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Part I

What are the prerequisites for the emergence of writing?

1. Introduction: where does writing come from?

It is universally taken for granted that articulate language preceded writing in human evolution. The idea of a linear and causal development, though, is probably a misleading simplification which owes more to ideology than evidence. It may be a logical fallacy similar to the idea that writing preceded reading. The complexity of the factors involved in cognitive and cultural evolution should prompt us to map the interactions between ecological contexts and the emergent adaptive competencies which were selected by these environmental constraints (including social constraints) rather than impose on a sporadic archaeological record the grand narrative of Progress from grunts to discourse. It is more plausible that multiple interactions in the bounded space of *Homo*'s niches created some statistical regularity which natural selection favored. Concepts such as speaking, writing, and reading pertain to mutually exclusive cultural categories which cannot be used as a starting point for a reflection on the archaeology of writing. Empirical evidence garnered in the cognitive neurosciences suggests that biological and cultural entanglements are not amenable to ideological simplifications. For heuristic purposes, the current assumptions concerning the origins of writing will be radically questioned in this paper. Rather than searching for uncontroversial evidence of writing according to the criteria of advanced literate societies, we will endeavor to examine and discuss the conditions without which writing would be impossible to develop and sustain. The order

in which these preconditions will be briefly examined neither implies an evolutionary order nor any suggestion of a hierarchy. They are more likely to have evolved or co-evolved simultaneously.

2. Biological preconditions for the possibility of writing

The evolution of the hand's precision grip and its fine coordination with vision is a competence which is observed in primates when they prepare twigs to extract termites from their mound, when they get food from shells, and when they groom each other or themselves. The heuristic replication of stone tool making has shown the extent of the complexity of the coordination of the gestures which are necessary for this process. The neuro-muscular mechanisms required for the technology of writing through engraving or painting must have existed long before the first productions of drawings and signs appeared in the archaeological record. On the other hand, the visual discrimination of fairly high-resolution geometrical patterns involving lines, angles, and curves which is also required for writing and reading is an ancient adaptation to tree dwelling which goes back to the common ancestor. The physiological capacities which make writing possible had been within the repertory of *Homo* long before the first uncontroversial proofs of writing occurred. There is ample evidence of manual skills in the geometrical straight lines which form diamond shapes on the pieces of ochre which were found at the Blombos caves (circa 60,000 years ago), in the miniature statues representing females (the "Venus figurines" from circa 25,000 years ago), and in the relatively more recent Azilian painted pebbles (circa 10,000 years ago), to name only a few examples taken from a sixty-thousand-year-long span of time. Script-enabling dexterity had been available to anatomically modern humans at least 50,000 years before what current mainstream archaeology considers being the invention of writing.

3. Cognitive preconditions for the emergence of writing

Writing presupposes the cognitive capacity of planning and executing a complex task which requires a sufficiently extended working memory. It also presupposes a semiotic competence which makes it possible to relate signs to their referents and to process strings or clusters of signs in a way which creates complex meanings. It also requires that token signs be conceived as samples of distinct types of signs. Much attention has been devoted to the cognitive competence which is implied in stone tool making from the selection of proper raw material to the anticipation of the function which the three-dimensional finished product is meant to fulfill. Both working memory and long term planning are necessary cognitive components of such technological activities. Numerous paintings demonstrate a definite capacity for spatial organization, a kind of visual syntax if we understand syntax in its etymological sense of putting things together in a particular significant order or inferring information from their mutual relationship. These cognitive competencies are the same as those needed by hunters who rely on interpreting animal tracks and other signs through inferring the species from token signs which are never absolutely identical but can be reliably assigned to a generic type and through deducting other relevant information such as the time elapsed since the track was made, the direction of the movement, and the age and state of the animal among other virtual representations of the prey. But equally necessary, perhaps even more fundamentally, writing presupposes what has been dubbed the “theory of mind”, that is, the evolved capacity for an individual organism to conceive others as having cognitive competencies similar to its own. Writing indeed presupposes reading by others either for the purpose of communicating information or hiding it through forms of encryption.

4. Linguistic preconditions for the emergence of writing

Based on anatomic evidence and the level of social coordination which can be assumed to have characterized early humans, there is now a consensus that language evolved in *Homo* possibly as early as 200,000 years ago. What was the form of this early type of vocal communication and how it developed under which selective constraints is

in the domain of the un-knowable. Many hypotheses have been proposed. Many are based on the fallacy that language must have evolved like organisms have evolved through stages from primitive forms to advanced forms (from grunts or gesture to universal grammar syntax). There is no evidence of such a process or progress. Cultural evolution has its own dynamic and logic. Recent computations suggest that, if existing languages are compared from the point of view of their vocalic richness, it appears that earlier languages had a much larger quantity of sounds but that this number decreased as populations migrated out of Africa. Beyond this, there is no possibility to know anything about these languages except that they most likely had a lexicon including distinct sounds or combination of sounds in number sufficient to designate unambiguously individuals belonging to the group and all the relevant objects of their environment such as animal and plant species, artifacts, landscape beacons, and meteorological and cosmological events which impacted their lives. The idea that the earliest forms of language consisted of hardly distinct monosyllables is a gratuitous assumption based on fallacious notions of primitiveness. For writing to appear the speakers of a language must have an awareness of vocal segments which are variously combined in utterances. But mere conceptual units as those which can be assumed to form in the consciousness of a deaf-mute individual whose visual perception is not impaired could conceivably be also graphically represented although this would have to be in the context of a community of such individuals sharing similar forms of consciousness and having a social need for representing them externally on lasting supports. Language and consequently writing presuppose a social organization which projects itself toward the future and anticipates its continuation.

5. Sociological preconditions for the emergence and diffusion of writing

The mainstream theory on the invention of writing claims that this technology appeared in order to fulfill the need for keeping record of trade (or religious) transactions in the context of the economy of large urban settlements and political empires which

made this technology necessary. But there are other possible functional motivations which can explain why graphic equivalents of spoken utterances would become adaptive in the sociological context of much smaller populations. Our modern perception of languages as stable conventional systems of representation and communication which transcend generations and found the continuity of ethnic identities is greatly biased by the recent generalization of literacy. Spoken languages are constantly in flux and change very fast. A speaking community, as long it is of a size which allows for mutual monitoring and constant adjustments (approximately 150 individuals), is not aware of the changes which keep emerging and become continuously co-opted (or rejected) as functional parts of this spoken language. However, if the initial group splits into two sub-groups which become geographically separated and keep expanding demographically, their initial spoken language will diverge at an exponential rate to the extent that these two groups cannot communicate orally any longer. Signs and symbols engraved in a durable material can preserve at least for a while lineage information which might be considered valuable. Another plausible function is the preservation of information that is vital (let it be real or illusory) across generations, keeping in mind that the generational distance was comparatively much shorter than ours in population in which the average age of death was very low. Moreover, whatever vital information was preserved in the memory of the oldest member(s) of a group was liable to disappear before it could be transmitted. The notion of Artificial Memory Systems was proposed by some prehistorians (e.g., D'Errico) who could not help acknowledge that the archaeological record offers strings and clusters of signs which have all the formal appearance of encoded information. Whether these signs represent individual parts of lexical units, syllabic segments, or more complex vocalic combinations associated with objects and concepts is irrelevant unless one is biased by the structure of alphabetical writing which is far from being the only writing system, nor the most efficient one. Ethnocentric, ideological, and theoretical attitudes often interfere with sound judgment in issues involving language.

6. Reading and writing: what came first?

This question might be considered ludicrous because it seems obvious that we learn to read from texts which have been written in the first place and the idea that the ability to read should be a condition for writing to be invented sounds paradoxical in the extreme. Basically, reading consists of bringing at least two signs into a single act of cognition or awareness and inferring a meaning constrained by their distinct morphologies and their spatial relationship. Hunters are dependent on such a reading capacity because preys are elusive and information must be gathered from distinctive minimal signs such as tracks or other evidence of their past presence. Tracks in the mud, the sand or the snow provide information on the species of the animal which left them, its age and condition, and the direction in which it moved. Tracks combine angles and curves to tell a story which involves an agent and an action. The tracks of a deer can be read as “young male deer running toward the sunset”, a complex information which involves distinct individual signs and a context. In as much as these signs are associated with elements of a lexicon they can be verbalized and form what we call a sentence. Those who deny the linguistic nature of such an utterance are victim of the fallacy which is created by advanced literacy. The criterion of recursion as a defining feature of language can be observed only in written texts with sentences within which other sentences can be embedded in principle *ad infinitum*. This is simply not possible in spoken language because of the natural limits of the human working memory. Recursion is the artifact of a theory biased by literacy. New approaches to linguistics based on actual language uses, acknowledge the essential role of context in spoken language. The idea of a self-standing statement in the form of a well-formed and correctly spelled sentence independent of any context is a product of literacy. Early forms of writing are likely to be found integrated into contexts (geographical, morphological, ritualistic, or social) which strikingly differ from the printed page in which a virtual context is represented at the same time as the recording (real or fictional) of verbal interactions. These considerations modify the range of expectations that can be entertained in the quest for the earliest forms of writing.

7. Data and criteria for the evidence of writing

As it has been pointed out above, writing is usually conceived in relation to formal articulate language constrained by rigorous rules and in the form of self-sufficient texts. It depends on the conception of language and text which is taken for granted at a given time. If it is postulated that language is a context free universal grammar supported by language-processing modules which are hard-wired (genetically controlled), then the criteria for writing are bound to be as rigorous as those for language so conceived. But if language is not perceived from the point of view of textual literacy, a fertile range of possibilities opens up the inquiry on the emergence of writing. Two conditions must be met to establish that traces of human graphic activities left on mineral supports or other permanent material can be considered as forms of scripts: (i) there must be a finite set of distinct, co-temporaneous human-made patterns within a bounded area; (ii) there must be evidence of some systematic ordering showing the recurrence of some tokens, that is, the ordering must not be random. Until recently little scientific attention has been given to these types of data because mainstream archaeology excludes a priori the disciplinary legitimacy of such inquiries which would require considerable financial means to be conducted. There are however, some signs of a promising change of epistemological attitudes as the generative grammar paradigm is showing signs of exhaustion and increasing irrelevance.

8. Bibliography

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