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Tools, Agency and the Category of *Living* Things

Summary: Humans and other animals attribute the qualities of living matter and agency to what we call tools and other cultural objects. In both cases a paradox may arise when autonomy is attributed to the object at the same time that it is recognized that its life-like characteristics are motivated by human actions. Nuaulu people in eastern Indonesia describe many kinds of objects as having the qualities we might otherwise reserve for biological organisms. They also distinguish entities that have many of the qualities of life but which ordinarily have no corporeal existence (spirits). While all cultural objects are potentially regarded in this way, in practice some objects are more alive and have more agency than others. I argue that part of the problem with existing anthropological treatments of the category *living things* is that they are either logical extrapolations through polythetic extension or based on formal taxonomic deduction/induction (ethnoscience). Using examples of meat-skewers, outboard motors, coconut graters, and sago-processing devices, together with certain *peripheral* forms of biological life, I demonstrate how Nuaulu ideas of what is animate and agentive are always fuzzy and contingent, and that by combining data from different kinds of ethnographic context, using different elicitation procedures, a more complex picture emerges.

> Human cognition, it appears, is handily eclectic. (Atran 1990: 78)

1 Introduction: thinking like a dog

I never cease to be amazed and intrigued by the way in which certain animals respond to humans using tools. Let me give two very specific examples from my own domestic life. When I am brushing away ashes in the fire hearth our border collie will snap at the brush, but only when I am using it. As soon as the brush is put down, and my hand withdrawn, and the brush is completely inert, the snapping and barking ceases. Similarly, when I am outside – let us say – raking autumnal leaves, the collie will snap and bark at the rake, but as soon as the rake is put down it becomes completely disinterested and wanders off. The dog also reacts to wheelbarrows and tractor mowers in a similar way, and bites at the wheels, consistent with the widely reported canine 'grab-bite' predatory behaviour pattern (Coppinger and Schneider 1995: 27).

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What is interesting about this observation is not simply the phenomenon itself (a characteristic of the breed), but a paradox that lies at the heart of our wonderment at the dog's perception and comprehension. It is a relatively uninteresting inference to say that when the tool is moving the dog responds to it as if the tool were animate. What is more interesting is to note that the tool becomes animate because it is attached to me. The dog knows me well enough and does not bark and snap when I am not raking or brushing, or whatever – only when the activity involves certain kinds of tool that interact with the ground. Thus, it does not happen when I am, say, using a hammer, or working at a bench. So, why, when the dog does not react aggressively to me normally, does it do so when I am using certain kinds of tools in a particular way? One possible explanation is that the dog responds to the rake or brush because it thinks it is an independent organism, and because of its close proximity must be threatening me. The collie has reverted to guard dog mode to protect me, responding to the rake or brush as if it were a recalcitrant sheep. So although it can see that I am the agent moving the rake it responds to the rake as though it was independent and itself had agency.

Can we therefore conclude that the dog is confused? Of course, not all animals respond in this way in such situations, certainly not all species and or most breeds of dog. Collies are trained as guard dogs to herd animals, and their behavioural features have been selected by humans, and cultivated to encourage such behaviour. However, quite apart from the puzzle of canine perception and understanding that this raises, both the general observation that animals other than humans can attribute the qualities of living matter and agency to what we call tools or affordances, and the specific paradox concerning the simultaneous attribution of autonomy to the tool and the visual evidence that it is motivated by a human, are, I think, relevant. We can conclude that both humans and other animals attribute the qualities of living matter and agency to what we call tools and other cultural objects. And in both cases a paradox may arise when autonomy is attributed to the object at the same time that it is recognized that its life-like characteristics are motivated by human actions.[1]

My account of the interaction between dogs and human tools is relevant to anthropological debates about the differences between human cognition of living and non-living things (e.g. Atran 1990). Nuaulu people in eastern Indonesia describe many kinds of object as having the qualities we might otherwise reserve for biological organisms. They also distinguish entities that have many of the qualities of life

1 It may be that dogs behaving in this way are responding to a *key stimulu*s, an old ethological concept that refers to specific stimuli that have the potential to release a specific behaviour (modal action pattern). The rapidly moving stimuli of the kind described here release the predatory behaviour, more effectively in collies and in particular dogs. In some cases this behaviour can become stereotypical (obsessive-compulsive) and therefore abnormal. In such cases what we see has little to do with seeing/perceiving directly, but rather reflects the brain's sensitivity to certain stimulus configurations.

but which ordinarily have no corporeal existence (spirits). While all cultural objects are potentially regarded in this way, in practice some objects are more alive and have more agency than others. I argue here that part of the problem with existing anthropological treatments of the category *living things* is that they are either logical extrapolations through polythetic extension, or based on formal taxonomic deduction/induction. Using examples of meat-skewers, outboard motors, coconut graters, and sago-processing devices, together with certain forms of *peripheral* biological life such as slime fungi and algae, I shall try to demonstrate how Nuaulu ideas of what is animate and agentive are always fuzzy and contingent, and that by combining data from different kinds of ethnographic context, using different elicitation procedures, a more complex picture emerges.

2 Tools, machines, and engines

Nuaulu people of eastern Indonesia provide us with plenty of examples of tools that might be said to have agency, but not all tools are the same. They attribute to many kinds of object the qualities that we might otherwise reserve for biological organisms, and although I have continued unashamedly to describe Nuaulu as *animists* despite the nuanced theorising of the ontological turn in anthropology, I do not have in mind here simply practices that we might formally understand as *animism*. Nuaulu do not animate every inanimate thing in their environment, all of the time. Neither by describing Nuaulu as animist do I mean that they exclusively resort to what Descola (2005) would understand by an animist ontology. Totemic, analogical, naturalist and animist *ontologies* are all available to Nuaulu, who like many people resort to each and all as and when the context makes them appropriate. I think we need to resist turning these important cognitive and representational distinctions into a mechanical typology. However, in examining the case of tools it is impossible to avoid notions of *animation* wherever we find the property of physical motion.

Tools have been classified in many ways, but here it helps to distinguish between: (a) tools that once made do not move (e.g. a fence or a stake in a pit trap), and (b) tools that move when activated by the human body and are often characterised ergonomically or in terms of physiological mechanics as an extension of a body part. These would include a hammer, sago pounder, or the fire hearth brush that featured in my opening example of dog-human interaction. Type (c) tools are those having simple moving parts that relay energy released by initial human motion, such as the Nuaulu sago flour extraction device, a treadle-operated coconut grater, or a hand-held string-making apparatus. These are effectively 'machines', or 'tended facilities' (Oswalt 1976) using mechanical power, having several parts for performing a particular task. Finally, there are (d) tools that are also machines in the sense outlined but that run on stored energy, and do not require continuous human inputs, only

initially to prime them or to add fuel. In the Nuaulu material universe these might include clocks, trucks, chainsaws, or outboard motors. We would usually describe these as *engines*, in that they each convert energy into useful mechanical motion. Let us now examine Nuaulu examples of each of these.

A common type (a) tool would be, as I have indicated, a fence or a pit trap stake. Although Nuaulu might in theory attribute some independent agency to either of these under certain circumstances, I have no examples of this ever being the case. A more interesting example would be a meat-skewer or *asunaete*. These are made of wood or bamboo and used in the preparation and transport of meat, but they are also a material instrument facilitating communication between the living and ancestral spirits. Thus, after a wild pig has been killed it will first be singed to remove most body hair near to the place where it was caught and before returning to the village. A fire is lit and a wooden stake cut to serve as a skewer to manipulate the carcase. A chip (*kakomate*) from the skewer – representing its soul or spirit – is placed inside the belly of the pig, removed after singing and re-united with the *asunaete*. The pig is butchered by first stripping out the lower jaw bone (*penesite*), throat and lungs. After the pig has been butchered, the skewer will be stuck in the ground and the throat and lungs (the organs of breathe) attached to the top as an offering to ancestral spirits, before being taken back to the village. A similar skewer (*asunaete marane*) is used for marsupial cuscus of the genera *Phalanger* and *Spilocuscus* that are the most frequent species hunted by Nuaulu (Ellen 1996). In this case, however, the skewers are not used to remove the fur through singing and do not have the organs of breathe tied to them. Instead, having served their purpose in cooking and for transport they are stuck into the ground and the chip initially removed to make the spike is re-attached to the skewer. The soul is thus re-united with the body, and it is believed that the spirit of the cuscus will return in another body, which will be eaten again. Thus, the *asunaete* has a simultaneous purpose of skewering the meat, roasting it or carrying it, but by virtue of this role also ensures that the spirit of the animal returns to the cosmos to sustain the population of cuscus for further hunting (fig. 1). *Asunaete* for the four different kinds of cuscus are differentiated by the presence or absence of notches, or the number of notches on the skewer. The skewer for *mara kokowe* (male *Phalanger orientalis*) has no notches, while that for *mara osu* (female *Phalanger orientalis*) has one or two notches. Thus the *asunaete* works in a similar way to the Huarani blowpipe,

> being a regulatory instrument inserted in webs of systemic relations through which the reproduction of society (Rival 2013: 97)

is effected through the reproduction of the cuscus population.

Fig. 1: Series of *asunaete*: cuscus (*Phalanger*) skewers planted as an offering to ancestral spirits; June 1970

Type (b) tools conform to our prototypical notion of what a tool should be, and readily fit the idea of tool as prosthesis, as an extension of the living human anatomy, moving with the body and sometimes even resembling human body parts: for example a sago pounder. But while tools become animated by virtue of being extensions of the human body, this – unlike the case of dog-brush interaction in my opening example – is in itself insufficient to make them *animate* in the sense understood by animism. Most Nuaulu tools, most of the time, are not attributed with animacy. However, some are more likely to be, and we need to identify what the conditions might be to satisfy this condition. In the first place, these conditions relate to the kind of subsistence activity with which they are connected. Thus, hunting (and in a previous era warfare) are high-risk activities in which supernatural support can make a difference. Secondly, some technologies are less under the continuous control of an operator. A bamboo pounder never leaves the hand that holds it during the actions entailed in pounding sago pith. However, arrows once they leave the projectile release mechanism we call a bow are subject to a variety of hazards over which the archer has no direct control: wind, movement of the prey, or of objects intervening between the hunter and his prey. In this situation, to attribute an arrow with agency and to make a preliminary offering to its embodied spirit to ensure its effectiveness in flight makes sense. However, in addition to such technological contexts, there is a category of tools that are always regarded as fully animate because of their simultaneous status as ritual objects. In the first place, any tool or other artefact that has been used in ritual becomes sacred and cannot be disposed of, being stored until it disintegrates in the smokey lofts of clan houses. But there are other ritual objects, such as shields nowadays used only in ceremonial contexts (Ellen 1990). Most of these are not subject to special ritual

attention, but others are produced and stored with anthropomorphic regard under controlled ritual circumstances. They well illustrate Gell's (1998: 230–231) notion of 'objectified personhood' through deferred or abducted human agency, existing both 'objectively', and subjectively as persons. But not only are there sacred shields but also sacred spears and baskets (Ellen 2012) and other objects, all of which are exemplary instances of each kind of tool. To have all baskets, spears and shields accorded special respect would be inconvenient, but to have just some objects in a given category with sacred agency is sufficient to make the point. The logic here is similar to the totemic logic prohibiting one species within a category of potential food animals or plants, the rest of which can be eaten (Ellen 1998: 254–255).

The third category of tool (type c) contains those with moving parts, and those that I will discuss here are the sago flour extraction apparatus and the treadle-operated coconut grater. Although like type (b) tools they are in a sense, like any tool, an extension of the body, part of the extended phenotype, they are so in a less obvious way and rather than simply being a specialized extension to a limb, such as a sago pounder, the relationship between tool and person is more complex, the body and apparatus entwining in each other holistically. This appears to be the case for many tools that we describe as machines, and we need to examine whether it makes a difference when attributing agency or animacy. The first of these two cases (fig. 2), what Nuaulu call the *aha*, is a device of great antiquity and of wide distribution in the Moluccas and New Guinea, used for separating starch granules from pith residue. The apparatus consists, basically, of two troughs made from sago leafstalk resting on a frame, in which one – the input trough or *sihane* – overlaps with and is slightly higher than the lower (*solo-solo*) output trough. Attached to the overlapping end of the *sihane* is a filter mesh (*nunte*), usually of stitched coconut fibre matting, which acts as a semi-permeable membrane. The upper part of the membrane is attached by string to a flexible sapling that acts as a spring-loaded assembly (*hehune hatai*). As water flows into the upper trough, the resulting mulch is pressed against the filter with one hand and the string pulled down with the other. Because of the flexibility of the sapling the membrane automatically retracts, enabling further compression of the mulch, and is ready for the operator to press once more. Thus, the latent energy produced by the bent sapling assists the process of efficient filtering. There is a process of complex bodily engagement between the individual and the apparatus. Here the tool is not simply motivated by the arm, but in a process initiated by the operator, actually collaborates in the process of filtering in a multifunctional kind of way (Ellen 2004). This is such a common and culturally embedded technique that Nuaulu seldom reflect on its mode of function. As far as I know, it is never described in terms that would lead to an understanding that it is anthropomorphized, though the success of the processing activity is routinely ensured by making a small offering to the ancestral spirits who own the sago, consisting of tobacco, *Areca* fruit and betel pepper fruits wrapped in a leaf, and tucked into a convenient joint in the apparatus.

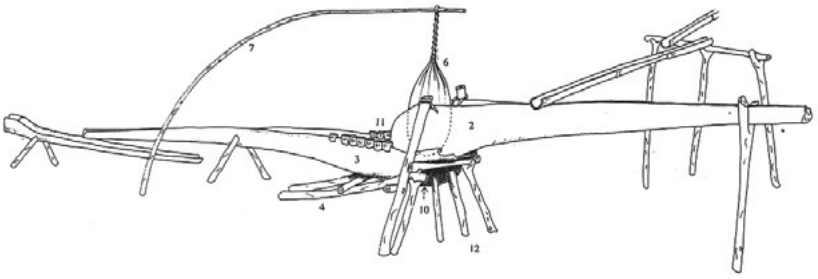

Fig. 2: *Aha*, Nuaulu sago-processing apparatus

By contrast, the rotary action treadle-operated coconut grater (fig. 3) is of relatively recent introduction, and is perhaps no older than the late nineteenth century, part of a new technological repertoire associated with an increase in the planting of coconut palms for commercial copra production, and an increase in oil production for local consumption. The operator (usually male) presses the treadle with one foot, which pulls a string that rotates a cutting head, first in one direction and then in the other, using successive actions on the treadle. The head is made of wood in which metal cutting blades are embedded, and this assembly is attached to a spindle at waist height. As can be seen from fig. 3, the action – like the sago flour processing apparatus – requires engagement with the whole body. To my knowledge, there are no associated ritual practices, though in several technical respects the treadle-operated coconut grater is comparable to the much older sago-washing device.

Fig. 3: Treadle-operated *coconut grater*, Rouhua village, Seram; December 1970

Finally, there are type (d) tools, machines driven by a non-human source of power, which in the historical experience of the Nuaulu consist of devices reliant on steam power, diesel, or petrol. These have been familiar parts of the Nuaulu world for over a century, with steam and diesel driven boats, and power-driven ban saws used in timber yards. The internal combustion engine found in trucks and generators, mainly became familiar along with aircraft during the Second World War, and through increased travel to Ambon and other islands. With independence the road system deteriorated and most devices with engines were out of the reach of most people in rural areas of Seram. As the economy grew under the New Order, so Nuaulu became more familiar with road vehicles, tools such as chainsaws, and especially the outboard motor, the ubiquitous and eponymous *motor jonson*. Outboard motors became common with local fisherman and small scale traders during the 1980s, though being essentially forest-oriented Nuaulu have acquired them only recently. What is relevant to our discussion here is that Nuaulu treat outboard motors as essentially animate and motivated by a spirit even though some have a good knowledge of the practicalities of how they work. Nevertheless, when they go wrong, as they often do, Nuaulu will, after physical inspection and adjustment, make offerings and invocations to get them moving. These offerings are basically no different from those that they might offer before hunting, or tuck into the joints of a sago processing apparatus. I was first introduced to this practice by a chance observation of Rosemary Bolton of Nuaulu 'feeding an outboard motor' in 1996. Up until that time no Nuaulu of my acquaintance had owned an outboard motor and I was determined to follow through on the observation. To some extent this fits in with existing ritual practices relating to outrigger canoes and other sailing craft found in central Moluccan waters, that are anthropomorphized and subjected to life-cycle rituals and rituals at various stages in their manufacture (Ellen 2003: 161f.). However, the outboard motor confers new properties to the vessel, namely a source of propulsion independent of human bodily action. While this has obvious technical advantages, it has the disadvantage that the operation of the vessel is less under the control of the crew. In a sailing boat, the crew can appeal to the spirits of the wind and may encourage them to blow by supplication in the form of banging gongs or similar metal objects. This is not possible with a *jonson*, and it is hardly surprizing that the crew seek to maximize the forces working in their favour when the risk is increased.

In making ontological sense of these machines and the practices that accompany them it is also relevant that outboard motors and sago-grating machines, move, whirr, hum and get hot when they are used. Moreover, tools that have a quasi-independent existence in not needing to rely on continuous human manual power also resemble biological life in their capacity to *die*. Paul Taylor (1990: 49) in his componential analysis of biotic forms claims that Tobelo define life as anything that has the capacity to die, and there is something paradoxically potent in this definition. Nuaulu speaking of an outboard motor that has just spluttered to a standstill having run out of fuel will say *mataenya* – 'it is dead', just as we would use the same word to describe a malfunc-

tioning vehicle or power tool. Interestingly, Bloch (1998: 48) notes that Zafimaniry speak of life in relation to entities as diverse as clouds, quartz and motor engines, and use *maty* (an Austronesian cognate of Nuaulu *matae*) for almost anything that breaks down. So, the attribution of the qualities of life to engines is hardly unique to the Nuaulu, and in Western societies too these same properties encourage modes of behaviour, emotion and linguistic expression that are wholly comparable. The point I want to make is that in these various attitudes concerning the degree to which tools have animacy, agency or intentionality reveals an underlying pan-human tendency. We all anthropomorphize tools (especially Western males) to the extent that some, such as cars, might be said to be fetishized (Miller 1987: 85–108). We develop an intimate relationship with them that can involve by turns love and anger when they do not perform as expected. Who has not shouted at a printer for breaking-down when racing to meet a deadline – an example that Alfred Gell (1998) has felicitously explored – notwithstanding a clear distinction between intentional persons and inanimate things in dominant Euro-American ontology. Many of you will know the famous scene in *Gourmet Night*, an episode of the British comedy show Faulty Towers, in which Basil (John Cleese) attacks his mini car that has mechanically failed while delivering food from a local restaurant to the hotel. Here is the dialogue to remind you:

> Come on! Start! Start, you vicious bastard! Come on! Oh, my God! I'm warning you! If you don't start I'll count to three. ... One two three right! That's it! I've had enough! You stalled just once too often! Right! Well, don't say I haven't warned you! I've laid it on the line to you time and time again! Right! Well, this is it! I'm gonna give you a damn good thrashing!

We laugh at this because we see in Basil's behaviour an exaggeration and mocking of our own attempts to interact with tools, where there is a clear dissonance between our rational techno-scientific selves and the more intuitive compulsion to treat an object as if it were biological and willful.

3 Life as a taxonomic category

I think I can fairly claim that Nuaulu ideas about animacy, are – like our own – generally fuzzy and contingent. However, if we look at scientific definitions there have been repeated attempts to define the boundaries of living matter and what this might imply. These approaches come from philosophy, developmental/cognitive psychology, twentieth century anthropology and particularly ethnobiology or ethnoscience. Let us start with the ethnoscience model. Brent Berlin (1992) describes the concept of 'living things' as a 'unique beginner' in a general taxonomy of biological organisms. For example, Taylor (1990) in his work on Tobelo ethnobiological classification uses a strict componential form of semantic analysis. Quite reasonably, he begins by indicating that Tobelo distinguish living from non-living, defining the former (as we have

seen) as entities with the characteristic of being able to die. But rather than talk of living things he uses the term 'biotic forms', which he then says are divided-up by Tobelo into 'sexual biotic forms' that contrast with four other groups at the same taxonomic level: coral, sponges, fungi, and (a single category) 'moss, mould, bryozoans, small algae'. 'Sexual biotic forms' are in turn divided into 'breathers' and 'non-breathers', the latter exemplified by seaweed and black coral, and the former by fauna and flora (fig. 4).

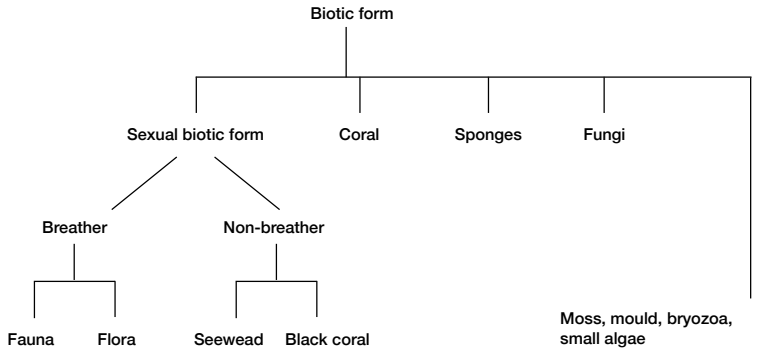

Fig. 4: Tobelo taxonomy of 'biotic forms' based on semantic componential analysis

Edmund Leach (1964) approached the issue in a different way, but with much the same result. Leach makes no reference to ethnoscience literature, and would probably be scathing in his dismissal of it if he had. Instead, he adopts a kind of logical formalism derived from Lévi-Strauss and Mary Douglas. The main problem with Leach, however, is not his underpinning theory, but his methods, or lack of them. The diagram in fig. 5 is drawn from Leach's imagination, augmented by his knowledge of the role of certain oppositions and notions from English popular culture and sacred texts. Leach uses the category 'nature' in a way that he has presumably derived from Lévi-Strauss, though he is sceptical of naive dualism and ambiguous on the universal proclivity of the nature-culture opposition (e.g. Leach 1972; 2000). Nature is, therefore, not the same as 'life' or 'living organisms', or even less Taylor's 'biotic forms'. He divides 'nature' into animate and inanimate, though we are left to speculate whether this means that the category 'inanimate' includes some living organisms, most obviously plants. His category 'animate' (lexico-logically) applies only to animals, given that it is then sub-divided into warm-blooded and cold-blooded. However, although I have often used Leach's folk-English scheme as a useful teaching example, it has always struck me as highly problematic. Not only does it suspiciously provide a convenient taxonomy of all living things that fits the logical conventions of a taxonomic approach, but it conflates discourses that we know to be separate, and flies in the face of ethnographic evidence. Unfortunately, 'living things' is a category that is easily

yielded using formal elicitation techniques, but it is less obvious once you aggregate data from different ethnographic contexts using different research procedures.

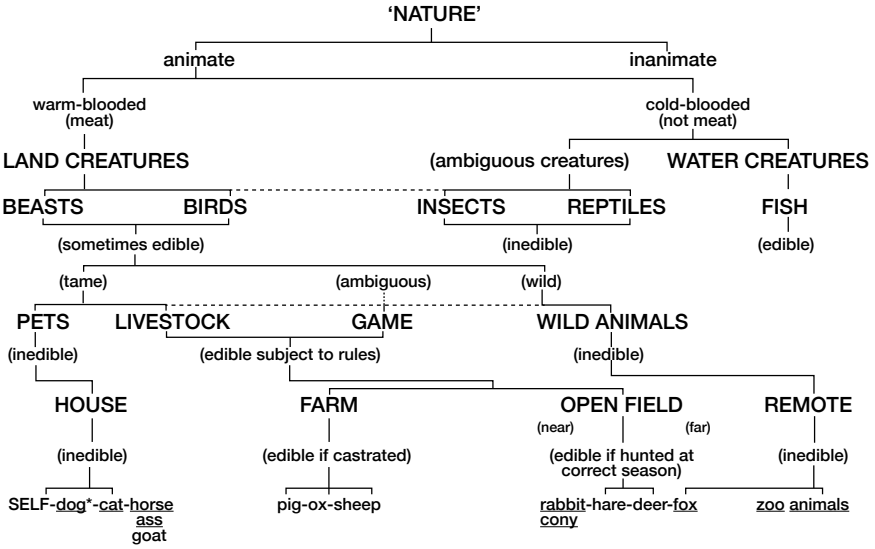

Fig. 5: Edmund Leach's (1964) version of the English classification of nature

Possibly because of the pitfalls in defining it, or in order to avoid the problems of using it as a unique beginner in a taxonomic description, many accounts of ethnobiological classification simply avoid considering what is meant by a 'living thing', and simply get on with the business of describing categories within the separate plant and animal domains. This approach is adopted by Hunn (2008) in his recent Zapotec natural history, and not even Berlin (1992), who while adopting the over-riding rubric of 'ethnobiological classification' and dwelling on the formal criteria for establishing 'folk-kingdoms' of (often nomenclaturally covert) plants and animals, is interested in considering the unique beginner that might define the domain of 'living things' overall. Such approaches, however, logically (that is inferentially or syllogistically) assume that 'living things' must exist as a categorical phenomenon. Thus, if plants are living things and animals are living things, then there must be a superordinate or more encompassing category that both belong to. But this definition assumes that we are only dealing with what might be conventionally understood as 'biological taxa'.

For an example of an early ethnoscience analysis of the category 'living thing' which, unlike the example imagined by Leach, is based on real ethnographic data, we can do no better than look at a paper published by Mary Black in 1969 on the Ojibwa category '/bema.diziwa.d/'. This Black describes as the 'head-term of the taxonomic universe' and it indicates just how complex the concept can be in a particular local manifestation. Black uses a classic lexicographic distinctive feature

approach. In her table 1 (1969: 186) 'living things' are divided into 'indians', 'white people', 'negroes' and 'asiatics'; and in another context into 'large animals', 'insects' and 'other'. In her table 2 (1969: 177) 'living things' are divided into 'human', 'large animals', 'small animals', 'birds', 'fish', and 'spirits'. And we might recall here that Hallowell (1960) sees Ojibwa spirits as ontologically 'nonhuman persons'. Moreover, '/bema.diziwa.d/', depending on informants, sometimes also includes 'trees', 'stones', 'leaves', 'berries', 'shells', 'sun' and the 'moon' (1969: 178). Well aware of the problems of confusing category with label, Black explains that choice of label here depends on 'context and type of contrast or relation'. They are taxonomically homonymous – sometimes just people, sometimes all living things. So, in Black's understanding of Ojibwa ontology, 'living things' may be biological taxa, human 'racial' groups, spirits or astronomical entities.

4 Comparing biological and non-biological classifications

Although we might now dismiss some of the formal approaches discussed above as methodologically naïve, they do seem to point at some interesting similarities in the way in which the cultured mind makes sense of domains as diverse as biodiversity, human groups, the spirit realm, and other *natural kinds* such as minerals. Sixteenth and seventeenth century European natural history routinely incorporated minerals as *natural kinds*. Early attempts to systematically describe the 'mineral kingdom' and related entities 'dug out of the earth' often followed closely the organization of local floras (Cooper 2007: 87–115). This approach was hardly novel even then. Rumphius in his *Ambonese Curiosity Cabinet* (1705 [1999]) follows Pliny who discussed minerals in his *Natural History*. Rumphius juxtaposes descriptions of species of crustacea, echinoderms, coelenterates, seaworms, molluscs, cephalopods, stones, metals, minerals, gemstones, concretions, and objects that come from animals and plants often used medicinally. Thus, a kind of crystal found in Ambon is named *Crystallus ambonica*, while *Amianthus ambonicus* is a variety of asbestos (1705 [1999]: 538). Also included are curiosities such as Mestica *sontong* (cuttlefish stones, 1705 [1999]: 531) and *Dendrites metallica* (small pieces of iron found in trees), or *Ambra grysea* (ambergris, the intestinal secretion of the sperm whale, 1705 [1999]: 499). Many of these objects are described using a version of the Latin binomial system. Then there are fossils such as *Cancri lapidescentes* (said to live under water but petrify when removed), and prehistoric tools and weapons. In such schemes fossils provided both a link with living biota and a problem. The idea that stones might reproduce, as Theophrastus had suggested in his *On Stones*, had still not been entirely repudiated. Following Rumphius, Linnaeus too attempted a 'taxonomy' of mineral 'species', and in the tenth edition (1758–1759) of the *Systema Naturae* proposed 4 'classes': Petræ, Mineræ, Fossilia and

Vitamentra. Such classifications and attempts to integrate minerals in a more general taxonomic approach to natural history were eventually abandoned, superseded in global science by different arrangements based on chemical composition. But as both the history of science and the comparative ethnographic record attest, there have been repeated attempts since to integrate various domains of natural history knowledge (Atran 1990: 78), but generally resulting in the confrontation between irreconcilably different organising principles. The same thinking has been extended to the humanly-made world of artefacts. Drawing his inspiration from Berlin's work on the universal features of folk ethnobiological classifications, Brown (Brown et al. 1976) claimed to find the same formal features of taxonomy in the organization of other domains, including both human artefacts and spirits, referencing also the work of Frake (1961, on disease categories) and Spradley (1970, on social categories). Brown concludes that 'principles originally attributed solely to biological classification (1976: 73) extend beyond biological and perhaps even beyond taxonomic classification' (1970: 84). He has in mind hierarchic depth, class contrast and inclusion, partonymy, and how nomenclature relates to category level. We can see some of these features in his rendering of American English tool taxonomy (fig. 6).[2]

Hierarchic level	Taxonomic rank	Term status	Nomenclatural
L0	UB	tool	PL
L1	lf	hammer	PL
L2	gn	hammer	PL
L2	gn	ballpeen hammer	PPL
L2	gn	sledge hammer	PPL
L2	gn	mallet	PL
L1	lf	vice	PL
L2	gn	clamp	PL
…			
L1	gn	saw	PL
L2	sp	sabre saw	SL
L3		crosscut saw	
L2	sp	regular screwdriver	
And so on …			

Key: UB = unique beginner, lf = life-form, gn = generic, sp = specific;
PL = unanalyzable productive lexeme, PP = productive primary lexeme,
SL = secondary lexeme, UPL = unproductive primary lexeme.

Fig. 6: American English *tool* taxonomy

2 In considering the ranks in non-biological domains Brown is content to employ the term 'life form' for level 1, though without flagging-up any sense of irony. Of course the *generic* level, like many concepts employed in Western scientific and other folk classifications of living things, frequently reflect social categories (genus, family, tribe …), echoing another broadly understood principle, that is how – of necessity – we use social categories to make sense of the natural world and non-social categories to make sense of nature, e.g. Lévi-Strauss 1966. The relationship between tool and organism displays the same conceptual mutuality, one domain being used to explain the other. Consider, for example, Aristotle's use of 'organon' in his natural history, and the long post-Aristotelian tradition of explaining animal function using mechanical analogies, e.g. Smith 2011.

In addition to treating certain tools in a *life-like* way, Nuaulu distinguish entities that have many of the qualities of life, but which in the ordinary way have no corporeal existence. Thus, Nuaulu – like many peoples – think of spirits as a kind of pseudo-organism and represent them as species-like entities that can be ordered in terms of family resemblances (Ellen 1993: 176–190), even if, as Boyer (1994: 97) argues, their conception as such violates the intuitive principles that some psychologists (e.g. Keil 1979) have demonstrated for the domain-specificity of living kinds. Because spirits have these qualities they are sometimes also attributed with corporeal manifestations: they become birds, or lizards, or indeed certain animals may always be regarded as the physical manifestations of spirits, such as scarab and long-horned beetles, or the death adder (*Acanthophis antarcticus*). In a way this is not surprizing, since we can only imagine the spirit world through our experience of the physical and social world. It was difficulties of this kind – both ontological and epistemological – that pre-occupied Scott Atran in much of his *Cognitive Foundations of Natural History* (1990). For Atran there is only a superficial similarity between biological and non-biological domains, 'living things [... being ...] everywhere ranked into transitively structured taxonomies, with no other natural-object domain so structured' (1990: 47). In concluding thus he draws on the support of field experiments in child psychology (1990: 50) and the work of Keil (1979). Keil has argued that children possess an ontological category of living things that includes animals and plants, allowing Atran (1990: 73 f.) to claim that young children 'categorically distinguish artefacts from living things' and come to presume that only the latter constitute 'natural kinds' with underlying essences, while limiting certain concepts (such as growth) to living things. For Atran (1990: 5) there is a significant contrast both in regard to the 'ordinary categorization of artefacts and the extraordinary scientific classification of living kinds'. Thus science is based on a kind of universal ethnoscience in which 'our universally held conception of the living world is both historically prior to, and psychologically necessary for, any scientific – or symbolic – elaboration of that world' (1990: 13).

As well as using experimental data, Atran (1990: 55–57) argues his case on formal logical grounds assuming this to be a universal grammar. Thus, *furniture* cannot be part of the definition of *chair*, although *animal* is part of the definition of *cat*. Transitive hierarchy, he therefore reasons, works for living kinds but not for artefacts, because the domain of artefacts fails to meet the inductive and deductive requirements of ranked taxonomies. Biota, like artefacts are often placed in different categories (whether we call these taxa or not), and although he recognizes that people often 'confound' artefacts with living kinds and 'confuse' plants with things made from plants, the underlying field structures are quite different. But one reason that artefacts are not conveniently organized taxonomically is because Atran has defined taxonomy in such a way that it can only be used for biota (1990: 57). If we are to argue on the basis of logical formalism, then we might forgive ordinary people from deviating from it in the practices of their ordinary lives. No wonder Atran (1990: 71) dismisses that work in developmental psychology (e.g. Carey 1985; see also Gelman 2003)

that shows that children will spontaneously attribute a common invented property, a kind of underlying nature, to dogs, flowers and inanimate objects. Such theories and data tend to support the idea of the integration of domains of knowledge, and of fundamental ambiguity in the concept of *natural kind*.

5 The body, social cognition and the limits of modularity

While we may still wish to argue that there are special features in ethnobiological classifications that distinguish them from the organization of other domains, I would argue that this has less to do with the cognitive apparatus brought to bear on them than the pattern of empirical discontinuities found in a particular ecological context. Similarly, the mind cognizes tools in the same way as living organisms partly because of a shared cognitive architecture, but also fundamentally because our models of apprehending and thinking about the world derive from our own bodily experience, and from the social worlds of which we are part. It has long been recognized that at the core of human cognition is a necessary duality and tension whereby humans understand the natural world through their experience of society, and the social world through their experience of nature (e.g. Lévi-Strauss 1962). This is why despite repeated attempts to counter naive dualism and challenge the culture-nature divide, the divide keeps on re-emerging (Leach 2000: 340; Astuti 2001). Thus, there is a general tendency in human relations with the inanimate world to attribute and represent that world in organic terms, and to attribute inanimate objects with the properties of living things (Ellen 1988). It happens because we are bound to model our world directly on our experience of our own body (Mauss 1934) and we employ this self-same model as a source of labels and concepts to interpret the world outside the body. The lexicon of animal parts is, after all, for the most part that of human anatomy. Botanical nomenclature is less so, and that of inanimate objects less still, but body terms – or at least terms that appear concurrently in anatomical lexicons – are still crucial (Ellen 1977). More than this, if we *thingify* or *entify* parts of a living system, and then observe that the things move, so to speak, it logically follows that the things may well be regarded, or spoken of, as if they were sentient beings; they will appear as though they were indeed animated. Thus, phenomena that have life are turned into objects, only be re-animated in turn (Ellen 1988: 223). The organic models we use vary along a continuum from general organic analogies (organomorphs), plant analogies (phytomorphs), animal analogies (zoomorphs), general human analogies (anthropomorphs), and the attribution of particular personalities (personification) (1988: 224). It is as if the mind progressively *enlivens* non-living entities, and humanizes other entities in which it recognizes life. I have elsewhere illustrated this point in relation to the personification of sacred shields that Nuaulu attribute with soul (*nemati*). The

shields and other sacred valuables (such as sacred spears or barkcloth beaters) are treated with reverence, anthropomorphically, granted personhood and have complex biographical histories, as reported for other parts of Indonesia (Ellen 1990, Hoskins 1998). When Viveiros de Castro (2004: 465) tells us that Amazonian beliefs attributing perceptual perspectives of the world to different species are connected with their belief that animals are *ex-humans*, this is not only an example of mythic legitimation but of how objects are treated as subjects and species as persons. We can see the same process at work when Carrithers, Bracken and Emery (2011) refer to 'the person-like character of a species' in conservation and taxonomic discourse and show how the 'axiom of amity' finds an afterlife in the same. At this point too even Atran seems to concede the point that 'because *humans* and *animals* are adjacent overlapping domains, then one might expect children to borrow from knowledge of *humans* to organize *animals* and *plants* '(Atran 1990: 74).

Because the role of the social world in the way we organize and understand nature is so entrenched in ordinary thought and discourse, this has been taken as good evidence that the faculties of social cognition have evolved in humans to eclipse other modules of knowledge (Mithen 1996); at some point in our evolutionary history the barriers between hitherto specialized intelligences distributed as quasi-separate neural networks in the brain – natural history cognition, intuitive physics and others – breakdown and merge with the hegemonic module of social cognition. Thus, if we are to understand those cultural behaviours we describe as *animistic* we must take into account a fundamental fact of human cognition: that we use social intelligence to make sense of the natural world. What we call *animism* is in a way the reification of multiple instances of such thinking, of repeated observations, reinforced by cultural elaboration into something approaching a coherent set of connected beliefs.

6 Organomorphism, motion, agency, intention

Thus, through the working out of the recent evolutionary history of the embodied brain, and polythetic linkage between different cognitive and semantic domains in any particular cultural population, we will find a group of things that are regarded as like life, or life-like. But in attributing the notion of *life* and more narrowly *animacy*, what features does the mind latch on to? The evidence of the previous section would suggest that we start with physical resemblance, especially since given our dominant sense of vision it is visually-salient attributes that first register and that are most easily encoded in memory. In other species it might be other senses that occupy this position, but even in humans these other senses can be critical in determining whether something is likely to be living. Imagine a world in which life is mainly apprehended and registered through the senses of sound or tactility (which we can perhaps imagine, especially if we are blind) or through smell (which we can only imagine with

difficulty). In reality, of course, our cognition of life is multi-sensorial and synaesthetic, but we must start with physical form. Some of the classic boundary problems of the category *living matter* are raised through an engagement with forms of life that do not fit easily into the cognitively universal (but not lexically-universal) prototypical categories of *plant* or *animal*, that are peripheral to biological life as most ordinary people experience it. Our different senses register different qualities on the life/non-life continuum, but combined offer a sufficiently discriminating instrument. In my work on Nuaulu ethnobiological classification fungi and algae are classic liminal forms (Ellen 2008). In the classifying and naming strategies that Nuaulu employ there is a tension between placing fungi with plants and according them their own separate *kingdom*, while seaweed is nomenclaturally aligned with fungi. The term *unate* refers to all visible fungi, with the exception of lichen-forming Ascomycetes; and is also applied to sponges (*unate nau moti*, literally, 'mushrooms of the reef'), and to all algal seaweed (*una nuae*), despite the first being phylogenetically Animalia and the latter either Plantae or Protista. All *unate* are marked lexically by the contracted prefix *una-* followed by an adjectival or other qualifier: for example, *una msinae* (red mushroom) for *Pycnoporus sanguineus*, or *una pate* (fig-tree mushroom) for *Trametes corrugata*. The broadly inclusive character of *unate* is in itself interesting, given that mushrooms as a phylogenetic grouping are extremely varied in shape, structure, colour, habit and reproduction. Since there can be considerable morphological difference, say between rigid shelf mushrooms or bracket fungi, fragile fleshy mushrooms and the highly salient coral mushrooms, we must assume that placing them together in a single clearly labelled category (whether 'mushrooms' or *unate*) must reflect some combination of cognitive prototype and common distinctive features. Not subsumed under *unate* are forms such as *Usnea*, a fruticose lichen which Nuaulu call *ahane*, and molds and mildew (which they call *rekunai*). Slime molds, which are not fungi, are given their own category as well: *sona*, literally 'sago jelly' which they are said to resemble. Freshwater and terrestrial algae are described as *mapunua* by Nuaulu and seen as related forms e.g. *lumu-lumu* (*Chaetomorpha javanica*) found commonly on trees. For Nuaulu all these forms are undeniably living, even though some seem to lack movement, others much evidence of growth, and others still a capacity for reproduction. Movement in the narrow sense is easily observable, growth less so, but reproduction in many cases has to be inferred. In most folk biologies while sexual biotic forms clearly reproduce, entities such as sponges merely endure.

So, by deliberately selecting liminal forms we can test the extent to which the notion of *life* applies, and if that test is passed whether such entities conform best to animal or to plant prototypes. But we also need to recognize that both these prototypes are in semantic tension, simultaneously sharing features and contrasting them. All living matter could be said to have both a vegetal and animalistic aspect, there being a *vegetal quality* especially found in plants, and an *animal quality* especially found in animals. This is why where certain peripheral organisms are placed in classificatory space varies between cultures, compared with the greater regulari-

ties reported for core plants and animals. But it is also reflected in the evolutionary convergence of forms that we might otherwise have no problem is assigning to one or other of the taxonomic kingdoms. Thus, for Nuaulu, certain plants have attributes of animals, such as the insectivorous pitcher plants (*koitipi*: *Nepenthes* spp.) found in the Manusela National Park, and certain animals the attributes of plants, as in various phasmid stick and leaf insects (*kau ai otoe*, e.g. *Platycrana viridana*). But in addition, we are constantly also primed to look out for what is potentially human in other parts of the living world, as we have seen from the previous section. We try to make things anthropomorphic, but while the basic attributes of morphology make this more promising in the case of, say, the Nuaulu marsupial cuscus, with its simian anatomy and multiple symbolic resonances (Ellen 1972), conservationists struggle to convince us of the humanity in the hapless pearl mussel (Carrithers et al. 2011).

In the attribution of life, and even more so of animacy in the sense of 'animality' (Reed 1988), morphological resemblance is not enough. As indispensible is motion, in all or any of its manifestations. Everywhere that liminal biological forms are attributed with animacy it is because in some way or another they display a characteristic that is semantically rooted in movement or its metaphorical extension, such as *locomotion*, *growth*, *reproduction*, *fission*, *fusion*, *fragmentation*. Even *eruption* and *erosion* are recognizably for all humans, *kinds of motion*. When we talk about the *living* landscape we have in mind the idea that it is dynamic, whether vegetally, animalistically or geomorphologically. Time, change and cause are all described in various contexts as if they were like motion. But to qualify for the condition of life, the source of motion has to be independent of any interlocutor. So, as we move between the different types of Nuaulu tool in the order that we considered them above, the cognitive stimuli amenable to the attribution of life seem to increase. In the transition from skewer to sago pounder, and from sago pounder to the sago flour extraction apparatus, from the treadle-operated coconut grater to the power-assisted sago grater and the outboard motor, there is a gradual shift in the source of the motion – and therefore seemingly of agency: from the using subject to the tool itself.

We now come to agency in the strict sense. As Gell (1998: 72) puts it, 'agency implies the possession of a mind which intends actions prior to performing them' and 'what matters is where an animated object stands in a network of social relations' (1998: 123). For Gell (1998: 132) there is only a slight dividing line between the intentionality of humans and of anthropomorphic objects. The problem with this is that, conceptually, it mixes up not only agency with intention, but with animacy and sociality as well. The term agency has been much stretched in recent anthropological discussions of animism and technology, but in this context I think we need to shrink it back to its core meaning: an intervention to produce a particular result, or something with 'the faculty of an agent' (Little, Onions and Friedrichsen 1973: 37). Thus, a sago-processing device has agency in the sense that it can produce unique outcomes in the context of human-object interaction. This neither makes it animate nor gives it intentionality. So, looking at our selected Nuaulu tools, on material grounds neither the

meat skewer nor the sago pounder can be said to have agency, though more complex machines with many parts which form a system with emergent properties not entirely under the control of the operator might indeed be said to possess agency. Thus, this would be the case for the sago-processing device, the coconut grater and the outboard motor.

A quality that Nuaulu commonly associate with the essentials of animal and human life is breathe (*nahai*), and breathe too is a kind of motion. At the birth of a child the moment at which a child breathes independently, when the chest begins to move and the lungs ventilate, is the beginning of autonomous human life, while death is the expiration of breathe and the end of movement, and therefore is (paradoxically) also a characteristic of life. Breathe as a concept is recurrent in ritual and attributed to physical entities that are anthropomorphized, such as sacred houses or ritual shields. Ritual shields, like the meat skewer, retain their organs of breathe in the first chip of wood to be cut, and which is thereafter kept in the loft of a sacred house. Most salient of all, however, is the literal extraction of the organs of breath (the lungs and trachea) of large game animals and their offering as a sacrifice to the clan ancestors in the form of a gift to the clan head. In the *asunaete* ritual these same organs are attached to a wooden skewer as a form of repayment for a life taken and as to ensure that life will thereby be replenished. In humans and large animals the physicality of breathe is clear enough, but in other biological organisms and non-biological entities it is not, and here we find that sound (more specifically vocalization) may sometimes serve as a proxy, for sound is only possible where there is breathe or motion to produce it. So, when cicadas sing it is evidence of breathe, or even when the wind blows through certain rocks to produce eery sounds it may be taken as evidence of life, recalling somewhat the remarks of Herodotus on the Colossi of Memnon at Thebes.

Finally, we come to intentionality. In the Nuaulu world, humans, some animals, spirits, the godhead, animals and some plants that have become coterminous with spirits might be said to act intentionally. Their actions in the world do not simply have consequences independent of the humans that interact with them, but they have minds that permit them to make plans and act in the world in ways that are deliberate responses to human and other behaviour, and which are often contrary.

7 Life as a matter of degree, while animacy is not animism

I am hardly the first to argue that the attribution of life is necessarily gradual, contextual and, from a biological perspective, sometimes inconveniently deviant. Bloch (1998: 53) calls this the 'more-or-less' character of life. Ingold (2006) argues that we can make anything seem alive, but we do not always chose to do so. Moreover, there is much ethnographic evidence that people do not agree about what life is and no uni-

versal distinctions as to what is alive and what not. Ingold (2011: 29) further speaks of 'bringing things to life', of 'things in life, rather than life in things', suggesting that life is less a property of individual entities than a phenomenon of which those entities are part. In this model, the animacy of the *lifeworld* is 'ontologically prior to their differentiation' (Ingold 2006: 10). What I have tried to do here is to unpack those conditions for the recognition of life and to show how they might constitute a series of progressive cognitive steps that when aggregated are more likely to prompt the attribution of life than not. These are: recognition of morphological resemblance, recognition of motion, and recognition of independent motion.[3] As we have seen, these are each reflected in a pattern of conceptual attribution that follows a broadly phylogenetic progression: we apprehend physical entities as being plant-like, animal-like, human-like and – ultimately – like individual human persons (Ellen 1988).

Part of the problem in the literature is that the discourses on biocognition, life and animism begin from different starting points and have different intellectual histories. While analytically we need to separate these and certainly not confuse and conflate the concepts and terms employed, in particular ethnographic cases it is unlikely that we will ever discover a convenient congruence. It may be that we need to separate vital from symbolic forces – that we need both 'vital (biological), and symbolic (spiritual) ontologies' – just as Mauss suggested we separate technical from symbolic classifications, and Berlin general-purpose 'natural' schemes from special-purpose schemes. Unfortunately real-life examples do not give us much hope that this is possible. In some cases we may find evidence of two life forces (spiritual and biological) as Rival (2012) suggests for Makushi cassava, but my informed bet is that because 'vital and technical processes [are] already situated in a complex relational complex when we experience them', in practical everyday life organisms and things are treated as though they are motivated by a single underlying force, unless otherwise prompted to re-consider. This would be my reading of the Nuaulu data.

While all cultural objects are potentially regarded in this way, in practice some objects are more alive, are more likely to evoke the characteristics of agency or indeed intentionality than others. Part of the problem with existing anthropological treatments of the category *living things* is that they are either logical extrapolations through polythetic extension, based on formal ethnotaxonomic deduction/induction, rooted in observations of how children under artificial conditions perform in field experiments of a very abstract kind, or (completely differently) assume that life is recognized phenomenologically prior to its differentiation. Nuaulu ideas of what is animate and agentive are always fuzzy and contingent. By combining data from different kinds

3 Compare this with a similar progression noted by Rival 2012: 71 in the contributions from Ingold 2006 and others in the animism debate regarding the logical implicatory relationships between communication, intentionality, consciousness, life, and movement. The problem, as Rival observes, is in a 'hazardous slippage' between concepts.

of ethnographic context, using different elicitation procedures, a more complex picture emerges. The same applies to animism, with which the attribution of life is too readily conflated. If, following Descola (2005: 183 f.), animism is 'the granting by humans to non-humans of an interiority identical to theirs, an attribution that humanizes animals (and plants)' (Rival 2012: 70), I would say that it is virtually impossible to separate ethno-theories of life processes from what is sometimes described as animism. However, not every object in nature is animated, and animism is not totalizing. Recent work (including my own) suggests much selectivity with which it is evoked ontologically, and limits to the extension of personhood as a humanlike category. Praet (2014) even argues that the outstanding feature of animism is its peculiar restrictiveness.

Moreover, regardless of the arguments surrounding how we might best understand *animism* as a specific worldview, whether we are considering humans or other species (including dogs), we can observe a tendency for the mind to use an understanding of living bodies to interpret experience of artefacts, including tools. When they exhibit evidence of motion, and especially independent motion, objects prompt responses and interactions that suggest recognition of animacy, agency and intentionality to different degrees. If you do not know whether something is alive then, as Ingold (2006) suggests, it is better to assume that it is. We have evolved a tendency to attribute the characteristics of life to parts of the world and to the world as a whole, since our experience of existence is how we must represent, model, understand and act in the world. Life in its most generalized phenomenological sense must emerge, in terms of our experience, from the aggregation of lives in particular. When Nuaulu refer to *mahai* (life), they are first and foremost thinking of human life, but this does not mean that they do not also readily extend the notion to other biota and non-biota as necessary.

A final word on motion as a condition of life. Motion is often necessary, but is seldom sufficient. Motion is often accompanied by multi-sensorial – often synaesthetic – characteristics that are shared with biological life, for example the expenditure of heat and the emission of sound. But while none of the clanking, whirring and buzzing of the treadle-operated coconut grater, or even the sloshing and slapping of a sago-processing device are sufficient for Nuaulu to conceive of them as living entities, the same features in an outboard motor or power-assisted sago grater are intrinsic to recognition of its animate status. For while the treadle-operated coconut grater and sago-processing device have the technical characteristics of a machine, they do not have the autonomy of an engine. Once primed and fueled the engine will run by itself until the fuel runs out or malfunctions. These technical processes are fully understood and Nuaulu have wondrous ways of fixing malfunctioning engines, but the combined features that give them quasi-autonomy also give them the vitality that is more than just the combination of the parts and crosses a boundary that places them with other vital biological and quasi-biological entities such as spirits. This is so despite their not sharing other characteristics that are often focal to our defi-

nitions of life, such as growth and reproduction. Humanly-operated machines may have agency, but engines can also appear to act intentionally. When Basil Fawlty is thrashing the car he is exacting revenge through punishment from an entity that has 'stalled just once too often'. It has willfully disobeyed its owner and driver. We laugh because we recognize that all of us, while fully accepting the technical reasons for mechanical failure, insist on treating the vehicle as if it were a sentient person who is deliberately contrary.

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Figures

Fig. 1: Photo Ellen 70-06-25.
Fig. 2: After Ellen 2004: 612, fig. 10.
Fig. 3: Photo Ellen 70-15-02.
Fig. 4: Taylor 1990: 48.
Fig. 5: Leach 1964: 41, table 1.
Fig. 6: After Brown et al. 1974: 78.

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