The role of river courses in organizing the cultural space of the Upper Paleolithic: examples from the Rhine, Rhône, Danube and Garonne

Shumon T. HUSSAIN

Harald FLOSS

Abstract: In order to understand human spatial behavior in the Paleolithic and related processes such as dispersal and mobility, it is urgently imperative to focus on a finer grained analysis of human-environment interactions than usually provided. Recent studies tend to overlook the explanatory value of single natural features establishing important anchor points for Paleolithic hunter-gatherer groups. Rivers are good candidates constituting such important natural features. We thus explore the role of salient rivers in the construction of Upper Paleolithic cultural landscapes through time. It is argued that rivers indeed played a crucial role, either as axes of communication and displacement or as referential frontier features in space. On the other hand, it seems clear that human river engagement was never static, but highly dynamic and variable both through space and time, because it is partly shaped by cultural conceptualizations and embedded in semantic webs. We finish our survey with the observation that in the Early Upper Paleolithic, rivers were mainly used to facilitate the flow of people and information, whereas the spatial consolidation after the colonization of Europe was accompanied by a tendency of conceptualizing rivers as frontiers or even boundaries. Only the Central European Magdalenian is again characterized by the use of rivers as spatial trajectories.

1 INTRODUCTION

One of the main issues in the anthropological field concerns the guiding principles and organizational systematics of human presence in space. Clearly, Paleolithic archaeology has the potential to contribute much to our growing knowledge on the spatiality of high mobile groups and how these people deal with environmental constraints, crises and opportunities – in short, how they handle the environment around them. It is interesting, however, that the field has nearly limited its spatial inquiry to the reconstruction of different land use strategies, settlement systems or raw material procurement patterns of Paleolithic hunter-gatherer groups in different regions and different timeframes (e.g. Floss 1994; Conard 2004; Delagnes & Rendu 2011). Consequently, the outcome is the generation of datasets of entire archaeological units and how they are distinctly characterized in terms of their engagement with space. To put it in another way, most authors believe that it is sufficient to deduce a "spatial fingerprint" of each archaeological entity at hand and finally to compare it with other entities. From this perspective, it is almost impossible to touch upon more fundamental principles of human spatial dwelling and their differential sociocultural manifestations.

The issue is complicated by an often implicit adaptationist stance in analyzing how humans inhabit a certain space; sociocultural land use strategies are thought to mirror mere ecological conditions in the sense of providing a solution for environmental troubles, leading to a view in which culture is seen as a derivative of the very natural framework into which it is placed (c.f. Alvard 2003). Without any doubt, people of a hunter-gatherer lifestyle rely heavily on the ecological and climatic backdrops of their immediate surroundings, but their space nevertheless yields a "built" dimension (e.g. Lang 2009). Nature in fact provides powerful stimuli which infiltrate into the sociocultural substratum and essentially shape it, but the processing of this information in cultural terms unleashes a feedback loop, loading natural features with meanings and semantics, what transforms them into places of significance (Tilley 1994; Bradley 2000; Rockman 2003; Meskell & Preucel 2004; Strang 2008; Edgeworth 2011). Space, therefore, is always both nature and culture, constituted and constantly altered by an entanglement of both spheres (Dünne & Günzel 2006; Döring & Thielmann 2008; Günzel 2009; Warf & Arias 2009; Hussain & Floss, in preparation). In order to understand the spatiality of a respective archaeological entity, it is thus necessary to take into account both sides of every single natural feature.

Since it is well known that people do not base their decisions and manners on pure rational grounds, but rather use intuition and fast heuristics – a way of processing spatial information which is explicitly selective and hierarchical – to pilot and behave in space (Kahneman *et al.* 1982; Czerlinski *et al.* 1999; Gigerenzer & Goldstein 1996; Brighton 2006; Chater *et al.* 2003; Gigerenzer & Brighton 2009; Gigerenzer & Gaissmaier 2011), it should be considered a prime imperative to examine the interplay of nature and culture in relation to features in the landscape which have the potential to substantially shape the human spatial performance. Especially in the Pleistocene riparian landscapes of Central and Western Europe, powerful river regimes must be regarded as significant push and pull features in this manner (cf. Malanson 1993; Hilty *et al.* 2003; Hussain & Floss, in preparation). Mighty drainage systems are important spatial reference points for human activity and are often the focus of veneration and ritual behavior due to their flow quality, which dissects the landscape in a natural and perceptive way (Strang 2008; Edgeworth 2011, 68), their pronounced dynamism (e.g. Bonnamour 2000; Bonnamour *et al.* 2005), their high biomass availability (Wohl 2004; Tockner *et al.* 2006), their ability to separate different climatic zones and biomes (cf. Bruxelles & Jarry 2011), and finally their corridor constituting character (Hilty

et al. 2003). From this perspective, Pleistocene river lines yield a crucial disposition to become contextual focal points in the sense of Schelling (1958, 1981), which would, in turn, grant them the capability to guide human spatial dwelling substantially. Clearly, Paleolithic archaeology can learn a lot about human spatial behavior by investigating the differential configuration of fluidscapes through time and space (cf. Strang 2008).

2 FLUIDSCAPES OF THE EARLY UPPER PALEOLITHIC: DANUBE, CHANNEL RIVER AND RHÔNE-SAÔNE FORMATION

If there has ever been a timeframe in which the role of rivers in the organization of space has become the target of archaeological interest, it would be in the era of the Early Upper Paleolithic (c.f. Davies 2001; Conard & Bolus 2003, 2008; Anikovich *et al*. 2007; Pettitt 2008; Dinnis 2008, 2009, 2012; Floss 2009a). In fact, there is a growing consensus that water played a pivotal role in the dispersion of AMH colonization remains over the European continent (Mellars 2006a, 2006b; Higham *et al*. 2012; Baales 2012). Evidence now hints to a river function of facilitating the opening and access of new land within the dispersal of AMHs into Europe (Conard & Bolus 2003; Anikovich *et al*. 2007; Dinnis 2012). The most elaborated model supporting this notion was first articulated by Conard & Bolus (2003, 2008) on the basis of the stratigraphic, mobile art and radiometric evidence from the Swabian Jura sites in south-western Germany, indicating a very rapid intrusion of Aurignacian people with a distinct material culture along the great Danube River into Central Europe (c.f. Hahn 1993; Floss & Conard 2000; Floss 2007, 2009b; Conard 2003, 2007, 2009; Porr 2010). Most authors accept the early beginning of the Aurignacian there around 40 ka cal. BP (Nigst 2006; Jöris *et al*. 2010; Hublin 2012) which clearly speaks in favor of the Danube corridor hypothesis. Recent re-sampling and -dating of material from the Geißenklösterle key site in the Ach valley, a small tributary of the Danube fluvial system, provided age determinations which place the onset of the Aurignacian occupation in the region to 42 ka cal. BP (Higham *et al*. 2012; Conard, in this volume). Additional evidence for an important east-west axis constituted by the Danube river system is documented in a special raw material procurement pattern which supports the flow of people and objects along the river line (Floss & Kieselbach 2004). It is thus very likely that the Aurignacian material record of the Danube catchment area is a manifestation of a very special engagement of river and people which led to the unfolding of a unique regional cultural heritage, including a distinct ivory figurine and personal ornamentation style (Floss 2007, 2009b; Conard 2007, 2009a, 2009b; Floss & Conard 2009, 2010). The natural character of the Danube River as the most important east-west corridor in the region was thus exploited by AMHs and denotes a crucial vector of human mobility and a critical axis of cultural information exchange during and after the dispersal process (Floss 2003a, 2003b). A good correlate for the Danube's role in Central Europe can be identified with the Don fluvial regime in the Black Sea region, which is believed to serve a similar function in the colonization of unfamiliar landscapes in Eastern Europe (Anikovich *et al*. 2007).

New results from the late Aurignacian of the British Isles support the hypothesis that powerful drainage systems provide important guidelines for human movement and organize the settlement of Europe's periphery as well (Dinnis 2008, 2009, 2012). Although earlier accounts favor a southern origin of the Aurignacian occurrence in Britain due to its striking western distribution (Jacobi 1999; Pettitt 2008), Dinnis (2012) recently made a convincing case for its eastern origin, taking into account the extension of distinct bladelet production methods which

indicate a strong affinity to Belgium and north-eastern France (see also Flas *et al.* 2006; Dinnis 2008, 2012). Therefore, it is suggested that AMHs swiftly penetrated Britain via the now submerged Channel River before establishing a steady occupation there (Dinnis 2012). In principle, the significance of rivers for Aurignacian spatiality is well known (e.g. Otte 1979), but has never been put into a broader perspective. The displacement of lithic material in the Périgord, for example, is also channeled by salient river systems, a pattern which is not sustained in later phases of the Upper Paleolithic (Djindjian *et al.* 1999). Rivers are clearly corridors of both natural and social relevance and facilitated the flow of people and ideas over vast distances. Such a view is further consistent with the Aurignacian record of Burgundy in eastern France, where one of the authors has been working for over a decade (Floss 1997, 2000a, 2000b, 2001). The Rhône-Saône formation notably links eastern France with south-western Germany as indicated by a few artifacts, one of which is a diagnostic Aurignacian carinated piece, made of "Bohnerzjaspis" and some blades manufactured in "Jurahornstein" from the Grotte de la Verpillière I. Both raw material units can be sourced in southern Germany in the region near Freiburg and thus crucially emphasize the corridor notion of the valley during the Aurignacian era.

3 FLUIDSCAPES OF THE MIDDLE TO LATE UPPER PALEOLITHIC: THE GARONNE, RHÔNE AND EBRO RIVER SYSTEMS

With the onset of the Middle Upper Paleolithic and the consolidation of the European occupation by AMHs, the engagement pattern with river regimes seems to change, becoming more variable and dynamic, which probably reflects different modes of conceptualization and a shifting quality of embeddedness in the cultural landscape of this period (e.g. Floss 2000, 2002; Simonet 2012; Bruxelles & Jarry 2011, 2012). The presence of other modes of handling a river in the European Upper Paleolithic is already indicated by the spatial imprint of the IUP/EUP technocomplex of the Châtelperronian occupying a significant part of south-western Europe, the spatial extension of which is clearly limited by the Rhône-Saône fluvial system in the East and probably by the Ebro massif in the south, determining the dwelling area of the Châtelperronian people (Floss 2000a, 2002b, 2003a; see also Connet 2002; Pelegrin & Soresi 2007, **figure 1a**). A similar picture emerges if one is tackling the spatial distribution pattern of the Solutrean in Western Europe which is separated from the south-eastern Early Epigravettian and its seemingly distinct technocultural character by the Rhône-Saône formation (Floss 2000a; Mussi 2002; Banks *et al.* 2008; **figure 1b**). Even in the Badegoulian at the end of the Middle Upper Paleolithic, this organizational principle is still visible in the archaeological record on a coarse-grained scale of analysis (Floss 2000a). Sandwiched between the Rhône-Saône river line in the east, the Ebro valley in the south and the Loire fluvial regime in the north (c.f. Banks *et al.* 2011), the Badegoulian sociocultural network displays a striking conceptualization of focal rivers as sociocultural frontiers, constituting a signal for "the end of the Badegoulian world" (**figure 1c**). Interestingly, a glimpse of the attribution of a frontier notion to the Rhône formation is conserved until the Late Upper Paleolithic and is mirrored in the south-western distribution margin of the Magdalenian, which is again marked by the river line isolating the Late Epigravettian in the south-east of Europe (Floss 2000a; Mussi 2002, **figure 1d**). One should be cautious, however, not to over-interpret these patterns because they might be heavily biased by different research traditions and classificatory systems, and thus may be artifacts of their own.

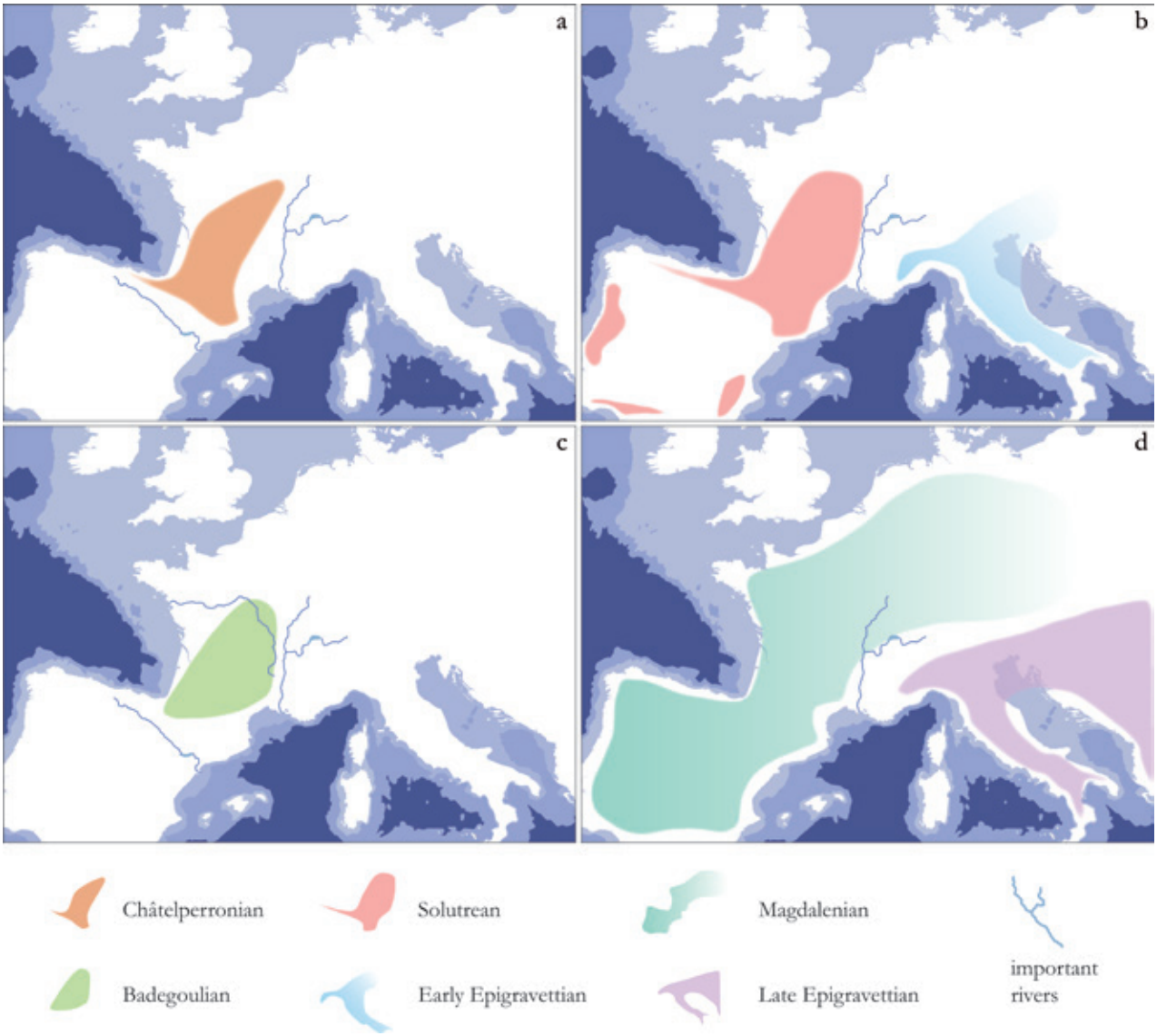


FIGURE 1 Spatial extension of initial and full Upper Paleolithic techno-complexes in relation to important river courses mentioned in the text: a. Châtelperronian of southwest France nestled in Ebro formation and Rhône-Saône river system (Connet 2002; Pelegrin & Soressi 2007); b. Solutrean and Early Epigravettian divided by the Rhône fluvial regime (Mussi 2002; Banks *et al.* 2008); c. Badegoulian framed by the Ebro, Rhône, Saône and Loire river courses (Banks *et al.* 2011); d. Magdalenian and Late Epigravettian separated by the Rhône river line (Mussi 2002). Spatial distributions are of course approximate and claim high accuracy only in relation to the critical river courses.

Additional evidence for a differential treatment of rivers by Middle Upper Paleolithic people has recently become available from the Garonne drainage system in south-western France, where extensive geoarchaeological surveys and drillings have enabled a detailed documentation of an entire archaeological landscape through time (Bruxelles & Jarry 2011; 2012; Jarry & Bruxelles 2012). Surprisingly, comprehensive investigation effort in the Garonne valley could not falsify a human-induced lack of Upper Paleolithic presence as hypothesized by Jaubert (2002), but rather point to an active avoidance of the area over the entire Upper Paleolithic (Jarry & Bruxelles 2012). The Garonne hinterland's occupation pattern cannot be explained by differential preservation or geomorphological causes because the sediments from the period in question are clearly present, but simply lack any trace of human presence (Bruxelles & Jarry 2011, 2012). The robustness of this finding is granted by the extensive research history of the valley documenting a whole range of Middle Paleolithic sites before and several Epipaleolithic or Mesolithic sites after the occupation hiatus in the Upper Paleolithic (**figure 2**). Research bias, therefore, can obviously be excluded as a reason for the virtual nonexistence of Upper Paleolithic sites around the Garonne drainage system. As already proposed by Bruxelles & Jarry (2011, 2012), the Garonne formation can be considered as a feature of spatial avoidance which limited communication

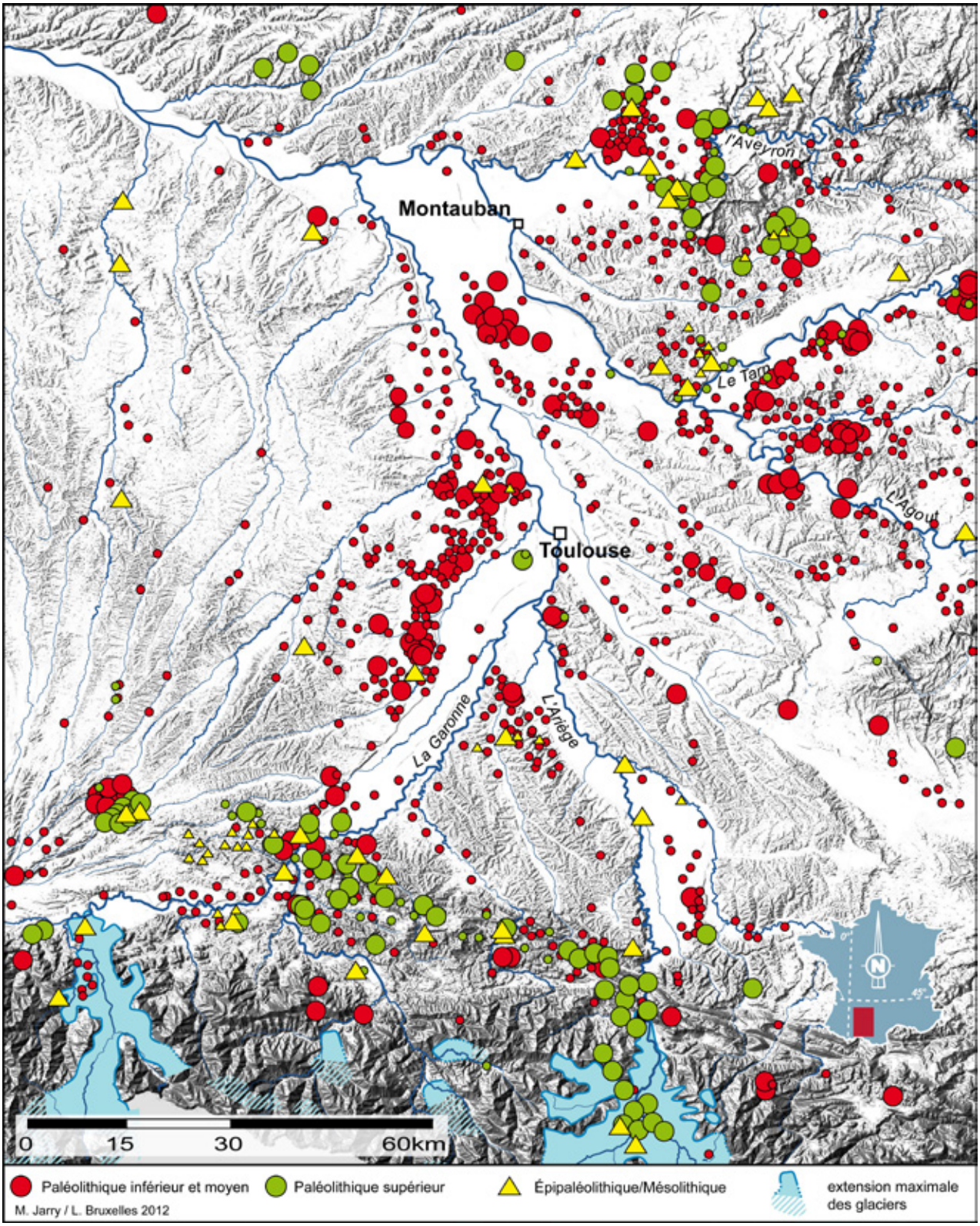


FIGURE 2 Archaeological occurrences in the Upper Garonne valley from the Pleistocene until the Holocene transition showing a differentiated spatial pattern: Upper Paleolithic sites cluster on the edges of the mountainous areas peripheral to the valley but are lacking within it (adapted from Jarry and Bruxelles 2012, fig. 1). Geomorphology and preservation issues cannot be invoked to explain this pattern. With kind permission of Marc Jarry and Laurent Bruxelles (INRAP, University of Toulouse).

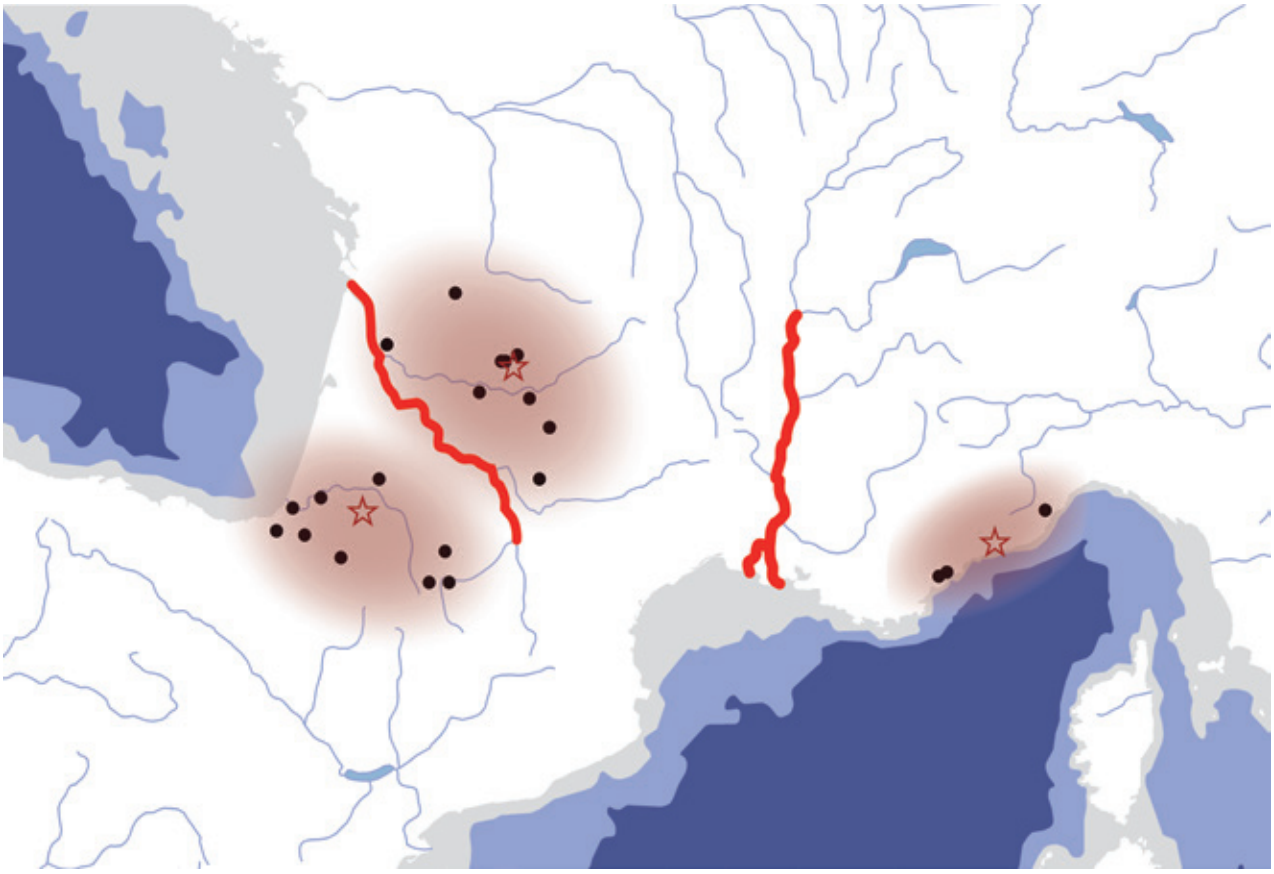


FIGURE 3 Empirical link between river lines and archaeological units interpreted as regional groups; the map shows the distribution of important regional groups in the Gravettian which center around the female figurine sites of Brassempouy, Laussel and Balzi Rossi. The archaeological entities around Brassempouy and Laussel in particular are crucially separated by the Garonne River (redrawn from Simonet 2012, fig. 86)..

and mobility in the region. The Raysse burin phase of the Gravettian, for example, is limited to the north of the Garonne valley (Klaric 2008), forming one of the internal margins of the Gravettian world (Klaric *et al.* 2009). Although the claim that a climatic deterioration in the very relevant timeframe was responsible for the strict avoidance of the region during the Upper Paleolithic has to be taken seriously (Bruxelles & Jarry 2011, 2012), we prefer a more liberal reading of the evidence at hand and suggest an interpretation which considers climate as one of several factors leading to a cultural reframing of the river system in the sense of a nature-culture entanglement (Hussain & Floss, in preparation).

The significance of the Garonne fluvial system in the Middle Upper Paleolithic, stretching a continuum of river conceptualization from frontier to boundary, was recently highlighted by Simonet (2012) as well, who made a case for the important role of the river in organizing the "spatial fingerprint" of regional groups in south-western France. On the basis of results from Brassempouy, Simonet (2012, 85ff.) argues that raw material catchment areas and affinities in material culture style, for example in portable art, indicate the presence of two distinct regional groups which line up around the female figurine sites of Brassempouy in the south and Laussel in the north. These two regional groups, or more precisely, local networks, are crucially separated by the prominent Garonne River draining the Atlantic Ocean (**figure 3**). A similar argument can probably be deduced from the spatial position of the local network around the female figurine site of Balzi Rossi in northern Italy, the influence of which seems to fade at the Rhône river line, although its chronological determination is of course debatable.

4 FLUIDSCAPES OF THE LATE UPPER PALEOLITHIC: THE RHINE, RHÔNE, SAÔNE AND DANUBE FLUVIAL REGIMES

With the consolidation of Central Europe's re-colonization process after the LGM, the most prominent riverine vectors seem to serve again as mobility and communication axes, facilitating the integration of the Magdalenian's vast socio-cultural space (c. f. Floss 1994, 2009a; Terberger *et al*. 2013). Maier (2012) has recently shown that the spatial imprint of the Central European Magdalenian and its site distribution respectively, are almost fully explainable with their spatial position next to main river lines. Particularly influential is the view of a strong interconnectedness of the Rhine rift system, the Saône River line and the Rhône fluvial regime as a crucial feature of the Magdalenian spatiality, which testifies its river engagement pronouncing a corridor notion again (Floss 2000a, 2009a). Bosinski (2008: 11), for example, also emphasized the natural pathway constituted by the Rhine River, which connects the Alps with the German Sea and should thus be seen as a predefined north-south trajectory. Strikingly, the flow of different materials along this route is very well documented, most prominently in the displacement of exotic raw materials and Mediterranean molluscs along

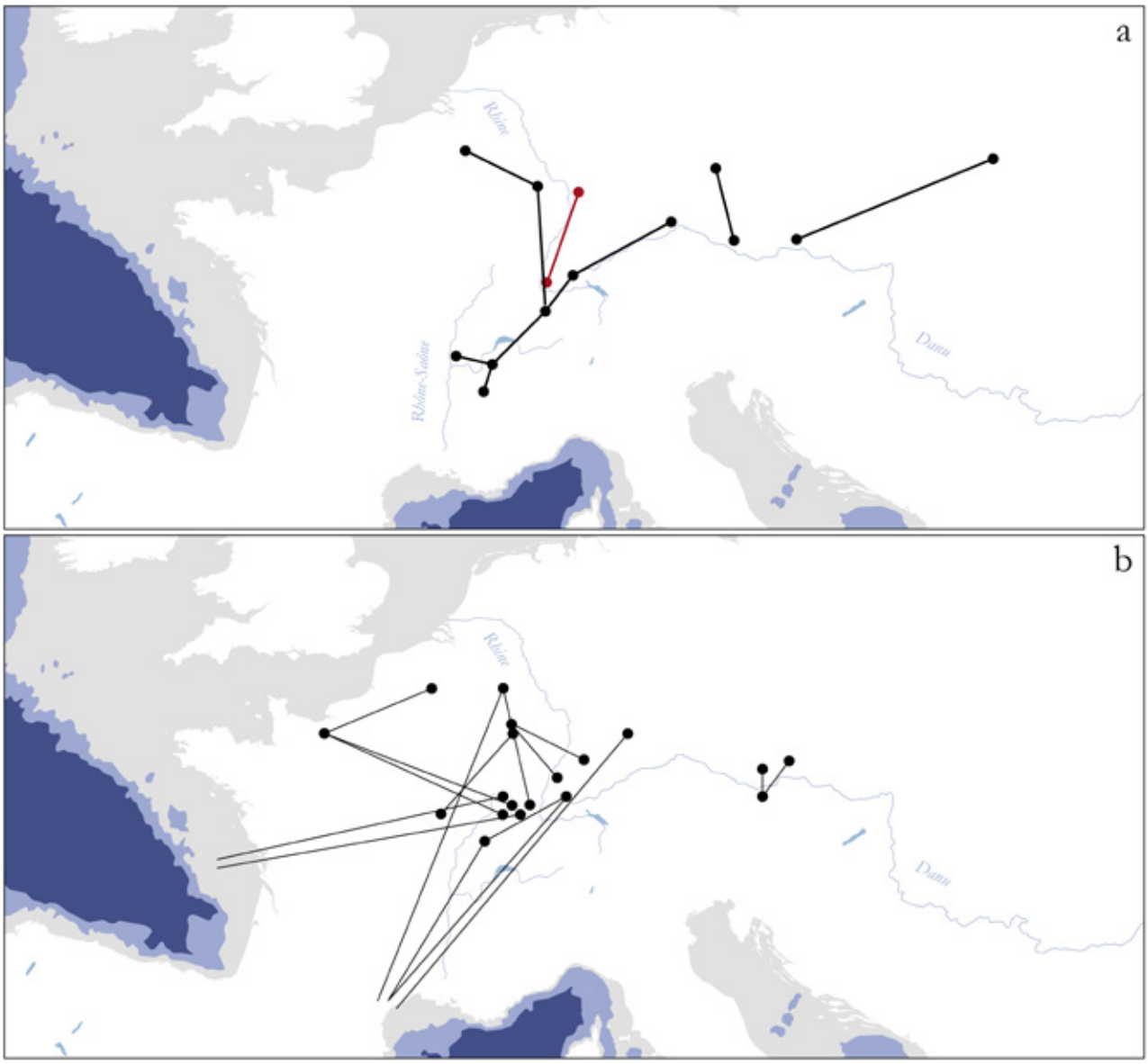


FIGURE 4 Relationship between the fluvial axes constituted by the Rhône-Saône formation, the Rhine River and the Danube fluvial system and raw material (a) and mollusc (b) spatial displacement vectors in the Central European Magdalenian. The spatial link between southwestern Germany and the Main area established by Dreiech-Götzenhain is indicated in red (modified and schematized after Maier 2012).

the Rhine-Saône-Rhône fluvial feature (Floss 1994, 2000, 2002b, 2003b, 2009a; Féblot-Augustins 2009). Non-local raw material flow can be evidenced with the presence of artifacts and nodules of "Bohnerzjaspis" in the famous Magdalenian site of Gönnersdorf, located several hundred kilometers away from the natural outcrops of this raw material type in southern Germany (Floss 1991, 1994, 2009a). Additionally, a small group of artifacts made of chalcedony and "Kieseloolith" which was probably imported from the Mainz Basin, some eighty to one hundred kilometers away, indicates the same spatial vector and thus clearly shows the importance of the Rhine as a mobility and communication trajectory in the Central European Magdalenian (Floss 1994; Street *et al*. 2012). The latest evidence for a strong link between the Lower and the Upper Rhine area comes from the site of Dreiech-Götzenhain near Offenbach, where Terberger *et al*. (2013) could recently identify a special variety of "Hornstein" among the raw material spectrum of the Magdalenian camp site. They attribute this type of "Hornstein" to the outcrops of Isteiner Klotz near Freiburg, thus supporting a crucial north-south trajectory along the Rhine fluvial system as an integral part of the Magdalenian's spatial performance (c.f. Terberger *et al*. 2013). Persuasively, the integration of the Magdalenian's cultural landscape via focal river courses is represented in the special pattern of marine mollusc provision in the Rhineland, plainest displayed in the Magdalenian sites of Gönnersdorf and Andernach-Martinsberg, which establishes a spatial link between this area and the Mediterranean Sea where they originate (Féblot-Augustins 1997, 2009; Floss 2002a; Àlvarez-Fernandez 2009). The occurrence of "Plattenhornstein" in the Magdalenian layers of the Swabian Jura sites in south-western Germany further supports this view because it reveals a similar role of the great Danube River as a feature which enhances the flow of people and communication. Locating the source outcrops of this "Plattenhornstein" variety from the Swabian caves in Bavaria, several hundred kilometers down the river line, sheds light on the east-west axis constituted by the Danube (Floss 1994, 2000a; Burkert & Floss 2005). The importance of the Danube fluvial system in catalyzing sociocultural developments in space is mirrored in the emergence of areas of common cultural heritage along the river course, documented, for example, in the appearance of distinctly decorated stone plaquettes which sketch an area from Hohle Fels in the Swabian Jura to Obere Klause in the Altmühl valley in Bavaria (Conard & Floss 1999; Conard & Uerpmann 2000; Floss & Conard 2001, 2009; Conard & Malina 2010). Clearly, the Danube River must be considered as a mediating feature which is constitutive in the construction of the Central European Magdalenian's cultural landscape. Both the Rhine-Saône-Rhône fluvial system and the Danube river regime therefore contribute much to the seemingly homogeneous outlook of the Magdalenian technocomplex in space (c.g. Maier 2012, fig. 4, fig. 29).

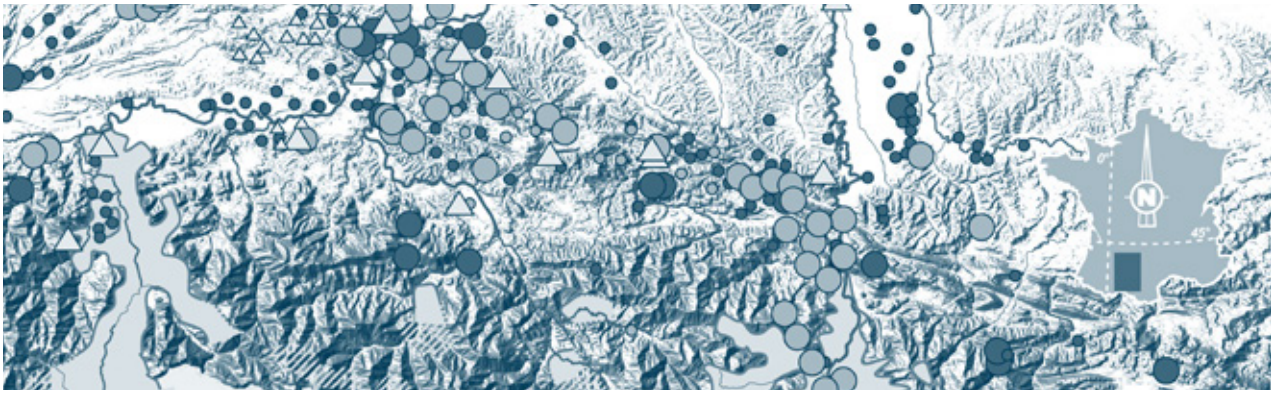
5 CONCLUSION

As an important step on the way of fully understanding human spatial behavior and its realization in past environmental settings, one must shift the emphasis from the primitive reconstruction of landscapes to their interpretation as a space with both a natural and a cultural dimension. If we further accept that, at the moment, much evidence speaks in favour of a highly biased and perceptively organized behavioral foundation of humans in general, it readily becomes clear that single extraordinary features of a landscape can be powerful "agents" in structuring their spatial dwelling. Our exploration of the role of salient river regimes in the Upper Paleolithic of Central and Western Europe should therefore be seen as a first attempt in taking this insight seriously (c.f. Hussain & Floss, in preparation).

Not every river is a feature of spatial reference of course, but the most powerful fluvial axes of Central Europe display a remarkable significance for the European Upper Paleolithic's spatial performance. As a means of constructing and organizing cultural landscapes through time, rivers can tell us much about how humans engage their environment, how they conceptualize it and finally how they structure their space. Since the archaeological record is difficult to read in this respect due to its sampling, classification and research bias, it is important by now to focus on a few very well established case studies exemplifying the changing role of salient rivers throughout the entire Upper Paleolithic. We believe that a general tendency toward a twofold and oscillating pattern of river use can be identified. In the Early Upper Paleolithic and the Aurignacian respectively, human activity, mobility and communication are crucially channeled by the great fluvial lines of Europe. Dispersal is facilitated by the role of river systems as guidelines for human spatial piloting as well as their character as natural pathways allowing for the opening of formerly unfamiliar landscapes. During the Middle Upper Paleolithic, especially during the Gravettian, major drainage systems tend to be conceptualized as frontiers or even cultural boundaries. In principle, river function within the respective cultural settings of the Middle Upper Paleolithic seems to be much more variable than in earlier phases. The Late Upper Paleolithic Madgalenian testifies to the return to a spatial strategy which again integrates river regimes as corridors of communication and material culture flow, constituting spatial trajectories, which is accompanied by the emergence of areas of common cultural heritage, a phenomenon already documented in the Early Upper Paleolithic. We believe that these results very well demonstrate that there is no *a priori* way to think about rivers in the Upper Paleolithic, but rather that we should acknowledge human river engagement as a fruitful empirical and theoretical endeavor stimulating future research efforts.

AKNOWLEDGMENTS

We are very grateful to Allison Casaly for her remarkable editing effort, as well as the organizers of the 2012 UISPP conference "Modes de contacts et de déplacements au Paléolithique eurasiatique" in Liège for having us there and providing us with the opportunity to write this paper. We had a lot of valuable advisors and commenters, among which we would especially thank Rob Dinnis, Andreas Maier, Tim Piccolini and Raymond Corbey. Kiron J. Hussain kindly arranged the figures. We are in particularly thankful to Laurent Bruxelles and Marc Jarry, who permitted us to reprint one of their figures. Any remaining errors or shortcomings are ours.



REFERENCES

ALVARD M.S. (2003) – The Adaptive Nature of Culture. *Evolutionary Anthropology* 12:136–149.

ÁLVAREZ-FERNANDEZ E. (2009) – Magdalenian personal ornaments on the Move: A Review of the Current Evidence in Central Europe. *Zephyrus* LXII:45–59.

ANIKOVICH M.V., SINITSYN A.A., HOFFECKER J.F., HOLLIDAY V. T., POPOV V.V., LISITSYN S. N., FORMAN S.L., LEVKOVSKAYA G.M., POSPELOVA G.A., KUZ'MINA I.E., BUROVA N.D., GOLDBERG P., MACPHAIL R.I., GIACCIO B. & PRASLOV N.D. (2007) – Early Upper Paleolithic in Eastern Europe and Implications for the Dispersal of Modern Humans. *Science* 315:223–226.

BAALES M. (2012) – Der pleistozäne Mensch und das Wasser. In: F. Klimscha, R. Eichmann, C. Schuler & H. Fahlbusch (Eds.), *Wasserwirtschaftliche Innovationen im archäologischen Kontext. Von den prähistorischen Anfängen bis zu den Metropolen der Antike*, Leidorf, p. 23–36.

BANKS W.E., D'ERRICO F., TOWNSEND PETERSON A., VANHAEREN M., KAGEYAMA M., SEPULCHRE P., RAMSTEIN G., JOST A. & LUNT D. (2008) – Human ecological niches and ranges during the LGM in Europe derived from an application of eco-cultural niche modeling. *Journal of Archaeological Science* 35:481–491.

BANKS W.E., AUBRY T., D'ERRICO F., ZILHAO J., LIRA-NORIEGA A. & TOWNSEND PETERSON A. (2011) – Eco-cultural niches of the Badegoulian: Unravelling links between cultural adaptation and ecology during the Last Glacial Maximum in France. *Journal of Anthropological Archaeology* 30:359–374.

BONNAMOUR L. (2000) – *Archéologie de la Saône*. Paris.

BONNAMOUR L., DUBOIS D., GIRARDIN R. & MICHEL C. (2005) – *Caprices de Saône. Crues and glaces*. Chalon-sur-Saône.

BOSINSKI G. (2008) – *Urgeschichte am Rhein*. Tübinger Monographien zur Urgeschichte 11, Tübingen.

BRADLEY R. (2000) – *An Archaeology of Natural Places*. London and New York.

BRIGHTON H. (2006) – Robust inferences with simple cognitive models. In: C. Lebière & B. Wray (Eds.), *Between a Rock and a Hard Place: Cognitive Science Principles Meet AI-Hard Problems*. Papers from the AAAI Spring Symposium, Menlo Park: 17–22.

BRUXELLES L. & JARRY M. (2011) – Climatic conditions, settlement patterns and cultures in the Paleolithic: The example of the Garonne Valley (southwest France). *Journal of Human Evolution* 61:538–548.

BRUXELLES L. & JARRY M. (2012) – Climats et cultures paléolithiques : quand la vallée devient frontière. *Archéopages, numéro spécial 10 ans de l'Institut*, p. 72–85.

BURKERT W. & FLOSS H. (2005) – Lithic exploitation areas of the Upper Paleolithic of West and Southwest Germany - a comparative study. In: G. Körlin & G. Weisberger (Eds.), *Stone Age - Mining Age*, Bochum, p. 35–49.

CHATER N., OAKSFORD M., NAKISA R. & REDIGNTON M. (2003) – Fast, frugal and rational: how rational norms explain behavior. *Organizational Behavior and Human Decision Processes* 90:63–86.

CONARD N.J. (2003) – Paleolithic ivory sculptures from southwestern Germany and the origins of figurative art. *Nature* 426:830–832.

CONARD N.J. (2004) – *Settlement dynamics of the Middle Paleolithic and Middle Stone Age. Volume II*. Tübingen Publications in Prehistory, Tübingen.

CONARD N.J. (2007) – Neue Elfenbeinskulpturen aus dem Aurignacien der Schwäbischen Alb und die Entstehung der figürlichen Kunst. In: H. Floss & N. Rouquerol (Eds.), *Les chemins de l'art Aurignacien en europe - Das Aurignacien und die Anfänge der Kunst in Europa*, Aurignac: Éditions Musée-forum Aurignac, p. 317–330.

CONARD N.J. (2009) – A female figurine from the basal Aurignacian of Hohle Fels Cave in southwestern Germany. *Nature* 459:248–252.

CONARD N.J. & FLOSS H. (1999) – Une pierre peinte du Hohle Fels (Baden-Württemberg, Allemagne) et la question de l'art pariétal paléolithique en Europe central. *Paléo* 11:167–176.

CONARD N.J. & FLOSS H. (2000) – Eine Elfenbeinplastik vom Hohle Fels bei Schelklingen und ihre Bedeutung für die Entwicklung des Jungpaläolithikum in Südwestdeutschland. *Archäologisches Korrespondenzblatt* 30:473–480.

CONARD N.J. & UERPMANN H.-P. (2000) – New Evidence for Paleolithic Rock Painting in Central Europe. *Current Anthropology* 41:853–856.

CONARD N.J. & BOLUS M. (2003) – Radiocarbon dating the appearance of modern humans and timing of cultural innovations in Europe: new results and new challenges. *Journal of Human Evolution* 44:331–371.

CONARD N.J. & BOLUS M. (2008) – Radiocarbon dating the late Middle Paleolithic and Aurignacian of the Swabian Jura. *Journal of Human Evolution* 55:886–897.

CONARD N.J. & MALINA M. (2010) – Neue Belege für Malerei aus dem Magdalénien des Hohle Fels. *Archäologische Ausgrabungen Baden-Württemberg* 2009:52–56.

CONNET N. (2002) – *Le Châtelperronien: réflexion sur l'unité and l'identité techno-économique de l'industrie lithique*. Lille.

COUCLELIS H., GOLLEDGE R.G., GALE N. & TOBLER W. (1987) – Exploring the Anchor-Point Hypothesis of Spatial Cognition. *Journal of Environmental Psychology* 7:99–122.

CZERLINSKI J., GIGERENZER G. & GOLDSTEIN D.G. (1999) – How good are simple heuristics. In: G. Gigerenzer, P.M. Todd & the ABC-Research Group (Eds.), *Simple Heuristics that make us smart*, Oxford, p. 97–118.

DAVIES W. (2001) – A very model of a modern human industry: new perspectives on the origins and spread of the Aurignacien in Europe. *Proceedings of the Prehistoric Society* 67:195–217.

DELAGNE A. & RENDU W. (2011) – Shifts in Neandertal mobility, technology and subsistence strategy in western France. *Journal of Archaeological Science* 38:1771–1783.

DINNIS R. (2008) – On the technology of Late Aurignacien burin and scraper production, and the importance of the Paviland lithic assemblage and the Paviland burin. *Lithics: The Journal of the Lithic Studies Society* 29:18–35.

DINNIS R. (2009) – *Understanding the British Aurignacian*. Unpublished PhD dissertation, University of Sheffield.

DINNIS R. (2012) – The Archaeology of Britain's first modern humans. *Antiquity* 86:627–641.

DJINDJIAN F., KOZLOWSKI J. & OTTE M. (1999) – *Le Paléolithique supérieur en Europe*. Paris.

DÖRING J. & THIELMANN T. (2008) – *Spatial Turn. Das Raumparadigma in den Kultur- und Sozialwissenschaften*. Bielefeld.

DÜNNE J. & GÜNZEL S. (2006) – *Raumtheorie. Grundlagentexte aus Philosophie und Kulturwissenschaften*. Frankfurt am Main.

EDGEWORTH M. (2011) – *Fluid Pasts. Archaeology of Flow*. Bristol.

FÉBLOT-AUGUSTINS J. (1997) – *La circulation des matières premières au Paléolithique. Synthèse des données, perspectives comportementales*. Liège.

FÉBLOT-AUGUSTINS J. (2009) – Revisiting European Upper Paleolithic raw material transfers: the demise of the cultural ecological paradigm? In: B. Adams & B.S. Blades (Eds.), *Lithic Materials and Paleolithic Societies*, Oxford, p. 25–46.

FLAS D., MILLER R. & JACOBS B. (2006) – Les 'burins' de l'atelier de débitage aurignacien de Maisières-Canal (Province du Hainaut, Belgique). Dans : J.-P. Bracco, M. de Araujo Igreja & F. Le brun-Ricalens (Eds.), *Burins préhistoriques: formes, fonctionnements, fonctions*, ArchéoLogiques 2. Luxembourg, Musée national d'histoire et d'art, p. 55–74.

FLOSS H. (1991) – Rohmaterialversorgung im Paläolithikum des Mittelrheingebietes. *Archäologische Informationen* 14:113–117.

FLOSS H. (1994) – *Rohmaterialversorgung im Paläolithikum des Mittelrheingebietes*. Monographien des RGZM 21. Bonn.

FLOSS H. (1997) – La découverte d'un grand inconnu : Varennes-lès-Macon, important gisement à pointes à dos dans la basse vallée de la Saône au Sud de Mâcon (Saône-et-Loire, France). *Bulletin de la Société Préhistorique Française* 94:327–330.

FLOSS H. (2000a) – Le couloir Rhin-Saône-Rhône - axe de communication au tardiglaciaire ? *Les dernies chasseurs-cueilleurs d'Europe occidentale (13.000–5.500 av. J.-C.). Actes du Colloque de Besançon, 23.25. octobre 1998*, Besançon, p. 313–321.

FLOSS H. (2000b) – Azé, eine komplexe Höhlen- und Freilandfundstelle im Süden Burgunds. Ein Überblick vom Altpaläolithikum bis zum Magdalénien. *Archäologisches Korrespondenzblatt* 30:307–326.

FLOSS H. (2001) – Les derniers chasseurs paléolithiques dans la basse vallée de la Saône entre Tournus et Lyon. *Bulletin de la Société Préhistorique Luxembourgeoise* 20–21:159–183.

FLOSS H. (2002) – La Saône - Lien ou limite de l'occupation humaine au Paléolithique. Dans : Institut de Recherche du Val de Saône-Mâconnais (Ed.), *La Saône : axe de civilisation*. Congrès International, Mâcon, p. 113–125.

FLOSS H. (2003) – Did they meet or not? Observations on Châtelperronian and Aurignacian settlement patterns in eastern France. In: J. Zilhao & F. d'Errico (Eds.), *The Chronology of the Aurignacian and of the Transitional Technocomplexes.*

Dating, Stratigraphies, Cultural Implications, Trabalhos de Arqueologia. Lisboa, p. 273–287.

FLOSS H. (2007) – Die Kleinkunst des Aurignacien auf der Schwäbischen Alb und ihre Stellung in der paläolithischen Kunst. In: H. Floss & N. Rouquerol (Eds.), *Les chemins de l'art Aurignacien en europe - Das Aurignacien und die Anfänge der Kunst in Europa*, Aurignac, Éditions Musée-forum Aurignac, p. 295–316.

FLOSS H. (2009a) – Menschen mit Migrationshintergrund. Materialien unterwegs. In: Archäologisches Landesmuseum Baden-Württemberg and Abteilung für Ältere Urgeschichte und Quartärökologie Eberhard Karls University Tübingen (Eds.), *Eiszeit. Kunst und Kultur*. Begleitband zur Großen Landesausstellung Eiszeit - Kunst und Kultur im Kunstgebäude Stuttgart, Stuttgart, p. 180–182.

FLOSS H. (2009b) – Kunst schafft Identität. Das Aurignacien und die Zeit der ersten Kunst. In: Archäologisches Landesmuseum Baden-Württemberg and Abteilung für Ältere Urgeschichte und Quartärökologie Eberhard Karls University Tübingen (Eds.), *Eiszeit. Kunst und Kultur*. Begleitband zur Großen Landesausstellung Eiszeit - Kunst und Kultur im Kunstgebäude Stuttgart, Stuttgart, p. 248–257.

FLOSS H. & CONARD N.J. (2001) – Malerei in der Eiszeitkunst des Süddeutsch-Schweizerischen Jura. In: H.-J. Müller-Beck, J. Conard & W. Schürle (Eds.), *Eiszeitkunst im Süddeutsch-Schweizerischen Jura*, Stuttgart, p. 75–87.

FLOSS H. & KIESELBACH P. (2004) – The Danube Corridor after 29.000 BP - New results on raw material procurement patterns in the Gravettian of southwestern Germany. *Mitteilungen der Gesellschaft für Urgeschichte* 13:61–68.

FLOSS H. & CONARD N.J. (2009) – Lascaux auf der Alb? Hinweise auf Höhlenkunst im deutschen Südwesten. In: Archäologisches Landesmuseum Baden-Württemberg and Abteilung für Ältere Urgeschichte und Quartärökologie Eberhard Karls University Tübingen (Eds.), *Eiszeit. Kunst und Kultur*. Begleitband zur Großen Landesausstellung Eiszeit - Kunst und Kultur im Kunstgebäude Stuttgart, Stuttgart, p. 303–306.

FLOSS H. & CONARD N.J. (2010) – L'art mobilier du Jura souabe. Dans : M. Otte (Ed.), *Les Aurignaciens*, Paris, p. 201–214.

GIGERENZER G. & GOLDSTEIN D.G. (1996) – Reasoning the fast and frugal way: models of bounded rationality. *Psychological Review* 104:650–669.

GIGERENZER G. & BRIGHTON H. (2009) – Homo heuristicus: why biased minds make better inferences. *Topics in Cognitive Science* 1:107–143.

GIGERENZER G. & GAISSMAIER W. (2011) – Heuristic Decision Making. *Annual Review of Psychology* 2010:451–482.

GÜNZEL S. (2009) – *Raumwissenschaften*. Frankfurt am Main.

HAHN J. (1993) – Aurignacian art in central Europe. In: H. Knecht, A. Pike-Taya & R. White (Eds.), *Before Lascaux: the Complex record of the Early Upper Paleolithic*, Boca Raton, p. 229–241.

HIGHAM T., BASELL L., JACOBI R., WOOD R., BRONK RAMSEY C. & CONARD N.J. (2012) – Testing models for the beginning of the Aurignacian and the advent of figurative art and music: The radiocarbon chronology of Geißenklösterle. *Journal of Human Evolution* 62:664–676.

HILTY J.A., LIDICKER JR. W.Z. & MERENLENDER A.M. (2003) – *Corridor Ecology. The Science of Linking Landscapes for Biodiversity Conservation*. Washington, Covelo and London.

HUBLIN J.-J. (2012) – The earliest modern human colonization of Europe. *PNAS* 109:13471–13472.

JACOBI R.M. (1999) – Some observations on the British Early Upper Paleolithic. In: W. Davies & R. Charles (Eds.), *Dorothy Garrod and the Progress of the Paleolithic: Studies in Prehistoric Archaeology of the Near East and Europe*, Oxford, p. 35–40.

JARRY M. & BRUXELLES L. (2012) – L'influence des variations climatiques sur les peuplements paléolithiques entre Massif Central et Pyrénées. *Géologues* 173:20–23.

JAUBERT J. (2002) – Le Paléolithique dans le Midi toulousain. Dans : J.-M. Pailler (Ed.), *Tolosa. Nouvelles Recherches sur Toulouse et son Histoire dans l'Antiquité*. Colloque de l'École Francaise de Rome 281, p. 43–52.

JÖRIS O., NEUGEBAUER-MARESCH C., WENINGER B. & STREET M. (2010) – The radiocarbon chronology of the Aurignacian to Mid-Upper Paleolithic Transition along the Middle and Upper Danube. In: C. Neugebauer-Maresch & L.R. Owen (Eds.), *New Aspects of the Central and Eastern European Upper Paleolithic - Methods, Chronology, Technology and Subsistence*. Symposium by the Prehistoric Commission of the Austrian Academy of Sciences, Vienna 2005, November 9–11. Vienna, Mitteilungen der Prähistorischen Kommission 72:101–137.

KAHNEMAN D. (2003) – Maps of bounded rationality: a perspective on intuitive judgment and choice. In: T. Frangsmyr (Ed.), *Les Prix Nobel: The Nobel Prices 2002*, Stockholm, p. 449–489.

KLARIC L. (2008) – Anciennes et nouvelles hypothèse d'interprétation du Gravettien moyen sein de la mosaïque gravettienne. *Paléo* 20:257–276.

KLARIC L., GUILLERMIN P. & AUBRY T. (2009) – Des armatures variées et des modes de productions variables. Réflexions à partir de quelques exemples issus du Gravettien d'Europe occidentale (France, Portugal, Allemagne). *Gallia Préhistoire* 51:113–154.

LANG F. (2009) – Archäologie. In: S. Günzel (Ed.), *Raumwissenschaften*, Frankfurt am Main, p. 30–46.

MAIER A. (2012) – *The Central European Magdalenian. Regional diversity and internal variability*. Unpublished PhD dissertation, University of Cologne.

MALANSON G.P. (1993) – *Riparian landscapes*. Cambridge.

MELLARS P.A. (2006a) – Going East: New Genetic and Archaeological Perspectives on the Modern Human Colonization of Eurasia. *Science* 313:796–800.

MELLARS P.A. (2006b) – Archaeology and the Dispersal of Modern Humans in Europe: Deconstructing the "Aurignacian". *Evolutionary Anthropology* 15:167–182.

MESKELL L. & PREUCEL R.W. (2004) – *A Companion to Social Archaeology*. Oxford.

MUSSI M. (2002) – *Earliest Italy. An Overview of the Italian Paleolithic and Mesolithic*. New York.

NIGST P.R. (2006) – The first modern humans in the Middle Danube area? New evidence from Willendorf II (Eastern Austria). In: N.J. Conard (Ed.), *When Neanderthals and Modern Humans Met*, Tübingen, p. 269–304.

OTTE M. (1979) – *Le paléolithique supérieur ancien en Belgique*. Monographies d'archéologie nationale 5. Bruxelles, Musées royaux d'art et d'histoire.

PELEGRIN J. & SORESSI M. (2007) – Le Châtelperronien et ses rapports avec le Moustérien. Dans : B. Vandermeersch, M. Bruno & Y. Coppens (Eds.), *Les Néandertaliens: Biologie et cultures*, Paris, p. 283–296.

PETTITT P. (2008) – The British Upper Paleolithic. In: Pollard J. (Ed.), *Prehistoric Britain*, London, p. 18–57.

PORR M. (2010) – Paleolithic Art as Cultural Memory: a Case Study of the Aurignacian Art of Southwest Germany. *Cambridge Archaeological Journal* 20:87–108.

ROCKMAN M. (2003) – Knowledge and learning in the archaeology of colonization. In: M. Rockman & J. Steele (Eds.), *Colonization of Unfamiliar Landscapes. The archaeology of adaptation*, Oxon and New York, p. 3–24.

SCHELLING T.C. (1958) – The Strategy of Conflict. Prospectus for a Reorientation of Game Theory. *The Journal of Conflict Resolution* 2:203–264.

SCHELLING T.C. (1981) – *A Strategy of Conflict*. Harvard, Cambridge and London.

STRANG V. (2008) – The Social Construction of Water. In: B. David & J. Thomas (Eds.), *Handbook of Landscape Archaeology* 1:123–130.

STREET M., JÖRIS O. & TURNER E. (2012) – Magdalenian settlement in the German Rhineland - An update. *Quaternary International* 272–273:231–250.

SIMONET A. (2012) – *Brassempouy (Landes, France) ou la matrice gravettienne de l'Europe*. Liège, ERAUL 133.

TILLEY C. (1994) – *A phenomenology of landscape: places, paths and monuments*. London.

TERBERGER T., FLOSS H., HEINZELMANN P., KOTULA A. & SERANGELI J. (2013) – Down the river Rhine c. 16.000 years ago - new evidence from the site Dreieich-Götzenhain, Hesse. In: A. Pastoors & B. Auffermann (Eds.), *Pleistocene foragers: Their culture and environment*. Festschrift in honour of Gerd-Christian Weniger for his sixtieth birthday, Wissenschaftliche Schriften des Neanderthal Museums 6, Mettmann: 101–115.

TOCKNER K., PAETZOLD A., KARAUS U., CLARET C. & ZETTEL J. (2006) – Ecology of braided rivers. In: G.H. Sambrook Smith, J.L. Best, C.S. Bristow & G.E. Petts (Eds.), *Braided Rivers: Process Deposits, Ecology and Management*, Special Publication Number 36 of the International Association of Sedimentologists, Malden, Oxford and Carlton, p. 339–360.

WARF B. & ARIAS S. (2009) – *The Spatial Turn. Interdisciplinary Perspectives*. London and New York.

WOHL E.E. (2004) – *Disconnected Rivers. Linking Rivers to Landscapes*. New Haven and London.