

The Archaeology of Graphic Signs: Evolutionary and Systemic Approaches 1

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Abstract

Current views of writing hold that scripts were devised in the Neolithic in order to perform some political and economic functions. Consequently, their history retraces their further transformations with changing linguistic and cultural needs. Inspired by the methods outlined by Edouard Piette (1827-1906) and William Flinders Petrie (1853-1942), this paper proposes heuristically to reverse the direction of the inquiry and to investigate backward the steps that may have lead to these systems. It relies on the methods of evolutionary logic applied to technological changes. It assumes that the earliest known systems of graphic signs, rather than being absolute beginnings, are the results of long evolutionary processes that can be traced back to symbolic representations in the palaeolithic archaeological record.

Résumé

L'origine de l'écriture est généralement attribuée à une invention du Néolithique répondant à des besoins économiques et politiques. Son histoire consiste à suivre ses évolutions multiples à partir de cette source selon les contextes linguistiques et culturels qui se sont formés par la suite. Cet article propose une démarche heuristique différente, inspirée par les travaux de deux pionniers, Edouard Piette (1827-1906) et William Flinders Petrie (1853-1942)⁹, qui se sont penchés sur ces problèmes il y a plus de cent ans. Leur approche consistait à remonter vers les antécédents morphologiques et fonctionnels des premières écritures qui étaient alors conçues non comme des innovations

absolues mais comme l'aboutissement d'un long processus de changements culturels soumis aux lois de l'évolution.

Key words: cultural evolution, palaeolithic, scripts, signs, symbolism.

Mots clés: écriture, évolution culturelle, paléolithique, signes, symbolisme.

1. Introduction: Theory between cognition and emotion

The extent to which expectations can bias perceptions has been well documented by psychologists (e.g., Hoffman 1998). The contemporary cognitive neurosciences have shown that there exist some templates in the brain that have been wired-in by evolution and make it prone to identify certain patterns that are particularly relevant to survival. But such specific sensitivity applies to any forms that broadly resemble the typical relations and proportions of these relevant patterns. There are numerous examples of this phenomenon that have been observed across all animal species. Human neonates, for instance, respond by a smile to a cardboard on which two darker patches have been drawn where the human eyes are located on a face (e.g., Goren *et al.* 1975). Sketchy visual information suffices to prime perception templates and trigger adaptive behaviors (e.g., Cox *et al.* 2004). But even in adults, when neuronal selective sensitivity and plasticity allow the brain to discriminate among a great variety of patterns in all the sensorial modalities, specialized neurons take shortcuts and constantly anticipate on the basis of limited information (e.g., Glimcher 2003, Gonzalez-Crussi 2006). The emerging science of neuro-economics that endeavors to find out how brains make decisions theorizes that adaptive behavior cannot wait for exhaustive analyses of incoming information before appropriate moves are made. We are constantly projecting meaningful

percepts that usually, but not necessarily lead to correct interpretations of our environments (Guthrie 2006). The brain can be deceived by its own evolved functionality, a feature that can be (and often is) exploited by predators and deceivers (e.g., Piatelli-Palmarini 1994). Scientific methods consist precisely of devising ways of avoiding the traps of self-deception. These efforts, however, are constantly threatened by the power of our imagination, a form of perceptive projection, as well as by our emotions, which are an important source of perceptual biases (e.g., Pfaff 2005).

In prehistoric archaeology, the most general sources of expectations usually come from the representations of human origins that prevail in the imagination of the researcher as a member of a cultural community. The early “scientific” and popular iconography displayed in magazines, books, and museums, later amplified by films and other media, conveys powerful images and narratives. Hence the frequent reactions of “surprise”, or denial, when new archaeological discoveries put into question established wisdom based on the common sense that has historically developed in archaeological disciplines. We tend to think that theories are rationally constructed on the basis of what we observe but what we perceive often is to a large extent biased by the set of expectations created by theories. As Paul Bahn points out in his review of Dale Guthrie’s book on the nature of palaeolithic art: “People often see what they want to see in rock art.” (Bahn 2006:575). This does not imply willful dishonesty – we actually do not see what we do not expect to see -- but reflects a general condition of human inquiry and a consequence of the kind of brain that has evolved in the context of our immediate survival not in view of an ultimate rational capacity for science (Gigerenzer *et al.* 2001).

The rigorous heuristics and methodologies that have been painfully devised in very recent times (relatively to the time frame of evolution) are constantly challenged by the weight of the selective pressures which fine-tuned our perception apparatus with respect to a range of particular environments. It seems that we find it hard not to fall into the trap of a “good” pattern in any perceptual medium and that we cannot resist a “good” narrative, that is, the representation of a dramatized series of events whose conclusion is virtually rewarding in as much as it construes our ontological status as being the latest and highest of all organisms. Our cognition is attracted by such perceptual and cognitive constraints that seem to put nicely into order the diversity, and often the incoherence of the information our sensory apparatus captures. It is not so much that we do not want to take contrary evidence into consideration but simply that we do not see all that is here to be seen. All scientific observation must sort out what is relevant information from what is noise but what is noise for a theory may be crucial information for another. Moreover, the emotional relation of an individual to theories is not immune to the biases of ethnic and tribal thinking.

These preliminary reflections are in order when the vexed question of the origin of writing is raised. A powerful narrative is entrenched in our culture(s), and prehistoric archaeology has already a long disciplinary history that has “educated” our perception of rock art. Any “deviance” with respect to the mainstream interpretations of the day triggers fierce debates, as two pioneers, Edouard Piette and William Flinders Petrie, whose ideas (and evidence) were at odds with the accepted wisdom of their time, experienced about a century ago.

2. The archaeology of writing. Two pioneers: Edouard Piette and William Flinders Petrie.

The name of Edouard Piette (1827-1906) is usually associated in the contemporary literature (e.g., Delson *et al.* 2000) with the Azilian that is generally considered to be a culture that links, in the European context, the late Upper Palaeolithic and the Neolithic (ca. 11-9 Ka). Piette dubbed this period of time “Epipalaeolithic” or “Early Mesolithic”. It is mainly based on the excavations he did in 1887, 1888, and 1889 at the Mas d’Azil cave on the left bank of the river Arise, which is located in Ariège, a French Pyrénées region. Piette was a lawyer and a judge by profession. He funded his own archaeological research which he completed during his free time between 1871 and 1889. Drawing from his knowledge of geology and stratigraphy, his relative dating of prehistoric artifacts was based on clearly marked strata which included a succession of cultural assemblages formed by stone and bone tools as well as evidence of climatic changes and subsequent variations of the *fauna* and *flora*. Some strata were neatly demarcated by period of flooding (Piette 1895). In addition to geology, he adduced to his rigorous reasoning reliable zoological, botanical and chemical knowledge. His most important results concerning the Mas d’Azil excavations were published between 1895 and 1905 in *L’Anthropologie* and the *Bulletins de la société d’anthropologie de Paris*. His collection was displayed at the International Exhibition of 1889 in Paris. The latter event was crucial in convincing other prehistorians of the validity of his claims concerning the importance of the Azilian culture.

This was indeed needed because he advocated a continuum in cultural evolution at a time when the dominant dogma was that there had been a gap between the Upper Palaeolithic and the Neolithic, an extended period of time when the previous populations and their cultures had become extinct. Neolithic technologies and art were viewed as an absolute beginning, the hallmarks of a new race, the humans proper. A debate was raging between those who attributed to an actual ontological and historical “hiatus” the absence of any transition in the archaeological record of the time (e.g., Emile Cartailhac 1845-1921), and those who thought that this was more likely due to a “lacuna” in the knowledge that had been acquired so far through a limited number of excavations (e.g., G. de Mortillet 1821-1898). Piette provided evidence that the apparent gap could be resolved but he was first confronted to an aggressive skepticism. Nowadays, a similar debate is being replayed regarding the earliest evidence of palaeoart with respect to the relationship between Neanderthals and anatomically modern humans (e.g., Bednarik 2003).

The particular relevance of Piette to the object of this paper is that he repeatedly argued that the numerous geometric patterns that were engraved or painted on bones, ivory and pebbles constituted an archaic script of which he described the elements that were variously combined on inscribed artifacts (Piette 1895, 1905). He related these patterns to both Palaeolithic iconic signs that preceded them and to the earliest forms of hieroglyphic and alphabetical writings that succeeded them along a chronological sequence of continuity and transformations. He did not make any attempt at deciphering these inscriptions but focused on their morphological characteristics. He tentatively analyzed some of them according to the contemporary theory of symbolism, for which he

thought advice from Classic archaeologists such as Salomon Reinach (1858-1932). His approach was encapsulated in the word he chose to designate the Mesolithic: “L’âge glyptique”, from the Greek word meaning “engraving”, and by analogy with the term hieroglyphs (sacred engravings). This terminological choice made it clear that he saw the development of refined geometrical and figurative patterns not only as an art form but also as an important step toward symbolic, abstract representations that would soon lead to writing if it was not already a kind of archaic script.

In fact, one of his last essays was squarely entitled “Les écritures de l’âge glyptique” (1905). His claim is based on two kinds of artifacts: pebbles on which individual patterns are painted, and larger objects such as pieces of prepared bones, antlers or ivory on which sequences of distinctive signs have been engraved. Interestingly, he notes that the individual patterns visible on the pebbles appear to have been made without particular consideration for their aesthetic perfection but could rather be considered as implementations of algorithms such as the general specifications of how straight lines and curves should intersect so as to achieve distinctive figures. What appears to be relevant is indeed what makes each pattern an individually recognizable sign or, in other words, a token implementing a type. These signs are variously combined on the larger artifacts where they have been engraved with great care. It is the formal relationship between these two kinds of artifacts that constitutes the basis of his argument for the existence of a script. However, Piette repeatedly insists that he does not claim that this script is decipherable in view of the available data.

It is noteworthy that the dating propounded by Piette is not based on style but strictly on stratigraphy. Contrary to what is the case with cave paintings, artifacts are

located within a natural time capsule that provides information about the contemporaneous climatic and environmental changes, and can yield reliable dating as long as a proper methodology is applied during the excavations. This latter aspect of archaeological research was scrupulously addressed by Piette who had scientific credentials in geology and palaeontology. Keenly aware of taphonomic logic, he emphasizes that the layers of sediments left by the periodic flooding of the banks of the river Arise and on the floor of the cave provide a reasonable ground for distinguishing the relative age of the cultural assemblages excavated at the Mas d'Azil.

William Flinders Petrie (1853-1942) was a British archaeologist and anthropologist who conducted extensive excavations in Egypt and in the Middle East from 1880 on. His career has been retraced in several accounts of his life (e.g., Drower 1985). He developed a rigorous methodology both in the way in which the sites were dug and managed, and in the interpretation of the archaeological record. He applied statistical analysis to artifacts' analysis, and formalized a systematic method called "seriation" in order to establish relative chronology, notably for the prehistoric potteries found in the cemeteries he discovered (e.g., Naqada). His findings and theoretical writings appeared in numerous publications (see Uphill 1872). Like Piette, with whom he corresponded, Petrie was impressed by some individual patterns he found painted and engraved on prehistoric pottery and other artifacts as they evoked familiar characteristics of the signs of ancient alphabets that appeared later. Petrie's particular relevance to the topic of this paper comes from *The Formation of the Alphabet*, a monograph he published in 1912.

Against the accepted theory that a systematic alphabet had been invented by a tribe or an individual in a developed civilization, Petrie contended that “a wide body of signs had been gradually brought into use in primitive times for various purposes” and that “they were interchanged by trade, and spread from land to land, until the less-known and less useful signs were ousted by those in more general acceptance” (Petrie 1912:3)

Two original premises characterize Petrie’s approach. Firstly, he dismisses the theory that abstract patterns originated in picture and pictographs that had been simplified, and claims that meaningful distinctive geometric forms are more primitive signs than pictures. He states for instance that “[s]igns rather than pictures are the primitive system.” and that “[p]ictographs tend to wear down and be schematized but this is a secondary development, not a primitive one. [Long before the earliest hieroglyphs] there had existed, from the beginnings of the prehistoric ages, a totally different system of linear signs, full of variety and distinction” (Petrie 1912: 3). Secondly, he applies to the history of the changes that are observed over time in these multifarious “signaries” a Darwinian logic of natural selection in view of the cultural context, including the particular language, in which they came to be used. He thus interestingly anticipated, on the one hand, the discovery of the earliest forms of human markings such as the engraving of patterns on mineral supports that were discovered in the Blombos cave (e.g., Henshilwood 2006; Errico *et al*, 2001), and, on the other hand, the main tenets of memetics, an epistemological perspective that endeavors to apply evolutionary logic to cultural changes. As a consequence of these views, he considered that Egyptian hieroglyphs were a secondary development in the history of writing. Petrie’s ideas did not take shape in a theoretical void but were informed by the relevant literature of his time

which he questioned. He was familiar, for instance, with Isaac Taylor's *The Alphabet* (1883) and Philippe Berger's *Histoire de l'écriture dans l'antiquité* (1891) which expounded the state of the art toward the end of the century. He also sought advice from contemporary philologists such as Alan Gardiner, and was conversant with basic semiotic concept as he stated in a chapter entitled "The growth of signs": "Man is a sign-using animal" (Petrie 1912: 3), obviously meaning by "signs" the Saussurian notion of a conventional association between a signifier (in this case a geometric figure) and a signified (a meaning).

In view of his experience as a field archaeologist who had excavated prehistoric sites, he could not help questioning the accepted theory that writing had started rather suddenly. He had recorded indeed many prehistoric signs very similar to the ones that later formed historical syllabaries and alphabets. He had noted the greater diversity of the most ancient "signaries" (the word by which he refers to these sets of geometric signs in the prehistoric archaeological record), and he brought to the question a Darwinian perspective. First, one should look at what preceded a particular form rather than what followed it, going back step by step toward the most ancient one in the belief that there is no absolute beginnings. This was an approach that transferred the principles of biological evolution to the realm of technological (or cultural) evolution, a strategy that has been foregrounded in recent times (e.g., Basalla 1988). The relatively small number of signs in syllabaries, and the still smaller number in alphabets were interpreted by Petrie as the result of a kind of natural (cultural) selection. His theory was that the most ancient geometric signs referred to broad entities or behaviors and had been in use long before pictures appeared. First associated with ideas or categories of objects, these geometric

patterns became more closely associated with the words that designated them, and eventually the forces of what could be called “semiotic economy” (not Petrie’s term) tended to reduce the number of signs towards the smaller number of signs needed for syllabary, then for alphabetical coding. His approach does not lead to any pronouncement regarding either phonetic or semantic values. It consists of ordering on the time scale based on stratigraphy numerous sets of distinct patterns that have been engraved or painted, and making the assumption that each one is coming through imitation (teaching, copying, trading, stealing, etc.) from a previous one. The selection of forms over time (why some survived and other did not in rock art assemblages) is dictated by their functionality with respect to particular semiotic systems. Some contemporaries of Petrie criticized this view on the ground that such geometrical patterns were generated by universal properties of the human mind and did not need to be explained by vertical transmission, or population contacts and transversal imitation. This is a debate that is still raging in the context of memetics and the conceptualization of cultural evolution, not to mention controversies among mathematicians themselves.

3. Archaeology of writing: questions of ideology, theory, and method.

The rationale for focusing on the century-old publications by Piette and Petrie is that these archaeologists have adumbrated a promising heuristic strategy that could be fruitful in view of today’s expanded body of data and greatly improved technological means of

investigation. Their contributions, however, have been forgotten as time passed. For a variety of reasons, the legacy of the mainstream prehistoric archaeology of their time, against which they developed their original arguments supported by reliable data, remained the dominant ideology and inspired interpretations based on different premises. Issues concerning the “invention” of writing loom large in the ideological agenda of philosophical and religious institutions. Indeed these issues ultimately pertain to the very definition of humanity, mind, progress, civilization, history, all being conceived on the discontinuous mode, a kind of “cultural creationism”. The overall structure could be characterized as a “negative before” opposed to a “positive after”. These “values” are neatly ordered in the fundamentally ideological narratives that describe the emergence of writing implemented by various theories.

By contrast, Piette and Petrie advocated the continuous mode inspired by Darwinian thinking. They were applying to cultures a methodology that followed the principles of evolution through natural selection among variations that cannot be too discontinuous but only confer a slight advantage with respect to a particular environment, which may be, of course, a cultural environment. Any apparent gap in the genealogy of forms is circumstantial and can only come from our imperfect knowledge of the archaeological record, not from some kind of ontological hiatus. This approach evokes cladistics as a method of choice for ordering the data, a method that was adumbrated by Petrie “seriation.”

Obviously, not everybody is equally eager to freely investigate possible earlier forms of writing that would be at odds with currently accepted theories that legitimate fundamental assumptions upon which full systems of meaning are based. The issue is not

indifferent to religious establishments of whatever brand and has never been so. For instance, Piette lamented that the caves at Lourdes had been dug and emptied of large quantities of Azilian artifacts in order to make space for catholic religious shrines. Painted pebbles were found spread among the ballast on roads or in heaps of excavated dirt and rocks that had been downloaded away from the caves. Some archaeologists had no choice but collecting them among the detritus without having the benefit of stratigraphic information (Piette 1905: 6). He also mentioned that a complete collection of painted pebbles and other evidence had been stolen from his home (Piette 1905:7).

Both Piette and Petrie described the emergence of writing as an evolutionary process congruent with the evolution of any technology (e.g., Basalla 1988), which is based on constant modifications applied to existing artifacts which are improved in view of whatever functions they serve until, because of taphonomic logic, there appears to be a gap between a previous kind of artifacts and a novel technology. Engraved signs are such artifacts. Piette and Petrie focused on the morphology of the geometrical figures of rock art and ordered them in view of their stratigraphic locations along a genealogy of small modifications and selection. They cautiously proposed hypotheses regarding not so much the meanings of these signs as their potential functions in discriminating meanings. They described their continuity and changes, their successive co-occurrences in cultural assemblages. They speculated on their cognitive values mindful of the fact that only further discoveries could confirm or disprove their hypotheses.

Unlike most researchers, they focused their scientific attention on continuous lines of descent rather than on the sudden emergence of new technologies and new styles. Petrie advocated a sort of regressive method: Given an alphabet or syllabary character,

one should look for patterns that preceded it in previous contexts, and progress back on the time scale as far as possible so as to establish a genealogy of forms as series of descent with modifications. Piette's starting point was a relatively well established chronological period from which he could proceed confidently both forward and backward in archaeological time. Petrie's reference point in time was prehistoric Egypt. Their method, however, were very similar and inspired by the same evolutionary epistemology. Their focus was on establishing successive repertoires of signs through following genealogies, noting the "extinction" of some lineages. There have been, since them, many attempts at cataloguing and classifying signs, either on the ground of their topological properties (straight lines, curves, open or closed figures, etc.) or with reference to assumed sexual referents (one of the latest such repertoires being Guthrie 2006). The drawback of these repertoires, however useful they may be, is that they focus on individual signs rather than on clusters or sequences of signs. Each identifiable geometric pattern is abstracted from its context and assigned to the type to which it appears to belong. Little effort is made to record the collocation of different signs, probably because the dominant theories exclude the possibility that such combinations could be pertinent. Each geometric pattern is perceived and interpreted in itself as the schematic representation of an iconic referent, let it be a phosphene, a weapon, a trap, a penis or a vulva depending on the interpretative matrix that guides the perception of the observer. The discipline has generated a set of descriptive terms that forms a heteroclit vocabulary in which words inspired by Euclidian geometric are mixed with a variety of trivial metaphors and neologisms. These terms constitute powerful perceptual filters that

detract observers from paying attention to their mutual relations within a sequence or a cluster.

The script hypothesis is as worthy of attention as any others from a heuristic point of view, since there has not been any conclusive demonstration that the other extant hypotheses are more than tentative interpretations. This is why observational strategies should be devised to record and systematically compare clusters and sequences of geometric signs which appear to be formed of different types. Engraved bones, antlers, stones and other objects should be the starting point of such investigations as they offer better degrees of certainty concerning their intentionality and functionality. Piette and Petrie were mindful of such criteria as they called attention to items that exhibited the formal organization that would be expected from a script. Piette mentioned that some Azilian pebbles show sequences of aligned different signs, and also published samples of what he considered “glyptic writing” engraved on bones. He also often called attention to the fact that some of these individual geometric patterns were also found in much more ancient artifacts and cave walls.

It is certainly appropriate to recall, in concluding this paper, that André Leroi-Gourhan (1911-1986), who published in the form of tables several inventories of the types of Palaeolithic geometric signs (1958a, 1958b), remarked once that we could think that this would be a form of script if these populations had known writing. The circularity of the reasoning thus clearly exposes the biases that ideology imposes on cognition. Both perception itself in the recording of data and the methodology devised to interpret those data can be distorted by our ideological assumptions to an extent that is rarely

recognized. At least, a keen awareness of these limits can alert us to the danger of some epistemological pitfalls.

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