GEOLINGUISTIC AND OTHER LINES OF EVIDENCE FOR THE CORRELATION BETWEEN LITHIC AND LINGUISTIC DEVELOPMENT

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1. Introduction

The eighth Colloquium on "Lithic industries, language and social behaviour in the first human forms", organized by Fiorenzo Facchini for the XIII UISPP Congress at Forlì - in which I had the privilege and the pleasure of participating - represents in my opinion an event in the history of research on the language of the earliest hominids. Two of the major world specialists on the subject, Phillip V. Tobias and Kathleen R. Gibson, summarising their fundamental research, were able to substantiate their claim that "human language" was already spoken by the earliest hominids. Five more participants - Dharmapal P. Agrawal and Sheeda Kusumgar, John D. Clark, Fiorenzo Facchini and myself - came to the same conclusion on the basis of independent arguments. I might be wrong, but I think it will be difficult, after this colloquium, for the supporters of a late, Upper Palaeolothic emergence of "human language", not to reconsider their thesis.

As I said, what gave the Colloquium its momentous value was Professor Tobias' and Dr. Gibson's papers. Tobias reconstructed the "overlooked and neglected history" (Tobias 1996 91) of discoveries which in the last twenty years brought him to conclude that *Homo habilis* spoke a human language, and came to state that the question now is no longer whether *Homo habilis* spoke, but whether the capacity for language was already optionally present in some *Australopithecus*, to become obligatory in *Homo*, or emerged with *Homo*, as one of his unique traits. I will return to this fundamental question further in my paper.

Kathleen Gibson, summarising her and other scholars' interdisciplinary research on the subject, focused on the cognitive insights for which she is most renowned, and came to the conclusion that "the bulk of the evidence suggests that the rudiments of language capacities may have been present in early *Homo* and that language capacities may have been fully developed in Neanderthals and other archaic *Homo sapiens*" (Gibson 1996 121).

The two distinguished colleagues from India contributed new insights to the study of the relationship between technological and cognitive development, bringing in Chomsky's innatism

and a stimulating discussion of its implications for glottogenesis. I will return to this point further on in my paper (Agrawal & Kusumgar 1996).

Fiorenzo Facchini gave a lucid synthesis of the interdisciplinary arguments that can be marshalled in favour of the theory of the beginning of language with the earliest hominids, focusing on the relationship beween tool making, social behaviour, language and neural development, and on the "capacité de projet qui est évidente dans l'outillage du Paléolithique inférieur et dans d'autres manifestations qui présentent des signes de psychisme humain" (Facchini 1996 129).

I myself (Alinei 1996) brought geolinguistics into the field, by showing that the areal distribution of the three earliest types of lithic tools corresponds exactly with the areal distribution of the three world types of language, namely isolating, inflecting (or fusional) and agglutinative; and that the three types of lithic innovations seemed to correspond to the three major lexical types also from a cognitive develomental point of view, in the spirit of Gibson's view that "the level of cognitive complexity applied to making tools may provide insights to the levels of cognitive capacity available for linguistic and other functions" (Gibson 1996 119).

In this paper, the first I write after Forlì, I will return to the main points of my own contribution to the Colloquium, making an attempt at developing them further, in the light of the other contributions to the Colloquium.

2. Towards a continuity theory of language development from *Homo habilis* to *sapiens sapiens*

As a linguist, I feel first of all compelled to justify the fact that so few linguists, at present, take part in the present debate about the origin of language. This is unfortunate, but not without reason. The notorious 'prohibition' of any discussion of glottogenesis, issued by the prestigious Societé Linguistique de Paris in 1868, surely still weighs on many linguists' minds, and in any case influences academic institutions and curricula. There is no institutional place, for example, for the study of glottogenesis in most linguistic departments, the world over. As to the psychological influence of the prohibition, an example will suffice: after WW II, when research on language origin was resumed, the first issue of Unesco's *Cahiers d'Histoire Mondiale* published an article by Sir Richard Paget (1952) on the gestural origin of language. The journal's editor, Lucien Febvre, not only had to justify this publication because of the "espèce d'interdit qu'on fait peser depuis plus

d'un demi-siècle sur la question des origines du langage" (the kind of prohibition that has been hanging over the question of the origin of language for more than half a century), but, more importantly, also because of the "réserves ... formulées ... au sujet de cet article par des personnes très autorisées" (the reservations formulated about this article by people with much professional authority). Unfortunately, we do not know the names of these very authoritative people, who had tried to block publication, but we can be sure that one generation and a half later such 'authorities' with their strong reservations still exist, and exercise adequate pressure on young linguists.

As a geolinguist, in charge of the *Atlas Linguarum Europae* (Alinei et. al. 1982-1990, in press) and thus involved with geolinguistic problems on a continental scale, I am particularly attracted by the possibility of connecting the origin of the areal distribution of world's languages to that of the origin of language. In a recent book (Alinei 1996) I have used geolinguistics, next to many other lines of evidence, to argue for direct language continuity and evolution from *Homo habilis* and *erectus* to *sapiens sapiens* and to extant languages, hereby opposing the (now abandoned?) discontinuity theory of Lieberman (1991), and following the supporters - in varying degrees - of some form of speech evolution from the earliest humans: among others, G. Clark (1962), Leroi-Gourhan (1964), Clark & Piggott (1970), Parker & Gibson (1979), Holloway (1981), Wymer (1982), Bickerton (1990). J.D. Clark (1992), Leakey & Lewin (1992), Renfrew (1992), Aiello & Dunbar (1993), Facchini (1993a, 1993b), Tobias (1993), Pope & Keates (1994).

After Tobias' paper at the 1996 UISPP Colloquium, I think the presence of language in early hominids can be considered as proved beyond reasonable doubt. The focus should now be on the above-mentioned question posed by Tobias, which I will now discuss. I shall first quote Tobias extensively: "It is my contention that the ability for spoken language has been a characteristic of the hominids at least since the emergence of the genus *Homo* in the Later Pliocene, about 2.5 myr." However, "We know that about 2 1/2 myr ago there was a great cladogenetic split in hominid phylogeny. Hominids were faced by one of these evolutionary choices". The new question then arises: "Did brains capable of articulated language first appear before or after the split? If they arose after the split, then it is a special uniquely derived trait, an autapomorphic trait, of the genus *Homo*. We have on the other hand to countenance the possibility that this faculty might have appeared before rather than after the bifurcation. If it arose in an advanced *A. africanus* before the

split, it is likely that the propensity to speak would have been handed on to both or all lineages derived from the split. Several lines of evidence suggest that the rudiments of speech centres and of speaking were present already before the last common ancestral hominid population spawned *Homo* and the robust australopythecines (Broca's bulge in *A.africanus*; tool-making perhaps by a derived *A.africanus* and a hint of an inferior parietal lobule in one endocast, SK 1585, of *A.robusts*). Both sets of shoots would then have inherited the propensity for spoken language. The function would probably have been facultative in *A.robusts* and *A.boisei*, but obligate in *Homo*" (94).

As I will try to show, my own geolinguistic contribution to the study of the origins and of the first spread of language(s), combined with Chomsky's major claim about the innate character of language, may provide a tentative answer to the question posed by Tobias.

At the centre of my theory, which I have called the Continuity Theory, I have placed, among other arguments, the hypothesis of the correlation between lithic, linguistic and cognitive development, basing myself on the conclusions of, among others, Leroi-Gourhan (1964), Holloway (1981, 1983), Holloway & De La Coste-Lareymondie (1982), Leakey & Lewin (1992), Gibson & Ingold (edd.) (1993), Tobias (1993), and in particular of Parker & Gibson (1979), whose approach has proved particularly suitable for a linguistic elaboration. As in my Forlì paper, here I will concentrate only on the lithic-linguistic areal correlation, and omit an illustration of my other arguments for language continuity from *Homo habilis* and *erectus* through *sapiens sapiens* to present languages.

3. The areal distribution of Paleolithic tools and of language types

As is known, choppers and bifacials seem to have a neatly complementary areal distribution. The discoverer of this surprising, and so far unexplained, distributional pattern is Hallam Movius (1944, 1948, 1955), and the frontier between choppers and bifacials he identified has been called after him the 'Movius line'. Gordon Childe, however, in his *What Happened in History* (1954 31-32) added a third area, that of crude flakes: "Throughout Africa, in western Europe, and in southern India (my emphasis) the favourite and most carefully shaped tools were made by knocking bits off a large lump or core till this was reduced to one of four of five standard forms. The products can all be classified as *core tools* and are currently designated hand-axes. In Europe during the ice age and in

northern Eurasia (my emphasis) we meet on the other hand almost exclusively what are termed *flake-tools*. Their makers do not seem to have cared much what shape was ultimately assumed by the parent lump or core; they were primarily interested in the flakes detached and trimmed these up to form implements, less rigorously standardized than hand-axes. Finally the tools made by China man (my emphasis) and the earliest implements (termed Soan) from northern India and the Malay Peninsula (my emphasis) cannot be classed as either core or flake tools, but are regarded as representative of a distinct '*chopper*' or 'pebble' cycle. The divergent traditions thus revealed no doubt reflect different responses to differing environments. But they are essentially conventional and conditioned by distinct social traditions. No factor of climate or habitat obviously obliges a tool maker to choose the core rather than the flakes detached from it. And no less striking than the divergences between the main cycles are the uniformity and continuity within each. Notably in the core-tool province the same peculiar forms were given to hand-axes from the Cape of Good Hope to the Mediterranean and from the Atlantic coasts to central India. For a couple of glacial cycles we can detect only minor variations and improvements on a small assortment of traditional forms. And in each part of the province these variations succeed one another in the same order. It looks as if some sort of intercourse were being maintained among the widely-scattered groups so that ideas were interchanged and technical experience was pooled" (Childe 1954 31-32).

Later surveys, from monographs on the Paleolithic such as Wymer (1982) to short interdisciplinary summaries such as Cavalli Sforza (1991), have tended to emphasize the distributional contrast between the two areas of choppers and bifacials. Quite recently, however, the Movius line has been revisited by K. Schick (1994; cp. J.D. Clark 1994, Roebroeks 1994 and Bar-Yosef 1994), who has confirmed the existence of the third area, called by her 'Mode-1 area'. Fig. 1 reproduces Schick's map (Schick 1994) , modified after Isaac (1982).

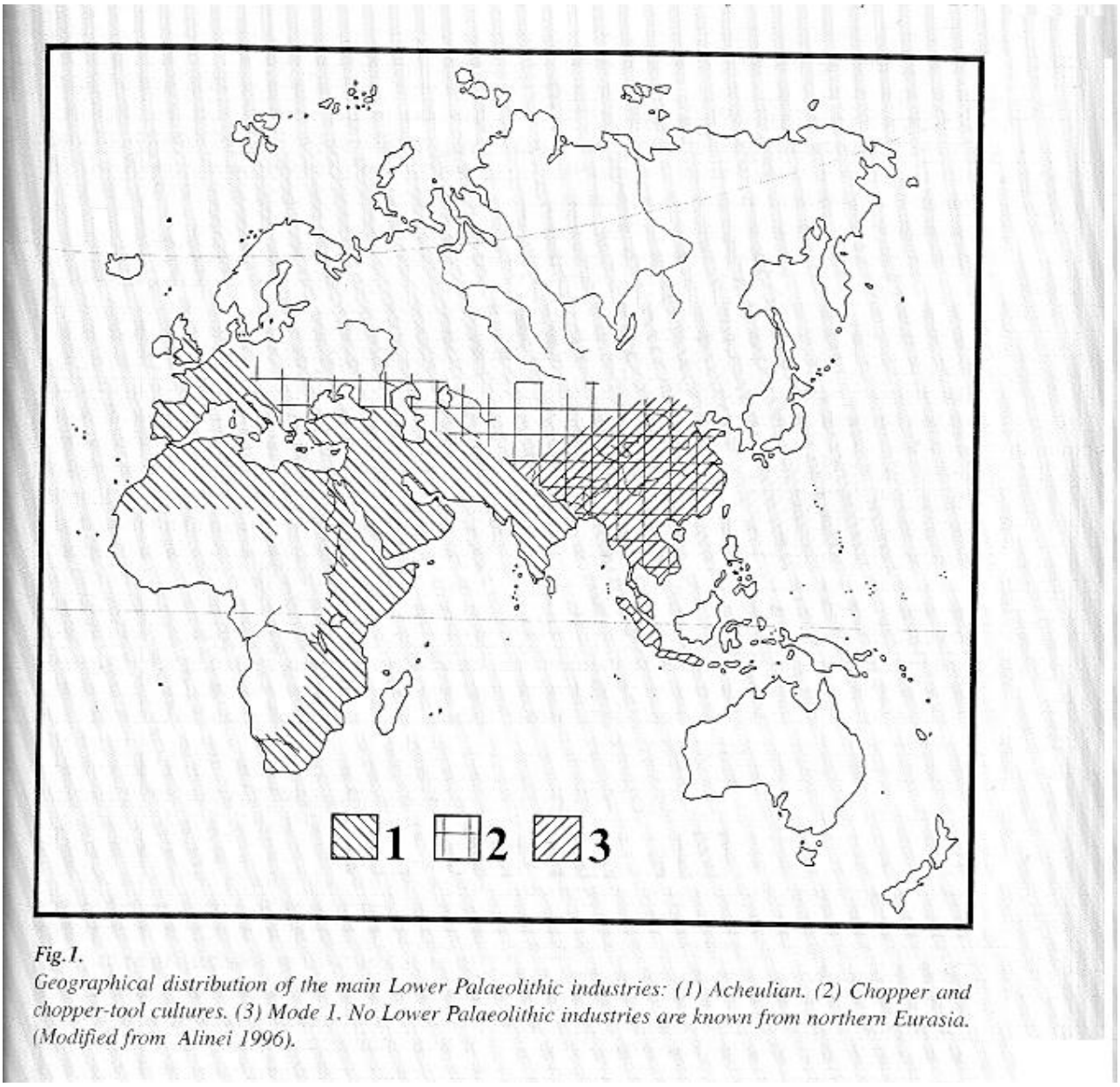


Fig.1.
Geographical distribution of the main Lower Palaeolithic industries: (1) Acheulian. (2) Chopper and chopper-tool cultures. (3) Mode 1. No Lower Palaeolithic industries are known from northern Eurasia. (Modified from Alinei 1996).

As one can see, the three great typological areas of Middle Pleistocene lithic industries correspond to those already identified by Childe:

(1) Northern, eastern and southern Africa, western Europe, and southern India for BIFACIALS.

(2) China, northern India and the Malay Peninsula for CHOPPERS and chopping tools.

(3) Northern Eurasia for 'MODE 1' tools.

John Wymer's recent survey of the Paleolithic (1982) gives the essentials of the chronology and the cultural implications of the lithic areal distribution, basically elaborating on Childe: "The Middle Pleistocene probably saw the most stable and uniform culture the world has ever known, and stone industries in Africa, India and Europe have astounding similarities with each other"

(1982 33). In this area "there appears little or no contact with hunting groups of India, China and the Far East", where on the contrary "*Choppers* industries survived ... to the exclusion of hand-axes". "In these regions, the transition to advanced hunting communities was less rapid, and both specialised and unspecialised hunting groups continued with little change, unaware of the development elsewhere in the world" (156). The same holds for the successive period: "The Late Pleistocene archaeology of ... China and the rest of the Far East is very different from that of Europe, Africa and the Near and Middle East" (218). "In Europe and Africa the evidence suggests movement of people, the spread of new ideas and the gradual formation in most areas of advanced hunting communities with leptolithic tools... In the Far East the pattern appears to have been a steadier continuity and uniformity. Contact with the rest of the world was minimal and population movements restricted for the most part to within the sub-continent peninsula...". Also the Levallois technical innovation, based on bifacial technology, "never seems to have caused any fundamental changes" in the chopper area (218).

Irrespective of which causes are attributed to the forming of this "enigmatic" distributional pattern (Schick 1994; on the problem see also J.D. Clark 1994) , what strikes the geolinguist is the possibility of correlating it with a similar, though linguistic, distributional pattern. Probably because linguistics has not previously occupied itself with the lithic areal distribution, nobody seems to have noticed that the tripartition of the Old World into areas of choppers, 'Mode 1' tools and bifacials corresponds rather closely to the distributional pattern of the three main types of languages, as they have been identified since the end of the last century: namely ISOLATING, INFLECTING (or FUSIONAL) and AGGLUTINATIVE. For the non linguist let me recall that while all the world's languages, without exception, classify and communicate about reality by means of lexemes, ISOLATING languages have monosyllabic lexemes and express grammatical functions by separate lexemes, INFLECTING languages have polysyllabic lexemes and express grammatical functions by one synthetical morpheme, incorporated into lexemes, and AGGLUTINATIVE languages have exceptionally long lexemes, and express grammatical functions by a sequence of analytical morphemes attached to lexemes, in a one-to-one relationship with each grammatical function. Limitations of space prevent me from recounting the history of the discovery of, and of research on, language typology. It suffices here to recall that the major

linguists of the world, from the German brothers Schlegel, von Humboldt, Bopp, and Schleicher in the last century, to the Dane Jespersen, the representatives of the Prague school, the Russian Trubetskoy and the Americans Sapir in this century, have contributed to it. From Schleicher (1848) on, the three types of language were put in a sort of evolutionary sequence, first from isolating, through agglutinative, to inflecting, in order to have 'our own' Indoeuropean at the apex of evolution (with the Eurocentric bias which was already typical of German research of the last century!); and then, more recently, and according to Trubetskoy (1939), from isolating, through inflecting, to agglutinative. The latter sequence is also the one we will have to adopt, as we shall see shortly. However, Trubetskoy's thesis had little following, not because of a critical discussion of its merits, but because in the meantime the tripartite classification of language typology had fallen out of fashion, owing to a basically inadequate criticism. This criticism was twofold: (A) there are different and better methods of classifying languages than by means of the three typological categories, and (B) these would be in any case too fuzzy to be of any real value. Both parts of the criticism, however, are inaccurate in terms of classification theory, the existence of which seem to have escaped most linguists. There are no 'absolute' classifications, but as many as there are aspects to the object to be classified. As a consequence, languages need to be classified with one set of methods as far as their phonological systems are concerned, with another as to their phonetic characteristics, with a third as to their syntactical ones, with a fourth for their morphological ones, and so on, for all of its numerous facets. The 'classical' typological tripartition is still relevant then, but only for that particular aspect of language which is the relationship between lexemes as representations of the world, and grammatical functions as tools to organise lexemes into syntax. For this specific, and quite significant aspect of language, the three typological categories are still indispensable and quite accurate. As to their fuzziness, this is inherent - in varying degrees - to all classificatory categories. Traditional categories such as vowels and consonants are certainly no less fuzzy than the ones in question, nevertheless are constantly used even by those linguists who are ready to criticise the three typological categories for their fuzziness.

Unfortunately, the abandonment of research on the three morphological categories - dictated by fashion rather than by a critical approach - has left its marks, as there is not as yet any world

map of languages classified according to the tripartition. However, I have been able to obtain from Matthew Dryer of Buffalo University, New York, a world map of isolating languages (fig.2), which he has produced on the basis of a databank sufficiently representative of world languages, and for the other two categories I have solved the problem on the basis of common information.

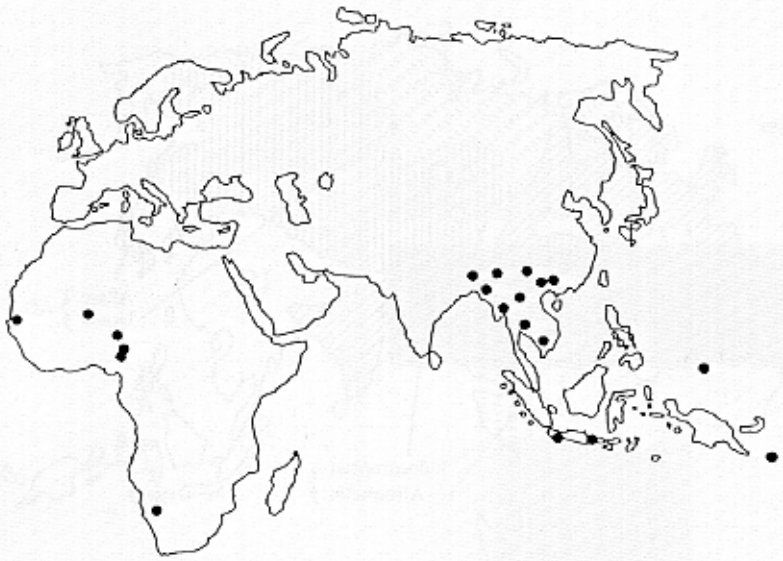


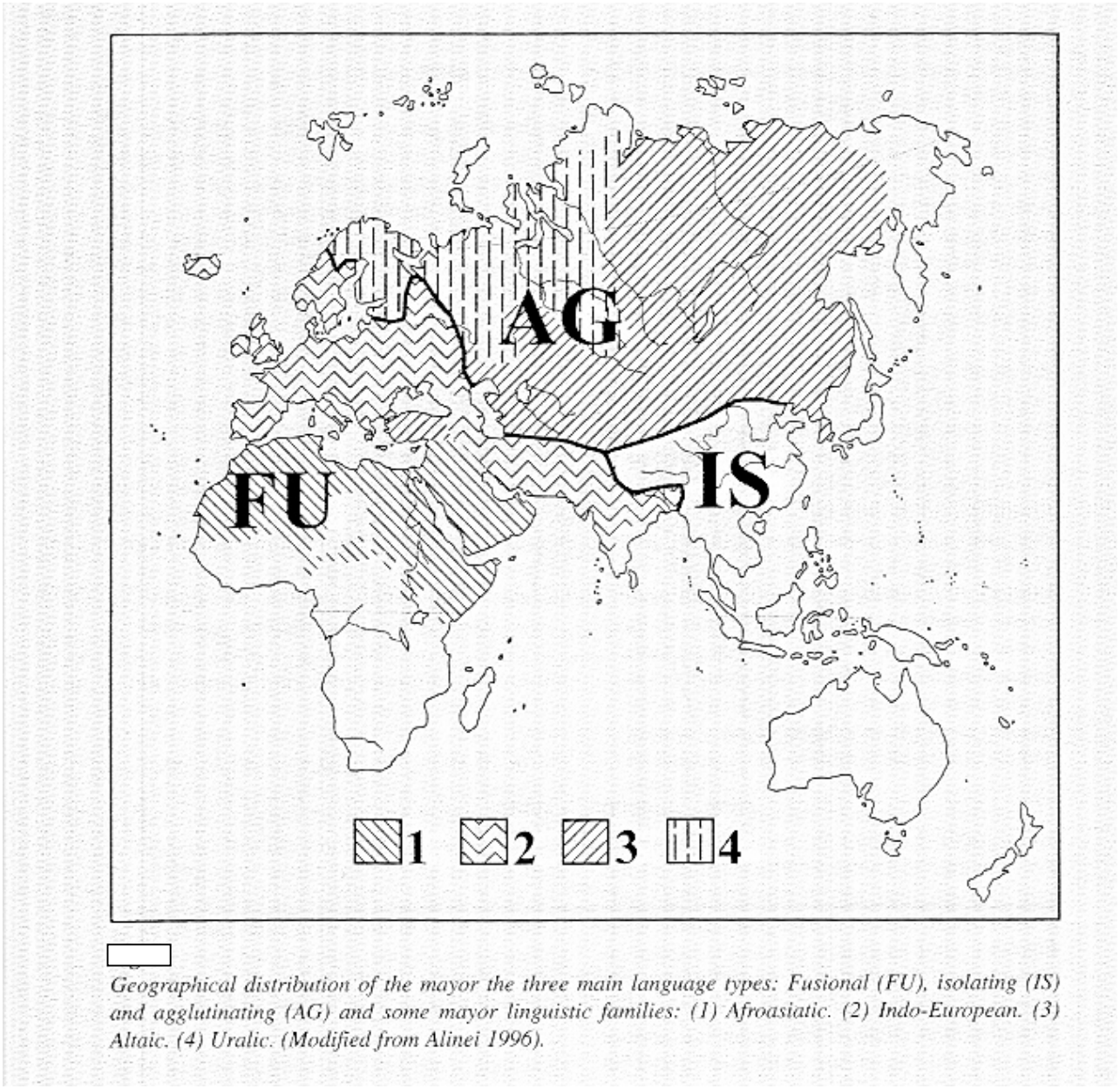
FIG. 2: World map of isolating languages

Matthew Dryer's map shows that there are no isolating languages in the New World, and that 16 out of the 22 languages in the Old World shown by the map, concentrate in the Far East, that is precisely in the chopper area.

Also the 6 isolating languages in Africa occur exclusively in the western area, that is precisely in the area where bifacials are absent in the record of Lower Paleolithic.

It must be added that this map is conservative, in the sense that it records only languages which satisfy all conditions for their classification as isolating. If we relaxed the criteria for inclusion, quite a few other languages would be added. But even in this case by far the greatest number of them would fall within the same two areas and none in the remaining areas of the Old World.

As to inflecting and agglutinative languages, the exhaustive information we have on the world's major language families and languages is sufficient to draw a provisory map, such as fig. 3.



Geographical distribution of the mayor the three main language types: Fusional (FU), isolating (IS) and agglutinating (AG) and some mayor linguistic families: (1) Afroasiatic. (2) Indo-European. (3) Altaic. (4) Uralic. (Modified from Alinei 1996).

FIG. 3

This basic map is Merritt Ruhlen's world map of linguistic phyla (Ruhlen 1991), which I have elaborated on the basis of common knowledge about their typological features. For we know for sure:

(A) that all Indoeuropean languages are of the inflecting type;

(B) that amost all Afroasiatic languages are inflecting (see further for the few exceptions);

(C) that all Uralic languages are agglutinative;

(D) that all Altaic languages are agglutinative.

In other words, a distributional map of these four large language families automatically provides an approximate map of inflectional and agglutinative languages for a sufficiently representative part of the Old World.

More importantly, even though this map will not capture some inflecting and agglutinative languages in the rest of Africa and in north-eastern Siberia, it is sufficient to show that the areal distribution of the two major inflecting language phyla and that of the two major agglutinative language phyla in the Old World, corresponds quite closely with the areas, respectively, of bifacial and Mode 1 tools.

Comparison of the two maps (fig. 1 and fig. 3) shows that the three lithic areas are strikingly similar to the three linguistic areas. Here is the detail:

(1) The chopper area in South East Asia corresponds quite closely with the South-eastern area of isolating languages. Also the few isolating African languages fall within the area without bifacials in Western Africa.

(2) The area of Mode 1 tools in Central Asia and Eastern Europe looks very much like the focus area of the people who much later inhabited Northern Asia and North-eastern Europe, and spoke agglutinative languages that eventually became, among others, Uralic, Altaic and Paleosiberian. Agglutinative languages, in other words, occur precisely where bifacials never arrived, and Mode 1 tools were superseded by leptolithic tools. The apparent contradiction of Anatolia, which lies in the bifacial area, and thus should show inflecting, instead of agglutinative languages, is clearly the result of recent events: recall the extinction of several IE and other languages of Anatolia, prior to the arrival of Turkish from Central Asia.

(3) The area of bifacials in Northern Africa and in South-Western Asia corresponds quite closely with the area of inflecting languages, which includes not only Afroasiatic (= Hamito-Semitic) and the Indo-Arian branch of Indoeuropean, but also Kartvelian and other Caucasian languages.

(4) In Europe, the position of the Movius line is controversial, and some authors would probably put it more to the East than it appears on this map. Whatever the original position might have been, however, we would have to assume a further eastwards expansion of the bifacial area, in order to account for the larger European area of inflecting languages. This assumption is totally warranted

by what we know of the recent expansion of Indoeuropean at the expense of Uralic agglutinative languages.

Additional linguistic information, which I have collected after Forlì, seems to reinforce the areal correlation hypothesis.

(i) Most languages of Northern Africa and South-western Asia that belong to the Afroasiatic phylum (Hamito-Semitic) also belong to the inflecting type, and thus correspond to the bifacial substratum of this area. A few languages of North-western Africa belonging to this phylum, however, show a distinctive isolating character, and this contradicts the expectations of comparative linguistics, according to which a language phylum should belong to the same general type. Now these Afroasiatic isolating languages belong to the so called West Chadic group, and these are precisely the ones we see on the northern border of the area where bifacials are absent from the Lower Paleolitic record. West Chadic, then, could be interpreted as the only branching of Afroasiatic having been affected by a different lithic substratum.

(ii) Another interesting detail concerns the Mongolian area, in the Far East, which one would expect to belong to the isolating type of the chopper area. Mongolian, however, belongs to the Altaic language family and thus shows an agglutinative character. This seeming contradiction turns into a confirmation when one discovers that the archaeological record of Mongolia, in contrast to the general chopper typology of the area to its south, shows leptolithic tools: the Ordosian area, for example, shows leptolithic industries, akin to Upper Paleolithic industries of (agglutinative) Siberia, and not to (isolating) China (Wymer 1982, 218). "Only in the ... area of Mongolia is there any definite sign of a diffusion of ideas from the technologically advanced west" (Wymer 1982, 218, emphasis mine). In other words, Mongolia lies in the Mode I area, to the North of the chopper area, and not in the chopper area.

(iii) Also in the extreme north-east of Siberia, where Altaic languages do not reach, and the linguistic map is empty, there appears the Chukchi-Kamchatkan language family, which is also agglutinative, as predicted by the model.

There are only a few problematic areas, for which, however, an explanation can easily be suggested:

(1) the Southern Indian area, which belongs to the bifacial area. Here we find, instead of the inflecting languages predicted by the areal correlation, Dravidian languages, which are agglutinative. However, most scholars consider the Dravidian group as intrusive in India, and associate it either with Uralic, or Altaic, or Elamite, all agglutinative.

(2) South-eastern Africa, which belongs to the bifacial area. Here we find agglutinative languages, belonging to the Bantoid group, , instead of inflecting ones. However, since the Bantu homeland is considered to be in the north-western part of the present Bantu distribution, the southwards expansion of Bantu languages would have involved the extinction of earlier inflecting languages.

All in all, the two distributional areas seem to correspond too closely to allow a coincidence hypothesis.

4. The cognitive interpretation of the lithic-geolinguistic correlation

The linguistic interpretation of the three equivalences is particularly fruitful, in my opinion, if one makes use of the model elaborated by Parker & Gibson (1979), and further developed by Dr. Gibson's subsequent work. This model is based on Piaget's psycho-linguistic theory (e.g. Piaget 1952, 1954, 1955), to which one might add his precursor Vygotsky (1968 = 1928)) by which action, and not perception, precedes intelligence. Hence, the legitimacy of utilising the development of lithic technology in order to reconstruct the earliest stages of the cognitive and linguistic development of humans. In Parker's & Gibson's model, for example, aimed throwing gives rise to the development of a Euclidian concept of straight line projection; the flaking technique for the creation of a cutting line in the production of choppers and flakes as tools gives rise to the notion of sharpness of angle and thus of a section of a solid; the use of percussion to create a geometric section gives rise to the notion of force transmission through contact of objects, etc. In short, the association of lithic tools with *Homo habilis* permits one to suggest that "certain projective and Euclidean preconcepts... arose as adaptations for stone-tool manufacture". Similarly, butchering with subsequent social sharing of food among group members requires the capacity of dividing a whole into equal parts, and of constructing one-to-one correspondences.

Another fruitful insight in Parker's & Gibson's model is the one that focuses on the specificity of the operational contexts, in contrast with the generality of the cognitive and linguistic

developments that derive from them. Aimed throwing, butchering, sharing, etc. are context-specific, but acquire a general value as their function is extended to any kind of context. From a linguistic point of view, this insight is particularly convincing, since the passage from specific to general is one of the most frequently observed semantic developments: witness the passage from 'flax thread' to 'line' (lat. *linea* 'line' from *linus* 'flax'), from 'stone' to 'calculus' (lat. *calculus* 'little stone; calculus', from *calx* 'stone'), from 'sheep' to 'money' (lat. *pecunia* 'money' from *pecus* 'sheep, cattle'), and from 'foot' 'head' 'leg' 'arm' etc. as parts of the body to general spacial notions in most languages.

Obviously, the equivalence between choppers and isolating languages implies that the languages spoken by *Homo habilis* and *erectus*, prior to the beginning of bifacial industries, were isolating. This is also what other linguists have speculated, on the basis of purely linguistic arguments (e.g. Bickerton 1980). In the Far East, however, isolating languages would have continued despite the further evolution to (in the multiregionalist model), or the immigration of (in the Out-of-Africa 2 model), *Homo sapiens sapiens*.

From a cognitive and linguistic developmental point of view, following and elaborating on Parker & Gibson (1979), the production of choppers could be seen as the operational antecedent of the first production of lexemes, on the basis of the equation:

(1) *truncated cobble* = segment of vocal flow (ISOLATING lexeme)

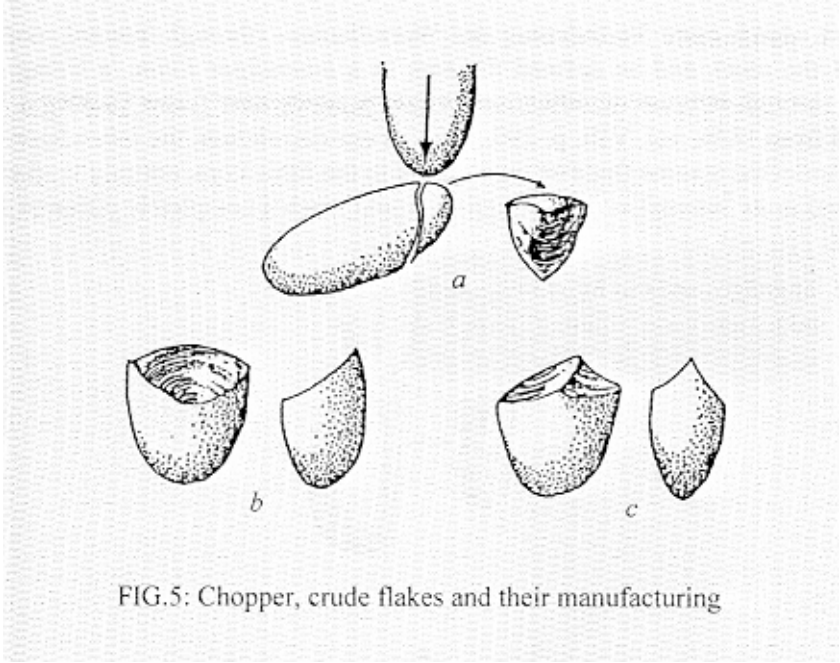


FIG.5: Chopper, crude flakes and their manufacturing

Just as the natural cobble is truncated on one side, modified as to obtain its new, tool function, the continuous, uninterrupted vocal flow is actively interrupted and made discontinuous, as to obtain its new, lexical function. Notice that the main difference between the animal call and the human lexeme is precisely in the voluntary interruption of the vocal emission, and in the attribution of a fixed value to the resulting fragment, which therefore becomes reproducible. The process is similar to the one that takes place in the purposeful truncation of a side of the cobble, by which the truncated cobble becomes a standard, reproducible tool. However, the difference between the two processes is not only in the results of the voluntary modification (truncation/segmentation) of the natural material, but also in the degree of generality of purpose reached by them: the cobble is modified, i.e. sharpened, in order to serve a very specific working purpose, the voice flow is truncated to serve a more general, cognitive and communicative purpose. This generalization process seems to obey the same pattern illustrated by Parker & Gibson (1979).

Consider now the second equivalence, between bifacials and inflecting languages, and compare it to the first:

(1) *chopper* = single, ISOLATING lexeme

(2) *bifacial* = lexeme with the addition of a synthetical morpheme (INFLECTING)

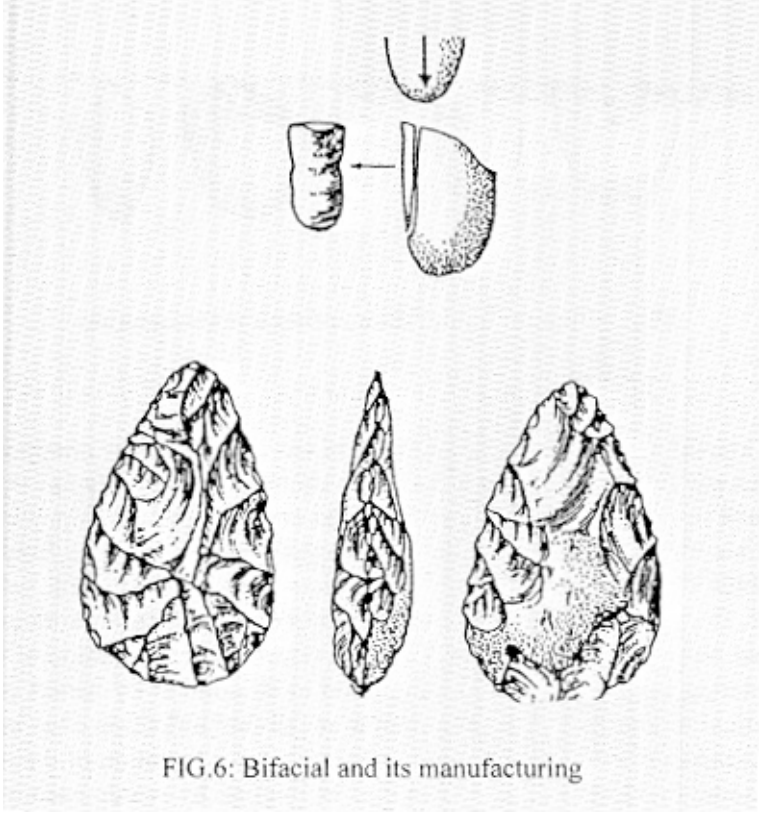


FIG.6: Bifacial and its manufacturing

As is known, while the original cobble, in relationship to the chopper, remains for a great part intact, being truncated only on one side, the bifacial is the result of a retouch involving the whole surface of the original. The development concerning bifacials may also find a parallel on a cognitive level: whereas from the truncated cobble there can emerge only the notion of the word/syllable as a phonic segment, from the working of the whole surface of the bifacial a more complex notion can emerge, namely that of a deeper, structural modification of the previously isolating lexeme, and of its adaptation to its context by means of an affix (grammatical morpheme). It is important to recall that inflection does not involve a mere juxtaposition of a morpheme to a lexeme, but adaptation of the morpheme to the lexeme or viceversa, as shown e.g. in English by words such as *do does done* and *did*, or *sleep slept*. Morevoer, while the isolating lexeme could only have either a semantic meaning or a grammatical meaning, now the inflected lexeme will incorporate a double function, both semantic and grammatical. Students of lithic technology often use the expression of 'morphological retouch', which could also be suitable in linguistics. When Friedrich Schlegel, the discoverer of the linguistic tripartite typology, in his *Über die Sprache und Weisheit der Indier* of 1808, described the inflecting or fusional type, he explained that its essence was reached "durch innre Veränderung des Wurzellautes" (through internal modification of the root), and he defined the root as a *lebendiger Keim*, 'a living core', which through internal modifications would produce new forms (Schlegel 1808 (quoted from 1846, vol. VIII, p.299, 302)). In our correlation, the *lebendiger Keim* of the inflected lexeme finds its own matrix in the lithic core, entirely worked and modified in its 'internal structure', until it would reach a completely different shape from its original one.

Consider now the third and last equivalence, between prepared cores (leptolithic tools) and agglutinative languages, and compare it to the other two:

(1) *chopper* = ISOLATING lexeme

(2) *bifacial* = INFLECTING lexeme, with one synthetical morpheme

(3) *flake/blade* = AGGLUTINATIVE lexeme, with a sequence of analytical morphemes.

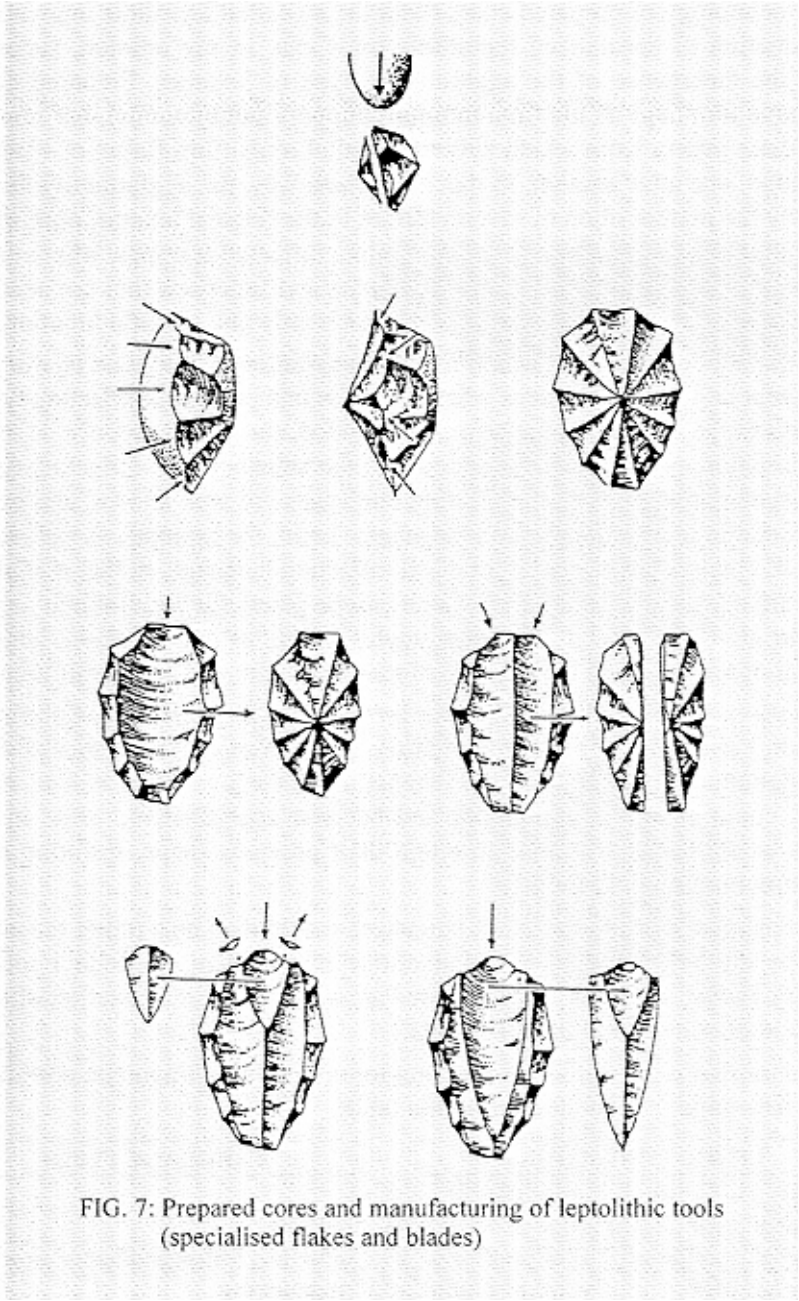


FIG. 7: Prepared cores and manufacturing of leptolithic tools (specialised flakes and blades)

The technology of prepared cores (with the so called Levallois innovation) for the production of specialized leptolithic tools can, in my opinion, succesfully explain the emergence of the agglutinative type of lexemes. Prepared cores no longer have the shape of the final tool (as choppers and bifacials), but serve as an intermediate matrix from which several, parallel tools (thin flakes or blades) can be obtained, one after another. In much the same way, the agglutinative lexeme is formed by the juxtaposition of several affixes to the original lexeme, each of which has its particular grammatical function. Unlike inflected lexemes, where one affix can express synthetically the different grammatical functions that are needed, the agglutinative affix is specialised, as it expresses only one specific function.

The impact of the Levallois and further innovations would then be different in the different areas: in those areas where bifacials had produced inflecting typology, the impact of the new technology would be limited, and would produce, at the most, the introduction of agglutinative aspects into the already stable inflecting typology. These agglutinative aspects of inflecting languages are well-known, and examples can be found in most Indoeuropean languages. Latin, for example, as well as its numerous IE cognate languages, is a typical inflecting language, in that it shows synthetical affixes such as *-i* of *pueri*, which can be plural for 'the children', or dative for 'to the child', but it can also show agglutination, as in *ama-ba-nt*, where *ama* 'love', *-ba-* is an affix for a certain type of past, and *-nt* marks the plural: 'they loved'.

In those areas where bifacials never arrived (Northern Eurasia, Central Asia), and Mode 1 had remained the only industry, the innovation would inevitably bring about agglutination (Uralic, Altaic, Paleosiberian etc.). In other words, isolating lexemes could easily be juxtaposed and become agglutinative, while inflecting lexemes would necessarily tend to retain their previous shape, resulting from an earlier structural modification.

The emergence of agglutinative languages would then be a rather recent affair, caused by the Middle and Upper Paleolithic replacement of Mode 1 tools with leptolithic industries in already populated areas, or by the introduction of the new industry in previously uninhabited areas.

Summarizing our results, we could represent the lithic/linguistic correlation in its different stages and modalities in this table:

LITHIC INNOVATIONS			**LANGUAGE TYPES**
I	II	III	
choppers →	→	→	= *ISOLATING*
choppers	*bifacials*	*prepared cores*	= *INFLECTING* with agglutinative aspects
Mode I	→	*prepared cores*	= *AGGLUTINATIVE*

5. Tobias' question, the lithic-geolinguistic correlation and Chomsky's theory about language innatism

I will now return to Tobias' fundamental question: was language, as a facultative function, already present "before the last common ancestral hominid population spawned *Homo* and the robust

australopithecines", to become an obligatory trait in *Homo*? I think this question can be answered affirmatively, in the light both of the lithic-geolinguistic correlation and of Chomsky's theory of the innate character of language.

The lithic-geolinguistic correlation would prove that populations of *Homo habilis* and *erectus*, both in Africa and in the rest of the Old World, already spoke languages of monosyllabic words, and that some of these early populations, in Africa and in the Far East, would never have changed the 'superficial structure' (Chomsky) of their languages, although in the course of the Paleolithic they would have further developed their 'deep grammatical structure' (Chomsky). A linguistic stability of this magnitude would be unthinkable without projecting the emergence of language back to some *Australopithecus*.

As to Chomsky's theory, Agrawal & Kusumgar, in their paper for Forlì, have aptly underlined the possibility of reconciling it with evolutionary theory. Following an important book by Steven Pinker on 'language instinct', inspired by Chomsky's theory of language (Pinker 1994), they have pointed out that although, as Pinker writes, "Chomsky and some of his fiercest opponents agree on one thing: that uniquely human language instinct seems to be incompatible with the modern Darwinian theory of evolution", there is also no reason to doubt, as Pinker writes, "that the principal explanation [for the emergence of language] is the same as for any other complex instinct or organ, Darwin's theory of natural selection" (Agrawal & Kusumgar 1994 101).

Agrawal & Kusumgar, however, do not mention Pinker's suggestion to solve the contradiction. And this is especially interesting to us as it is very similar to Tobias' already quoted insight: "a form of language could first have emerged [...] after the branch leading to humans split off from the one leading to chimpanzees. The result would be be languageless chimps and approximately five to seven million years in which language could have gradually evolved" (Pinker 1994 345).

It seems to me that Pinker's and Tobia's independent conclusions provide indeed an adequate solution to the problem of reconciling evolutionary theory with Chomsky's well-founded innatism: language should be posited as already existing, optionally, in some *Australopithecus*, and as having become part of the human evolutionary heritage only with *Homo*. In this new model,

language would indeed be innate in humans, but only as the result of a much longer evolution than traditionally thought, beginning with some *Australopithecus*.

6. General implications of the lithic-geolinguistic correlation

Before concluding, I would like to list and illustrate briefly what I think are the major implications of the lithic-geolinguistic correlation.

(1) As noted earlier, some form of linguistic continuity from *Homo habilis* to *Homo sapiens sapiens* is implicit in almost all theories of glottogenesis nowadays. In my opinion, it is difficult to see how this acknowledgement can be reconciled with the denial of any form of hybridisation between *Homo sapiens sapiens* and earlier species, which is the usual claim of the supporters of the Out of Africa 2 model. The lithic-geolinguistic correlation, however, would prove something more than a generic continuity from *Homo habilis*. What would emerge, along with linguistic continuity, would be geographic continuity of modern humans from the earliest populations which inhabited the Old World after the first diaspora out of Africa, and thus some evidence for a multiregional origin of modern humans.

(2) As to the linguistic significance of the lithic-geolinguistic correlation, this would mainly consist of the following aspects:

(A) All languages spoken by *Homo habilis* and *erectus*, prior to the beginning of bifacial industries, would have been 'isolating', that is consisting of monosyllabic words, which would have been used both for lexicon and grammar. The exclusive presence of monosyllabic words in the earliest stages of language has already been postulated by the few scholars who have attempted to sketch how these early languages would look like (e.g. Bickerton, Lieberman). The newly assumed correlation would add 'geographic continuity' to the already assumed linguistic continuity.

(B) The exclusive use of monosyllabic words by *Homo habilis* and *erectus* would have also caused the emergence of tones (politonality). As is known, tones are a necessary feature of isolating languages, in order to earmark the different meanings of monosyllabic words, which would otherwise become incomprehensible. As a consequence, we might add politonality to the list of features of primordial languages, and consider politonality in modern languages, other than isolating (i.e. agglutinative or inflecting), as 'relics' of this universal isolating mode of the earliest languages.

(C) The development of inflecting words from the innovation of bifacials would not imply the emergence of polysyllabic words, but simply a more complex (deep as well as superficial) syntax for monosyllabic words. By means of this new syntax, new grammatical functions, and old ones which in the isolating mode were expressed by separate monosyllabic words, would now be expressed by the inner modification (*Ablaut* and similar phenomena) of pre-existing monosyllabic words. Evolution from isolating to inflecting has already been postulated by linguists (for example Trubetzkoy). In the new scenario, however, the geographic distribution of the innovation would be restricted to the bifacial area, that is to western and central Europe, northern Africa, south-eastern Asia. In the rest of the Old World isolating languages would have continued through *Homo sapiens sapiens*, increasing their deep grammar without changing their superficial one.

(D) In the isolating as well as in the inflecting area, polysyllabic words would result from the emergence of the technique of prepared cores, and their function would be - like that of inflection - to attach grammar to lexicon. In the isolating areas, however, agglutination would produce a structural modification to the existing mode. In areas where bifacials had already caused inner modification of words, agglutination would only be added (superimposed) to the previous mode, and thus would not change the basic underlying system. From the point of view of linguistic evolution, the peak of grammatical complexity would have been reached by now (as Trubetzkoy already saw), for all three procedures for expressing grammatical function by means of lexicon would be known and exploited, in their respective areas. This is why, I think, we can attribute fully modern language already to Neanderthal, as suggested by Gibson and others.

7. Conclusion

The Continuity Theory I have presented in my book (Alinei 1996) does not rest only on the lithic-geolinguistic correlation. Among other things, I have tried to show that historical and comparative linguistics, born in the 19th century, might still be hindered by the same 'chronological bias' as the pre-Darwinian study of paleontological fossils. Linguistic fossils have until now been placed, it seems to me, within an 'antedeluvian' chronology, ignoring most stages of prehistory as a possible scenario for their emergence and change. Invasions have been invented to justify the shortcomings and the contradictions of a basically too short chronology for language evolution.

There is in fact plenty of evidence in the linguistic record of the major world languages for a longer-chronology approach to language evolution, and to what I would like to call *archaeolinguistics*. While in my book I have already tried to show how, and with what impact, the linguistic record can be re-interpreted in the new light, I leave it to specialists to assess the implications of the lithic-geolinguistic correlation for palaeoanthropology and for the study of human cognitive evolution.

REFERENCES

Agrawal, Dharmapal P. & Sheela Kusumgar (1996), Origins of tool, techniques and languages: are they related?, in Facchini (ed.), pp. 95-105

Aiello, Leslie C & R.I.M. Dunbar (1993), Neocortex Size, Group Size, and the Evolution of Language. *Current Anthropology* 34, 184-193.

Alinei, Mario (1996), *Origini delle lingue d'Europa, I: La Teoria della Continuità*. Bologna: Il Mulino.

Alinei, Mario (1996), The correlation between lithic and linguistic develoment: a geolinguist's view, in Facchini (ed.), pp. 107-116.

Alinei Mario et al. (1982-1990), *Atlas Linguarum Europae*, I 1-4. Assen: Van Gorcum & Co.

Alinei Mario et al. (in press), *Atlas Linguarum Europae*, I 5, Rome, Istituto Poligrafico e Zecca di Stato.

Bar-Yosef, Ofer (1994), The Lower Paleolithic of the Near East. *Journal of World Prehistory* 8, 211-265.

Bickerton, Derek (1990), *Language and Species*. Chicago and London: The University of Chicago Press.

Cavalli-Sforza, Luca (1991), Comparative studies in human evolution (reading version), in International Conference on Genetics, Linguistics, and Archaeology. Florence, Italy.

Childe, V. Gordon (1954), *What happened in history*. London: Penguin Books.

Clark, Grahame (1962), *World Prehistory. An Outline*. Cambridge: Cambridge University Press.

Clark, Grahame, Stuart Piggott (1970), *Prehistoric Societies*. London: Penguin Books, 1990.

Clark, J. Desmond (1994), The Acheulian Industrial Complex in Africa and Elsewhere, in *Integrative Paths to the Past: Paleoanthroplogical Advances in honor of F.Clark Howell* eds. R.S. Corruccini & R.L. Ciochon. Englewood Cliffs, NJ: Prentice Hall, 451-469.

Clark, J. Desmond (1996), Development of organisation, language and social rerlationship of the makers of the Oldowan and Acheulian industrial complexes, in Facchini (ed.), pp. 85-86.

Facchini, Fiorenzo (1993a), Premesse per una Paleoantropologia culturale, in *Paleoantropologia e Preistoria*, *Prolusioni*. Milano: Jaka Book, 85-99,

Facchini, Fiorenzo (1993b), Linguaggio, in *Paleoantropologia e Preistoria*, *Dizionario*. Milano: Jaka Book, 344.

Facchini, Fiorenzo (1996), Structures anatomiques et correlations culturelles dans le développement du langage humain, in Facchini (ed.), pp. 125-133.

Facchini, Fiorenzo (ed.) (1996), *Colloquium VIII: Lithic Industries, Language and Social Behaviour in the First Human Forms, The Colloquia of the XIII International Congress of Prehistoric and Protohistoric Sciences*, Forlì (Italia) 8-14 September 1996.

Gibson, Kathleen R. (1996), Technology, language and cognitive capacity, in Facchini (ed.), pp. 117-123.

Gibson, Kathleen R. & Tim Ingold (edd.) (1993), *Tools, Language and Cognition in Human Evolution*. Cambridge: Cambridge University Press.

Holloway, Ralph L. (1981), Culture, symbols, and human brain evolution. *Dialectical Anthropology* 5, 287-303.

Holloway, Ralph L. (1983), Human paleontological evidence relevant to language behavior. *Human Neurobiology* 2, 105-114

Holloway, Ralph L, & Marie Christine De La Coste-Lareymondie (1982), Brain Endocasts Asymmetry in Pongids and Hominids: Some Preliminary Findings on the Paleontology of Cerebral Dominance. *American Journal of Physical Anthropology* 58, 101-110.

Isaac, Glynn Ll. (1982), The earliest archaeological traces, in *The Cambridge History of Africa, vol. I. From the earliest times to c. 500 BC* ed. J. Desmond Clark. Cambridge: Cambridge University Press, 157-247.

Leakey, Richard & Roger Lewin (1992), *Origins reconsidered. In Search of What Makes Us Human*. New York: Doubleday.

Leroi-Gourhan, André (1964), *Le geste et la parole*. Paris: Albin Michel.

Lieberman, Philip (1991), *Uniquely Human. The Evolution of Speech, Thought, and Selfless Behaviour*. Cambridge, Mass., London: Harvard University Press.

Movius, H.L. (1944), Early man and Pleistocene Stratigraphy in Southern and Eastern Asia, in *Papers of the Peabody Museum of Archeology and Ethnology*, Harvard University.

Movius,H.L. (1948), The Lower Palaeolithic Cultures of Southern and Eastern Asia. *Transactions Amer.Phil.Soc.*38 (4), 329-420.

Movius, H.L. (1955), Paleolithic Archeology in Southern and eastern Asia, exclusive of India. *Cahiers d'Histoire Mondiale* 2, 257-282, 520-553.

Parker S.T & K.R.Gibson (1979), A developmental model for the evolution of language and intelligence in early hominids. *The Behavioral and Brain Sciences* 2, 367-408.

Paget, Richard (1952), The origins of language, with special reference to the Paleolithic age. *Cahiers d'Histoire Mondiale*, I, 1, 399-414.

Piaget, J. (1952), *The Origins of Intelligence in Children*. New York: Norton.

Piaget, J. (1954), *The Construction of Reality in the Child*. New York: Basic Books.

Piaget, J. (1955), *The Language and Thought of the Child*. New York: World Publishing.

Pope, G. Geoffrey & Susan G. Keates (1994), The Evolution of Human Cognition and Cultural Capacity. A view from the Far East, in *Integrative Paths to the Past: Paleoanthroplogical Advances in honor of F.Clark Howell* eds. R.S. Corruccini & R.L. Ciochon. Englewood Cliffs, NJ: Prentice Hall, 531-567.

Renfrew, Colin (1992), Archaeology, genetics and linguistic diversity. *Man, The Journal of the Royal Anthropological Institute*, N.S. 27, 445-478.

Roebroeks, Wil (1994), Updating the Earliest Occupation of Europe. *Current Anthropology* 35, 301-305.

Schick, Kathy (1994), The Movius Line reconsidered. Perspectives on the earlier Paleolithic of Eastern Asia , in *Integrative Paths to the Past: Paleoanthroplogical Advances in honor of F.Clark Howell* eds. R.S. Corruccini & R.L. Ciochon. Englewood Cliffs, NJ: Prentice Hall 429-449.

Schlegel, Friedrich (1808), *Über die Sprache und Weisheit der Indier* (I quote from the 2nd edition of the *sämtliche Werke*, 1846, vol. VIII, Wien).

Tobias, Phillip Valentine (1993), Paleoantropologia, in *Paleoantropologia e Preistoria*, *Prolusioni*. Milano: Jaka Book, 37-60.

Tobias, Phillip Valentine (1996), The evolution of the brain, language and cognition, in Facchini (ed.), pp. 87-94

Trubetzkoy, N.S. (1939), Gedanken über das indogermanenproblem,. *Acta Linguistica* 1, 81-89 (reprinted in *Die Urheimat der Indogermanen* ed. A. Scherer (1968). Darmstadt: Wissenschaftliche Buchgesellschaft, 214-223).

Vygotsky, L. S. (1962), *Thought and language*, The M.I.T. Press, Cambridge, Massachusetts.

Wymer, John (1982), *The Palaeolithic Age*. London & Sydney: Croom Helm.

ABSTRACT

This paper develops the hypothesis of a correlation between lithic and linguistic development on the basis of two observations: (I) the seemingly close similarity between the distributional area of the three basic morphological types of language (isolating, inflecting, agglutinative) and that of the earliest lithic industries ('Movius line', dividing choppers, bifacials and Mode 1 tools). (II) The seemingly close correspondence, in terms of operational and cognitive processes, between choppers and uninflected words as results of the *truncation* of, respectively, stone and vocal emission; between bifacials and inflected words as results of *retouching* of stones and of words, and between prepared cores and agglutinative words as results of *juxtaposition* of blades and morphemes. The Continuity Theory based on the correlation seems to open the possibility of reconciling the evolutionary approach to language origins (Tobias, Gibson e.a.) with Chomsky's innatism, while contradicting the attribution of modern language exclusively to *Homo sapiens sapiens*.

Keywords: Glottogenetics, Old World prehistory, Geolinguistics, Language Typology.