

## The Prehistory of Technology: On the Contribution of Leroi-Gourhan

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Bernard Stiegler's *Technics and Time* can in many respects be seen as a thematic continuation of the philosophical programme initiated some three decades earlier in Derrida's *Of Grammatology* (1967).<sup>1</sup> Put simply, where the governing theme of *Grammatology* was the question of the 'repression' of writing in Western metaphysics, Stiegler's text reformulates this question in terms of the repression of technology, undertaking a series of symptomatic readings of the history of that repression. A second, and important, point of intellectual continuity between the two texts is their reference to the work of the prehistorian and anthropologist André Leroi-Gourhan (1911–86). Like Derrida, Stiegler sees Leroi-Gourhan's palaeoanthropology as providing an essential starting point for a non-metaphysical reflection on the nature of the human. Unlike Derrida, whose treatment of Leroi-Gourhan in *Of Grammatology* is relatively brief and selective, Stiegler devotes substantial passages of the first and second volumes of *Technics and Time* to commentary of Leroi-Gourhan's texts. It is through this extended dialogue between philosophy and anthropology in *Technics and Time* that a number of key concepts of Stiegler's early philosophy of technology emerge and are developed: the idea of a 'maieutic' relationship between the human and the technological, the *who* and the *what*; the concept of 'tertiary memory'; the notions of advance and delay. At the same time, the convergent dialogue between Stiegler and Leroi-Gourhan reaches a critical limit in the first volume of *Technics and Time* as Stiegler begins to question what might be termed Leroi-Gourhan's delimitations of the pre- or proto-human. The intention of the following analysis is to examine these points of intellectual convergence and divergence, asking to what extent Stiegler's philosophical critique of Leroi-Gourhan may be missing its mark, and asking whether

certain points of convergence between the two thinkers may not in their turn be questioned and subjected to another form of critique.

The contribution of Leroi-Gourhan's anthropology to Stiegler's philosophy of technology lies first and foremost in its systematically materialist approach to the definition of the human. From an early stage in his career, Leroi-Gourhan was questioning what he considered to be the intellectualist bias of the anthropology deriving from the sociological tradition of Durkheim and Mauss, in which the role attributed to technology in the study of human society was normally a subordinate one (Leroi-Gourhan 1993: 148/210–11, vol. 1). Stiegler's initial engagement with Leroi-Gourhan in the first chapter of *Technics and Time*, 1 is a reading of his pre-war anthropology of technology as set out in the two volumes of *Évolution et techniques*, published in 1943 and 1945. Much of *Évolution et techniques* consists of extensive taxonomic descriptions of the elementary transactions of humans with different categories of matter, but there is also a self-reflexive methodological dimension to Leroi-Gourhan's investigation which brings it squarely into the domain of philosophy. The key concept here is that of the technical tendency (*tendance technique*), a concept which will be central to Stiegler's subsequent analysis of the dynamics of technological development in *Technics and Time*. For Leroi-Gourhan, the technical tendency refers to the technological determinism which dictates that humans will engage with their external environment (*milieu*) in predictable and convergent ways, and that the aggregate tendency of technological evolution will be towards an increasingly effective engagement with that environment.<sup>2</sup>

For Stiegler, the interest of Leroi-Gourhan's concept of technical tendency lies in its non-anthropological perspective on the evolution and history of technology. In Leroi-Gourhan's investigations of what Stiegler terms the 'coupling' of the human and material, traditional diffusionist explanations of technical development are consistently bracketed out in favour of the idea of technological convergence – it is often impossible to reconstruct the origin and the different routes of transmission of technical complexes. This does not negate the historical fact of technical development through the communication and exchange of technologies between human groups, but rather situates the dynamic for technical development at a higher level of determination. Much like the phenomenon of convergence in biological evolution, where

genetically distinct species may under similar environmental conditions assume near-identical forms, the range of functional transactions between the human and the material is finite, so that similar technical complexes may emerge independently in geographically distinct human groups. As Stiegler points out, Leroi-Gourhan's reference to the biological in *Évolution et techniques* is both metaphorical and more than metaphorical: technical evolution is both *analogous* to biological evolution and, in its coupling of the human and the material, a *continuation* of biological evolution (TT<sub>1</sub>, 48–9/63). This equation between the biological and the technical, what Stiegler terms the 'zootechnological relation of the human to matter' (TT<sub>1</sub>, 49/63), will be an important component of his analysis of Leroi-Gourhan in the third chapter of *Technics and Time*, 1. More generally, Leroi-Gourhan's definition of the technical tendency helps Stiegler to conceptualise the *autonomy* of technical development in relation to the human. In contrast with the anthropocentric perspective of a human invention of technology, locating the 'origin' of this or that technical complex in this or that geographical group, Leroi-Gourhan argues for the differential 'materialisation' (Stiegler uses the Simondian term 'concretisation') of the technical tendency in ethnically distinct human groups. For Stiegler, the interest of this determinism of technological form and function is its ultimate indifference to the ethnic: it is both constitutive of the difference between cultures and ultimately the vector of the dissolution of cultural difference in the modern world (TT<sub>1</sub>, 64–5/79; see also TT<sub>2</sub>, 76–7/94–5).

Combined with Stiegler's readings of other theories of technology (Gille, Simondon, Heidegger) in the first chapter of *Technics and Time*, 1, Leroi-Gourhan's pre-war anthropology of technology therefore provides Stiegler with a model of technical evolution that will inform his more general reflections on the state of technology in the contemporary world. Equally importantly, Leroi-Gourhan's post-war work on the prehistory of technology can be said to provide a natural-historical grounding for and validation of Stiegler's thesis concerning the co-determination of the human and the technical. In what is structurally the central chapter of *Technics and Time*, 1, Stiegler undertakes a detailed reading of Leroi-Gourhan's *Gesture and Speech* (1964–5), an exemplary text whose intellectual legacy, he argues, has still not been properly assumed in either palaeoanthropology or philosophy (TT<sub>1</sub>, 84/97).

As Stiegler indicates, *Gesture and Speech* opens with a critique of traditional metaphysical definitions of the human, such as that of Rousseau's *Second Discourse*, which present an original humanity fully formed in body and mind but lacking both the 'arts' of culture and the structures of society. Rousseau's speculative reconstruction of the origins and development of humanity is a 'transcendental' anthropology, which has to begin by setting aside the 'facts' in order to explain the passage from the state of nature to the state of culture (TTI, 84/97). The palaeoanthropology of *Gesture and Speech*, by contrast, starts from the facts of evolutionary sequences. Importantly for Stiegler, Leroi-Gourhan begins his narrative of human evolution with the pre-human, in the extended series of vertebrate forms, some of which will eventually converge on the human. This places the animal before the human, but it also places the anatomical before the cognitive. Leroi-Gourhan treats the functional anatomies of animal forms as different *engineering* solutions to the vital requirements of mobility and prehension in different environmental conditions. At each stage of a given evolutionary sequence, a 'balance' or equilibrium is achieved between organs dedicated to locomotion and the forward-facing organs dedicated to orientation and prehension – what Leroi-Gourhan terms the 'anterior field' (*champ antérieur*). Leroi-Gourhan emphasises that the development of nervous systems to 'control' the operations of the anterior field is secondary to the development of the skeleton, the mechanical infrastructure which articulates movement. As Stiegler comments, quoting Leroi-Gourhan, 'mobility, rather than intelligence, is the "significant feature"' (TTI, 146/156). According to this interpretation, the evolutionary singularity which will distinguish the human from proximate animal forms such as the primates is not the brain but the feet: the emergence of full bipedalism permits a further 'liberation' of the anterior field, freeing the hands for more complex and mediated interaction with the material world. Thus, *Zinjanthropus boisei*, the earliest hominid form known at the time of *Gesture and Speech*, presents a braincase markedly inferior in volume to that of anatomically modern humans, but is fully bipedal and already in possession of rudimentary stone tools.<sup>3</sup> In the first volume of *Gesture and Speech*, Leroi-Gourhan will describe the successive stages leading from *Zinjanthropus* to Neanderthal, the most advanced hominid form before *Homo sapiens*.<sup>4</sup> What the palaeontological and archaeological records demonstrate is a general synchrony between technical

and cognitive evolution, a complexification in tool stereotypes accompanied by a growth in brain size and in particular expansion of the cortex. For Stiegler, the significant feature of this evolution is that it is not the product of a fully-formed human intelligence: it is not the human mind that invents technology, rather the human mind is invented with and through technology in a two-way process, a 'structural coupling' between the human and material which he terms an 'instrumental maieutics' (TTI, 158/167). Temporally, Stiegler formulates this circular relationship in terms of 'advance' and 'delay': there is an advance of the material (the anatomical and the mechanical) over the mental (nervous system, brain, cortex), and a delay, a retardation of the human (mind and body) in relation to its 'externalisations' in the instrumental world (TTI, 145/155).

Stiegler describes the evolutionary emergence of human cognition as a succession of 'mirror stages' in which the human achieves self-reflexive consciousness through its manual engagement with the material world: the cortex is (metaphorically) reflected in the piece of flint. But the mirror of technology is also a memory. The artefact endures as a trace, a record of a process of manufacture external to the human agent: 'Flint is the first reflective memory, the first mirror' (TTI, 142/152).<sup>5</sup> Leroi-Gourhan refers to the process of manufacture itself as the operational sequence (*chaîne opératoire*), the structured chain or sequence of actions necessary to extract, for example, a specific instrument (tool or weapon) from the raw material of the block of flint. The operational sequence therefore presupposes a certain intentionality, a capacity for anticipation in the agent of technology, from the earliest forms of human intelligence onwards.<sup>6</sup> As Stiegler will later comment, the concept of the operational sequence allows Leroi-Gourhan to think of language and technics as co-emergent features of human cognition, both dependent on a process of abstraction and a 'syntax' of operations (TTI, 167/176). This concept also contributes to Stiegler's formulation of what will be a central component of his philosophy of technology in *Technics and Time*, the idea of 'tertiary memory'. Leroi-Gourhan describes the specificity of the human as residing in three categories or levels of memory. The first two levels, genetic and epigenetic, are the categories of memory shared with other biological species, the hereditary memory of genetic reproduction and, increasingly in mammals, the neurological memory of individual experience. The singularity of the human, however, resides in the

type of extra-individual (shared, social) memory deposited in the operational sequences of language and technology. Stiegler refers to the operation of this third level of memory as *epiphylogenesis*, an essentially cumulative process which in its turn exercises a powerful selective pressure on the biological human: 'It is in this sense that the *what* [the techno-logical] invents the *who* [the human] just as much as it is invented by it' (TT1, 177/185).

Stiegler's reading of *Gesture and Speech* in *Technics and Time*, 1 is a generally convergent reading, to the extent that the dialogue it sets up between philosophy and anthropology is a mutually confirming one. From what is probably the most philosophical of Leroi-Gourhan's texts, Stiegler extracts a series of concepts (liberation, externalisation, operational sequence, etc.) and translates these into the terms of his more general philosophy of technology: instrumental maieutics, advance/delay, epiphylogenesis, the *whol/what*, etc. The strength of this reading is that it confirms and continues what is the fundamental materialism of Leroi-Gourhan's account of human origins, presenting human evolution as the synthetic co-emergence and co-determination of mind, technics, language and memory. However, what I find most interesting in this reading is the point at which it diverges from its reference text, where Stiegler begins a critique of what he considers to be the residual essentialism of Leroi-Gourhan's thought. This has to do with the different *stages* of the human described by Leroi-Gourhan in *Gesture and Speech*. Whereas Leroi-Gourhan characterises the evolutionary sequence from *Zinjanthropus* to Neanderthal as a progressive 'humanisation' of the human (Stiegler uses the more conventional term 'hominisation'), he sees the appearance of *Homo sapiens* as marking a qualitative shift in this evolution, in which a species whose intelligence has been geared primarily to the material requirements of subsistence and survival begins to show signs of another type of intelligence, a spiritual and creative intelligence not immediately dependent on the technical intelligence of its origins. For Stiegler, this introduction of a 'second origin' of the human is logically in contradiction with the remainder of Leroi-Gourhan's demonstration, and is characteristic of the kind of metaphysical humanism Leroi-Gourhan had himself critiqued in the introduction of *Gesture and Speech*:

The critique of Rousseau consisted in saying that the human is not a spiritual miracle that would be 'added' to a previously given body of

the primate. Now, with the second origin, something is ‘added’ to the technological: the *symbolic* or the *faculty of symbolisation*, without an understanding of its provenance. (TTI, 163/170)

Stiegler’s critique of Leroi-Gourhan could be described as classically deconstructive, in many respects reminiscent of Derrida’s treatment of Lévi-Strauss or Rousseau in *Of Grammatology*. He warns us that ‘*the greatest vigilance with respect to oppositions is called for – even if – and nothing is more difficult – the contestation of oppositions must not eliminate the genetics of differences*’ (TTI, 163/172). The ‘opposition’ in question is Leroi-Gourhan’s distinction between *Homo faber* and *Homo sapiens*, between technical intelligence and symbolic intelligence, and Stiegler is certainly right to alert us to the dangers of such essentialising oppositions. However, first it is not entirely clear that Leroi-Gourhan actually *opposes* these two types of intelligence. Second, as Stiegler himself seems to concede, the contesting of such oppositions may itself prevent us from being able to think the genetic, i.e., how one form of humanity may be followed or superseded by a different form of humanity. This qualification, I think, lies at the centre of the divergence between philosophy and anthropology – Stiegler and Leroi-Gourhan – as it develops in *Technics and Time*, I, a divergence which could be said to derive from their differing perspectives on the question of time and on the question of ‘symbolic’ thinking.

As its title indicates, Stiegler’s book is an investigation of the relationship between human technics and human time. This investigation is explicitly presented as a variation on ‘the Heideggerian problematic of time’ (TTI, 179/187), in which for Stiegler ‘our most profound question is the technological rooting of all relation to time’ (TTI, 135/146). The phenomenological-existential (lived) experience of past-present-future, the time of memory, consciousness and anticipation, is grounded in technics. It is technics which gives time, which is the origin and possibility of human time. As we have seen, in the convergent phase of Stiegler’s reading of Leroi-Gourhan, palaeoanthropology provides the positive ‘facts’ and a conceptual framework for thinking such an origination. The concept of the operational sequence, based on the technical artefacts of the archaeological record, infers a capacity for conscious anticipation from the earliest of human forms. At the same time, these artefacts endure as an externalised residue of human intention and human action, and therefore as a replicable ‘hard’

memory, a ‘mirror’ of consciousness, as Stiegler describes it. The repetition of technological stereotypes from generation to generation creates an extra-individual, collective memory over and above that of the biological species.

Despite its analytical force, it could be argued that Stiegler’s quasi-phenomenological framing of the question of technics and time generates a rather partial and somewhat reductive reading of prehistory, a reading which does not properly give the measure of evolutionary time. A symptom of this bias is Stiegler’s relative indifference to Leroi-Gourhan’s attempts to delineate different stages in the evolution of archaic humanity, and to explain the transitions between them. It is as if for Stiegler the philosopher, the principle of the technical constitution of intelligence is sufficient, and it is not necessary to reconstruct the stages through which different human forms may have developed in their convergence on anatomically modern humans. Here, I will take a sample of two short passages as examples of this attitude, the first referring to the beginnings of the human in *Zinjanthropus* and the second to its termination in *Homo sapiens*:

Either the human is human from the Zinjanthropian onward, in which case there is technico-intellectual intelligence as such in a single stroke, [which] means that there is anticipation in the full sense of the term [. . .] Or the Zinjanthropian is nothing but a prehomimid who cannot anticipate, that is, who is not in time and who in no case accomplishes its future since it has none, no more than does the ‘man of pure nature’. (TTI, 160/169)

On the basis of these specifications, which blur a too distinct boundary [*frontière*] between the different stages of the archaic human, Leroi-Gourhan introduces his major thesis on the last stage – the preponderant role played by society. [. . .] Must this mean that society was not there before? Certainly not. That there is a dynamic in which preponderances shift is obvious. But that boundaries [*frontières*] should be marked off in this dynamic is less satisfactory. Everything is there in a single stroke. Everything is differentiated in one coup, together. It is the *inorganic organisation of memory* that constitutes the essential element, the first coup engendering all the others and being transformed in transforming all the others in its wake. In this complex, the brain has in fact only a secondary role, in no case a preponderant one. (TTI, 174/182)



In the first passage Stiegler is responding to Leroi-Gourhan's attempt, in *Gesture and Speech*, to establish what might have been the cognitive differences between the earliest and most recent of human forms. In line with the synchronism of Leroi-Gourhan's analysis of the archaeological evidence – his correlation of successive anatomical forms with the complexification of tool stereotypes – he speculates that later human forms may be associated with a higher degree of reflexive intelligence and vice versa. On the one hand, Stiegler's response to Leroi-Gourhan is a logical one: it is difficult, perhaps impossible, to attribute levels of anticipation, to quantify or qualify degrees of intelligence and reflexivity in relation to different stages of hominid development. If one is searching for 'the essential element', as he puts it in the second passage above, then it is present from the beginning, in 'a single stroke', in the technical intelligence of *Zinjanthropus*. On the other hand, Stiegler's response is perhaps too starkly formulated in terms of the 'either-or', reducing Leroi-Gourhan's anthropology to the binary alternative of a *Zinjanthropus* who is either human or pre-human. This response is also limited, it could be argued, by its dependence on a certain type of philosophical discourse, a discourse which has a tendency – when confronted with the genetic, the historical and the developmental – to default to the explanatory mode of the 'always already'. This is quite foreign to Leroi-Gourhan's mode of thinking with respect to the process of evolution, a mode of thinking predicated on the 'both-and' rather than the 'either-or' and the 'not-quite-yet' rather than the 'always already': *Zinjanthropus* is both already essentially human (human = technics = language) and developmentally (anatomically, neurologically) not quite yet the same species of human as later hominid forms. As has been noted, Stiegler seems to be indifferent to, even impatient with – as is clear in the second passage quoted above – Leroi-Gourhan's attempts to reconstruct successive stages of the human, to establish boundaries (*frontières*) between them. As a result of this, his reading of Leroi-Gourhan seems temporally flat, characterised rhetorically by its repeated references to *Zinjanthropus*–Neanderthal as a single evolutionary sequence. This reading does not sufficiently take account of what the prehistorian or palaeontologist must take account of: the existence of different anatomical forms associated with different industries and the problem of explaining the transitions between them. In fact, despite the density of Stiegler's reading of *Gesture and Speech*, it is for the most part brief and elliptical on

the detail of its science. While recognising, for example, that the evolution of the human brain configuration ‘takes time’ (TTI, 163/172), it is barely mentioned that this time is of the order of some two million years, nor that the transition to *Homo sapiens* takes place over a period that is relatively a fraction of this time. Similarly, Stiegler is not specific on the quantitative difference between the braincases of *Zinjanthropus* and Neanderthal, a difference of the order of approximately 1:3, increasing from 500 cm<sup>3</sup> in *Zinjanthropus* to more than 1500 cm<sup>3</sup> in Neanderthal. It is on the basis of these differences of evolutionary time and anatomical dimension that the palaeoanthropologist makes the evaluation that the philosopher appears reticent to make: that *Zinjanthropus* would have been cognitively less advanced than the hominid forms which followed it. By contrast, the most that Stiegler is able to say regarding such cognitive differences is that the ‘technical and cerebral conditions’ of *Zinjanthropus* are ‘profoundly alien to us’ (TTI, 173/181).

Equally important, at the qualitative level of expression, is what could be described as Stiegler’s philosophical processing of Leroi-Gourhan’s text, that is, the translation of his account of human cognitive evolution into the terms of a philosophy of *difference*. In both of the preceding passages, it is argued that the essential features of the human are present from the origin, in a ‘single stroke’. In the second passage, it is qualified that ‘Everything is differentiated in one coup, together’. And a few pages later, it is proposed that ‘From the Zinjanthropian to the Neanderthal, cortex and tool are differentiated together, in one and the same movement’ (TTI, 176/184). The deployment of this vocabulary of difference and differentiation will doubtless draw a certain category of reader into philosophically familiar terrain. Conceptually, it is consistent with Stiegler’s attempts to think the temporality of technology, his formulation of a dynamics of ‘advance’ and ‘delay’ via the Derridean concept of *différance*. However, it can be asked to what extent this terminology does justice to the process of evolution ‘From the Zinjanthropian to the Neanderthal’, as it is described in Leroi-Gourhan’s text. The concept of differentiation, it could be argued, provides only an approximate representation of the evolutionary process, which in Leroi-Gourhan’s account takes place through a series of *additions* or *accretions*. For example, once the basic anatomical (skeletal) infrastructure of the human is in place (bipedalism, liberation of the hand), the growth in cranial capacity

observed from *Zinjanthropus* onwards is not so much a process of differentiation as the progressive layering of brain functions, culminating in the full development of the pre-frontal cortex in *Homo sapiens*:

Proceeding from the very general biological phenomenon of evolution employing earlier stages to serve as the active substratum for new, innovative ones, we have considered the evolution of the nervous system in terms of the addition of new cortical areas that led to the simultaneous emergence of technical motor function and language, and, later, to technicity controlled by mental processes [*une technicité hautement réfléchie*] and to figurative thought. (Leroi-Gourhan 1993: 251/56, vol. 2)

What is fascinating here is that the model informing Leroi-Gourhan's description of cognitive evolution as a process of accretion and stratification, a combination of the new and the residual, is a *technological* model. The section immediately preceding this passage evokes the electronic and cybernetic technology of the 'last twenty years', which has already achieved a comparatively high level of imitation of biological systems (*le vivant*), representing 'a synthesis of all previous stages'. These new automatic technologies force the biologist to view the living and the technical-artificial worlds as two parallel manifestations of the same process (1993: 250–1/55–6, vol. 2). If one were searching for an appropriate meta-discourse for the description of the processes of bio-neurological and technological evolution, it seems that the technical metaphor of *bricolage* would in fact provide a more effective means of conceptualising these processes than Stiegler's more abstract notion of differentiation. As the molecular biologist François Jacob puts it, evolution as *bricolage* is the 'constant re-use of the old in order to make the new' (Lévi-Strauss 2009: 50).

Stiegler's reservations concerning Leroi-Gourhan's delineations of different stages of human development are therefore symptomatic of a more general divergence between philosophy and anthropology in their modes of thinking about human and evolutionary time. Put simply, Stiegler's reading appears to be more concerned with the essential and the originary than with the developmental and the emergent. This in turn affects how he approaches the question of symbolic intelligence. Stiegler is particularly critical of Leroi-Gourhan's attribution to *Homo sapiens* of the capacity for a higher level of symbolic abstraction, and his

contrasting of the latter with the more ‘concrete’ forms of symbolisation that would have been available to preceding human types. He argues that the idea of a ‘concrete’ symbol is a contradictory concept, that – as Leroi-Gourhan himself admits elsewhere – language is in essence and from the beginning based on a process of abstraction (TTI, 168–9/176–7). While Stiegler’s point is a cogent one – Leroi-Gourhan’s characterisation of different stages of language evolution might indeed have been more carefully formulated – nevertheless the question remains of the possibility and probability of a gradated evolution of language.<sup>7</sup> Again, Stiegler’s tendency is to argue that ‘Everything is there in a single stroke’ (TTI, 174/182), a position which brings him close to Lévi-Strauss’s formulation in the *Introduction to Mauss* of a singular and integral origin of language.<sup>8</sup> In line with his framing of the question of technics and time within a ‘Heideggerian problematic’, this originary symbolic intelligence is linked with the possibility of an already properly human, *existential* relation to death:

There is no [second origin] because technological differentiation presupposes full-fledged anticipation, at once operative and dynamic, from the Australanthropian onward, and such anticipation can only be a relation to death, which means that symbolic intellectuality must equally be already there. (TTI, 163/171–2)

The inference from what remains of *Zinjanthropus* (fragments of bone and structured stone) of this package of human attributes (anticipation, symbolic intelligence, consciousness of death) is logically coherent to the extent that it is an extrapolation of what we know of the human from our perspective as *Homo sapiens*. However, it is not verifiable, and does nothing to explain the evolutionary distance between *Zinjanthropus* and Neanderthal. For the prehistorian and anthropologist, of course, it is not a question of the individual and existential, but of the collective and ritual ‘relation to death’, and there is no hard (durable) evidence of this kind of behaviour until very late in the archaeological record, with Neanderthal. Asserting that ‘to clarify the meaning of “symbolic” is to introduce the question of mortality’, Stiegler goes on to quote Leroi-Gourhan directly:

Archaeological evidence of such activity – which goes beyond technical motor function – [is] the earliest of an aesthetic or religious

character [*de caractère esthétique-religieux*], [and] can be classified in two groups as reactions to death and reactions to shapes of an unusual or unexpected kind [*l'insolite de la forme*]. (TTI, 164/173)

Quite symptomatically, Stiegler's reading of Leroi-Gourhan following this quotation remains fixated on the question of death, and is silent on the second category of mental activity cited by Leroi-Gourhan, an omission which is repeated a few pages later in a further quotation from *Gesture and Speech* (TTI, 167–8/176). What Leroi-Gourhan is referring to here is the presence, relatively late in the archaeological record, of natural objects with no clear utilitarian function which were collected by our hominid predecessors, including Neanderthal. He takes this non-utilitarian behaviour as evidence of an emergent aesthetic sensibility, an advanced form of pattern recognition anticipating the later explosion of artistic activity observed in the Upper Palaeolithic period (Leroi-Gourhan 1993: 367–9/212–14, vol. 2). While Stiegler's critique of Leroi-Gourhan is restricted to the technical-linguistic dimension of symbolic intelligence – what Leroi-Gourhan would describe as a 'linear' mode of cognition based on the operational sequence – it is strangely elliptical on the wider, 'multidimensional' forms of symbolic activity evident in the archaeological record from Neanderthal onward.<sup>9</sup> This is curious, because for Leroi-Gourhan it is precisely the emergence of this wider capacity for symbolisation which explains the exponential growth of technological culture associated with *Homo sapiens*, what was referred to above as a 'highly reflexive level of technicity' (*une technicité hautement réfléchie*). Again in a passage quoted by Stiegler, Leroi-Gourhan argues that the new cognitive capacities evident in Palaeoanthropians (Neanderthal) act as both a 'counterbalance' and a 'stimulant' to technical intelligence (1993: 162/171). Whereas the evolution of the brain up to this point follows the process of externalisation and is determined by it, from this point onwards it is the brain which becomes the driving force.

To claim, as Stiegler does, that Leroi-Gourhan *opposes* technical intelligence and 'spiritual' or 'creative' intelligence, that he posits a unexplained 'leap' from one state or stage of the human to another, therefore does only partial justice to the narrative of human evolution as it is presented in *Gesture and Speech* – Stiegler's attribution of a 'second origin' of the human too readily conflates Leroi-Gourhan with Rousseau in this respect. Leroi-

Gourhan himself would doubtless agree with Stiegler that there is no second origin, but at the same time would argue that there are emergent properties at the stage of Neanderthal and *Homo sapiens* which set these species apart from previous human forms. ‘Emergent’ in this context does not mean *ex nihilo* – it is less the case of an evolutionary jump than a continuation of the process of stratification described above – evolution as the constant building upon the old in order to make the new – reaching definitive critical mass with *Homo sapiens*.<sup>10</sup> Nor does this emergence mean, again as argued by Stiegler, that previous human forms are presented by Leroi-Gourhan as being ‘almost human’ or less-than-human: the humanism of *Gesture and Speech* is much more inclusive than this simple opposition suggests.

If Stiegler’s critique of Leroi-Gourhan in *Technics and Time*, I is not a conclusive critique, there are also other aspects of his reading of *Gesture and Speech* which appear to suffer from a relative deficit of critique. This has to do with the wider moral-humanistic dimension of Leroi-Gourhan’s exposition and its relationship with Stiegler’s own particular philosophical programme, as he pursues it in the first two volumes of *Technics and Time*. As Stiegler notes, ‘the end of the human cannot be investigated without investigating its origin’ (TTI, 135/146). In fact, while Stiegler diverges from Leroi-Gourhan on the question of the ‘second origin’, he remains convergent with his evaluations concerning the evolution of technology following the bio-neurological stabilisation of the species with *Homo sapiens*. The dynamics of this evolution are played out between the three points of the individual, the technical and the social. At each stage of the evolutionary sequence leading from vertebrate to primate to hominid to *Homo sapiens*, Leroi-Gourhan describes what is essentially a process of accommodation or compromise between disparate forces: accommodation between different aspects of anatomical form and function in the skeleton; accommodation between the nervous system and the bodily articulations governing locomotion and prehension; accommodation between the neuro-motor areas of the brain and the fine articulations of the hand turned to the manipulation of matter. The operative term in all of these descriptions is ‘balance’ or ‘equilibrium’ (French: *équilibre*): the tendency of evolution as adaptation is towards the dynamic distribution of forces, a balancing out of form and function. The problem, and question, as the hominid sequence develops in the direction of an increasing

externalisation of functions, is whether such an equilibrium can be maintained. Leroi-Gourhan's diagnosis, as his narrative moves into proto-historical and historical time, is that there is an increasing *disequilibrium*, a mismatch between the bio-neurological substrate of the human and the social and technological systems which have served as multipliers of its material transactions with the world. Translated into the terms of Stiegler's philosophy of technology, there is an 'advance' of the social and technological, and a chronic 'delay' of the human that is never properly compensated. Just as the individual human is progressively absorbed into the social organism, the latter is itself overtaken and dissolved by a technical tendency which is purely autonomous in its operation.

This is the tenor and orientation of Stiegler's reading of Leroi-Gourhan in the second volume of *Technics and Time*, a reading which seems in a number of ways to be critically less sharp than that of the first volume. Much of this reading consists of an extended commentary and quotation of *Gesture and Speech* which simply confirms Stiegler's own diagnosis of the 'disorientation' of contemporary existence. Paradoxically, the critical force which the philosopher had previously applied to the question of the 'second origin' is not applied to what is arguably a more problematic aspect of Leroi-Gourhan's thought: his systematic use of the unmarked concepts of equilibrium/disequilibrium (on which point, see Johnson 2011: 475, 484–7). For Leroi-Gourhan the palaeontologist, the idea of an increasing distortion in the relationship between the biological human and its technological systems presupposes a more 'natural' point of equilibrium, a prehistorical or historical stage at which the human body and human mind are more in balance with their externalised (humanised) environments. For Leroi-Gourhan the anthropologist, such an equilibrium equates at the level of the social with the individual's psychological integration into an ethnic unit of a tolerably 'human' scale. Placed in its historical context, the anxiety expressed in the second part of *Gesture and Speech* concerning the contemporary 'fate' of *Homo sapiens* derives from the state of accelerated technological development initiated by the Second World War and the post-war 'planetaryisation' of Western civilisation – what Lévi-Strauss termed 'monoculture' (Lévi-Strauss 1992: 38/36–7). In his own, dramatised (italicised) references to our world situation *today*, Stiegler shadows this discourse of disequilibrium (distension, distortion, disproportion) with his own discourse of 'disorientation':

the *who* is dimensionally out of proportion and temporally out of step with the *what* – the *Gestell* – of contemporary technology (TT2, 73, 81/91, 99).

The questions that Leroi-Gourhan – and Stiegler reading Leroi-Gourhan – raise about ‘the end of the human’ are of course legitimate questions: it is difficult to dismiss or relativise the globally transformative effects of the technological revolutions of the second part of the twentieth century. However, it can also be said that Leroi-Gourhan’s evaluation of the fate of *Homo sapiens* follows an entirely conventional history of thinking about technology, one which contrasts the ascendent trajectory of the technical tendency – the autonomous and infinite perfectibility of technology – with the descendent trajectory of the human, the catastrophic history of societies and civilisations. It is here in fact that Leroi-Gourhan can be said to be closest to the Rousseau of the *Second Discourse*.<sup>11</sup> It is here also that he seems close to the argument of contemporary evolutionary psychologists that there is a mismatch between the biological human, which reached its point of stabilisation during the Upper Palaeolithic period, and the social and technological environments of the modern world (see, for example, Pinker 2002: 219–22). If there is a criticism to be made here of Stiegler’s reading of Leroi-Gourhan, it is that his generalised references to the ‘speed’ and ‘acceleration’ of contemporary technological civilisation too readily replicate these arguments without critical qualification. His evaluation, following Leroi-Gourhan, of the ‘dis-ease’ (*mal-être*) of contemporary existence, of ‘a humanity that is essentially a late-comer [*retardataire*]’ (TT2, 95/115), is consistent with the existential mode (and mood) of his analysis, but leaves open the whole question of the essential ‘nature’ of the human and the specific realities of modern technological systems.<sup>12</sup>

To conclude, viewed from a wider perspective, Stiegler’s engagement with the anthropology of Leroi-Gourhan provides an interesting case study of the ongoing dialogue between philosophy and the human sciences in France. In ‘Of Grammatology as a Positive Science’, Derrida had proposed a mutually correcting or regulating relationship between grammatology and the ‘facts’ of scientific knowledge: ‘a reflection must clearly be undertaken, within which the discovery of “positive” facts and the “deconstruction” of the history of metaphysics, in all its concepts, are subjected to a detailed and arduous process of mutual verification’ (Derrida 1997: 83/124). Stiegler’s dialogue with Leroi-Gourhan is a compelling example of



the extension of this project to the question of technology, in which Stiegler's own deconstruction of the metaphysics of presence finds its scientific grounding in Leroi-Gourhan's materialist description of human origins. As has been seen, this dialogue enables Stiegler to develop a number of concepts which will become central to his philosophy of technology. At the same time, Stiegler's reading is critical of the residual essentialism of Leroi-Gourhan's anthropology, questioning his 'oppositions' between different types of prehistoric humanity. The conclusion of the analysis above was that this correction of anthropology is coherent within its own parameters, but that its critique of Leroi-Gourhan is not a definitive one. More interestingly, it revealed the possible divergences between philosophy and anthropology in terms of their different framings of the question of time and the nature of the symbolic – from this point of view, and following Derrida's remarks above, it could be said that anthropology might in its turn perform a corrective function in relation to philosophy. Finally, our analysis indicated a relative lack of critical perspective in Stiegler's replication of Leroi-Gourhan's diagnosis of the dystopic development of modern humanity. Stiegler's reading of some of the more speculative passages of *Gesture and Speech* allows him to develop his own narrative of 'disorientation', but it is not clear in the final analysis how far this diagnosis advances our understanding of the specificities of contemporary machine civilisation. Despite these reservations, the strength and the value of Stiegler's engagement with Leroi-Gourhan in *Technics and Time* is that it raises some challenging questions about the origins and ends of humanity, encouraging further critical reflection on the nature of technology and the nature of the human.

### Notes

1. Richard Beardsworth notes this intellectual genealogy in an early appreciation of *Technics and Time*, I (Beardsworth 1995: 90–1).
2. For Leroi-Gourhan's quasi-Bergsonian definition of 'tendency', see Leroi-Gourhan 1973: 336–7.
3. The genus name *Zinjanthropus* is no longer used in palaeoanthropology, and has been replaced by *Australopithecus* or *Paranthropus boisei*. Since Stiegler's reading of Leroi-Gourhan does not make this adjustment, for the purposes of consistency the following analysis will retain the older term.
4. Leroi-Gourhan uses the now outdated categories of Australanthropian,

- Archanthropian, Palaeoanthropian and Neanthropian to designate the principal morphological stages of hominid evolution, the latter two stages relating to Neanderthal and *Homo sapiens* respectively.
5. The English translation of *La Technique et le temps* cannot capture the graphic and phonetic resonance of *silex* (flint) and *cortex*, which Stiegler visibly exploits in the original French text. It must be said that Stiegler's repeated use of this formulation (*silex/cortex*) can give the impression of a scene of technology restricted to lithic materials, whereas early hominid technical activity would obviously have involved a range of materials of differing degrees of perishability, all of which would have been capable of constituting an externalised 'memory' in the sense described by Stiegler. Stiegler's aphoristic formulation of the 'mirroring' of flint and mind should therefore be read as being metonymically implicit of this wider ecology of prehistoric technology.
  6. For a useful discussion and contextualisation of this concept, see Nathan Schlanger's chapter in Audouze and Schlanger 2004.
  7. Contemporary research in the field of language evolution takes seriously the idea of a 'protolanguage' and the existence of stages of development of prehistoric human language. See, for example, Knight, Studdert-Kennedy and Hurford 2000; Wray 2002; Christiansen and Kirby 2003.
  8. 'Language can only have arisen all at once [*le langage n'a pu naître que tout d'un coup*]' (Lévi-Strauss 1978: 59/xlvii). Derrida will of course question this argument in *Of Grammatology* (Derrida 1997: 120–1/177).
  9. On the distinction between linear (phonetic) and multidimensional (graphic, figurative) expression, see Leroi-Gourhan 1993: 195–6/270–2, vol. 1. Leroi-Gourhan's remarks on the symbolic and the figurative in *Gesture and Speech* need to be related to his more wide-ranging studies of prehistoric art and religion in other major works published during the same period, in particular Leroi-Gourhan 1964, 1965.
  10. While Leroi-Gourhan's chronology for the appearance of anatomically modern *Homo sapiens* is now outdated (see Randall White's introduction to Leroi-Gourhan 1993: xxi), the discipline of palaeo-anthropology has remained paradigmatically consistent in its recognition of a behavioural revolution occurring during the Mid-Upper Palaeolithic period (from approximately 35,000 years ago onwards), involving the emergence of elaborate ritual, aesthetic production and advanced projectile technology.

11. Leroi-Gourhan confesses this ideological affinity with Rousseau in his interviews with Claude-Henri Rocquet (Leroi-Gourhan 1982: 53).
12. In his interviews with Stiegler, Élie During questions what certain readers might perceive to be Stiegler's 'hyper-philosophical' approach to the question of technology, asking to what extent it is able or willing to take account of the material diversity of contemporary technologies (PA, 20-1, 24-5).