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Human-thing entanglement: towards an integrated archaeological perspective

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In exploring human-thing entanglement I wish to make five points. (1) Humans depend on things. In much of the new work in the social and human sciences in which humans and things co-constitute each other, there is, oddly, little account of the things themselves. (2) Things depend on other things. All things depend on other things along chains of interdependence. (3) Things depend on humans. Things are not inert. They are always falling apart, transforming, growing, changing, dying, running out. (4) The defining aspect of human entanglement with made things is that humans get caught in a double-bind, depending on things that depend on humans. (5) Traits evolve and persist. When evolutionary archaeologists identify lineages of cultural affinity, they claim to be studying cultural transmission. Transmission may be involved in such lineages, but it is the overall entanglement of humans and things that allows success or failure of traits.

The subtitle of this article refers to an integrated archaeological perspective. I find myself drawn towards an attempt at a synthesis of archaeological theory not because of an irresistible urge to self-destruct, and not because I think that synthesis for its own sake is a good thing; far from it. But rather I find myself drawn to it at this historical moment in archaeology for two reasons. First I am fascinated by the question of whether the different opposing camps and factions really are as incompatible as they might initially seem. Certainly, the overall theoretical positions often seem incommensurable, but are there not aspects of each theory that can be reconciled and found useful? Second and more important, my urge to find bridges grows out of my practical experience excavating at Çatalhöyük since 1993. On a large international project it has become clear that a wide diversity of positions in the discipline have something to offer. It is out of this practical experience that my intellectual fascination has grown.

But I know that my attempt will offend; there is nothing so annoying as someone attempting to be a grand synthesizer feeding off existing scholarship and distorting its individual messages. What I present today is less a grand synthesis and more a personal attempt to formulate a perspective on humans and things that draws on existing scholarship. The approach which I find myself stumbling towards focuses on entanglement, with apologies to Nick Thomas (1991) and Darwin and various others to whom

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I shall return. More generally, the approach is based on the foregrounding of things and thus can be seen as part of a wider 'thing theory', with apologies to Bill Brown (2001; 2003).

Humans depend on things

Here I am using the word 'thing' very generally to refer to human-made objects, but also at this initial stage some of what I will say refers just as well to naturally occurring objects, animals, plants, and humans, as well as sounds and words – any object or sound in which humans have an interest.

It has become a truism in archaeology, anthropology, and the social sciences and humanities very broadly to recognize a 'return to things' over recent years (Preda 1999), in contrast to the earlier focus on representation, and to the long scholarly tradition that separated subject from object, mind from matter (Boivin 2008; Domanska 2006; Olsen 2003). Numerous different perspectives have converged on some version of the idea that subject and object, mind and matter, human and thing co-constitute each other. In these different approaches it is accepted that human existence and human social life depend on material things.

In archaeology this new consensus has been reached by different though interconnected routes. For example, there has been an influence from Heidegger on archaeologists such as Julian Thomas (1998) and Bjørner Olsen (2010); there has been a wider impact from phenomenology on landscape studies as exemplified in the work of Chris Tilley (1994); the University College London school of material culture studies derived from a line of thought from Hegel and Marx onwards has been very influential in archaeology (Miller 1987; 2005); there is also a linked but wider debate about materiality in archaeology as seen in the work of Chris Gosden (2005) and Lynn Meskell (2005), very much in dialogue with authors such as Mauss, Bourdieu, Gell, and Ingold; Bruno Latour's notion of a symmetry between humans and things and Actor Network Theory are having an impact in the discipline (Shanks 2007; Webmoor & Witmore 2008); and cognitive archaeology, influenced by neuroscience and evolutionary psychology, describes 'thought and practical activity going forward together' and discusses the 'extended mind' (DeMarrais, Gosden & Renfrew 2004: 1; see also Boivin 2008 and Knappett 2005). In behavioural archaeology there is focus on the mixing of people and things in behavioural chains (Skibo & Schiffer 2008) and in evolutionary archaeology there is increasingly influence from the 'dual-inheritance' view of co-evolution between biology and culture (Richerson & Boyd 2005).

So we can say with some confidence that there would be general agreement in archaeology, as well as in related disciplines, with the idea that humans and human social life depend on things. We can say that we humans depend on things as technologies, that we depend on things as tools to feed us, to keep us warm, to forge social relations in exchange, to worship. Many would accept that as humans we have evolved with certain physical and cognitive capacities because of our dependence on things. It would also be widely acceptable to say that our perceptions and our notions of desire, anger, love, are always to some degree of or for something, including other persons. Similarly, at least if one takes an interactionist view (Jordan 2009), much thought may be impossible without something to think of, and certainly memory is closely tied to material mnemonics.

In the Neolithic, one material that humans in the Middle East became thoroughly dependent on was clay, and indeed Mirjana Stevanovic (1997) has called this the Age of

Clay because of the great proliferation from the Pre-Pottery Neolithic onwards of the use of clay for houses, hearths, ovens, figurines, skull modelling, and then, later, pottery. Nicki Boivin (2008) expands on this point, emphasizing the link to the use of soil for early agriculture. Çatalhöyük (7400-6000 BC) in central Turkey is a good example as it is located on the Konya Plain, where there is little access to stone (Hodder 2006). The surrounding alluvial soils were used for agriculture, and the soil was also dug through to gain access to the alluvium for brick and house construction. Pits were dug just outside the site (for KOPAL excavations see Boyer, Roberts & Merrick 2007) to obtain the alluvium as well as to reach the underlying marl that provided clay for plastering floors and walls. All hearths and ovens were made of clay, and around the oven people used clay pots and heated food using clay balls. Social divisions within the house were marked by clay platforms and ridges. Beneath the platforms, people were buried in pits dug into the clay, and in one case a person was buried holding a human skull on which the face was remodelled in clay plaster and painted red. People made, held, and used clay figurines, and Carolyn Nakamura and Lynn Meskell (2009; see also Meskell, Nakamura, King & Farid 2008) have emphasized how these were parts of daily sensuous existence at the site. Indeed, whenever we have spent time in an experimental copy of a Çatalhöyük house built at the site, our mouths, skin, and hair become laced with clay. We have found clay in the lung residues on ribs in skeletons from the site (Birch 2005). This sensuous link between humans and things at Çatalhöyük is rather nicely demonstrated by the clay ball shown in Figure 1. The ball has been bitten into by a child. By studying the pattern of teeth impressions, Simon Hillson (pers. comm.) has been able to demonstrate that the child was 2-3 years old. Clay balls, often initially unfired, were baked and used at Çatalhöyük to heat liquids (Atalay 2005) and were usually kept by the oven, and the taste and feel of clay, rather like Proust's 'petite Madeleine', must have linked the growing child to a particular site of memories. The identity of the child was indissolubly linked, through such physical sensations, to hearth, house, clay. Thus people at Çatalhöyük lived in a world of clay and clayey soil and depended on it for protection, warmth, food, social identity, personal identity, as well as for the development of senses and probably cognition. As many people have noted (e.g. Boivin 2008), the modelling of clay and the transformation of matter in fired clay may have contributed to a changed understanding of the world.

Figure 1. Marks from bite of milk teeth in a clay ball from the lower levels at Çatalhöyük. (Source: Simon Hillson.)

In most of the work in the social and human sciences in which it is argued that humans and things co-constitute each other, or fluidly mix together, there is, oddly, little account of the things themselves (cf. Lemonnier & Latour 1996; Olsen 2007). Any notion of 'the thing itself' is indefensible given the notion of co-constitution, but it remains true that most anthropological and archaeological accounts of materiality or material agency or material cognition remain human-centred. Most of these accounts seem shy of using a traditional archaeological methodology. When archaeological practitioners look at things, they measure and draw them, analyse chemically the constituents, describe and source their parts, quantify changes through time and across space. They take the thing very seriously and describe it very fully and use analytical techniques derived from the natural sciences. Despite attempts made by, for example, Andrew Jones (2004) and others (see debate in *Archaeometry* **47: 1**, 2005, 175-207; cf. Sillar & Tite 2000) to link archaeometry to current social theory, there is very little detailed description of artefacts in much of the literature dealing with materiality, material agency, phenomenology, and so on (for a similar critique see Ingold 2007*a* and 2007*b*). There is, for example, an enormous divide between the journal *Archaeometry* and the *Journal of Material Culture*.

Things depend on other things

I now want to switch from talking about all things to talking about things made by humans – artefacts or material culture – or things interfered with by humans, such as domesticated plants and animals.

Perhaps one consequence of the human-centred approaches I have just described is that things have appeared to us rather directly as separate, bounded entities. This is indeed how they naïvely appear to us as humans. But in fact my usage of the word 'thing' draws attention to the Old English and Old High German origins of the word meaning assembly (*Webster's Dictionary*, and for the archaeology of early Scandinavian 'thing' assemblies see Sanmark 2009). A 'ting' was a drawing together (Heidegger 1971; Olsen 2003; 2010). Things appear separate and bounded. But all things depend on other things along chains of interdependence in which many other actors are involved – human, institutional, legalistic, bureaucratic, and so on – as Bruno Latour (1996; 2005) has so effectively argued. Things in their dependence on other things draw things, people, together.

Even the earliest cultural acts, such as the making of fire, involved an assemblage of objects – from fire-making tools, to the pit in which the fire was made, to the wood used for fuel, and thus the containers or tools used to cut or collect wood, and so on (Fig. 2).

The winning of clay at Çatalhöyük depended on tools to dig the earth with (Fig. 3). The placing of clay plaster on walls involved cattle scapulae, which were used to spread on the clay, and river pebbles, which in turn were used to burnish the surface. Use of plaster needed clay pits in the KOPAL area near the site (see above) and containers (e.g. baskets) to carry the marl clays to the site, and the plaster interacted with the brick walls on which the plaster was placed, holding onto the mudbrick. This particular type of plaster allowed animal horns and skulls to be plastered over to make plaster reliefs on the walls. In the early phase of occupation of the site, pre-Level XII especially, red paint was placed on hard plaster floors (Matthews 2005). The later softer plasters were absorbent and thus easy to paint on. Used on the floors, these later plasters assembled dead and living humans also, since the plasters interacted with decaying human bodies

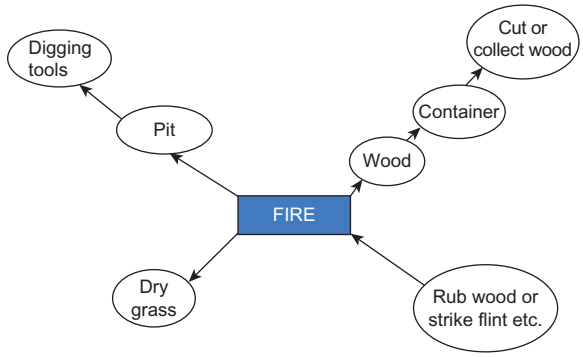

Figure 2. Some of the tools and processes involved in making a simple fire. (Source: Author.)

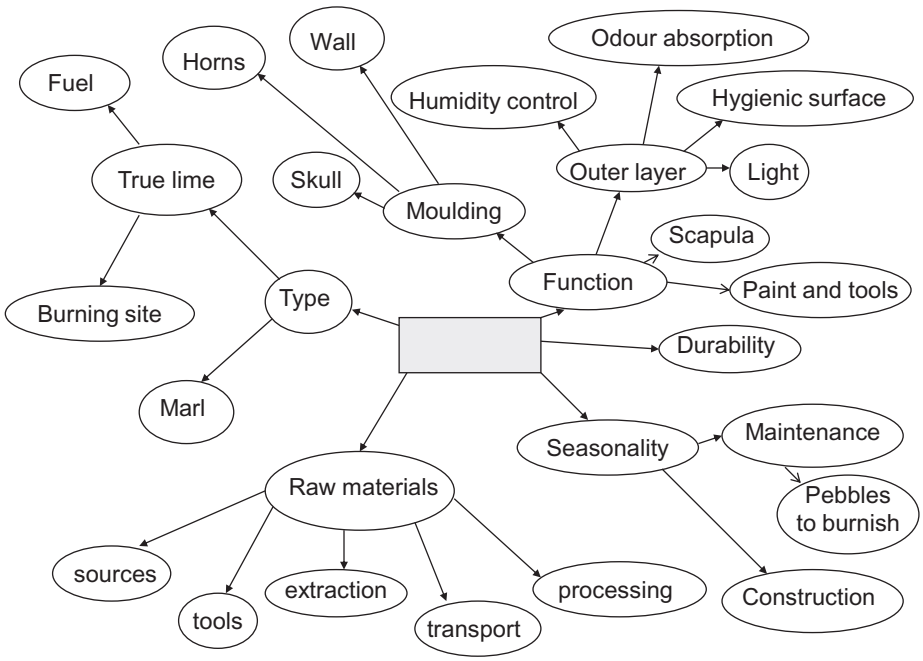

Figure 3. Some of tools and processes involved with plaster at Çatalhöyük. (Source: Author and Chris Doherty.)

beneath the floors and absorbed odour. They made the house liveable and hygienic, reflecting light and providing smooth surfaces.

Any thing is dependent on the other things used to make it, to use it, to repair it, to discard it. It bears the marks of these other things, and archaeologists have long been adept at the study of the traces on things to see how they were used and made (particularly in relation to stone, clay, bone, and metal). Archaeologists have been at pains to emphasize that the interactions between things also involve bodily engagement. The French school of technology studies has emphasized the importance of body

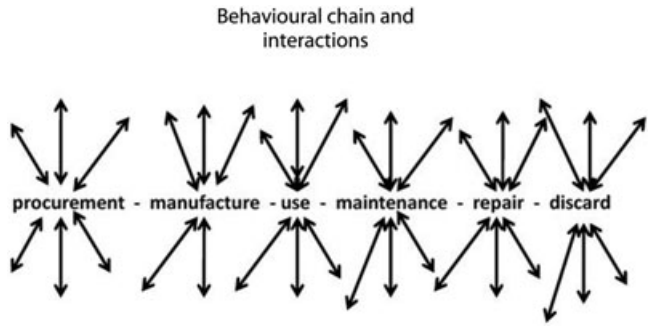

Figure 4. Interactions occur at all stages along behavioural chains. (Source: Author.)

and gesture in *chaînes opératoires* (Lemonnier 1993; Leroi-Gourhan 1964-5). In a parallel development in the United States, the behavioural archaeology of Mike Schiffer and his students has discussed behavioural chains extending beyond procurement and manufacture to use, maintenance, repair, discard (Skibo & Schiffer 2008). Schiffer's emphasis on 'performance characteristics' includes a broad range of capabilities of things and humans along behavioural chains (Schiffer 1999), but it has most distinctively led to detailed study of how the material characteristics of, say, a pot enable certain tasks to be fulfilled, and in this way it is similar to James Gibson's (1979) notion of 'affordances' as used in archaeology by Carl Knappett (2005). In discussing performance characteristics, James Skibo and Mike Schiffer argue that, for example, 'a cooking pot must have high thermal shock resistance to withstand repeated placement over an open fire without cracking' (2008: 12) – thus the potter might have to add more temper, or different types of temper, or make thinner walls to make sure the pot will not crack over a fire. In order to understand such interactions (Fig. 4) between clay, temper, fire, hearth, food, and so on, what Bill Sillar and Michael Tite (2000) call 'embedded technologies', archaeologists conduct experiments that replicate past cooking and firing practices. But the steps along the behavioural chain are also studied by materials analysis of sourcing, firing temperatures, permeability, and so on. And yet Schiffer and many others working on the material characteristics of things are nowadays at pains to emphasize that social, ritual, ideological, and other factors enter into behavioural chains and interactions. In this they absorb the social focus of technology studies more widely.

Things depend on humans

At one level it is a tautology to say that things depend on people because in the last section I limited my discussion to human-made things. It is obvious that things depend on the people who make them, use them, repair them, discard them. Things depend on humans all along the behavioural chain and throughout their use lives (as Appadurai 1986 demonstrated in *The social life of things*).

Yet an emphasis needs to be added here. There is an oft-expressed assumption in anthropology and the social sciences that things, objects, are stable and fixed. For example, Michel Serres wrote: 'Our relationships, social bonds would be airy as clouds were there only contracts between subjects. In fact, the object ... stabilizes our relationships' (1995: 87), while Hannah Arendt wrote that 'the things of the world have the

function of stabilizing human life' (1958: 137). We seem to think that the things themselves are fixed while the meanings we give to them swirl and change. While this may often appear true in the short time-span of ethnographic inquiry, from an archaeological perspective things seem transient, always changing, problematic, unbounded. Things are always falling apart, transforming, growing, changing, dying, running out. We know about the constraints on humans from the material world, at least in the Marxist sense of the dialectic between the relations and forces of production, and we know about environmental determinism, ecosystem constraint, and so on. But at the scale of those living in societies and institutions, there is also the need to deal with the impermanence of things.

The walls made of unfired mud brick at Çatalhöyük provide an example. We have put the walls of houses on display. They appear solid and timeless; after all they have stood for 9,000 years. But this appearance of permanence is an artifice of the massive use of chemicals, consolidants, and grouts applied by our conservators. Our team is in an endless daily struggle to keep the walls up (Fig. 5). We find the walls leaning at dizzying angles. James Mellaart had found the same thing. Talking of VIB and earlier walls, he wrote: '[W]alls leant at drunken angles, developed large cracks upon drying, and were a menace all round' (1964: 39). The people at Çatalhöyük had the same problem.

This instability is the nature of unfired, sun-dried clay – but it is especially true of the smectitic clays used at Çatalhöyük. Chris Doherty and others doing the archaeometric work on the materials and environments of Çatalhöyük have begun to build up a picture of how these clays were used. Smectite-rich soils are found in many semi-arid environments that have a local volcanic geology. Çatalhöyük is in a semi-arid zone and the site is surrounded by alluvial soils that derive from volcanic regions to the south-west. We know these alluvial soils were used for building houses – as demonstrated by the extraction pits by the site (see above). Smectites are prone to very quick expansion with water and very high shrinkage when dry, and this property continues when they are used as constructional materials. The relationships between molecules in the clay produced relationships between people in society at Çatalhöyük as they worked together to solve the problem of collapsing walls.

Figure 5. Conservators in Building 5 at Çatalhöyük. (Source: Çatalhöyük Research Project and Jason Quinlan.)

People in Neolithic Çatalhöyük dealt with the problem in a variety of ways. For example, they supported the walls with large wooden posts; they also recruited the ancestors to hold up the house – in Building 6 a human skull was placed at the bottom of a post. But they had other solutions as well, such as frequently covering the walls in a plaster (we have found up to 450 thin plaster surfaces on one wall) and doubling walls (adjacent houses do not share walls; rather walls are built up against or support each other). Later in the occupation of the site, large trees for making house posts disappeared from the area (perhaps through over-use, or because of human-induced ecological change, as will be suggested below). One solution was that people started making thicker walls with bigger bricks and getting sandier clays. The greater use of sand made the smectite more stable. In the end, right at the top of the Neolithic mound, in Levels I-III and on the following Chalcolithic West mound (6000-5500 BC on the other side of the river), internal buttresses were added to give increased support (Biehl & Ravenstock 2009; Erdoğu 2009; Marciniak & Czerniak 2008).

The use of sandier bricks involved going farther to get clays (S. Love & C. Doherty, pers. comm.), and so people shifted from making bricks by laying wet clay directly on walls to making bricks at a dedicated location away from the site and carrying them to the site – the use of moulds and brick-making away from the site implies more complex scheduling and technology of brick construction. Dealing with smectite led to various implications and entanglements with things that increasingly trapped people in further relationships with things (Fig. 6).

The bricks and other human-made artefacts entrapped people in long-term relationships of material investment, care, and maintenance – people became entangled

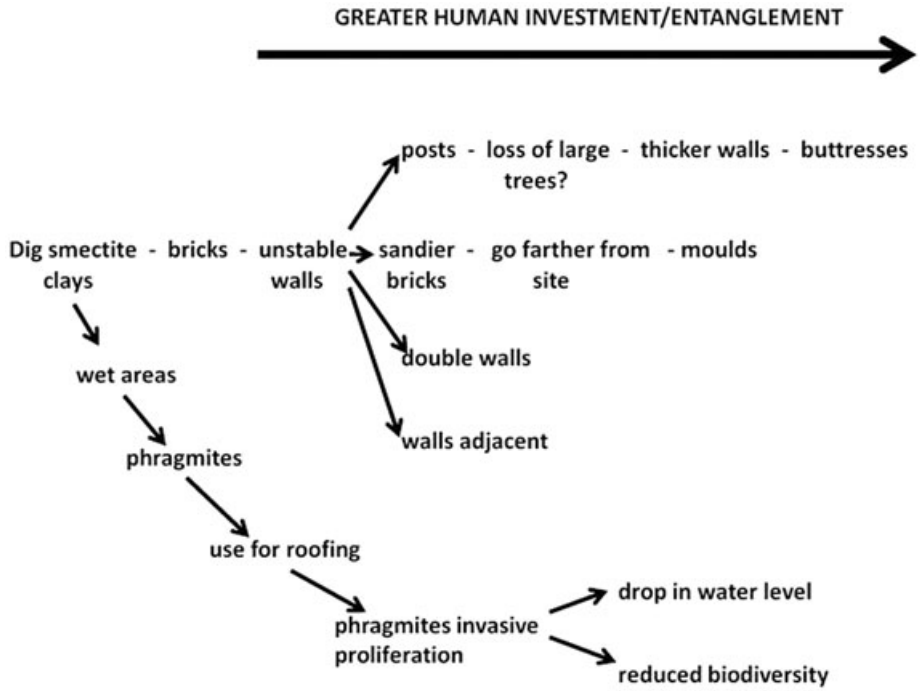

Figure 6. Sequences of entanglement resulting from brick-making at Çatalhöyük. (Source: Author, Chris Doherty, and Philippa Ryan.)

and domesticated by things. A related example has been identified by Philippa Ryan (pers. comm.) in her work on the phytoliths from Çatalhöyük. The exploitation of the reed *Phragmites australis* in the area around Çatalhöyük led to an aggressive proliferation of this species in wetter areas. The proliferation of the Phragmites near the site may initially have been encouraged by the digging of pits for clay extraction that filled with water (Fig. 6). The exploitation of this plant for roofing and other functions led to invasion by the plant, with a resultant lowering of the water tables and a competitive expulsion of other species (perhaps including trees, as suggested above). Thus an unintended outcome of the winning of clay from pits may have been the expansion of an aggressive plant that proliferated near the site and would have had to be cut back in an endless battle in order to allow continued dependence on the local wetland resources which were an important part of the Çatalhöyük diet. Humans were forced to invest more in order to stay in the same place.

Perhaps the best example of how human-thing dependencies lead to entrapment is the domestication of cereals. Once the tough rachis had been selected for, the plants depended on humans for their regeneration. Wheats and people had become co-entangled – the wheats had entangled people and domesticated them. The reproduction of wheat came to depend on our continued intervention. We obtained increased production per unit area of land but we also got trapped into clearing, planting, weeding, harvesting, winnowing, pounding, roasting, grinding, and so on, together with all the additional tools involved.

Human behavioural ecology is having increasing influence in archaeology (Winterhalder & Smith 2000). It shows how things, especially plants and animals, draw humans into long-term dependencies. For example, the diet-breadth model argues that humans will exploit those resources which have the highest rate of return – and that humans will go down the ladder to lower rates when pressures on resources increase (Bird & O'Connell 2006). The rate of return here includes the costs of collecting, processing, and making tools, and in terms of sustainable exploitation, the rate of return can include conservation measures. Thus diet-breadth models can be construed as descriptions of the ways in which the behaviour of resources (i.e. their depletion or conservation) depends on further action by humans. Douglas Bird, Rebecca Bliege Bird, and Christopher Parker (2005) have documented the complex interactions between Australian Aboriginal burning of landscapes and the availability of different types of game. In a study of fishing among Torres Strait Islanders, Bliege Bird (2007) has documented the complex interplay between the behaviour of different types of fish and the behaviour of men and women as they obtain resources.

So within the more general notion that things depend on humans, I focus on the idea that the behaviour of things, plants, and animals draws humans into various forms of care. Things cannot reproduce and therefore cannot exist without humans. Of course, a house that has fallen down still exists. And domesticated species can revert or go feral if untended. The argument is more that things cannot exist for humans, in the ways that humans want, without human intervention. Resources, wild or domesticated, animate or inanimate, need tending, conserving, protecting, if they are to exist in the ways that humans want them to.

Entanglement

Many people have described the complex networks, mixes, and engagements that result from the dependence of humans on things, things on things, and things on humans.

For example, there are the actor networks or heterogeneous mixes of humans and things as defined by Latour (2005) and his colleagues. There is Colin Renfrew's (2005) material engagement between humans and things. Marcel Mauss wrote that 'souls are mixed with things; things with souls' (2002 [1924]: 25-6), and in this anthropological tradition others such as Marilyn Strathern (1988) have talked of enchainment or distributed personhood (see also Chapman 2000). French technological studies have long focused on the *chaînes opératoires* through which things and humans pass as artefacts are produced (Lemonnier 1993; Leroi-Gourhan 1964-5). Nick Thomas in his 1991 book on 'entangled objects' writes of people 'mutually entangled in an array of rights and obligations, people who are "reciprocally dependent"' (1991: 14).

Another approach to entanglement derives from the overly used passage at the end of *The origin of species* in which Darwin describes an entangled bank: 'It is interesting to contemplate an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about', and so on (1958 [1859]: 459). This account has been used to develop notions of mutuality and symbiosis between species. It introduces the concept of ecosystem and co-evolution. Yet more generally we can refer to the work on systems, and particularly on complex systems. Clearly, different types of system behave differently, and in archaeology there has been a tradition of quantitative work on system properties and their behaviour in relation to innovation and change. In complex, chaotic systems, even small events can have large-scale repercussions, as shown recently in the work of Sander van der Leeuw and James McGlade (1997). Agent-based modelling is proving productive in understanding the emergent properties of complex systems, as Tim Kohler and George Gummerman (2000) and Alex Bentley, Mark Lake, and Stephen Shennan (2005) have shown.

Most approaches to entanglement do not deal specifically with the material properties of things (Ingold 2007*a*). I wish to focus on the number of ways in which entanglements between people that involve things create specific practical entrapments. I can make my point by taking some of the classic objects used to support the idea of human dependence on things. For example, Maurice Merleau-Ponty (1962 [1945]) describes the blind man's stick as an extension of self and of the self's sensory system. But from the point of view presented here, the stick is not an isolated thing – there are networks surrounding procurement, production, consumption, exchange, and discard that provide a stick of a particular type and sensitivity, made of a particular material and made with a particular technology. The stick has a certain smoothness and weight which produce the blind man's sensitivity. The blind man depends on the stick, and the stick depends on the blind man – but both are incorporated in a wider set of relations between humans and things in which the blind man's sight is entrapped. Or we can take Proust's 'petite Madeleine'. Proust (1981 [1913]) concentrates on Swann's individual memories as they are conjured up by the cake and of teas with his mother. These are sweet memories created by a sweet cake in which there is sugar. As Sidney Mintz (1985) argued, our Western sense of sweetness derives from a very particular global network in which a natural product – sugar cane – became tied to particular forms of exploitation, trade, taste, and civility. Our bodily sense of sweetness is trapped within a particular set of entanglements. One could make similar points about Heidegger's hammer (and Heidegger's [1973 [1927]: 97] 'equipmental totality' is a rather more limited notion than the broad entanglements considered here).

So the idea of entanglement is not simply co-dependence or mutualism or co-evolution or systems feedback between humans and things. Rather, it tries to

capture various forms of being caught up. The degree to which humans and things are entangled relates to the length of connected but often invisible links that are involved. Thus in the example I gave of a Palaeolithic hunter lighting a fire, the entanglement in terms of length of strings of connection is small (Fig. 2). It is greater for the clay at Çatalhöyük (Fig. 3). But each of these entanglements is miniscule in relation to the 10-20,000 parts needed for the modern car, obtained from all parts of the globe and involving trade agreements, tax systems, bureaucratic procedures, and transport systems. And in our world the car is a small thing compared with the entanglements of all the parts in a ship or in an aeroplane or in an IKEA store.

It is not just the number and length of the strings that determine the degree of entanglement. Entrapment also occurs in things because of embodied routines (Bourdieu 1977; Giddens 1979). It occurs because of scheduling in that our interactions with one thing may conflict with the yearly scheduling of our interactions with other things – that is, with the different life histories of objects and persons (Appadurai 1986; Flannery 1968); entrapment occurs because we have invested labour, resources, time, in things; it occurs because we have come to depend on the positive benefits deriving from the greater flows of resources and information through the network; entrapment occurs because various forms of ownership of things may lead to rights and obligations towards each other. Thus the notion of entanglement as I define it is not just a return to notions of materialism and environmental constraint. It is not the materials themselves that cause entanglement, but the interlacing of materials with the whole suite of ways in which humans and things depend on each other. So it may be better to think of the entangled web as made not of strings but of multi-stranded cables. It is precisely the interactions between the multiple strands – the material, biological, social, cultural, psychological, cognitive strands of the individual cables – that make the entanglement so strong.

The defining aspect of entanglement with made things is that humans get caught in a double-bind, depending on things that depend on humans. Put another way, things as we want them have limited ability to reproduce themselves, so in our dependency on them we become entrapped in their dependency on us. There is also an important temporal dimension in entanglement. The dependence of things on humans means that humans are always busy along the strings or cables of entanglement fixing things, putting fingers in dykes, fixing holes in buckets, and so on. And because things and humans live in different temporalities, there is an unpredictability about where maintenance and innovation may next be needed. So how is it best to research transformation and change in entanglements?

The evolution and persistence of traits

Self and society are distributed down strings, or cables, of entanglement that quickly cross space and time. Self and society are thus subject to distant events. The co-dependence of humans and things leads to further human-thing action as the things on which we depend run out, break off, fall apart, decay, stop reproducing, unless we intervene. Of course human strategies in relation to things may have sequential logics of their own. They force inflationary or deflationary processes in the human-thing entanglements. They are one motor of change, as is captured in Gordon Childe's (1951 [1936]) Marxist-inspired maxim that 'man makes himself'. But my focus is on how the material things used in those strategies are not as stable as they often appear to be. They

are always changing, at their own temporal scales, forcing unpredictable change in the overall system of entanglements.

It may seem inadequate to try to develop a theory of long-term change that is based on 'things going wrong', but this is a core component of Darwinian explanations of evolutionary change where spontaneous gene mutations create variability. Indeed, in searching for theories of change that might deal with the long-term and spatially distributed entanglements of humans and things, neo-Darwinian evolutionary theory might seem attractive. There is a particular attraction because evolutionary archaeologists such as Robert Dunnell (1980) 'asked what the operation of evolutionary forces would look like from the point of view of the cultural attributes or artifacts themselves' (Shennan 2008: 78). This focus on things rather than agents may be useful in any attempt to reset the excessive focus on human agency, phenomenology, personhood, and memory in archaeology in recent years. Many attempts have been made in archaeology to apply the principles of biological evolution to the cultural sphere, and these have been usefully summarized by Stephen Shennan (2003; 2008), amongst others. It is difficult to talk about these divergent approaches as a group, but I want to focus on some general points.

What is the role of material culture in these evolutionary arguments? For many writers, things are considered to be part of the human phenotype. Thus, much human behavioural ecology takes its stance from Konrad Lorenz (1950) and Niko Tinbergen (1963), who argued that behaviour is part and parcel of the adaptive equipment of animals. A phenotypic approach is explicit in Marek Kohn and Steven Mithen's (1999) discussion of the role of Palaeolithic handaxes in sexual selection. But it is equally possible to argue that made things constitute environments in which certain behaviours are selected for. Thus, Boivin (2008) has described material culture in terms of the construction of niches that exerted pressure on human evolution (see also M.J. Brown & Feldman 2009).

Thus it appears that material things – indeed the same material thing – can be considered as both the trait that is selected for and the environment in which traits are selected, and genes too have this dual function. If we say that the human phenotype is made up of humans and things – thus the blind man with his stick – and if we say that things and humans make up the environment around the phenotype – thus the things and people with which the stick interacts – then we are returned to the entanglement of humans and things. Change involves the selection of human-things within human-thing environments. Hence entanglement has an in-built evolutionary component. Things go wrong – 'events, dear boy, events', with apologies to Harold Macmillan – and solutions are selected for that are fitting within the overall entanglement of humans and things.

The various forms of evolutionary theory in archaeology might be thought to contribute two additional components to an understanding of change in human-thing entanglements. The first is the role of natural selection and the second is the role of transmission.

With regard to natural selection, it is clear that there is a biological component to human-thing entanglements. Over the very long term it is undoubtedly the case that our human biology has evolved through its interaction with things so that we have become dependent on things. This is true of our physiology and cognitive abilities. In *The descent of man*, Darwin (1883: 50) described how the structure of the hand had evolved because of the use of tools. A post-Pleistocene example of gene-culture

co-evolution is the spread of lactose tolerance linked to the spread of domestic cattle and milk (Richerson & Boyd 2005: 193). Terrence Deacon (1997) has made a persuasive case that the development of symbolic communication, especially language, produced a context in which a large increase in the prefrontal cortical parts of the brain was selected for.

Indeed it may be difficult adequately to explore reproductive success without reference to human-thing entanglements. Peter Richerson and Robert Boyd have suggested that 'some cultural variants persist and spread because they cause their bearers to be more likely to survive and be imitated' (2005: 238). Lee Lyman and Michael O'Brien (1998) argue that the ultimate reason why snowmobiles replaced snowshoes amongst the Cree is that those who inherited the trait outcompeted those who did not, enhancing both their reproductive success and the replicative success of the snowmobiles. It may at times be possible to demonstrate that particular behaviours do correlate with reproductive success. Thus in their application of costly signalling theory to turtle hunting by the Meriam in the Torres Straits, Eric Smith, Rebecca Bliege Bird, and Douglas Bird (2003) find that signallers (hunters) gain social and reproductive benefits. Successful hunters gain social recognition, have an earlier onset of reproduction, achieve higher age-specific reproductive success, and gain higher-quality mates, who also achieve above-average reproductive success. In a very different context, Austin Hughes (1986) and Eckart Voland (1990) have used parish records to show that occupational status (farmer or craftsman, etc.) and income have a long-term effect on number of offspring. It is difficult to apply this type of study in prehistory unless long-term monitoring of the aDNA of populations can be attained, but in any case the fact that farmers in eighteenth-century AD Belgium had more descendants over several generations does not mean that there were more farmers. The spread of snowmobiles or farming (the latter even in the Neolithic – Haak *et al.* 2005; Zvelebil 1986) may have little to do with demographic processes and much more to do with factors such as entanglement of snowmobiles in technologies and supply networks or the movement of populations into agglomerated settlements or cities. Recent work (e.g. J.H. Jones 2009) has argued that with regard to fitness, survival (or somatic success) is what matters, not reproduction (or reproductive success). James Jones (2009) shows that there is strong selective pressure on surviving to beyond age 5 (or so). Entanglement provides a way of linking material with social factors (such as social support, status, etc.) that may enhance efforts by parents to raise children successfully. It seems, then, that measuring reproductive success in archaeology is not only difficult but also insufficient, as the selective pressures leading to reproductive success and survival are largely to be found in human-thing entanglements.

Turning to the role of transmission in evolutionary theory in archaeology, many have argued that cultural and biological transmission differ. But archaeologists have often taken on board the notion that cultural selection is analogous to the selection of genes. Boyd and Richerson (1985) describe various forces leading to evolution of transmitted traits, such as cultural mutation and drift, guided variation, and biased transmission. In terms of biased transmission there is a results bias that occurs when people change what they do because a new way of doing seems more effective, or a context bias that occurs when the person copied is prestigious or when people conform to local traditions.

Such accounts of culture often seem very un-anthropological. As soon as one says that 'cultural evolution refers to the changing distributions of cultural attributes in

populations, likewise affected by processes such as natural selection but also by others that have no analog in genetic evolution' (Shennan 2008: 76), the floodgates seem opened to all the possible factors that anthropologists have discussed over decades in exploring how people manipulate material culture socially. It is inadequate to gloss this complexity in terms of forms of biased transmission. There seems a real need for the more nuanced types of perspective seen in materiality or agency or memory studies (Dobres & Robb 2000; Meskell 2005; Miller 2005; Van Dyke & Alcock 2003). Richerson and Boyd (2005) very clearly see culture as transmitted information, held in the brain, though also stored in writing or in pottery decoration. But such accounts seem a long way from, for example, Michael Taussig's (1993) subtle accounts of the mimetic process. In most anthropological work material culture is nowadays seen as actively engaged in social processes.

One can take this point farther. When archaeologists identify lineages of cultural affinity, battle-ship curves, merging and bifurcation in cultural traditions, what they describe results immediately from sequences of production not transmission. Archaeologists identify continuities through time but 'clearly, transmission implies continuity but continuity does not necessarily imply transmission' (Shennan 2008: 80). Rather than seeing continuity and variation as Darwinian 'descent with modification', rather than seeing it as the product of social learning, or common environments or functions, it can be studied in terms of structure and agency, orthodoxy and heterodoxy, domination and resistance, memory construction, the invention of tradition, hierarchy and heterarchy, or any number of other ways in which anthropologists and archaeologists have explored continuity and change. The tendency in much work in evolutionary archaeology has been to focus on the construction of lineages and clades themselves, pushing all these 'anthropological' factors into the background as part of the selective environment. But it is precisely this selective environment which is key in understanding forms of social learning and in determining the causes of cultural continuities (M.J. Brown & Feldman 2009). From the point of view presented in this article, the battle-ship curves are immediately curves showing frequencies of production of things. Whether humans copy or transform other objects or humans often depends on the material character of things, the potentials offered by the material itself, the availability of technologies and of labour relations. Humans can copy in an instant; they are mimetic beings as much as they are bound by habitus. Ideas can spread like wild-fire. Humans actively transform things as part of social strategies. Whether they do or do not imitate depends on the ways in which humans and things are embedded within entanglements. Clearly transmission is a component of many social processes, but the role it plays and its relationship to material or behavioural similarities depend on how learning and production get caught up in networks of entanglement.

A related problem concerns the methods of identifying cultural sequences and lineages. Any object can be defined in limitless ways, and so which characters and variables are to be chosen in constructing lineages? The construction of lineages in language has been relatively successful, but material culture is more frequently manipulated by people as they memorialize some things and forget others. Anthropologists have long studied what Eric Hobsbawm and Terence Ranger (1992) called 'the invention of tradition', and prehistorians of all people know that typological similarities and differences can be manipulated by political interests in order to construct lineages, sequences of affiliation (Diaz-Andreu & Champion 1996). It is a very outdated view of anthropology and culture to imagine that culture is a package of stuff that is just

handed down, objectively marking descent. In fact sequences and lineages are always to some degree invented – both in the past and in the present. If dual-inheritance theory accepts the play of these biases in the past, then it must also accept their role in the construction of affinity and descent in the present.

Returning to Çatalhöyük, the Neolithic entanglement with clay, associated with a domestic mode of production, led to the mudbrick house (Hodder 1990; 2006). The mudbrick house was the social focus of material, social, symbolic, and sensual life. Some houses started and then finished after no, or just a few, rebuilds, the vacant lot then being used for midden. Other houses were more successful, being rebuilt in the same way and in exactly the same location up to six times (Hodder 2006). This variability of surviving and non-surviving houses seems ripe for a Darwinian analysis. Surely the long-lived houses were those with greater reproductive or replicative success?

The evidence at present intimates that the Çatalhöyük houses may not have been machines for the reproduction of genes. Using tooth morphology as a proxy measure for genetic distance, Marin Pilloud (2009) has demonstrated that individuals buried beneath the floors of houses were not more closely related to each other than individuals in the population as a whole. And those buried beneath the floors of the long-lived houses do not seem to have been better off in terms of health either. The health indicators so far studied by the team led by Simon Hillson and Clark Larsen (pers. comm.) do not show differences between the long-lived and shorter-term houses. And there is no evidence so far of greater productive success. Storage and productive space, for example, remain much the same in both long-lived and short-term houses (Hodder & Pels 2010).

It is possible to argue instead that the houses that successfully persisted were those that were fitting in relation to other aspects of entanglement at the time. They were the ones that were most successful at performing this local version of what Maurice Bloch, Webb Keane, and Peter Pels, working at the site, have classified as a version of a 'house society' (Bloch 2010; Hodder & Pels 2010; Keane 2010). Those in the long-lived houses were most successful at keeping the walls up, repairing them and furnishing them. They were the ones who were most effective at using ancestral cults and memory construction to keep the house going. They were the ones who were best at constructing 'history' through the passing down of animal and human skulls and body parts. They were the ones who best performed a particular material, social, symbolic, and sensual repertoire – they did things that were fitting within a particular entanglement involving clay, bricks, skulls, bulls, and houses but also involving ideas of history, ancestry, relations with the dead. We can find no evidence that the long-lasting houses controlled production or exchange or had better resources in some way. Rather, once they had successfully started to build a history and to amass evidence of that history (skulls, bucrania, body parts, images of feasts), these houses were able to elaborate on and perform that history more powerfully than others. So an entanglement in which history was important, and which was itself fitting within the long-term relations of delayed-return economies (Woodburn 1980), was a context in which those humans and things good at history-making were more likely to be successful and be selected for.

We have seen that individuals at Çatalhöyük were sensuously tied to clay and to the clay house and hearth. We have seen also that they engaged in a variety of strategies to keep the house from leaning and falling apart. The more it fell apart, and the more humans caused change to the local environment, the more they had to intensify, change brick technologies, build thicker walls. Looking after the house involved recruiting the

ancestors to hold up posts. A good feast may have not only solidified the social ties of the 'house' of people but may also have helped the material house to stand. In performing history, humans depended on the house, but at the same time the house depended on humans. House, human, and society were all materially entangled together. Any material, technological, social, symbolic, stylistic change only persisted in so far as it was fitting within these entanglements.

The introduction and spread of pottery at Çatalhöyük provides a further example. Fired clay objects and plaster occur from the earliest levels (around 7400 cal BC), but fired clay pottery starts in Level XII, at around 7000-6900 cal BC. At first the quantities of this thick, undecorated, organic (straw) tempered pottery are very small (Last 2005: Table 5.2), increasing gradually through time. There is little evidence from exterior smudging that these early, thick, small vessels were used in cooking over a fire. Rather, in the early levels up to Level VII, cooking seems to have been achieved with the extensive use of balls of clay that were heated and placed with food in containers of basketry, wood, or clay (Atalay 2005).

Around Level VII, these clay balls die out and at the same time pottery changes to being thin-walled and mineral-tempered, and the pots have larger capacity (Fig. 7). Frequent evidence of smudging on the outer surfaces of these pots suggest they were used in cooking, and experiments in behavioural archaeology have shown the greater efficiency of heat transfer in mineral-tempered pots in contrast to organic-tempered pots (Skibo, Schiffer & Reid 1989). So what was it that selected for the use of clay pots in cooking instead of clay balls in Level VII at Çatalhöyük?

Careful comparison of cooking with pots and clay balls, using ethnographic and experimental data, demonstrated that the main advantage of cooking in clay pots over

Figure 7. Mineral-tempered cooking pot from Çatalhöyük. (Source: Çatalhöyük Research Project and Jason Quinlan.)

a fire was that the cook was more able to do other things at the same time (Atalay 2005). Use of clay balls involved continual monitoring of the cooking process, moving the balls back into the fire as they cooled down, shifting the balls around. But a cooking pot could more easily be left on the fire, acting as a 'delegate' of the cook (Latour 2005). The cook was more able to do other things and leave some of the cooking to the pot. Efficiencies of this type may well have become significant around Level VII in the Çatalhöyük sequence since it is in Levels VII and VI that the settlement seems largest and most densely crammed with houses. There is also more evidence of symbolic elaboration and burial in houses in Levels VII and VI. With more going on in the houses and more pressure on available resources, behaviour (or human-thing entanglement) that allowed greater efficiencies and multi-tasking in houses was selected for.

But the entanglements between humans and things at Level VII were yet more complex. The shift to sandier bricks described above also occurred in Level VII. As noted above, this shift in brick composition involved new sources of clay and new technological processes as bricks were now made and dried prior to being brought to site. The shift to new sources of clay with mineral inclusions and off-site production of bricks could have had an impact on the simultaneous switch to the production of pottery with mineral inclusions (Doherty 2008). The same sandier clays used in the bricks were also used in making pottery in Level VII and after. It is possible that it made sense to exploit pottery clays with mineral content because people were getting sandier clays for bricks.

Another aspect of the entanglement of cooking pottery was its use for processing animal fat. Residue analysis has suggested that the mineral-tempered cooking pots were used for processing the fats of small ruminants, probably domesticated sheep and goat (Copley, Clark & Evershed 2005). There is much evidence from the faunal remains that domesticated sheep and goat were by far the main source of animal protein at the site, and that the bones were very carefully processed to remove all fats and marrow (Russell & Martin 2005). Given the importance of sheep and goat in the diet, and the intensive labour involved in breaking up bones to gain fats, the efficiencies gained by switching from clay balls to pots in cooking would have been significant.

I have described the fittingness of mineral-tempered cooking pottery in the entanglements of Level VII at Çatalhöyük. But why was that pottery undecorated (Fig. 7)? Why was undecorated pottery fitting in the main sequence at the site? As we have seen, the cooking pots were used to process domesticated sheep and goat products. These animals hardly, if ever, appear in all the rich symbolism at the site. It seems fitting, therefore, that the pots in which their fats were processed were similarly not decorated. Rather, decoration and symbolism concentrated on wild animals, on hunting, baiting, and feasting on them, as well as on burial (Hodder 2006). Burial platforms in houses are often marked with red ochre or painted decoration. It is remarkable too that a clear rule existed at Çatalhöyük: pots could not be placed in graves with humans. Pots, rather, were entangled in a world of domestic production and processing, separated from the entanglements surrounding the production of histories, wild animals, death and burial.

Except, that is, for the pot shown in Figure 8. This was a one-off. Found in pieces in a midden in the northern part of the site, probably close to Level VI in time, this is a remarkable pot. Not only is it unique in levels in which all pottery remains undecorated, but also it encapsulates so effectively the main themes in the production of history at the site. The pot has a human face at either end, with eyes not marked. At

Figure 8. Pot from midden in the 4040 Area at Çatalhöyük, dated to approximately Level VI, and showing human and bull heads. (Source: Çatalhöyük Research Project and Jason Quinlan and Lynn Meskell.)

Çatalhöyük, a human skull has been found with facial features modelled in plaster (Hodder 2006). The eyes are not shown in the same way as on the pot, and so it is possible that the human faces on the pot are of the dead. On the two sides of the pot are shown the heads of bulls. It is mainly bull and human heads that are collected and kept or passed down at Çatalhöyük in order to build histories. Wonderfully creative as it is, this pot was never copied, never transmitted. It is in the wrong medium. At this time in the occupation of Çatalhöyük, all pottery was undecorated because it was entangled in cooking and sheep and goat fat. This decorated example did not get copied. It was not fitting in the entanglements at the time.

At the end of the Çatalhöyük sequence and on the ensuing West Mound, decorated pottery of the type shown in Figure 9 appears. This time the decoration is massively copied. This time decorated pottery, sometimes with human and animal imagery, is introduced, spreads, and the new trait persists for at least 500 years. The proliferation

Figure 9. Chalcolithic painted pottery from the West Mound at Çatalhöyük. (Source: Çatalhöyük Research Project and Jason Quinlan.)

occurred because a new set of entanglements gradually emerged in which pottery got caught up. The propensity towards pottery decoration at Çatalhöyük increases gradually from Level V upwards (towards Level I) at the same time that we begin to see shifts towards an erosion of the emphasis on the production of history, so that there is less evidence of exact repetition of houses built on top of each other in one place, and less of the bull and other installations in houses (Düring 2006). It is possible that wild bulls became less available in the landscape after the intensive hunting in Levels VII and VI. But in the uppermost levels (III and above) the excavations by Team Poznan have found a tomb rather than in-house burial (Marciniak & Czerniak 2008) and by the Chalcolithic West Mound (6000-5500 cal BC) there is no evidence of burial beneath platform floors. In the latest levels at Çatalhöyük and on the later West Mound the houses change in character. The houses become larger, with more rooms, and with more storage and productive space. The hearth moves into the centre of the main room and pottery is used both for cooking and for serving and consumption. It is this display pottery that is decorated. Pottery decoration in this context was fitting. It allowed the expression of productive potential around the central hearth in these new large houses focused on production (Hodder 2006).

In this account, we see cooking pottery increasing, and then decorated pottery increasing. And we do see continuities of tradition in which transmission must have played a part. But really the persistence of that tradition can only be loosely linked to reproductive success of the carriers – it is difficult to see how one could even begin to explore that idea. And it seems unlikely that we can explain all this by mode of transmission – even if we could demonstrate what that was. Rather the increase of pottery and then the increase of decorated pottery are tightly linked to a complex interweaved web of other changing factors: the role of the house, the placing of the hearth, the production of bricks, the role of cooking, and so on. The battle-ship curves for cooking pottery and decorated pottery both show gradual increases. But the key to understanding these lineages is not reproductive success or mode of transmission. It is in getting to grips with the selective context for reproduction and transmission.

Fittingness here is different from fitness in natural selection in that the former is based not solely on reproductive success or survival but on how a trait works within entanglements consisting of the mutual dependencies of humans and things. But as in Darwinian evolutionary theory, change in human-thing entanglement comes about through the co-evolution of traits. Entanglements change through the co-fittingness of traits and their mutual adjustment. This change can be gradual or sudden depending on numerous contingent factors and on the complex interactions of variables, as complexity theory has so effectively argued (Kohler & Gummerman 2000).

Conclusion

So I have failed in my attempt at integration. I have not been able to bring the different perspectives successfully together. I have referred to and brought in various ideas and perspectives, but I have not successfully brought on board the full plank of each theory. Thus there are clear advantages of some form of Darwinian approach to an understanding of long-term change in human-thing entanglement. But on the other hand, it seems difficult to retain the term 'Darwinian' if the emphases on reproductive success and transmission are displaced. Those who study material agency and materiality will question whether archaeometrists are dealing with relevant questions. Behavioural archaeologists will be quizzical that their approach can be situated in an overall theoretical account that is not solely behavioural.

I do nevertheless feel there are grounds for claiming that behind existing approaches there lurks a complementarity that is so often masked by dichotomous stances and postures. There does seem some value in striving for a synthetic and integrative account, however partial it might be.

In the first part of my account I described approaches that deal with the identity between humans and things. In describing this human dependence on things, the main perspectives involved were from the social and human sciences, those engaged in debates about agency, materiality, memory, cognition. These approaches are essential for the study of human-thing entanglement, but few of them engage seriously with things themselves and their connections.

I then moved to consider approaches that deal more with matter and with ecological and environmental relations. In describing thing dependence on humans and on other things, the main perspectives involved were from the material sciences and from behavioural research. These material studies are central to any attempt to break out of a human-centred, social-centred approach, but the difficulties with them are that they easily become reductive and descriptive and they do not deal well with change.

So in the last part of my account I described approaches derived from biology. In describing the transformation of human-thing entanglements through time it became clear that some sort of engagement with Darwin-inspired approaches is useful as they deal with the long term and at least some of them de-centre from humans to the things that get selected for. Two of the struts of these theories, selection and transmission, seem more acceptable if reworked within a theory of human-thing entanglement.

Nowadays talk of integration in the sciences often focuses on bridging between culture and biology. In this article I have argued that inserting a third term, the material, allows the possibility of some form of integration across a wider swathe of approaches and disciplines, however inelegant and partial. It does seem possible that a focus on things allows one to bring together aspects of much social theory related to materiality, embodiment, memory construction – with behavioural, ecological,

biochemistry, and materials science approaches – and with biological and evolutionary approaches. I have offered the idea of entanglement as a bridging concept. Sir Walter Scott may well have been right to talk of 'the tangled web we weave', but I have argued that the tangled web also weaves us, and indeed that the material stuff of the web, its knots and stickiness, entangle both our culture and our biology.

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Imbrication entre humains et choses : vers une perspective archéologique intégrée

Résumé

Par l'exploration de l'intrication entre humains et choses, l'auteur souhaite soulever cinq points. (1) Les humains dépendent des choses. Pourtant, dans une grande partie des nouveaux travaux en sciences sociales et humaines dans lesquels les humains et les choses sont co-constitutifs, les choses sont, curieusement, peu considérées. (2) Les choses dépendent d'autres choses. Toutes les choses dépendent d'autres choses, au fil de chaînes d'interdépendance. (3) Les choses dépendent des humains. Elles ne sont pas inertes. Elles passent leur temps à tomber en morceaux, à se transformer, à pousser, à changer, à mourir, à s'épuiser. (4) L'aspect définissant l'intrication des humains avec les objets fabriqués est que les humains sont pris dans un *double bind*, dépendant des choses qui dépendent d'eux. (5) Certains traits apparaissent, évoluent et persistent. Quand les archéologues évolutionnistes identifient des lignées d'affinité culturelle, ils affirment étudier la transmission culturelle. Bien que la transmission puisse être à l'œuvre dans ces lignées, c'est l'intrication globale des hommes et des choses qui permet aux traits de prospérer ou de disparaître.

Ian Hodder obtained his Ph.D. at Cambridge in 1975. After a brief period teaching at Leeds, he returned to Cambridge, where he taught until 1999. During that time he became Professor of Archaeology and was elected a Fellow of the British Academy. In 1999 he moved to teach at Stanford University as Dunlevie Family Professor in the Department of Anthropology.

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