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Three career itineraries that linked prehistory, archaeology, and technology: Augustus Lane Fox Pitt Rivers (1827-1900), André Leroi-Gourhan (1911-1986) and François Sigaut (1940-2012)

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Abstract

There are numerous bridges between technology and prehistoric archaeology. The author will illustrate them herein by reference to three major figures who marked 150 years of history from the middle of the nineteenth century to today. The first, Pitt Rivers, can be seen as a forerunner even if the second, Leroi-Gourhan, does not seem to have read his work or, at least, does not cite him in his own writing. Conversely, François Sigaut, the third main figure of our itinerary both read his work and was responsible for him being discovered in France at the end of the 1980s when he was still unknown, as it were. Common interests can be observed in the work of these three personalities such as the link between humans and technology and they also question humanity's specific features. All three had the same attention to details combined with openness to neighbouring disciplines. But, however close their centres of interest were, all three were nonetheless highly influenced by the major questions of their own eras.

Keywords: Technology, Prehistory, Augustus Lane Fox Pitt Rivers, André Leroi-Gourhan, François Sigaut

Résumé

Les passerelles entre la technologie et l'archéologie préhistorique sont nombreuses. L'auteur les illustrera ici par trois figures majeures qui ont jalonné 150 ans d'histoire, du milieu du XIXe siècle à aujourd'hui. Le premier Pitt Rivers, peut faire figure de précurseur, même si le second, Leroi-Gourhan ne semble pas l'avoir lu, ou du moins ne le cite pas dans ses écrits. En revanche, François Sigaut, le troisième acteur de notre parcours, l'a non seulement lu mais est à l'origine de sa découverte en France à la fin des années 1980 alors qu'il y était pour ainsi dire inconnu. On perçoit dans l'œuvre de ces trois personnalités des préoccupations communes telles que le lien entre l'homme et l'outil et la recherche de ce qui fait la spécificité de l'homme. Tous trois se caractérisent aussi par une même attention aux détails et en même temps une ouverture vis-à-vis des disciplines voisines. Mais on perçoit aussi que, pour proches que soient leurs centres d'intérêt, chacun d'entre eux est cependant empreint des grandes questions de leur temps.

Mots-clés : Technologie, Préhistoire, Augustus Lane Fox Pitt Rivers, André Leroi-Gourhan, François Sigaut

1. Introduction

There are numerous bridges between technology and prehistoric archaeology. I shall illustrate them herein by reference to three major figures who marked 150 years of history from the middle of the nineteenth century to today. The first, Augustus Lane Fox Pitt Rivers, can be seen as a forerunner even if the second, Leroi-Gourhan, does not seem to have read his work or, at least, does not cite him in his own writing. Conversely, François Sigaut, the third main figure of our itinerary both read his work and was responsible for him being discovered in France at the end of the 1980s when he was still unknown, as it were (Sigaut 1990).

2. Augustus Lane Fox Pitt Rivers (1827-1900)

Augustus Lane Fox Pitt Rivers is known today for the museum in Oxford named after him. As a career soldier, he took part in British Army missions and particularly the Crimea expedition in 1850 as a general staff officer. His speciality was ballistics and in the field he was given the task of instructing officers on the use of firearms (Thompson 1977; Bowden 1991). He was a multi-faceted person; he founded two museums, was a landowner, archaeologist, anthropologist and Inspector of Ancient Monuments. His greatest desire was to contribute to the education of the people but it was his research in archaeology and his monumental collection which made him famous.

Many British archaeologists consider the General to be ‘the father of scientific archaeology’. Sir Mortimer Wheeler himself declares that he was his disciple. Conversely, others see him as an amusing eccentric with his own private band and menagerie of exotic animals (Bowden 1991: 1). Pitt Rivers took part in digs on over forty sites ranging from the classical through the Palaeolithic eras up to the Middle Ages. However, he was also one of the first and most fervent advocates of Darwinian gradualist theory. He considered that nature did not make jumps, instead evolving gradually, and it was his profound conviction that these natural laws could be applied to human societies (Lane Fox,¹ e.g. 1906 [1868]: 96; 1875: 307-308).

He was part of a group of intellectuals made up of the most recognized British archaeologists and academics of the era, including Thomas Henry Huxley, Herbert Spencer, Sir John Evans, Sir John Lubbock (who became his son-in-law), Augustus Franck and Darwin himself, not to mention other recognized personalities in geology, philology and anthropology. He played a driving role in this group from the 1860s until the end of the century and was strongly involved in several academic societies. This led him to be appointed Inspector of Ancient Monuments in 1882.

His work as an archaeologist seems particularly original to us today because it presented three specific characteristics (Bowden 1991):

- 1) He excavated a very large variety of archaeological sites whereas his contemporaries were obsessed by excavating burrows. He did not neglect funeral monuments but also considered that ‘the relics found in camps and dwellings are the things that were in everyday use, and, therefore, give us better insight into the social conditions of the people’ (Pitt Rivers 1883: 65).² Like his contemporary, the Dane Worsaae, he understood the documentary interest of pieces as humble as shards of ceramic or bone fragments.
- 2) The General was aware of the interest of the context in which an object was discovered while his contemporaries were content just to know which site an artefact came from. He insisted on the need to note the exact findspot and its relation with characteristic structures to reconstruct the history of the site. His stratigraphic surveying was very meticulous but his excavation methods left something to be desired (Bowden 1991: 94). Although he had understood the importance of stratigraphy, he continued to dig in spits and not by layers (*ibid.* 94). Nevertheless, the ‘level of supervision of Pitt Rivers’ excavations was extremely high by nineteenth-century standards’ (*ibid.* 156).
- 3) He took analysis of relics further than his contemporaries. For instance, he had the idea of measuring the bones of modern-day animals and comparing them with those found in excavations. He also carried out experiments such as knapping flints (initiated by John Evans) and digging using bone and antler tools. He also studied the silting of ditches. All these approaches were only taken up again in the second half of the xxth century (*ibid.* 158).

¹ He signed his first articles as Lane Fox then changed his name in 1880 to Pitt Rivers, ‘according to the wishes of the second Lord Rivers’ (Pitt Rivers, 1891, n. 1), after having inherited the family estate – an immense property in Dorset. His archaeological activity which began at the start of the 1860s then continued with excavations on his own land.

² He excavated megalithic sites, hillforts, flint mines and other sites from all eras ranging from the Palaeolithic (only 2 sites) and Neolithic eras, the Bronze and Iron Ages, Roman Britain to the Middle Ages.

He would have liked there to have been subtler, in-detail analysis techniques to enable the constitutive elements and origins of ceramics to be determined. He was a visionary and thought it possible that one day there would be a sufficient number of archaeologists for them to be organized and integrated into a specific profession (*ibid.* 158).

One of the General's most relevant traits was that he was a compulsive collector who put his acquisitions into order through meticulous study (*ibid.* 9). Starting in the 1850s and for the following twenty years or so, he gathered a huge collection of objects of all sorts from 'savage' societies. Also from the 1860s onwards, he collected objects from archaeological sites as his interest in the past grew. He donated this collection of around 20,000 objects to the museum in Oxford in 1884. After the donation to Oxford, he continued to collect objects from 1880 to 1900 for his new museum in Farnham, Dorset, near the family estate which he had inherited. The total of his two collections is estimated at around 50,000 objects.³

His objective for these collections was above all scientific because they were intended to demonstrate and promote his theory on the evolution of technical objects. His theory of progress is based on his intuitive idea that the shapes of objects reflect ideas. He thus established this hypothesis: 1, that links can be established between different objects through an analysis of their shape; 2, that relations between shapes are crucial because they enable the mental operations they must involve to be reconstructed; 3, that ideas lead to other ideas and feed off each other which means they follow the same laws as those of evolution of living beings (de Beaune 2013a). Like the products of the animal and vegetal kingdoms, human ideas can be classified into genera, species and varieties and their evolution can be retraced 'from the simple to the complex and from the homogeneous to the heterogeneous' because they obey the same laws (Lane Fox 1875: 307). Basically, his programme consisted of transposing Charles Darwin's ideas about the evolution of living organisms to the productions of human minds to reconstruct the sequence of ideas which enabled humanity to progress 'from the condition of the lower animals' to today's condition and to thus 'provide really reliable materials for a philosophy of progress' (*ibid.* 300).

As objects are the only evidence of the mental operations which led to their production, the way these are arranged in the museum aims to show how human ideas have evolved throughout time. Beginning with objects created by modern 'savages' and tracing back to objects made by prehistoric humans, he attempts to rewrite history in reverse by retracing, step by step, this evolution. This explains, for instance, his interest in ethnology which he judges essential for prehistorians (Pitt Rivers 1887: 265). Indeed, his first archeological fieldworks were explicitly carried out in the aim of completing his long-term typological series – it should indeed be noted that the term typology seems to have been introduced into archaeology by him – before he realized the intrinsic interest of archaeology (Bowden 1991: 55). This explains the importance (rare among his contemporaries) which he attributed to the succession of geological strata which is vital to establish the chronology of early men in Great Britain.

Pitt Rivers based his whole exhibition system on evidence of this evolution from the prehistoric to modern 'savage' eras in such a way that the objects were placed in lines supposed to give a visual representation of the mental and cultural development of humanity (see de Beaune 2013a, on the museographic application of his theory). The radial presentation system he imagined was intended to enable even less well-informed students to easily understand the evolution from any object at all by simply observing its position with reference to the centre of the rotunda (Pitt Rivers 1888, 1891). Thus, the museum's dual scientific and pedagogical objectives could be brought together.

He applied his evolutionist's vision to social progress which he thought could only occur through evolution rather than revolution and through the education of the masses, justifying the existing

³ A complete biography, all Pitt Rivers' work and the catalogues of his collections are all available on the remarkable 'Rethinking Pitt Rivers' website created by the Pitt Rivers museum team: <http://web.prm.ox.ac.uk/rpr/>

world order – including the expansion of the British Empire – and thus opening the door to a dangerous form of racism (Bowden 1991: 56).

3. André Leroi-Gourhan (1911-1986)

André Leroi-Gourhan lived just as full a life as Pitt Rivers – a life which it is difficult to sum up in a relatively short text.⁴ He was an ethnologist, anthropobiologist, orientalist, linguist, museographer, technologist, prehistorian, etc. Although he had multiple interests, his early years were above all devoted to the technical field. He was part of the group of young people who contributed to the renovation of the *Musée du Trocadéro* and the constitution of the future *Musée de l'Homme*, working with Georges-Henri Rivièrè and Paul Rivet from 1932 to 1935. He was put in charge of reorganizing the museum's Arctic section and creating the card classification system for the objects. This work inspired him to write his first book in 1936 when he was just 25, *La civilisation du Renne* which focuses on the relations humans have with animals, and also his first written work on technology which were published in *l'Encyclopédie française* (1936a and b).⁵ This first writing reveals the desire to grasp Man's activities both in technical details and in their interaction with the environment.

In 1937, he received a grant from the Japanese government and spent two years in Japan where he carried out an ethnological study of the Ainu people and made a vast collection of documents which he later used in the technology studies he ended after the war.⁶

He first worked for the CNRS on a grant then as a researcher from 1940 to 1945 replacing Philippe Stern for the curation of the *Musée Guimet*. His passion for objects and his museographic skills led him to publish *L'Homme et la Matière* in 1943 and *Milieu et Techniques*, in 1945. In the same year he defended his thesis on the *Archaeology of the North Pacific* under the direction of Marcel Mauss and published it the following year.

In 1944, he was appointed senior lecturer in Colonial Ethnology in Lyon where he taught comparative technology based on the study of Lyon's colonial museums' collections of ethnographical objects. His conception of ethnology had to include fieldwork and therefore he travelled all over the Mâcon region with his students who he provided with an initiation into what he was later to call 'prehistoric ethnology'. His first excavations date from this period in Furtins cave in the Saône-et-Loire region (in 1946) then in the Arcy-sur-Cure caves (Yonne region) in 1947.

In 1946, he was appointed deputy director of the *Musée de l'Homme* and senior CNRS researcher. He was influenced by the work of 1930s Russian archaeologists and developed a field method involving horizontal excavation which means relics can be found in the places they occupied when people abandoned them there. In an excavation manual published in 1950, he advocated systematic, exhaustive recording of all categories of relics and insisted on the fact that the relics in themselves count less than their inter-relations (Leroi-Gourhan 1950).

In 1954, his desire to combine cultural and biological aspects in one subject area led him to defend a second *ès-sciences* doctoral thesis devoted to the craniology of vertebrates entitled *Tracés d'équilibres mécaniques du crâne des vertébrés terrestres* thus returning to his very early interest in skulls which he had collected during his adolescence and to the courses he studied at the *École d'Anthropologie de Paris* (Soulier 2003). It was only published around thirty years later in 1983.

⁴ The biographical details given herein come from several distinct sources: three special editions which journals devoted to A. Leroi-Gourhan shortly after he passed away (*Terrains*, 1986 ; *Bulletin de la Société préhistorique française*, 1987 et *Les Nouvelles de l'Archéologie*, 1992) as well as a book of interviews with Claude-Henri Rocquet in 1982. A comprehensive biography has just been published (Soulier, 2018).

⁵ We have republished this text in the *Documents pour l'Histoire des Techniques* (de Beaune, 2011).

⁶ An issue of the *Journal Techniques & culture* was dedicated to Leroi-Gourhan's Japanese studies: 'Geste et matière. Leroi-Gourhan, découvertes japonaises' (Joulian, 2011).

Until 1956 he combined his teaching in Lyon with the post of deputy director of the *Musée de l'Homme*, living in both Paris and Lyon. In 1956, following the accidental death of Marcel Griaule, he succeeded him at the Sorbonne, transforming the chair of General Ethnology into the chair of Prehistoric Ethnology.

In 1962, when the Mournouards Hypogeum (Marne region) was saved, he used his model for excavation methods in the mortuary field of archaeology. He showed how meticulous study of the arrangement of the mortuary monument and the position of the bones can enable archaeologists to discover funeral gestures and post-depositional disturbance. He thus simultaneously founded taphonomic analysis and funerary archaeology.

He started excavating on the Pincevent site in the Seine-et-Marne region in 1964 and here he put his field methods into practice, founding a real excavation school. The site is still today used for teaching purposes as a work-school where students from Paris 1 University learn about excavation methods.

In 1964's *Le Geste et la parole*⁷ he attempted to show how the interaction between nature and culture produced an inseparably cultural and biological evolution from the first hominins to modern humans.

He continued his annual excavations in Pincevent until the end of his life but also found a new source of curiosity – decorated Palaeolithic caves. As a life-long collector, he set out to collect all the available data on decorated caves which led, in 1965, to a monumental work: the *Préhistoire de l'Art occidental*. As well as this work's interest as a document, it featured a new structuralist approach even if he was not the only person to have developed it.

In 1969, he was elected to the Collège de France then became a member of the Institute as an orientalist which was like a distant echo of his youth. He took institutional retirement in 1981.

André Leroi-Gourhan was self-taught with an encyclopaedic knowledge and rightly acclaimed as a 'passer-through-walls' of the mind. He was interested in bringing up questions. Once the question had been asked and answers could be glimpsed in the distance, he moved on to another subject. He had ploughed, others could harvest.

4. Points in common between Leroi-Gourhan and Pitt Rivers

The two men had the same favourite subjects and their points of view were often very close. In what follows, I will examine some of their common areas of interest:

- 1) *Collectionism*: Leroi-Gourhan left school at the age of 14 to start an apprenticeship. He spent the little spare time left him by various menial jobs at the flea market. He meticulously listed and drew the objects he bought in notebooks. He began a highly varied collection of human and animal skulls, objects from Africa and America and pottery. Both men collected skulls, carved flint objects and ethnographic weapons and tools.
- 2) *Bioanthropology (particularly craniometry)*: At the age of 18, Leroi-Gourhan was studying on a course in physical anthropology at the *École d'Anthropologie de Paris* and, as discussed above, in 1954 he defended a second doctoral thesis (*ès-sciences* this time) devoted to the craniology of vertebrates. We may also recall that Pitt Rivers measured both skulls from his excavations and those of his living contemporaries (Bowden 1991: 51). However, while Pitt Rivers' ideas were not far from the racialist theses of his era – for which he cannot be criticized in retrospect – Leroi-Gourhan had a very different standpoint. For him, the determinist logical principles which ruled nature also apply to human productions and he

⁷ English translation – *Gesture and Speech*, 1993.

studied the craniology of terrestrial vertebrates exactly in the same way as a problem of mechanical balance.

- 3) *The classification of techniques*: Pitt Rivers based his classifications on the evolution of forms independently of time and place, whereas Leroi-Gourhan's classification is arborescent and based on modes of action upon materials, worked materials and their technical applications (transport, production, acquisition and consumption techniques). Leroi-Gourhan classificatory system was based on the physical properties of materials and the means used to transform them. Leroi-Gourhan himself admitted that, while his 'systematic technology' created using 40,000 technical reference cards which was the subject of the two volumes of *Evolution et Techniques* (1943 and 1945) was an essential basis for work, but 'the tool is truly only within the gesture which makes it technically effective' (Leroi-Gourhan 1965a: 35). This ambition to study technical action rather than tools alone brings him closer to the ideas of François Sigaut who will be discussed later. It should be noted that when Leroi-Gourhan studied prehistory, he did not really study techniques and preferred the reconstitution of daily life which he called prehistoric ethnology.
- 4) *The evolutionist vision of technical progress*: Both men made a parallel between technical and biological evolution. 'When looking for the true roots of Technology, one must turn to Paleontology and Biology in their broadest sense. At all instants, technical elements can be felt to follow on from each other and organize themselves in the same way as living organisms and human creation, through its continuity, retraces the universal creation.' (Leroi-Gourhan 1945: 472). Leroi-Gourhan and Pitt Rivers had no doubt that there was a continuity between prehistoric techniques and those of the more recent past. Interestingly, both were wrong on this point because techniques do not evolve according to the laws of nature. While natural evolution is of course Darwinian, with living beings adapting to their conditions through natural selection, the evolution of techniques is closer to Lamarckian theory. Lamarck believed that evolution was bushy and occurred through the direct transmission of inheritance of acquired characteristics and through a tendency towards growing complexity and diversification. The same can be said of the evolution of techniques to a greater or lesser extent which explains how it can occur much quicker than natural evolution. This is perhaps the reason why Sigaut never focused on the evolution of techniques to explain the differences between them but rather on their cultural context.
- 5) *Their interest in museography*: This began early in Leroi-Gourhan's life as his projects for display cases for the *Musée du Trocadéro* show. In this work, he highlighted both the presentation of techniques and their context of use. Pitt Rivers is known to have considered his 'panoplies' as true scientific demonstrations.
- 6) *Their excavation methods*: Both Pitt Rivers and Leroi-Gourhan advocated rigorous excavation methods with relics listed as exhaustively as possible. Both men shared the same concerns about the quality of excavation techniques and the same desire to find elements which would help understand daily life. However, times had changed and he advocated horizontal excavation to preserve the layers of occupation floors that have to be 'followed' to meticulously pick up everything that can be found and thus leave the ground as it was when abandoned by the people who lived there. Leroi-Gourhan was not obsessed at all about the succession of stratigraphic layers but of course this was no longer a problem in the 1960s when the then newly discovered radiocarbon dating method had enabled archaeologists to obtain direct datings.

5. François Sigaut (1940-2012)

François Sigaut was trained as an agronomist and is best known for his work on the history of agriculture and for teaching the anthropology of techniques in pre-industrial societies at the School of Advanced Studies in the Social Sciences (*École des Hautes Études en Sciences Sociales*). Early

in his career he focused on three main fields.⁸ The first was the subject of his thesis defended in 1975 at the *École Pratique des Hautes Études*, namely the history of agriculture. Nevertheless, he also became interested in food techniques which are at the other end of the technical chain. As of 1980, he began studying general technology which gradually led to his interest in archaeology firstly for the analysis of techniques and secondly concerning the question of the origins of tools.

He worked on distinguishing the succession of different production operations from the first work on preparing fields to obtaining finished, edible products through ploughing, harvesting and maintenance of crops, then storage and the preparation of the final product. In doing so, he made efforts to identify the techniques themselves which were defined as the diverse alternative methods enabling a certain operation to be carried out but also studied how such operations fitted together in the technical system. His ambition was to develop identification, description and classification processes for the creation of the most complete corpus possible of the diverse agricultural techniques recorded worldwide. This was to run from the period as far back in the past for which information was available to the end of pre-industrial agriculture. For each stage, the idea is to identify operations by situating them in the society or societies where they were recorded as having existed.

Nonetheless, identifying, describing and classifying technical facts and events brings up numerous difficulties. In order to solve the challenge of identification, description is essential to avoid being confused by the use of a vocabulary likely to have evolved over time and which included meanings that varied according to the authors or even the regions involved.

Classification, which had to follow identification rather than precede it, brings up other challenges. To attempt to solve such difficulties, François Sigaut advocated remaining as close as possible to reality and advancing using small corpora without attempting a classification aimed at being too general. Thus his categorization of seed harvesting techniques can be considered exhaustive insofar as all the harvesting methods recorded in the available literature are included (Sigaut 1978, 1991a and 2012a).

This comparative and analytical approach is based on a broad use of ethnographical, historical and technical literature from the xviiith century onwards. This is because he was interested in the social and cultural conditions in which technical action evolved as well as the analysis of that action in itself. He always attempted to highlight the links that exist between different techniques in the same network of activities and between techniques and other elements of the social system.

And yet to develop concepts of general validity enabling comparative analysis, much older sources have to be compared with recent field research. This interest in working on a very long time scale and searching for the origins explains how François Sigaut gradually came to work with archaeologists and even prehistorians during his years of study.

To understand how activities at the basis of the way so-called pre-industrial societies functioned were shared out, he advocated carrying out 'technographic' description of those activities and also taking into account how technical actions were organized as *tasks* and how these were grouped into *ateliers* (*workshops*), a term he borrowed from Le Play as had Paul Descamps who adapted it to the study of what he called '*sociétés sauvages*' (primitive societies, Descamps 1923 and 1925). The word *atelier* designates the way in which a certain activity is shared out within a social group as simultaneous or successive tasks that are nonetheless linked.

This led him to focus on how tasks were shared out according to gender and age in simple or so-called *undivided* societies (to use Clastres's terminology – Clastres 1974) and also to take an interest

⁸ The biographical information presented herein was based on François Sigaut's conference proceedings from the archives of the EHESS, from his bibliography and from memories of conversations (see also de Beaune 2013b).

in more in-depth specializations in more complex societies. He also studied processes aimed at forcing or authorizing certain individuals to break rules forbidding them from carrying out activities specific to their gender (slavery, cross-dressing, etc.) and also the specialization of groups themselves which led them to become castes and to the structuring of Western European societies according to the notion of professions.

In another register, his essay published a few days before he passed away provides an appealing hypothesis on the origin of humans' activities involving tools (*'action outillée'*) (Sigaut 2012). He believed that this was specific to humans because it is linked to the development of mental capacities only humans possess such as sharing experience, joint attention and taking pleasure in succeeding. And these capacities are themselves linked to establishing an exchange between partners of different genders which does not occur in animal societies, however structured they may be. He insisted on the fact that this pleasure derives from both succeeding in a material action and from the recognition of that success by another person. Being deprived of this pleasure is the cause of true suffering as work sociologists well know (Sigaut 1991b and 2009).

For him, activity involving tools (*'action outillée'*) had a central place in human life systems which is why he always opposed the relative disinterest of historians, geographers and anthropologists in techniques (Sigaut 1981 and 2010).

He considered that in the field of the history of techniques, all authors considered themselves the first and imagined they had to reinvent everything from scratch and so advocated linking broken threads of thought (Sigaut 1987b) to escape from this vainly repetitive situation. To achieve this, the often very remarkable results of research from the past had to be rescued from anonymity. This is what he tried to do by contributing to the rediscovery of neglected authors, including Franz Reuleaux or Augustus Lane Fox Pitt Rivers (Sigaut and Cresswell 1987; Sigaut 1990) and by republishing some of them such as Charles-Georges Leroy and Paul Lacombe (Leroy 2006 [1768]; Lacombe 2009 [1889]).

6. Points in common between Sigaut and his two predecessors

Sigaut liked to create bridges between archaeology and the anthropology of techniques and very often highlighted the methodological contribution that archaeology could make to the study of techniques in current societies. He was not a prehistorian but became interested in this field towards the end of his life to better understand the origins of activity involving tools. There are points in common between his work and that of Pitt Rivers and Leroi-Gourhan.

- 1) *The classification of techniques*: Unlike his two predecessors, he thought that any holistic classification system was destined to fail, that large scale inventories were of no use and that it is best to content oneself with well-targeted classifications. His systematic classification of gestures (for example how harvesting tools were held) was strongly inspired by Haudricourt's work. His interest in technical gestures brought his thought closer to that of Leroi-Gourhan but he more readily accepted that he had inherited André-Georges Haudricourt's way of thinking (Sigaut 1987a).
- 2) *The description of techniques*: Here again, while Pitt Rivers and Leroi-Gourhan had an ahistorical vision of techniques, Sigaut considered it essential to situate them in their historical and social context to better measure differences and understand the way in which they were part of a network of activities. Although Leroi-Gourhan did not formalize the notion of the workshop including complementary activities, he did, however, have a relatively equivalent idea about technical changes within a group with the progressive substitution of an activity by another which keeps the situation well-balanced particularly in terms of working time (Leroi-Gourhan 1945: 309).

- 3) *The relation between humans and tools*: Both Pitt Rivers and Leroi-Gourhan considered tools to be a simple prolongation of the hand unlike Sigaut who thought tools did not work in the same way as the organs they were supposed to prolong. On the contrary, he suggested that ‘the limb or organ which is assisted [can] be considered as an instrument and even detached from the body or at least considered separately. This implies the existence of a mental model of activity involving tools and secondly, through a kind of reversal, this model being applied to the body itself. [...] And instead of a hammer or club being an “enhanced fist”, does the fist not rather simulate, quite ineffectively moreover, a club or hammer?’ (Sigaut 2012: 97). In this way, for him, all technical actions involve equipment even when tools are apparently absent.
- 4) *The link between technology and prehistory*: While Pitt Rivers worked on the two activities at the same time, Leroi-Gourhan shifted from the study of technology to the study of prehistory. Sigaut was never a prehistorian but he thought that prehistorians’ approach to techniques could bring new insight into the anthropology of techniques, particularly through attention paid to traces and marks and the experimental reconstitution of technical gestures (e.g. grinding).
- 5) *The evolution and origin of techniques*: Sigaut never attempted to portray an evolution of techniques. Conversely, he studied the origins of activity involving tools which was a recurrent theme in his articles and was discussed at length in his last book (2012). However, he did not discuss prehistorical tools at all to shed light on this question and instead used ethology to explain the emergence of tools in the era of ancient hominins. Thus each species lives in ‘its’ own world defined by its physiology, requirements, behavioural schemas, perceptual system, etc. This is Jacob von Uexküll’s concept of the *Umwelt*. And yet the involvement of tools opens up this closed world because humans’ universe was no longer directly connected to their biology.

7. Conclusion

How has posterity treated these three personalities? Pitt Rivers was fairly quickly forgotten before his reputation was reinstated. He was considered a great archaeologist in the 1930s particularly by Sir Mortimer Wheeler (Bowden 1991: 166). At Oxford, a whole team of researchers are studying his work and his remarkable collection (see the website ‘Rethinking Pitt Rivers’). In France, François Sigaut brought him back to people’s attention at a seminar at the School of Advanced Studies in the Social Sciences (EHESS) devoted to the birth and development of technology (Sigaut 1990).

Leroi-Gourhan left a circle of ‘disciples’ who carried out varied fieldworks on all the continents. Today, a new generation of prehistorians trained by these disciples is working in Leroi-Gourhan’s spirit, namely a paleoethnological approach. In particular, this is the case of the *Ethnologie Préhistorique* team, the heirs of the laboratory of the same name founded by Leroi-Gourhan in 1967 (Valentin *et al.* 2015). However, this work on technology has not spread much elsewhere although it is cited a great deal (see for example Beaune 2000). In the field of ethnology, he taught students at the *Centre for Education in Ethnological Research* (CFRE) which he created in 1947, some of whom became professional researchers such as Hélène Balfet and Robert Cresswell (Soulier 2015). However, to my knowledge, no ethnologists today consider themselves to be following on from Leroi-Gourhan’s works.

Without really attempting to do so, François Sigaut created a genuine school of thought. He taught many of his students – some of whom became career researchers – the importance of attention to details and the need for a true ‘technography’ which he considered the only ways to escape from the too general or artificial categories with which people too often content themselves. However he passed away too recently for us to determine what his legacy will be in coming decades.

François Sigaut drew a parallel between Pitt Rivers and Leroi-Gourhan. He suggested that, for both men, the object remained the central concern and action only interested them if it enabled them to understand an aspect of an object. This is the contrary of other authors like Haudricourt, building on Marcel Mauss, who considered techniques as schemes of action in which objects only play a secondary role (Sigaut 1990: 34). Sigaut noted with irony that Pitt Rivers did not cite his contemporaries (Frantz Reuleaux and Lewis Morgan among others). Similarly, Leroi-Gourhan cited his contemporaries and predecessors as little as possible and indeed never quoted his most direct predecessor, Pitt Rivers, whose work he probably had not read. Sigaut noted that both slightly vainly opted for intellectual solitude and thus hindered the principle of continuity in progress which was conversely so dear to them. 'No innovation, which means no science, is possible if all researchers believe they are forced, like Sisyphus, to roll the same rock back up the hill' (Sigaut 1990: 34).

Common interests can be observed in the work of these three personalities such as the link between humans and technology and they also question humanity's specific features. All three had the same attention to details combined with openness to neighbouring disciplines. But, however close their centres of interest were, all three were nonetheless highly influenced by the major questions of their own eras. In this way, Pitt-Rivers' quest for a portrait of the general evolution of techniques echoes his contemporaries' obsession for chronology. Leroi-Gourhan, on the other hand, paid great attention to the interactions between humans and their environment which could reflect the burgeoning interest in this subject in the middle of the xxth century. Finally, Sigaut above all worked on the insertion of techniques into activities as a whole from a more inclusive standpoint and even studied very contemporary questions such as suffering at work. Three men, three eras but the same quest for humans' specific characteristics and their relations with tools, their environment and the society in which they live and evolve. Fundamentally, three humanists.

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