social environment – no other animal has this...' (Gowlett 1995b, 37)

The second reason was that the brain payed for itself with ever more effective mental models.

In his 1996 *Mental Abilities of Early Homo* paper Gowlett presented the concept of the personal pointer (1996a), a zone of free-play (see also Isaac 1972), within which an individual knapper could express themselves in the handaxes they made without stepping outside of their society's understanding of what material culture was. He expressed it as the relationship between the individual Acheulean knapper and the group. Twenty three years after this was articulated, and nine years after the Social Brain project ended, this remains one of the highest research priorities in Lower and Middle Pleistocene archaeology.

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