

Toward an Ecology of Materials*

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Abstract

Both material culture studies and ecological anthropology are concerned with the material conditions of social and cultural life. Yet despite advances in each of these fields that have eroded traditional divisions between humanistic and science-based approaches, their respective practitioners continue to talk past one another in largely incommensurate theoretical languages. This review of recent trends in the study of material culture finds the reasons for this in (a) a conception of the material world and the nonhuman that leaves no space for living organisms, (b) an emphasis on materiality that prioritizes finished artifacts over the properties of materials, and (c) a conflation of things with objects that stops up the flows of energy and circulations of materials on which life depends. To overcome these limitations, the review proposes an ecology of materials that focuses on their enrollment in form-making processes. It concludes with some observations on materials, mind, and time.

INTRODUCTION

One of the peculiarities of material culture studies over recent decades has been its virtual divorce from the traditions of ecological anthropology. This is odd, given that both fields are broadly concerned with the material conditions of social and cultural life. Students of material culture are interested in people's relations with things. Ecological anthropologists study how human beings relate to their biotic and abiotic environments. For the former, persons and things are bound in relational networks; for the latter, human beings and other organisms are bound in webs of life. Yet practitioners of these two fields are speaking past one another in largely incommensurate theoretical languages. It is not hard to find reasons for this divergence in the recent histories of both anthropology and archaeology. Throughout the 1960s and 1970s, the two disciplines had been strongly linked, even identified, through the development of neofunctionalism in the former and processualism in the latter. Proponents of neofunctionalism in anthropology (Rappaport 1968, Vayda 1969) set out to show how diverse beliefs and practices could be understood as adaptations that served to maintain a self-regulating equilibrium in relations between human populations and their environments. Likewise in archaeology, the processual paradigm interpreted artifact assemblages and patterns of deposition as evidence for human behavioral adaptation to environmental conditions (Binford 1962, 1983). Both paradigms drew for inspiration on models in animal ecology and were keen to present themselves as paragons of positive science.

What has been called the material cultural turn (Hicks 2010) emerged at the end of the 1970s as a humanistic reaction against the scientific conceit of processual archaeology. Advocates of postprocessualism were determined to show how objects of material culture carried meanings constituted within wider fields of signification and figured in practice as vehicles of symbolic expression (Hodder 1982a,b). Ecological anthropology, meanwhile,

was evermore firmly gripped by the natural science paradigm, with the emergence of such approaches as behavioral ecology (Smith & Winterhalder 1992) and gene-culture coevolution (Durham 1991, Boyd & Richerson 2005). It is no wonder, then, that students of material culture and ecological anthropologists ended up glowering at one another from opposite sides of the ring, in what had become an increasingly polarized academic arena. But that was then. Things have since moved on, and both sides have made strenuous efforts to moderate their earlier positions. Ecological anthropologists have been at the forefront of rethinking the received dichotomies between nature and society, and between biology and culture, that had underwritten so much previous work, drawing instead from approaches in developmental biology, ecological psychology, biosemiotics, and even phenomenology (Ingold 1990, 1992, 2000b; Croll & Parkin 1992; Descola & Palsson 1996; Ellen & Fukui 1996). And in material culture studies, scholars have sought to recapture the physicality of the material world that had been neglected by the post-processualists in their quest for free-floating "meanings" that had seemed only arbitrarily attached to their signifiers (Olsen 2003, Boivin 2004, Knappett 2005). Surely, then, ecological anthropology and material culture studies should have now reached some kind of rapprochement. But they have not. Why?

In this review, I suggest three answers. First, material culture studies continue to operate with a conception of the material world, and of the nonhuman, that focuses on the artifactual domain at the expense of living organisms. Second, the prevailing emphasis on materiality obstructs our understanding of the fields of force and circulations of materials that actually give rise to things and that are constitutive of the web of life. And third, once things have been cut off from their source of vitality in flows of energy and materials, their generation, liveliness, and capacities for perception and response are stopped up. In what follows I consider each of these impediments to the integration of ecological anthropology and material culture studies

and suggest how they may be overcome through a focus on the active materials that compose the lifeworld. I conclude with some observations on materials, mind, and time.

MISSING NONHUMANS

A team of philosophically inclined chimpanzees has embarked on the sociological study of a human group. One of the first things they notice is that activities they are used to performing directly on one another, such as grooming, are displaced onto the manipulation of artifacts such as combs and brushes. They observe, too, that there is no point in the lives of human beings, from cradle to grave, when they are not being intimate with artifacts. They conclude that it would be a big mistake to separate out a domain of social or interpersonal relations from the wider set of person-artifact and artifact-artifact relations within which they are embedded.

It is with this imaginary scenario that Michael Schiffer introduces his study of “the material life of human beings” (Schiffer & Miller 1999, pp. 2–3). Why, Schiffer wonders, should a conclusion so evident to our simian philosophers escape the attention of most human sociologists, who continue to write as though their conspecifics inhabited a world of their own, aloof from the materials of life? His answer is that the very familiarity of everyday artifacts, and the intimacy with which we human beings routinely engage with them, blind us to their presence. We take these artifacts for granted. Although animals of many species interact on a sustained basis with things of various kinds, some of which they have made themselves, no other species comes close to humans in the extent to which they do so. “Incessant interaction with endlessly varied artefacts is,” Schiffer maintains, “the empirical reality of human life and what makes it so singular” (Schiffer & Miller 1999, p. 2).

Schiffer’s disparagement of orthodox social studies for their neglect of the artifactual domain has found frequent echoes in the literature. It has become almost commonplace, in

publications on material culture, for authors to register a general complaint against academic social science for its tendency to reckon as if there were no things or objects in the world, only persons. One such author is Bjørnar Olsen. In mounting his recent defense of things, Olsen (2010, p. 21) appeals to the authority of the philosopher Michel Serres, who has this to say:

The only assignable difference between animal societies and our own resides...in the emergence of objects. Our relationships, social bonds, would be as airy as clouds were there only contracts between subjects. In fact, the object, specific to the Hominidae, stabilizes our relationships. (Serres 1995, p. 87)

How is life, then, for the animals? Serres’s contention is that the social science to which we are accustomed—although intended for human beings—would actually be applicable, at best, to animals, since it leaves out of account the objects that anchor the kind of sociality that is specifically human (Serres & Latour 1995, pp. 199–200). It may work, for example, for a troop of baboons. Among members of the troop, relations decay as fast as they are established, for without extrasomatic objects there is nothing to hold them down. Instead, they have continually to be reasserted (Strum & Latour 1987; Latour 2005, pp. 69, 197–99).

Whatever the case may be for baboons, however, it is simply not true that, for non-human animals generally, social relations are free-floating rather than anchored in the material world. Many migratory seabirds return to breed, year in, year out, to the same cliffs and in the same pairs—as do herds of ungulates to the same calving grounds. Whether cliffs and grounds can be understood as objects is moot, but as I show below, they are most certainly *things*. As such, they play a well-established part in stabilizing relationships between breeding pairs in the first case and between mothers and offspring in the second. Innumerable anthropological studies have likewise demonstrated how human groups maintain strong and enduring attachments to particular places, along with the

features of the landscape that lend them their distinctive character. As in the totemic landscape of Aboriginal Australia (Myers 1986) or the homeland of the Koyukon of Alaska (Nelson 1983), every such place is woven as a gathering of stories, of the comings and goings of diverse human and other-than-human beings (Ingold 2000b, pp. 52–58). Keith Basso (1992, p. 126), in his classic study of the storied landscape of the Western Apache of Arizona, shows how mountains and arroyos take over from grandmothers and uncles in the moral education of younger generations. They are active players in the Apache world. Artifacts, by contrast, may play a small or even negligible part in bearing the load of interpersonal relationships, as anthropological studies of hunting and gathering societies have revealed (Woodburn 1982). They are readily made, or improvised on the spot, and equally readily discarded. What matters for the people, as Robin Ridington (1982, p. 470) has aptly noted, comprises not *artifacts* but *artifice*.

In light of these observations, and returning to Olsen's defense of things, what are we to make of the following?

If there is one historical trajectory running all the way down from Olduvai Gorge to Postmodernia, it must be one of increased mixing: that more and more tasks are delegated to nonhuman actors, and more and more actions mediated by things. Only by increasingly mobilizing things could humans come to experience 'episodes' of history such as the advent of farming, urbanization, state formations, industrialization, and postindustrialization. (Olsen 2010, pp. 9–10)

No doubt the citizens of Postmodernia are surrounded by a wealth of artifacts infinitely in excess of what was available to the little band of creatures, known to science as *Homo habilis*, who camped at Olduvai Gorge some two million years ago, whose only tools were crude stone choppers. We can be equally sure that, in the broad course of history, the number and kinds of artifacts that humans have used have

increased almost exponentially. This does not necessarily imply, however, a proportionate increase in the mobilization of things nonhuman. For what comes out unequivocally, both from the evidence of prehistory and from the ethnography of peoples who have not taken the high road to Postmodernia, is that there never has been a time when all sorts of nonhumans have not been enrolled in the tasks of keeping life going. What has changed is the nature of the nonhumans. As some have appeared on the scene, others have vanished. In the history of industrialization and postindustrialization, for example, a host of nonhumans once directly tasked with providing the wherewithal for human life have been sidelined, as the menagerie of the farmyard gave way to the cornucopia of the supermarket.

In their efforts to bring things back in, theorists have proposed a symmetrical approach, in which nonhumans of all sorts are allowed to play a role, alongside human beings, in the conduct and continuation of social life (Olsen 2003, 2007, 2010, p. 9; Webmoor 2007; Witmore 2007). With its geometrical connotations, the concept of symmetry is less than apposite, since precisely what is *not* implied is a relation between terms that are equal and opposite. On the contrary, the approach seeks a way of talking about persons and things that both allows for heterogeneity and is nonoppositional (Latour 2005, p. 76). Humans and nonhumans are different, but they are not to be regarded as *ontologically* distinct (Witmore 2007, p. 546). What is most remarkable about this principle of symmetry, however, is that it rests on a claim to human exceptionalism, along with a vision of progress from the animal to the human and from the hunting and gathering of our earliest ancestors to modern industrial society, which could have come straight out of the nineteenth century. Paradoxically, an approach that deontologizes the division between the human and the nonhuman and that establishes in its place a level playing field is justified on the grounds that in the manner of their engagement with material things and in the progressive history of this engagement human beings are

fundamentally different from all other living kinds. Hardly could a symmetrical approach rest on a more asymmetrical foundation!

“How,” asks Olsen, “do things and objects ‘mix’ with human beings to form the configurations we call *society* and *history*?” (Olsen 2010, p. 2, emphases in original). To pose the question in this way is, ipso facto, to exclude animals and plants—which exist “alongside” (Olsen 2010, p. 9) but, by the same token, are not part of “material culture”—from the processes of social and historical life. Society and history are rendered as exclusively human achievements, brought about by way of the enrollment of objects and things. It is precisely because of this asymmetry that the ostensibly exhaustive division between the human and the nonhuman practically omits the entire gamut of organic life-forms, along with the sunlight, moisture, air, and soil on which all life depends. Included in the category of the nonhuman are only those material objects and artifacts thanks to which some humans are able to assert their wholly exceptional way of being in the world. If animals and plants are included in this process of history making at all, it is as either quasi-humans or pseudo-objects.

Schiffer at least acknowledges the problem, for having initially equated “material” with “artifacts,” he admits that this hardly covers the full range of human beings’ involvement with the world around them. Accordingly, he expands his definition of material to encompass “any form of matter or energy,” of which—apart from people—he posits two kinds. One comprises *artifacts* (things shaped or modified by human activity, including domesticated plants and animals); the other comprises *externs*—a blanket category that covers everything else that is given independently of people, including “sunlight and clouds, wild plants and animals, rocks and minerals, and landforms.” Yet Schiffer promptly dismisses externs as a “residual category,” linking it to a theory of human cognitive evolution according to which the environment of externs was gradually left behind as humans found themselves interacting increasingly with artifacts (Schiffer

& Miller 1999, pp. 12–13, 126). If we are to reintegrate the study of material culture with ecological anthropology, then the externs must be brought back in, not just as a residue, but as the fundamental conditions for life—including, but not exclusive to, human life. After all, the ways in which human lives are bound up in processes of production with the lives of animals and plants, weather, and the land is what ecological anthropology is largely about.

To those with a background in the study of human ecology, the claim by material culture theorists that the “nonhuman” has been marginalized in the social sciences seems frankly preposterous. It is to turn a blind eye to the wealth of anthropological studies of the ways hunters, herders, gatherers, and farmers in various parts of the world have shared their lives with animals and plants. Under the guise of the restoration of nonhumans, what these theorists have really done is substitute one set of nonhumans for another: artifacts for life-forms. It is, as we have seen, the claim to human exceptionalism that is invoked to justify this substitution, the result of which is to set material culture studies and ecological anthropology on divergent paths. The way to bring them together again is to reverse the assimilation of living nonhuman organisms to pseudoartifacts, by raising artifacts to the status of things that, similarly to organisms, both grow and are grown. To do this, however, requires a change of focus, from the “objectness” of things to the material flows and formative processes wherein they come into being. It means to think of making as a process of growth, or ontogenesis. It is to this that I now turn.

MATERIALS AND MATERIALITY

When analysts speak of the “material world” or, more abstractly, of “materiality,” what do they mean (Ingold 2011a, pp. 19–32)? Put the question to students of material culture and you get contradictory answers. Thus a stone, according to Christopher Tilley (2007, p. 17), can be regarded in its “brute materiality” simply as a formless lump of matter. Yet we need a

concept of materiality, he thinks, to understand how particular pieces of stone are given form and meaning within specific social and historical contexts (cf. Tilley 2004). For Andrew Jones (2004, p. 330), likewise, the notion of materiality both encompasses “the material or physical component of the environment” and “emphasizes how those material properties are enrolled in the life projects of humans” (cf. Jones 2002, pp. 168–82). Nicole Boivin (2008, p. 26) tells us that she uses the word materiality “to emphasize the physicality of the material world,” yet this physicality embraces the fact “that it offers possibilities for the human agent.” Introducing a collection of essays on the theme of materiality, Paul Graves-Brown (2000a, p. 1) asserts that their common focus is on the question of “how the very material character of the world around us is appropriated by humanity” (compare Pollard 2004, p. 48).

In every case, there seem to be two sides to materiality. On one side is the brute materiality or “hard physicality” (Olsen 2003, p. 88) of the world’s “material character”; on the other side is the socially and historically situated agency of human beings who, in appropriating this physicality for their purposes, project on it both design and meaning in the conversion of naturally given raw material into the finished forms of artifacts. This duplicity in the comprehension of the material world mirrors that found in much older debates surrounding the concept of human nature, which could refer at once to the raw substrate of basic instinct that humans were alleged to share with the “brutes” and to a suite of characters—including language, intelligence, and the capacity for symbolic thought—by which they were said to be elevated to a level of being over and above all other creatures. The appeal in these debates to the “*human* nature of human nature” (Eisenberg 1972, emphasis in original; cf. Ingold 1994, pp. 19–25) did nothing to resolve this duplicity, but instead served only to reproduce it. In just the same way, in the notion of materiality, the world is presented both as the bedrock of existence and as an externality that is open to comprehension and appropriation by a transcendent humanity. The notion

of material culture is equally problematic and for many of the same reasons (Prown 1998; Schiffer & Millar 1999, p. 6; Ingold 2000a, p. 53; Jones 2002, pp. 64–6; Boivin 2008, p. 21; Jones & Boivin 2010, pp. 347–50; Olsen 2010, p. 25). “Material culture,” as Julian Thomas (2007, p. 15) puts it, “represents at once ideas that have been made material, and natural substance that has been rendered cultural.”

Underpinning this notion is a certain understanding of artifacts and of what it means to make things that has pervaded the Western intellectual tradition ever since it was first explicitly formulated by Aristotle. Any thing, Aristotle had reasoned, is a compound of matter (*hylē*) and form (*morphe*), which are brought together in the act of its creation. Accordingly, making begins with a form in mind and a formless lump of “raw material,” and it ends when form and matter are united in the complete artifact. In the history of modern thought, this *hylomorphic* model of creation was both further entrenched and increasingly unbalanced. Form came to be seen as actively imposed, whereas matter—thus rendered passive and inert—became that which was imposed upon. When, in the late 1960s, biological anthropologist Ralph Holloway (1969, p. 395), following a long line of predecessors, once more reclaimed culture as a distinctively human domain, defined by “the imposition of arbitrary form upon the environment,” we can clearly see this modern version of hylomorphism at work. Culture furnishes the forms, nature the materials; in the superimposition of the one upon the other, human beings create the material culture with which, to an ever-increasing extent, they surround themselves.

Unbeknownst to Holloway, however, and probably to most anthropologists and archaeologists at that time, the philosopher Gilbert Simondon had just produced a trenchant critique of hylomorphism. The first part of his thesis was published in 1964, but the second not until 1989; only in 2005 was the work published in its entirety (Simondon 1964, 1989, 2005). Against the doctrine of hylomorphism, with its assumption that the origination of things is

reducible to the imposition of preconceived abstract form on inert matter, Simondon's central postulate of *individuation* holds that the generation of things should be understood as a process of ontogenesis in which form is ever emergent rather than given in advance. Against the form-receiving passivity of matter, as posited in the hylomorphic model, Simondon took the essence of matter, or the material, to lie in form-taking activity (Massumi 2009, p. 43).

To underline his argument, Simondon deliberately chose to analyze a branch of manufacture that, at first glance, could hardly better exemplify hylomorphism at work. This example was making bricks. In forming the brick, prior to firing, soft clay is pressed into a preprepared, rectangular mold. The mold, it seems, prescribes the form, whereas the material—the clay—is initially formless. Surely, as the clay is pressed into the mold, ideal form is imposed on raw material, just as the logic of hylomorphism requires. But Simondon shows that this is not so. For one thing, the mold is no geometric abstraction but a solid construction that has first to be carpentered from hardwood. For another thing, the clay is not raw. Having been dug out from beneath the topsoil, it has first to be ground, sieved, and kneaded before it is ready for use. In the molding of a brick, then, form is not united with substance. Rather, there is a convergence of two “transformational half-chains” (*demi-chaînes de transformations*)—respectively, constructing the mold and preparing the clay—to a point at which they reach a certain compatibility: The clay can take to the mold and the mold the clay (Simondon 2005, pp. 41–42). At the moment of encounter, when the brickmaker “dashes” a clot of clay into the mold, the expressive force of the maker's gesture, imparted to the clay, comes up against the compressive resistance of the hard wood of the mold's walls. Thus the brick, with its characteristic rectangular outline, results not from the imposition of form onto matter but from the contraposition of equal and opposed forces immanent in both the clay and the mold. In this field of forces, the form emerges as a more or less transitory equilibration.

The hylomorphic model, Simondon concludes, corresponds to the perspective of a man who stands outside the works and sees what goes in and what comes out but nothing of what happens in between, of the actual processes wherein materials of diverse kinds come to take on the forms they do (Simondon 2005, p. 46). It is as though, in form and matter, he could grasp only the ends of the two half-chains but not what brings them together—only a simple relation of molding rather than the “perpetually variable, continuous modulation” that goes on in the midst of form-taking activity, in the becoming of things (Deleuze & Guattari 2004, p. 451). In their “treatise on nomadology,” Gilles Deleuze and Félix Guattari have taken up Simondon's crusade against hylomorphism, and thanks to their influence, the issues it raises are beginning to percolate through to anthropology. The trouble with the matter-form model, argue Deleuze & Guattari (2004, pp. 451–52), is that in assuming “a fixed form and a matter deemed homogeneous” it fails to acknowledge, on the one hand, the variability of matter—its tensions and elasticities, lines of flow and resistances—and, on the other hand, the conformations and deformations to which these modulations give rise. Whenever we encounter matter, Deleuze & Guattari (2004, pp. 451–52, emphasis in original) insist, “it is matter in movement, in flux, in variation,” with the consequence that “this matter-flow can only be *followed*.” Artisans or practitioners who follow the flow are, in effect, itinerants, guided by “intuition in action” (Ingold 2011a, p. 211).

But where Simondon took his key example from brickmaking, Deleuze and Guattari appeal to metallurgy. For them, metallurgy highlights a particular insufficiency of the hylomorphic model, namely that it can conceive of technical operations only as sequences of discrete steps, with a clear threshold marking the termination of each step and the commencement of the next. This is how technical operations are normatively depicted according to the classic model of the *chaîne opératoire*, introduced into anthropology by André Leroi-Gourhan (1993) and subsequently central to the comparative

study of techniques, especially among Franco-phone scholars (Naji & Douny 2009). But in metallurgy, these thresholds are precisely where the key operations take place. Thus, even as he beats out the form with hammer on anvil, the smith has periodically to return his iron to the fire: Material variation spills over into the formative process and, indeed, continues beyond it, since only after forging is the iron finally quenched. “Matter and form have never seemed more rigid than in metallurgy,” write Deleuze & Guattari (2004, p. 453), “yet the succession of forms tends to be replaced by the form of a continuous development, and the variability of matters tends to be replaced by the matter of a continuous variation.” Instead of the concatenation of the *chaîne opératoire*, where both techniques and forms go from point to point, we have here an unbroken, contrapuntal coupling of a gestural dance with a modulation of the material. Even iron flows, and the smith has to follow it.

What, then, is matter? What do we mean when we speak of materials? To understand the meaning of materials for those who work with them we need, as art historian James Elkins (2000, pp. 9–39) advises, to take a “short course in forgetting chemistry.” More precisely, we have to remember how materials were understood in the days of alchemy. Elkins’s point is that prior to the introduction of synthetic pigments, the painter’s knowledge of his materials was fundamentally alchemical. To paint was to bring together, into a single movement, a certain material mixture, loaded onto the brush, with a certain bodily gesture enacted through the hand that held it. But the science of chemistry can no more define the mixture than can the science of anatomy define the gesture (Elkins 2000, p. 18). The chemist thinks of matter in terms of its invariant atomic or molecular constitution. For the alchemist, by contrast, a material is known not by what it is but by what it does, specifically when mixed with other materials, treated in particular ways, or placed in particular situations (Conneller 2011, p. 19).

Chantal Conneller (2011) introduces her recent discussion of the archaeology of

materials by comparing two definitions of gold. One comes from a chemistry textbook, the other from an eighth-century Persian philosopher alchemist. For the chemist, gold is one of the elements in the periodic table, and as such, it has an essential constitution that is given quite independently of the manifold forms and circumstances of its appearance or of human encounters with it. But for the alchemist, gold was yellowing and gleaming, and anything that yellowed and gleamed, and that would also shine ever brighter under water and could be hammered into thin leaf, would count as gold (Conneller 2011, p. 4). One way to accommodate these divergent understandings of what is ostensibly the “same” material would be to argue, with the design theorist David Pye, for a distinction between the *properties* and *qualities* of materials. Properties, for Pye (1968, p. 47), are objective and scientifically measurable; qualities are subjective—they are ideas in people’s heads which they project onto the material in question. But this would only reproduce the duplicity in our understanding of the material world—between its given physicality and its valorization within human projects of making—that we have sought to resolve (Ingold 2011a, p. 30). The experienced practitioner’s knowledge of the properties of materials, like that of the alchemist, is not projected onto them but grows out of a lifetime of close engagement in a particular craft or trade. As Conneller (2011, p. 5) contends, “different understandings of materials are not simply ‘concepts’ set apart from ‘real’ properties; they are realised in terms of different practices that themselves have material effects.”

We should not thus think of the properties of materials as attributes. Rather, they are histories (Ingold 2011a, p. 32). To understand materials is to be able to tell their histories—of what they do and what happens to them when treated in particular ways—in the very practice of working with them. Materials do not exist as static entities with diagnostic attributes; they are not “little bits of nature,” as science studies scholar Karen Barad (2003, p. 821) puts it, awaiting the mark of an external force

like culture or history for their completion. “Matter is always already an ongoing historicity.” Materials, thus, *carry on*, undergoing continual modulation as they do so. In the phenomenal world, every material is a becoming. In this sense, we can agree with Deleuze & Guattari (2004) that materials evince a “life proper to matter,” albeit one that is hidden or rendered unrecognizable by the terms of the hylomorphic model, which reduce matter to inert substance.

Materials are ineffable. They cannot be pinned down in terms of established concepts or categories. To describe any material is to pose a riddle, whose answer can be discovered only through observation and engagement with what is there. To know materials, we have to follow them—to “follow the matter-flow as pure productivity”—as artisans have always done (Deleuze & Guattari 2004, p. 454). Their every technical gesture is a question, to which the material responds according to its bent. In following their materials, practitioners do not so much interact as co-respond with them (Ingold 2011b, p. 10). Production, then, is a process of *correspondence*: not the imposition of preconceived form on raw material substance, but the drawing out or bringing forth of potentials immanent in a world of becoming (Ingold 2011a, p. 6). In the act of production, the artisan couples his own movements and gestures—indeed, his very life—with the becoming of his materials, joining with and following the forces and flows that bring his work to fruition. Crucially, these paths of movement and lines of flow do not connect: They are not between one pre-existing entity and another but perpetually on the threshold of emergence. They are the lines along which materials flow and bodies move. Together, these entangled lines, of bodily movement and material flow, compose what I have elsewhere called the meshwork, as opposed to the network of connected entities (Ingold 2007, pp. 80–84; Knappett 2011). And this meshwork—to which I return below—is nothing other than the web of life itself. To study its lines, in short, is to adumbrate an ecology of materials.

OBJECTS AND THINGS

Anything we come across could, in principle, be regarded as either an object or a sample of material. To view it as an object is to take it for what it is: a complete and final form that confronts the viewer as a *fait accompli*. It is already made. Any further changes it may undergo, beyond the point of completion, consequently belong to the phase of use or consumption. It therefore comes as no surprise that the study of material culture, in its overwhelming focus on the ways finished artifacts are enrolled in the social lives of human beings, has long been associated with what has come to be known as *consumption studies* (Miller 1987, 1995; see Olsen 2010, p. 32). To view the same thing as a sample of material, by contrast, is to see it as a potential—for further making, growth, and transformation. In a world of materials, nothing is ever finished: “everything may be something, but being something is always on the way to becoming something else” (Ingold 2011b, p. 3). Materials, as noted above, are substances-in-becoming (Barad 2003, p. 822): They carry on, overtaking the formal destinations that, at one time or another, have been assigned to them. From an object-centered perspective, this carrying on is commonly rendered as recycling (Pollard 2004; Bunn 2011, pp. 26–27). From a materials-centered perspective, however, it is part of life. And to focus on the life of materials is to prioritize the processes of production, in the sense outlined above, over those of consumption.

For Daniel Miller (1987, pp. 19–33), who has consistently led the way in establishing material culture studies as a distinct field, human history has fundamentally to be understood as an ongoing process of *objectification*. In this, people create a material world that, in turn, provides a mirror in the reflection of which they and their successors fashion themselves. “We cannot know who we are, or become what we are,” Miller (2005, p. 8) writes, “except by looking in a material mirror, which is the historical world created by those who lived before us. This world confronts us as material culture and

continues to evolve through us.” It is of course true, as Karl Marx (1963, p. 15) famously asserted in the *Eighteenth Brumaire* of 1869, that human beings do not make their history just as they please, “but under circumstances directly encountered, given and transmitted from the past.” But is the past a mirror in which they see their own reflection, or is it the matrix of their ongoing lives? To suppose that the past is mirror rather than matrix—that it is held up before us in its final, objectified forms rather than carried with us as a bundle of potentials into our own processes of growth and maturation—seems to reflect the same duplicity that we have already encountered in the definitions of both humanity and materiality bequeathed to us by modern thought.

The obverse of the material object is, of course, the historical subject, and while falling over themselves in their attempts to overcome a subject/object dichotomy that is widely perceived to be discredited, theorists of all persuasions seem only to have reproduced it in the process. In recent years, however, a possible way forward has emerged through a renewed focus on *things*. Indeed, there has been such a spate of publications on the topic that some authors have been led to speak of the emergence of “thing theory” (Brown 2001). This is not, in truth, one theory so much as an arena of debate in which many different notions of what a thing might be jostle for attention (Gosden 2004, 2005; Latour 2004b; Henare et al. 2007; Knappe 2008, 2011; Trentmann 2009; Bennett 2010; Olsen 2010). Some authors, such as Olsen (2010), use the words “thing” and “object” more or less interchangeably. Others, such as Henare and her colleagues (Henare et al. 2007, pp. 4–5), refuse on principle to define what a thing is, arguing that things should be left to define themselves out of the specific ethnographic contexts from which they emerge. However, several scholars, myself included (Ingold 2011a, pp. 214–15), insist on a radical distinction between object and thing, drawing inspiration from an influential essay, entitled “The Thing,” by the philosopher Martin Heidegger (1971, pp. 165–82; cf. Harman 2005, 2010).

The object, for Heidegger, is closed in upon itself and stands before us complete and ready-made. It is defined by its confrontational “overagainstness”—face-to-face or surface-to-surface—in relation to the setting in which it is placed (Heidegger 1971, p. 167). We may look at it or even touch it, but this look or touch, however metrically close, remains affectively distant. We may interact with objects, but we cannot correspond with them. As the design philosopher Vilém Flusser (1999, p. 58) puts it, “an ‘object’ is what gets in the way, a problem thrown in your path like a projectile.” But if objects are against us, things are with us. Every thing, for Heidegger, is a gathering of materials in movement—a particular knotting together of the matter-flow—and to witness a thing is to join with the processes of its ongoing formation. To touch it, or to observe it, is to bring the movements of our own being into close correspondence with those of its constituent materials. Such engagement is to participate in what Heidegger calls its “thinging.”

One scholar, hardly sympathetic to Heidegger but who has nevertheless drawn on his distinction between object and thing, is Bruno Latour. He uses it to establish a parallel contrast between “matters of fact” and “matters of concern.” In place of the opposition between subjects and objects, confined to their respective domains of society and nature, Latour (2004a, pp. 53–90; 2004b) posits associations of humans and nonhumans, forever gathering themselves into collectives. Latour’s nonhumans, however, are resolutely inanimate. What draws them together are not trails of movement or growth, or of perception and response, but mutual, interactive effects in a network of effects that comprises the overall field of action. This is why Latour’s political ecology fails *as ecology*. Although purporting to merge the politics traditionally reserved for human society with the ecology once limited to entities deemed natural into a single field of negotiation and contestation, it instead offers no more than a skeleton of the affairs of real human and nonhuman organisms, bound as they are within a web of life. Latour’s is an ecology bereft of energy and

materials. He has nothing to say about them. This is precisely what distinguishes the “network” of Latourian Actor Network Theory (ANT) from the “meshwork” of my own account, and which I have introduced under the contrasting acronym of SPIDER—standing for Skilled Practice Involves Developmentally Embodied Responsiveness (Ingold 2011a, pp. 89–94). The emphasis in SPIDER is not on the interactive convocation of existing entities but on the co-responsive movement of occurrent things along their manifold lines of becoming. And in this we find common cause with the phenomenology of Maurice Merleau-Ponty.

For Merleau-Ponty, every living thing, our human selves included, is irrevocably stitched into the fabric of the world. This stitching both composes the thingly aspect of being and establishes the possibility of sentient life. It is not possible, as Merleau-Ponty (1968) showed, to be sentient in an insentient world: In such a world, light, sound, and feeling could figure only as vectors of projection in the conversion of objects into images, rather than as qualities of experience in themselves. Forever shut out from the world of which it seeks knowledge, the mind could grasp its contents only by way of internal representations, constructed—as the logic of hylomorphism requires—through a unification of the “raw material” of sensation with the ideational forms of cultural signification. In a sentient world, by contrast, things open up to the perceiver even as perceivers open up to them, becoming mutually entangled in that skein of movement and affect which Merleau-Ponty (1968, pp. 138–39) famously called “the flesh,” but which I have characterized, more accurately I think, as the meshwork. In the meshwork, the “flesh” of phenomenology is unified with the “web of life” of ecology. Thanks to their entanglement in the meshwork, my seeing things is the way things see through me, my hearing them is the way they hear through me, my feeling them is the way they feel through me. By way of perception, the world “coils over” (Merleau-Ponty 1968, p. 140) upon itself: The sensible becomes sentient, and vice versa.

In the spirit of SPIDER, we could say that sentient awareness and responsiveness are embodied, but only if the concept of embodiment is treated with some caution. As with the concepts of humanity and materiality, that of embodiment often seems to conceal a duality between a knowing mind and an existing world under the pretense of having brought about their unification. In the view of dance philosopher Maxine Sheets-Johnstone (1998, p. 359), for example, the notion of embodiment is nothing better than a “lexical band-aid,” which allows the division between knowing and being to persist simply by covering it up (Sheets-Johnstone 2011). Indeed, the division will persist, Sheets-Johnstone argues, so long as we fail to recognize that the key to both self-knowledge and organic life is movement. It is not just that bodies, as living organisms, move. They *are* their movements. Therefore, the knowledge they can have of themselves is inseparable from the sense they have of their own movements, or in a word, from kinesthesia. Animate beings, Sheets-Johnstone insists, do not experience themselves and one another as “packaged” but as moving and moved, in ongoing response—that is in correspondence—with the things around them (Ingold 2011b, p. 10). This is to think of the body not as a sink into which practices settle like sediment in a ditch, but rather as a dynamic center of unfolding activity. Or as Brenda Farnell (2000, p. 413) argues, it is to think *from*, rather than *about*, the body. The change of perspective entailed here precisely parallels our earlier injunction, taken from Deleuze and Guattari, to “follow the materials” (Ingold 2011b, pp. 2–6). It is to think *from* materials, not *about* them: to find “the consciousness or thought of the matter-flow” (Deleuze & Guattari 2004, p. 454). As the dancer thinks from the body, so the artisan thinks from materials.

In the living, dynamically centered body, person and organism are one. The body *is* the organism-person. As a gathering together of materials in movement, the body is moreover a thing. Thus we should no longer speak of relations between people and things, because

people are things too. Or as the title of a recent article by Timothy Webmoor and Christopher Witmore declares, “Things are us!” (Webmoor & Witmore 2008). As the things they are, people are also “processes, brought into being through production, embroiled in ongoing social projects, and requiring attentive engagement” (Pollard 2004, p. 60). In this regard, they are just like pots. In a study of ceramics from Northwest Argentina dating from the first millennium AD, Benjamin Alberti (2007, p. 211) argues that it would be a mistake to assume that the pot is a fixed and stable object, bearing the imprint of cultural form upon the “obdurate” matter of the physical world. On the contrary, evidence suggests that pots were treated like bodies and with the same concern: namely, to compensate for chronic instability and to shore up vessels for life against the ever-present susceptibility to discharge that threatens their dissolution or metamorphosis. The living body, likewise, is sustained thanks only to the continual taking in of materials from its surroundings and, in turn, the discharge into them, in the processes of respiration and metabolism. Things can exist and persist only because they *leak*: that is, because of the interchange of materials across the ever-emergent surfaces by which they differentiate themselves from the surrounding medium. The bodies of organisms and other things leak continually; indeed, their lives depend on it. Precisely this shift of perspective from stopped-up objects to leaky things distinguishes the ecology of materials from mainstream studies of material culture.

MINDING MATERIALS

Where, then, does such an ecology leave the mind? Should we, as Chris Gosden (2010) urges, do away with the concept of mind altogether? Or can we retain an ecology of mind, as Gregory Bateson (1973) thought, alongside and complementing an ecology of substance, the first dealing with information, the second with the exchange and circulations of energy and materials? Drawing inspiration

from Bateson, cognitive theorist Andy Clark (1997, 2001, 2010; Clark & Chalmers 1998) has charted just such a way forward in his theory of the “extended mind.” In a nutshell, the theory postulates that the mind, far from being coextensive with the brain, routinely spills out into the environment, enlisting all manner of extrasomatic objects and artifacts in the conduct of its operations. It, too, is a “leaky organ” (Clark 1997, p. 53) that mingles with the world in the conduct of its operations. Thanks to this leakage, the world becomes a kind of “distributed mind” (Jones 2007, p. 225).

For many archaeologists, the theory was a godsend, because it implied that in their studies of material culture researchers could contribute directly to understanding the cognitive processes of people in the past (Malafouris & Renfrew 2010). As Lambros Malafouris (2004, p. 58, original emphasis) argues, if we acknowledge (with Clark 1997, p. 98) that cognition is fundamentally a means of engaging with the world—if, in that sense, cognition is indissociable from action—“*then material culture is consubstantial with mind.*” But why should people think with the artifacts of material culture alone? Why not also with the air, the ground, mountains and streams, and other living beings? Why not with materials? And if cognition is indeed enacted, as Malafouris (2004, p. 59) claims, then how does it differ from life itself? Does thought lie in the interactions between brains, bodies, and objects in the world, or in the correspondences of material flows and sensory awareness by which, as Deleuze & Guattari (2004, p. 454) put it, consciousness is the “thought of the matter-flow” and material “the correlate of this consciousness”?

Yet we might still suppose that a fundamental difference exists between things and thought. The difference comes down to the question of durability. Olsen (2010, p. 158) offers the following as simple statements of fact: “Things are more persistent than thought. They evidently last longer than speech or gestures. Things are concrete and offer stability.” Every one of these statements, however, could be challenged. What lasts longer: a thought,

a gesture, a spoken word, or a handful of leaves thrown up into the air? The question is unanswerable, since neither thoughts, nor gestures, nor spoken words, nor even things are discrete objects strung in time like a string of beads. Rather, thinking is a process that carries on, as do movement, speech, and the materials of which things are made. Joshua Pollard (2004, pp. 51–53) describes how contemporary environmental artists have challenged our assumptions about the durability of things by producing works that are transitory and ephemeral. For Andy Goldsworthy, for example, the strength of a work lies in the “energies” emanating from materials in their movement, growth, and decay and in the fleeting moments when they come together as one (quoted in Friedman 1996, p. 10). My aim in this review, like Goldsworthy’s in his art, has been to bring the materials back in. With Barad (2003, p. 803), it has been to give “matter its due as an active participant in the world’s becoming.” What perdure are the materials of life, not the more or less solid and inertial forms they throw up. Artifacts and monuments

DEFINITION OF TERMS

Artifacts: objects thought to be made rather than grown

Body: a dynamic center of unfolding activity, rather than a sink into which practices are sedimented

Hylomorphism: the doctrine that making involves the imposition of preconceived form on matter

Materiality: (a) the “brute materiality” of the physical world; (b) the ways this world is appropriated in human projects

Materials: matter considered in respect of its occurrence in processes of flow and transformation

Nonhumans: often used as an alternative for “made objects” or “artifacts”; nonhumans should also include living organisms of all kinds

Objects: completed forms that stand over and against the perceiver and block further movement

Things: gatherings of materials in movement, as distinct from objects

are the cast-offs of history, but materials, to recall Barad’s (2003, p. 821) summation, are “ongoing historicity.” Materials are not *in* time; they are the stuff of time itself.

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