Social memory among late Neanderthals

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Jörg Orschiedt, Gerd-Christian Weniger (ed.), Neanderthals and Modern Humans – Discussing the Transition. Central and Eastern Europe from 50.000 – 30.000 B.P. Mettmann, 30-41

2000

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1. ABSTRACT

Between the first and the second glacial maximum (i.e. between 60.000 and 28.000 B. P., Oxygen Isotope Stage 3) a patchwork of different social memory units occurred in Central and Eastern Europe. The exchange of information becomes evident within well defined but flexible boundaries. It is the first time in the history of man in Europe that some typological features can be securely attributed to a specific time range and region of origin. A comparison of three major stratigraphies shows that technological features are superimposed on typological features. Artefacts began to represent their makers, thus indicating entities of social memory and lines of tradition. Hence, early OIS 3 Neanderthal behaviour seems to prepare the emergence of the European Upper Palaeolithic during late OIS 3.

2. A DEFINITION OF SOCIAL MEMORY

Social memory can be understood as the ability of a group of humans to maintain a specific set of information by means of tradition over many generations. Social memory contains a pool of ideas and concepts which are shared by a group of humans.

3. DEMOGRAPHY AND TRADITION

The more individuals contribute to such a pool, and participate in it, the higher the chance for successful tradition and for long-term maintenance of the pool's contents. By contrast, a small population which is isolated from others may develop specific ideas and concepts which get lost as soon as the population is extinct by starvation or other factors.

In an area which is inhabited by many small, isolated populations we may expect occasional, short termed occurrence of ideas and concepts. Innovations tend to disappear very quickly. Inventions are made repeatedly - and disappear several times.

In a more densely populated area with intensive social relations, ideas and concepts may disperse more easily. As more individuals participate in the information pool, the risk of information loss is lower (Fig. 1). Under Middle Palaeolithic conditions, with an estimated average population density of perhaps only 0.0003-0.0004 inhabitants per square km (compared to 0.004 for Caribou Eskimo; Zimmermann 1996, 52), demography has an essential impact on cultural tradition.

4. SHORT TERMED OCCURRENCES OF INNOVATIONS

Many cases of short term occurrences of innovations can be observed in most of what is called Middle Paleolithic. As a rule, and probably as a function of the demographic factor, innovations occur occasionally, and they get lost as fast as they

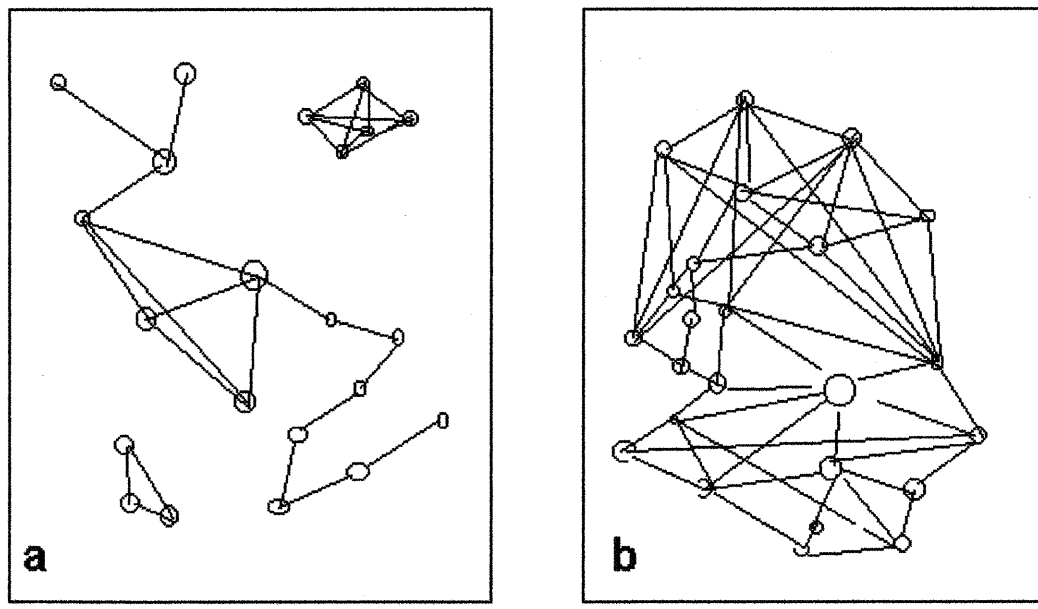

Fig. 1 The structure of social relations is crucial to the rate of survival of social memory. Widely dispersed human groups with low information exchange (a) take an increased risk of information loss. Dense populations, with many individuals interacting (b), minimize the risk of information loss. The !Hxaro exchange network of the Kalahari !Kung, for example, minimizes the risk of isolation under conditions of low population density (cf. Schweizer 1996, 171). During the OIS 5a/4 interface Neanderthal networks may have changed from a pattern like (a) to a pattern like (b) which would reflect higher population density in the western European refugium. During the expansion phase at the OIS 4/3 interface the same scheme might have been transferred to the rest of Europe. It might have been maintained under comparably low population density.

appear, without any effect or further development. The time span between repeated occurrences of the same technological or typological feature can be enormous.

For example, an assemblage with the Quina concept of flake production (cf. Bourgignon 1997, 37) may have an age of 280.000 B. P. (La Micoque C3), 200.000 B. P. (Yabrud), 140.000 B. P. (Zuttiyeh), or 60.000 B. P. (Combe Grenal). A Ferrassie-Charentian toolkit can be 180.000 years old (Biache), 130.000 years old (Rheindahlen B3) or 70.000 years old (Combe-Grenal). So-called Pradnik-spalls (a Pradnik spall is a sharpening spall taken from the previously retouched cutting edge of a bifacial tool) have been found at Mesvin IV (ca. 250-200.000 B. P.) and at Cotte St. Brelade/Jersey in a stratified context dated to 180.000 B.P. (Callow/Cornford 1986). In both cases, there is no other site of the time where Pradnik-spalls have been found. Much later, during OIS 3, a part of the last glacial cycle, the concept became common from 60.000 B.P. on in the central European Micoquian (Desbrosse 1976; Jöris 1992; Richter 1997, 200-203).

It is highly improbable that long lasting traditions existed over hundreds of thousands of years, and that such traditions were responsible for the occurence of specific phenomena within different time and space contexts. To the contrary, we must infer low survival rates of regional traditions, because population densities were extremely low and vast areas in the temperate zones of the northern hemisphere were depopulated several times, under harsh climatic conditions. Inventions like the Quina flake production or the Pradnik technique must have been made more than once during the Middle Palaeolithic.

5. A PROBLEM OF PREDICTION

As a consequence, it is virtually impossible for the archaeologist to predict place and date of origin of a given Middle Palaeolithic stone artefact assemblage. There

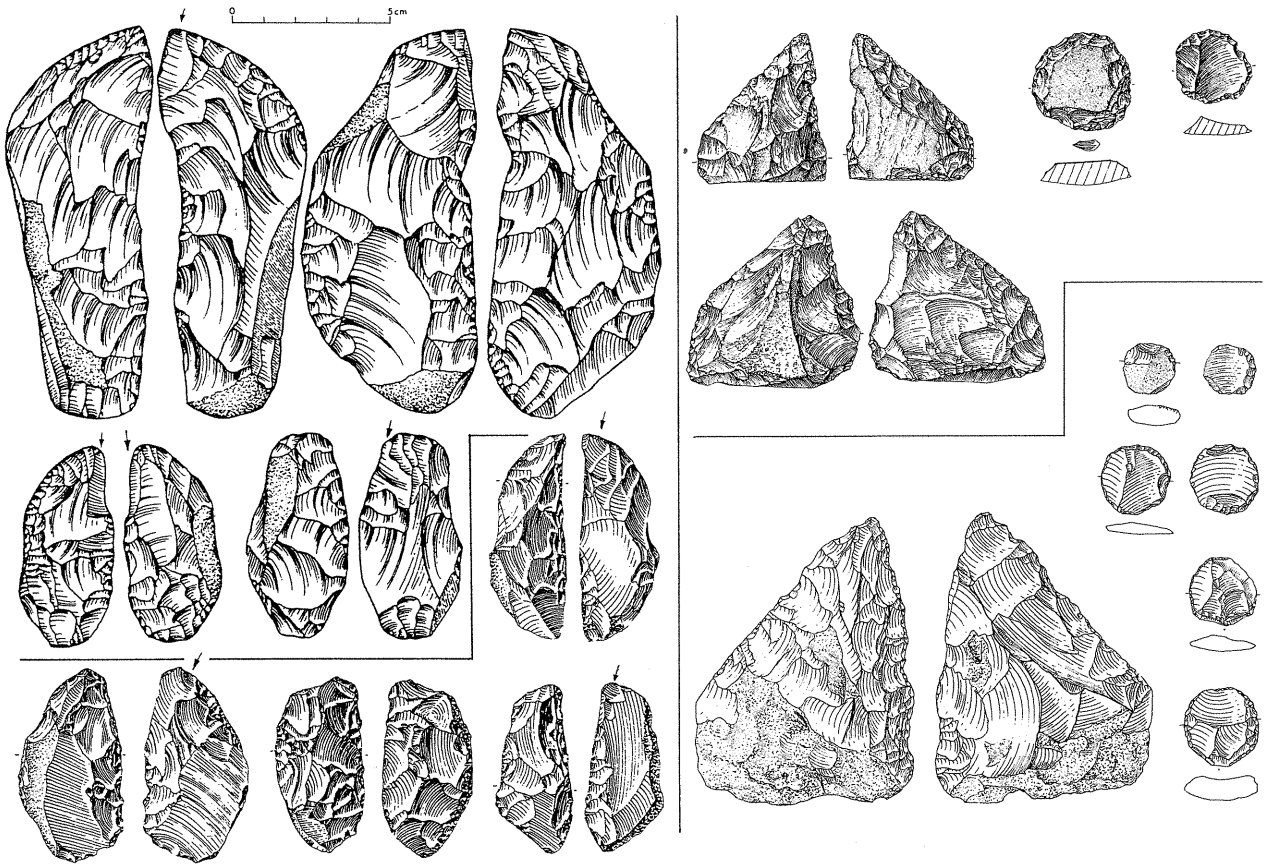

Fig. 2 Some formal tools characteristic to OIS 3 Micoquian assemblages: "Ciemna" knives, some with "Pradnik" spall" (Ciemna, Bockstein III); "Faustkeilblätter" (Sesselfelsgrotte; Kulna); "Groszak" scrapers (Sesselfelsgrotte, Kulna); after Kozlowski/Kozlowski 1977, pl.7, Wetzel/Bosinski 1969, pl.99,100, Richter 1997, pl.16, Valoch 1988, pl. 29, Richter 1997, pl.24, Valoch 1988, pl.21.

are almost no valid assumptions on the occurence of specific lithic attributes in time and space. As a rule, every single assemblage has to be dated, if possible, by stratigraphy, microfauna, pollen analysis and radiometric methods. Almost no reliable typological features exist in the Middle Paleolithic. There are no "mediterranean type" Bellbeakers (Final Neolithic, 2800 B.C.) or the "Nauheim" fibulas (Late La Tène, 100 B. C.) which can be used to pinpoint the approximate date for a given assemblage.

Only from the latest part of the European Middle Palaeolithic, some formal tools are known which allow for at least broad a placement in time and space, such as the triangular MtA handaxe (MtA), the "Jerzmanovice" point (Szeletian) or Micoquian tool types like (Fig. 2) the triangular "Faustkeilblatt" (Micoquian), the "Groszak" scraper (Micoquian) and the "Ciemna" knive.

6. MAJOR CHANGE AROUND 60.000 B. P.

These and other exceptions seem to concentrate in the MtA, the Micoquian and related complexes which are all present during OI stage 3 (60.000 - 28.000 B. P.). The presence of the Western European MtA during stage 3 is shown by evidence from stratigraphies like Combe-Grenal, Le Moustier and Pech de l'Azé. The Central European Micoquian ("Keilmessergruppen") turned out to be much younger then previously thought: Micoquian assemblages from Kulna Cave (Moravia), Lichtenberg (Lower Saxony; Veil et al. 1994) and Sesselfelsgrotte (Bavaria) have been securely dated to OI stage 3. The term „Micoquian" is used here in the sense of Bosinski

(Bosinski 1968): mainly Central European, late Middle Palaeolithic assemblages with bifacial tools such as Keilmesser, Faustkeilblatt, Fäustel, Halbkeil.

If the ephemeral occurrence of concepts is accepted as a rule for middle Paleolithic industries, this rule is no longer valid after 60.000 B. P. Now, during OIS 3, it seems as if a comprehensive library was completed of all technological knowledge ever created during the Middle Paleolithic. All earlier innovations which had been re-invented and re-lost several times, became now firmly established parts of OIS 3 technological knowledge. Moreover, some entirely "new" innovations were added to the library.

Thus, after 60.000 B. P., some concepts and ideas were introduced or re-introduced into social memory and were then obviously maintained over hundreds of generations and over vast areas of Europe. I will label these concepts and ideas, representing elements of a group's information pool, provisionally as "social memory units".

By comparing of three major cultural sequences, Combe-Grenal, Sesselfelsgrotte and Kulna Cave, we can pinpoint some examples of such "social memory units" to certain stages of the Weichselian chronology. A layout is proposed at the end of this paper for the specific relationship among some of the OIS 3 late Middle Paleolithic social memory units.

7. Sesselfelsgrotte, Combe-Grenal, Kulna

Combe-Grenal in South-Western France, Sesselfelsgrotte in Southern Germany and Kulna Cave in Moravia (Fig. 3) yielded stratigraphies of high resolution and considerable numbers of artifacts from the Eemian/Weichselian Middle Paleolithic, comprising OI Stages 5, 4, and 3. Combe-Grenal was excavated by Francois Bordes between 1953 and 1965. The upper 5 out of 10 m of stratigraphy contained 55 Weichselian archaeological levels (Guadelli/Laville 1990). Kulna Cave was excavated by Karel Valoch between 1961 and 1976. The upper 9 m of 14 m of stratigraphy contained 12 archaeological levels of the Weichselian Middle Paleolithic (Valoch 1988).

The paleolithic cave site of Sesselfelsgrotte, my focus for this paper, is situated in the valley of the lower Altmühl river (Bavaria), a tributary to the Danube. The site contains a sequence of 22 Weichselian Middle Paleolithic occupation units (Fig.4; Tab. 1). Field campaigns at the site were carried out from 1964 to 1977 and, again, in 1981, directed by Gisela Freund and collaborators (University of Erlangen). About 7 m of sedimentary deposit were excavated (Freund 1999). The layers consisted mainly of limestone debris from the roof of the shelter and from the slope above the cave.

Eight occupation units were uncovered from the lower part of the sequence ("Untere Schichten"). Analysis by Wolfgang Weißmüller (Weißmüller 1995) suggests an early Weichselian date for these assemblages. They can be classified as Mousterian with micro-size tools (assemblages Ses-U-A08 and Ses-U-A07), Charentian/Ferrassie type (assemblages Ses-U-A06 and Ses-U-A05), Charentian/Quina type (assemblage Ses-U-A04), and typical Mousterian (assemblages Ses-U-A03, Ses-U-A02 and Ses-U-A01). About 10.000 stone artefacts, found in the lower layers ("Untere Schichten"), were discarded duringephemeral occupations. These occupations belong to interstadial conditions (oxygen-isotope stade 5c and 5a) with forest and open landscape. Hunting of horses was an important subsistence activity. Only in the uppermost part of the lower layers (layers 3-West to M1), and quite close to the interface to the first glacial maximum (oxygen-isotope stade 4) of the Weichselian glaciation, glacial fauna like Mammouth occurs for the first time.

The two assemblages at the base (OIS 5c) compare well to the "micro-mousterian" or "Taubachian" of Kulna Cave and attest a central European context. The six assemblages on top of it (OIS 5a) are typologically and technologically similar to contemporaneous western European Mousterian industries. The lower three of these (early OIS 5a) have Charentian toolkits in common with aproximately contemporaneous assemblages from Kulna Cave.

A series of layers follows upward, containing no archaeological material, but abundant rodent remains (layers L,K,I). They are dated to the first glacial maximum of the Weichselian glaciation (oxygen-isotope stade 4). The rodent bones (remnants

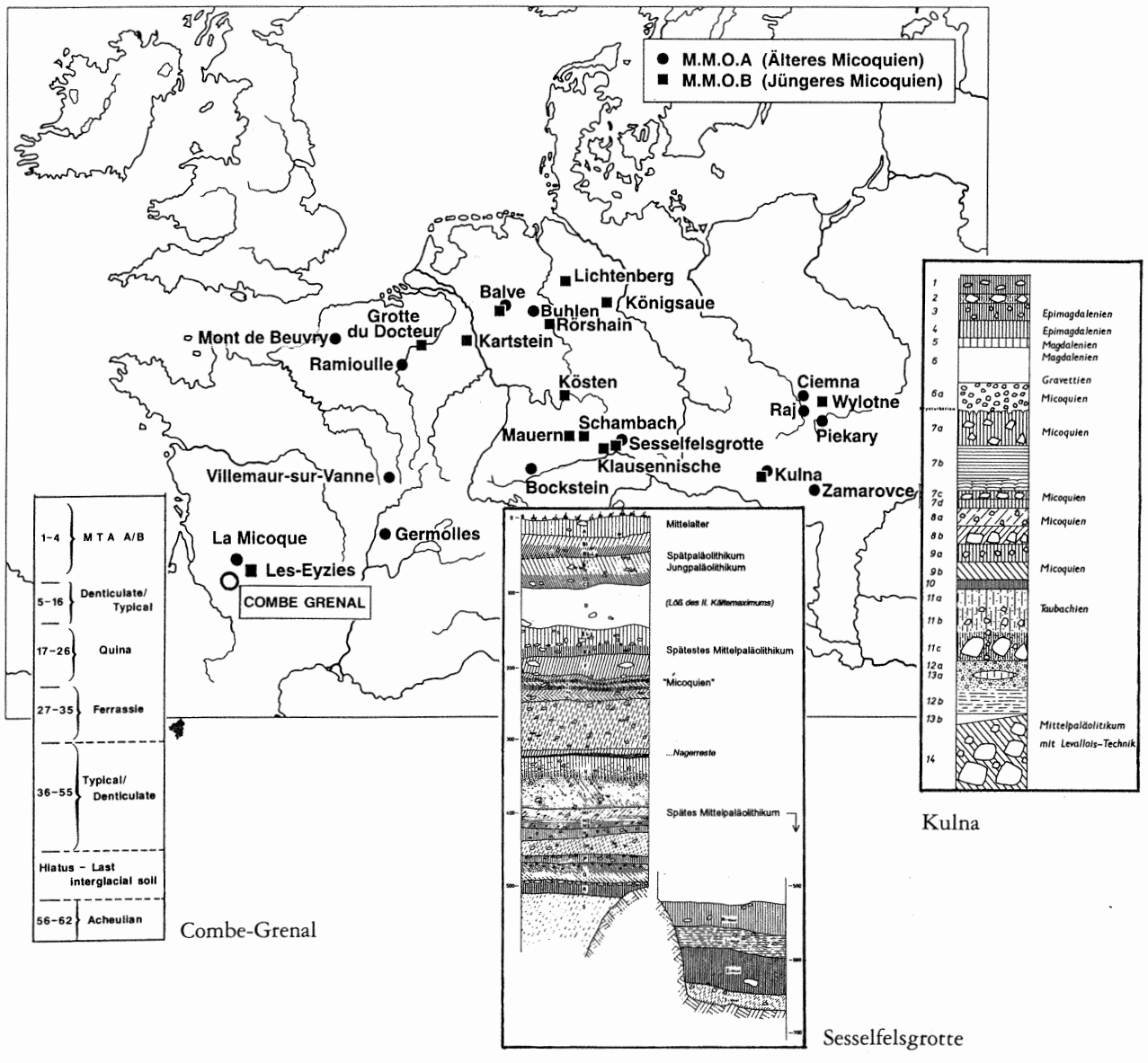

Fig. 3 The Combe-Grenal site (Mousterian) and principal Micoquian sites in Europe (MMO-A: Early Micoquian, MMO-B: Late Micoquian; for details see Richter 1997).

of owl pellets) suggest several subsequent stages of environmental change from a steppe landscape towards an arctic tundra landscape. At the same time when Sesselfelsgrotte and Kulna Cave (and probably all Western Central Europe) remained uninhabited, Quina inventories occured at Combe-Grenal.

The overlying "G-Komplex" (layers H, G5, G4a, G3, G2, G1) yielded 13 Mousterian and Micoquian assemblages (Richter 1997). Some of them were recovered from virtual living floors (in particular the layers G4 and G2 with several fireplaces). 85.000 stone artefacts from the "G-Komplex" go along with abundant hunting remains, mainly from mammouth, rendeer and horse. Men lived in a steppe landscape with some arctic elements which increase towards the top of the stratigraphic series. The "G-Komplex" is presumed to be part of an early OIS 3 interstadial complex. Men were present here between >50.000 and 40.000 14C-years B. P., based on preliminary radiocarbon dates. Most inventories can be attributed equally well to different "Micoquian" variants (if classification is derived from bifacial "type tools"), as well as to specific "Mousterian" variants (if classification is based on unifacial tool counts).

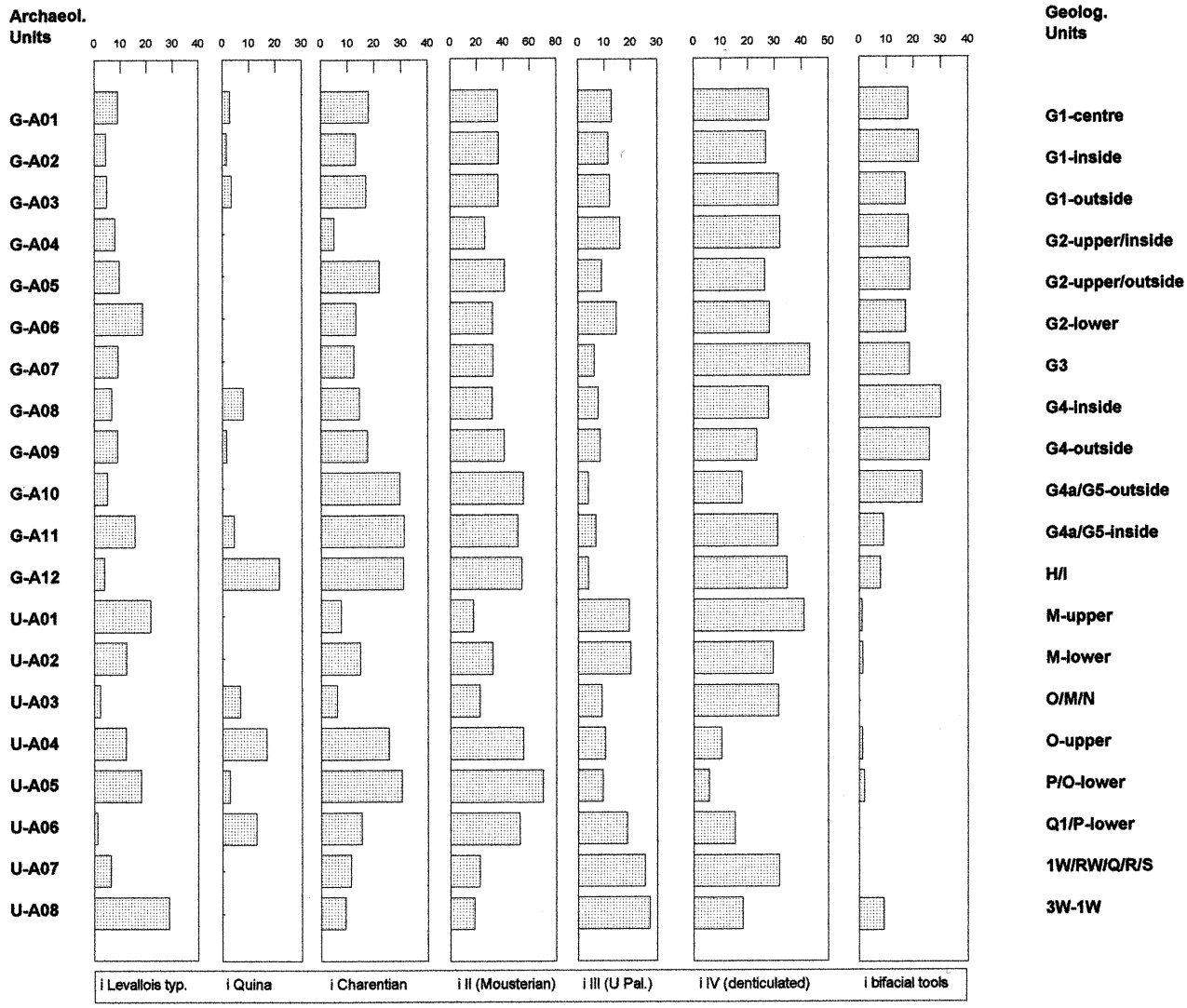

Fig. 4 Sesselfelsgrotte. Formal tool counts. Indices after Bordes (for raw data see Weissmüller 1995, Richter 1997).

"Micoquian" and "Mousterian" turn out to be multiple, interlaced phenomena, and not clearly seperated cultural units in time and space. In fact, the Micoquian is a "Mousterian with Micoquian option" (MMO), the Micoquian or bifacial option not realized always to the same extent. Characteristic modes of stone artefact production are the Quina method of artefact production (up to Ses-G-A08) and different kinds of Levallois methods (G-O7 to G-A01).

At the interface between OIS 4 and OIS 3, Quina industries are present at Sesselfelsgrotte and at Combe Grenal, at the same time when the Discoid method (Boeda 1995) of flake production prevailed at Kulna (still, the unifacial tool forms of the same layer 7a indicate a Charentian of the Quina type if classification is based on tool counts after Bordes). By contrast, Sesselfelsgrotte and Kulna have Micoquian bifacial tools in common with other Micoquian sites like Bockstein or La Micoque VI, probably from the same time. Like Sesselfelsgrotte, the Bockstein and La Micoque VI-Micoquian is characterized by the Quina flake production. Ciemna knives are specific to central European assemblages of this time, like Sesselfelsgrotte, Bockstein and Ciemna site, in Southern Poland, itself. These Central European assemblages represent an Early Micoquian or MMO-A (Fig.3).

All inventories mentioned above have in common a total absence or low percentage of Levallois products. The Levallois method occurs at Combe-Grenal (from

OIS	Combe-Grenal		Sesselfelsgrotte		Kulna		layer 1 6
	1-3	**MtA**					
	4-6	**Mtyp**	E3	**Mtyp(Mic)**			
			F	**----**			
	7-8	**Mtyp**	G-A01	**Mtyp-Mic**	6a	**M-Mic**	
			G-A02	**Mtyp-Mic**			
	9	**M**	G-A03	**Mtyp-Mic**			
	10	**M**	G-A04	**Mtyp-Mic**			
3			G-A05	**Mtyp-Mic**			
	11-13	**Mdent**	G-A06	**Mtyp-Mic**			
			G-A07	**Mdent(Mic)**			
	14-16	**Mdent**	G-A08	**Mtyp-Mic**			
	17-19	**Cquina**	G-A09	**Mtyp-Mic**			
			G-A10	**Cquina-Mic**	7a	**Cquina-Mic**	
	20	**Mdent**	G-A11	**Cquina(Mic)**			
	21	**Cquina**	G-A12	**Cquina(Mic)**			
			G-A13	**M**			
	22-25	**Cquina**					
4	26	**Cquina**	K	---	7b		
	27	**Cferr**					
	28-31	**Mtyp**	L	---			
	32-35	**Cferr**					
			U-A01	**Mtyp**	7c	**C**	
	36-37	**Mtyp**	U-A02	**Mtyp**	7	**C**	
5a	38	**Mdent**	U-A03	**Mtyp**	7d	**C**	
			U-A04	**Cquina**	8a	**C**	
			U-A05	**Cferr**	9b	**C**	
5b	40	**Mtyp**					
			U-A06	**Cferr**	10	**M**	
5c	50,52	**Mtyp**	U-A07	**Mmicro**	11	**Mmicro**	
			U-A08	**Mmicro**	13a	**Mmicro**	
					13b	**Mind**	
5d	54	**Mtyp**					

Tab. 1 Combe-Grenal, Sesselfelsgrotte and Kulna compared. Abbreviations: M = Mousterian, C = Charentian, Mic = Micoquian, MtA = Mousterian of Acheulean tradition; quina = Quina type, ferr = Ferrassie type, dent = denticulated, typ = typical, micro = micro-sized tools.

upwards), Kulna (layer 6a) and Sesselfelsgrotte (increasing from unit G-A07 upwards) as a later step of a parallel development during OIS 3. Within the same stage, denticulated Mousterian and typical Mousterian assemblages interchange, probably representing differences in time of occupation (Rolland 1988). Many Central European Later Micoquian sites, all with Levallois production, are attributed to the same time range (MMO-B; cf. Fig.3). Most of the MtA in Western Europe belongs probably to the same time range, thus apparently forming a frontier between Western European MtA and Central/Eastern European Micoquian. Still, this frontier is obviously neglected by the concepts used for flake production. As a "fond commun" they seem to be superimposed on typological features.

I have now mentioned many resemblances and differences which we can pinpoint to the same time ranges. Many other sites and examples could be quoted, and some of them can contribute further chronological evidence (f.e. Königsaue, Salzgitter-Lebenstedt, Lichtenberg; for details see Richter 1997, 219-247). The few examples discussed here already show complex relations among the regions and aspects which are represented by the three sites (Fig.5).

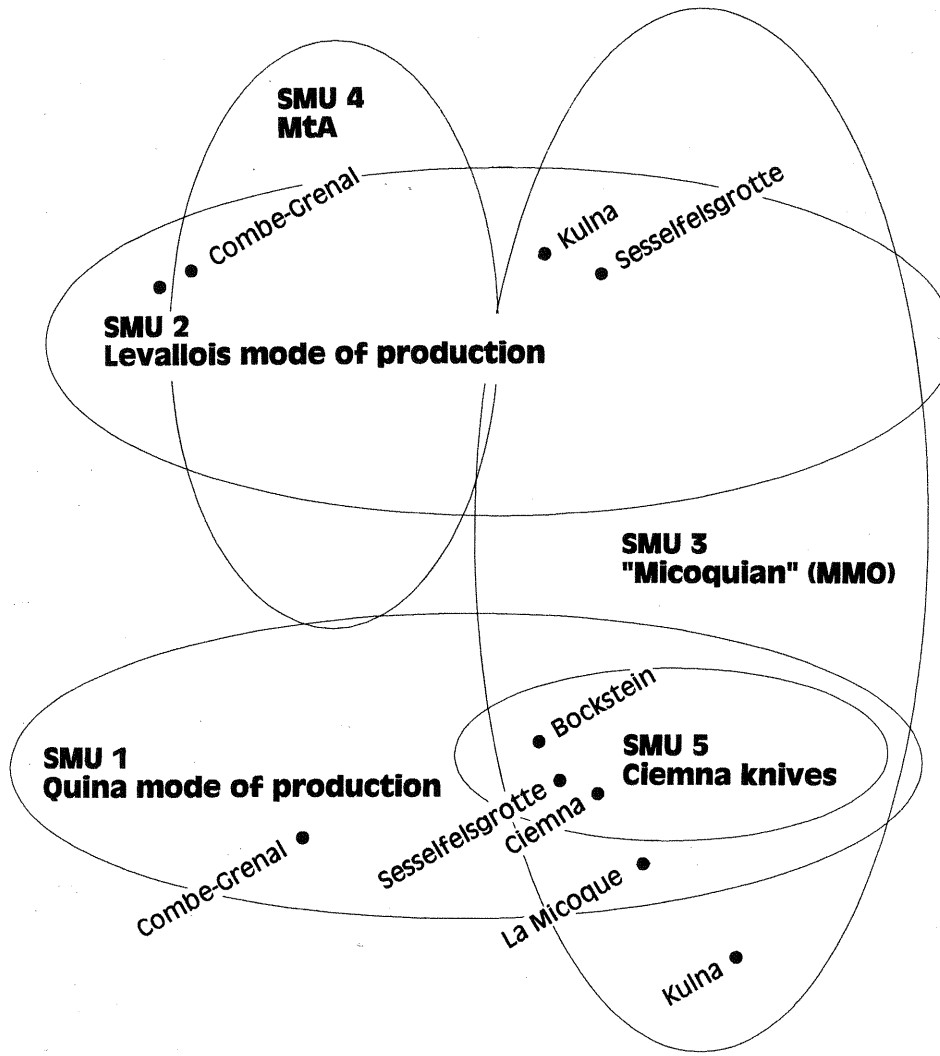

Fig. 5 A model of 5 social memory units in European OIS 4 and OIS 3, based on three stratigraphies (cf. table 1). Vertical order symbolizes chronological tendency from 60.000 (bottom) to 40.000 B.P. (top)

Five social memory units characterize the time range between late OIS 4 and earlier OIS 3, in the three stratigraphies under observation. The geographical terms mentioned below do not define the SMUs, but indicate the principal background regions of the SMU exchange networks:

SMU 1 (western Europe and western central Europe, OIS 4 - early OIS 3) is represented by the Quina flake production (Combe-Grenal 26 - 17; Sesselfelsgrotte G-A12 - G-A10 and, less significant G-A09, G-A08). Kulna 7a is excluded from SMU 1 by its different flake production.

SMU 2 (western Europe and central Europe, early OIS 3) is represented by the predominance of the Levallois flake production (Combe-Grenal 16 - 4; Combe-Grenal 3-1; Sesselfelsgrotte G-A07 - G-A01; Kulna 6a).

SMU 3 (western Europe and central Europe, early OIS 3) is represented by Micoquian tool forms (La Micoque-VI, Ciemna, Bockstein-III, Sesselfelsgrotte G-A13 - G-A01, Kulna 7a, 6a). Early SMU 3 coincides with much of SMU 1. Late SMU 3 coincides with the central and eastern part of SMU 2.

SMU 4 (western Europe, OIS 3) is represented by MtA tool forms (Combe-Grenal 1-3). SMU 4 coincides with much of the western part of SMU 2 and is complementary to late SMU 3. - SMU 5 (central Europe, early OIS 3) is represented by Ciemna knives (Keilmesser with rectangular cutting edge). SMU 5 is a part of early SMU 3. SMU 5 is also a part of SMU 1.

Sesselfelsgrotte shares some features with western, non-Micoquian assemblages and some with eastern, Micoquian assemblages at the same time. The SMUs discussed here cannot be accepted as indicators of conventional "cultures" but as independant elements, each of them indicating information exchange related to a certain aspect. We can read them as a hierarchic system. Their distribution in time and space argues for an essential intensification of social memory in the time range considered here. This might have been an important factor which lead to the evolution of the European Upper Paleolithic.

8. A POSSIBLE EXPLANATION

What stimulated the "essential intensification of social memory" after 60.000 B. P.? The 10.000 years of the first glacial maximum (OIS 4) depopulated large parts of Europe. A possible volcanic winter at 71.000 B. P. may have accelerated the deterioration of the early OIS 4 climate (Ambrose 1997). During OIS 4, human occupation was probably restricted to the temperate zones of Europe - southern Europe along the coast of the Mediterranean and western Europe with its more moderate continental climate. The world population at the time is estimated at 20.000 individuals maximum, the majority inhabiting the tropics. Thus, OIS 4 is supposed to have seen a population bottleneck which caused the great genetic homogeneity of the present world population.

OIS 4/3 European population history must presumably be understood in terms of retreat and expansion: retreat to the west during OIS 4 and repeated expansion to and retreat from, western central Europe during OIS 3 with its highly unstable climate.

The OIS 4 retreat created the SMU 1 information pool in western Europe. At the OIS 4/OIS 3 interface, SMU 1 expanded to the East and underwent a regional consolidation (SMU 5 and early SMU 3). OIS 3 saw a renaissance of the Levallois mode of production (SMU 2). SMU 2 was a product of two sub-systems (SMU 4 and late SMU 3) sharing strategies of flake production and tool use, but marked by different bifacial toolkits: MtA in western Europe and Micoquian in the European Mammouth Steppe.

Times of retreat (dense exchange networks) intensified and standardized the information pools (OIS 4). Times of expansion caused extended exchange networks which were probably maintained by specific social strategies under mobile conditions (OIS 4/OIS 3). Times of consolidation saw the emergence of regional sub-systems (short episodes during OIS 3). The marked population decrease during OIS 4, a virtual Neanderthal "bottleneck" in western Europe, and the subsequent expansion must have stimulated the development of specific strategies of network maintenance. These helped to establish regional SMUs which were then maintained for several thousand years.

The SMU model presented here is based on data from only three stratigraphies. It has preliminary character. Still, it discusses and illustrates a major change in Neanderthal behaviour after 60.000 B. P. which might have been a crucial step towards the Upper Paleolithic.

ACKNOWLEDGEMENT

The present paper was influenced by Hartmut Lang's cultural concept of "Konformität" (Lang 1998). I would like to express my thanks to Hartmut Lang and Thorsten Uthmeier for fruitful discussions.

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