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After the Deep Freeze: Confronting "Magdalenian" Realities in Cantabrian Spain And Beyond

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Abstract The Magdalenian culture-stratigraphic unit in Western Europe, despite being a construct of nineteenth-century prehistoric archeologists, does have reality as a continuous network of human inter-relationships, whose ecologically transcendent range expanded through the course of the Late Last Glacial, in many ways reminiscent of Braudel's *histoire de la longue durée*—in this case lasting some 9,000 calendar years. At the scale of the *moyenne durée*, the Magdalenian underwent several reorganizations [represented by its Initial, Lower, Middle, Upper, Final, and Epi-Magdalenian (i.e., Azilian, Federmesser) stages]—with distinctly regional manifestations and inter-regional connections—that in part can be understood in light of environmental/resource changes and variations at the scales of millennia and natural regions. At the scale of the *courte durée*, we are dealing with the adaptations of local and regional hunter-gatherer bands and the peculiarities and vicissitudes of their circumstances measured by forager group territories and centuries. Numerous, diverse concrete archaeological manifestations of territories and inter-group contacts support the growing consensus about the social reality of the Magdalenian phenomenon and the changes and variations that characterized it within a range that ultimately stretched from Portugal to Poland during the last millennia of the Pleistocene. Here, the focus is on Cantabrian Spain as one of the core or source areas of the Magdalenian cultural tradition that arose out of the Solutrean experience some 20,000 calendar years ago (about a millennium later than in France) and that was intimately linked to the process of human recolonization of upland and northerly regions of western and ultimately central Europe during the course of Greenland Stadial 2 and early Greenland Interstadial 1. Finally, archaeological and paleobiological indicators clearly point to major breaks in human adaptations and ways of understanding the human place in the universe a few centuries after the onset of Holocene conditions in Vasco-Cantabria, i.e., the development of Mesolithic cultures about 11,000 calendar years ago.

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Introduction

The purpose of this paper is to explore the reality and nature of a classic European Upper Paleolithic cultural tradition, the Magdalenian, and its major temporal subdivisions, in light of underlying environmental (resource) conditions and historic trajectories that reflected intra- and inter-regional social relations. The paper is grounded in the empirical record of Cantabrian Spain, but also views "Magdalenian culture" as a much wider phenomenon, as the human range re-expanded northward from humankind's late Last Glacial Maximum refugium in Iberia and southern France (of which Vasco-Cantabria was one key component region). I take the position that both processual and historical-like factors affected human behaviors and that these can be (however dimly) perceived as patterns in the retrievable archaeological record for a time which, though remote and extremely long by true historical standards, is now relatively accurately and precisely datable by ice cores and radiocarbon. This personal evolution on my part can be seen as a step back from perhaps overly reductionist environmental or demographic determinism, by admitting an important role for the limiting effect of long-term customs in the ways in which people in small forager bands learned, did, and taught material culture in contexts of equifinality. It is the result of four decades of excavations in diverse settings throughout Western Europe, as well as considerable study and discussion of the work of many colleagues from divergent paradigmatic perspectives: culture-historical, geological, humanist, positivist, processual, agency-based, etc. The goal is not so much purely theoretical, as it is one of stock-taking on the Magdalenian as a semi- or pseudo-historical reality, one that, with continuity, evolved and diversified through time, with practical inter-regional differences and overarching similarities in the realms of symbols, identity expression and, no doubt, general beliefs. Viewed from the USA, the Magdalenian phenomenon can be described with reference to our national motto: "*E Pluribus Unum*". The differences, of course, are that the USA has expanded and changed while maintaining that central reality for less than a quarter millennium and has government institutions, while the Magdalenian (as perceived or defined by archaeologists and paleo-art historians) had a run of some 6–7 millennia and was never more than a collection of regional or dialectical bands, in turn composed of local bands with fluid membership that tended to interact most intensively with other similar groups within their particular (and often ecologically distinctive) regions, but only episodically or selectively with bands in other regions.

Archaeologists who study the Upper Paleolithic of Europe are faced with a number of interpretation dilemmas that are related conceptually to Braudel's *histoires de la courte, moyenne et longue durée* (Braudel 1972; see Bintliff 1991; Peebles 1991). These problems arise from the facts that for the first time in the long prehistory of the continent, we as scholars are dealing not with extinct species of hominins but rather with anatomically modern humans, endowed with bodies and presumably brains (and logical thought processes) indistinguishable from those of contemporary people. In addition, unlike most of the Middle Paleolithic, the record of the whole Upper

Paleolithic is accurately and rather precisely datable by (calibrated) radiocarbon assay. The high densities of sites in many regions give the appearance of actual settlement patterns (such as along the short, but deep valleys of Vasco-Cantabria), even if the strict contemporaneity (and thus the functional complementarity) of particular sets of sites within any given natural area cannot usually be demonstrated [rare exceptions being three Gravettian sites of the Achtal in SW Germany (Scheer 1993)]. It is thus easy to fall into the assumption that such archaeological constructs as the Aurignacian, Gravettian, Solutrean, or Magdalenian are equivalent to historical entities, much as their inventors (G. de Mortillet, H. Breuil, D. Garrod, D. Peyrony, *et al*.) believed. It is currently my contention (after decades of skepticism) that at least for the most recent periods of the Upper Paleolithic (i.e., Solutrean and Magdalenian, and for even earlier, but regionally and materially very well-defined and tightly dated phenomena such as the Pavlovian of Central Europe), we can:

1. Begin to reconstruct and build explanations for redundant episodes of behavior (sometimes punctuated by occupational hiati) in particular places and territories as if they were "moments in time", conceptually corresponding to Braudel's *courtes durées*.
2. Define regionally and temporally bounded patterns of settlement, subsistence, technology, symboling, and social relations that could correspond to socio-cultural realities like ethnographic regional bands with self-perpetuating traditions, despite the existence of inter-area connections of varying intensity. This undertaking, at the Upper Paleolithic level of temporal resolution, could be roughly equivalent to Braudel's *moyenne durée*. At this level, the role of climatic phases as now rather precisely defined by ice cores, along with stable isotope, pollen, and micromammal studies, can be assessed, though obviously environmental determinism need not be presumed to have been causal, and certainly not in every case, especially given the margins for choice within foragers could have chosen and acted without endangering continued long-term survival.
3. Reconstruct networks of inter-regional relationships that transcended ecological zones and that evolved through long periods of time, in generally parallel fashion in terms of expressive culture and (presumably) belief systems, thereby constituting cultural realities beyond the nineteenth and early twentieth century notions of "peoples" envisioned by the founders of prehistoric archaeology. Such sweeping but archaeologically well-characterized socio-cultural-economic phenomena could be seen as approximating the notion of the *longue durée*.

The Questions

The questions to be very cursorily debated here specifically in regard to the Magdalenian are:

1. How can we realistically interpret in behavioral terms the palimpsest residues of repeated human occupations pertaining to the entity we call the Magdalenian? Can we perceive the actual factors (environmental, economic, demographic,

social, or even ideological) that led to periods of (semi-)continuous site-use versus episodes of abandonment, or those that caused shifts in the intensity, function, and rhythm of specific site occupation? Do palimpsest deposits "average-out" the idiosyncracies of individual occupations and of the residues they leave behind at specific places within sites to give a general picture of site functions during specific ranges of time? This is a particularly difficult problem in repeatedly and densely occupied caves (see Straus 1979, 1990; Galanidou 1997).

2. How can we discern and possibly explain larger-scale shifts in patterned economy, mobility, and social and territorial arrangements that may lie behind the classic, "fossil director"-marked temporal subdivisions of the Magdalenian in specific regions?
3. How can we meaningfully define and understand the supposed origins of "the" Magdalenian and its late glacial transformation into an Epi-Magdalenian entity (the Azilian or Federmesser), followed by its post-glacial substitution by a plethora of local Mesolithic traditions: punctuation events ("replacements") or gradual adaptations to changing late Quaternary environmental conditions? At the level of such major cultural stages in the human occupation of subcontinental areas as the Magdalenian, it is important that we try to document the nature of change and to comprehend the differences between periods of accelerated rates of change (major cultural transitions) versus more "normal", gradual rates of adaptation within existing, "traditional" norms. (By the former, I refer to major breaks or reorganizations in the ways in which humans interacted with one another and with the physical world; by the latter, I mean cultural selection and drift operating on more or less randomly produced inventions to produce innovations that nonetheless stayed within the generally accepted bounds of "business-as-usual" for human society in any given part of the world under mostly familiar environmental circumstances.)
4. Specifically, can we really speak of significant adaptive transitions (i.e., beyond just diagnostic artifacts) between such major blocks of cultural time in Western Europe as the Solutrean and the Magdalenian or the Magdalo-Azilian and the Mesolithic *sensu lato*? What real roles did such processes as human range contraction and expansion, local extinction, migration, and demic diffusion play in the "big story" of the dynamic settlement of Europe during Marine Isotope Stage 2 [i.e., the Upper Pleniglacial, ca. 27–12 cal kya (Andersen *et al*. 2006; Svensson *et al*. 2006)]? These are issues raised in the context of the Arkeotek Workshop, "Discontinuities and Continuities: Theories, Methods and Proxies for an Historical an Sociological Approach to the Evolution of Past Societies", held at the Université de Paris-Nanterre in January, 2011 (Fig. 1).

The Archaeological Record of the Cantabrian Magdalenian (and Beyond)

The archaeological record considered here is that of the Magdalenian in Cantabrian Spain. In this Atlantic region, stretching along the 43rd parallel of North latitude as a narrow strip between the Cantabrian Cordillera and coast, some 350 km westward from the Basque Country at the end of the Pyrenees to the River Nalón *in* central

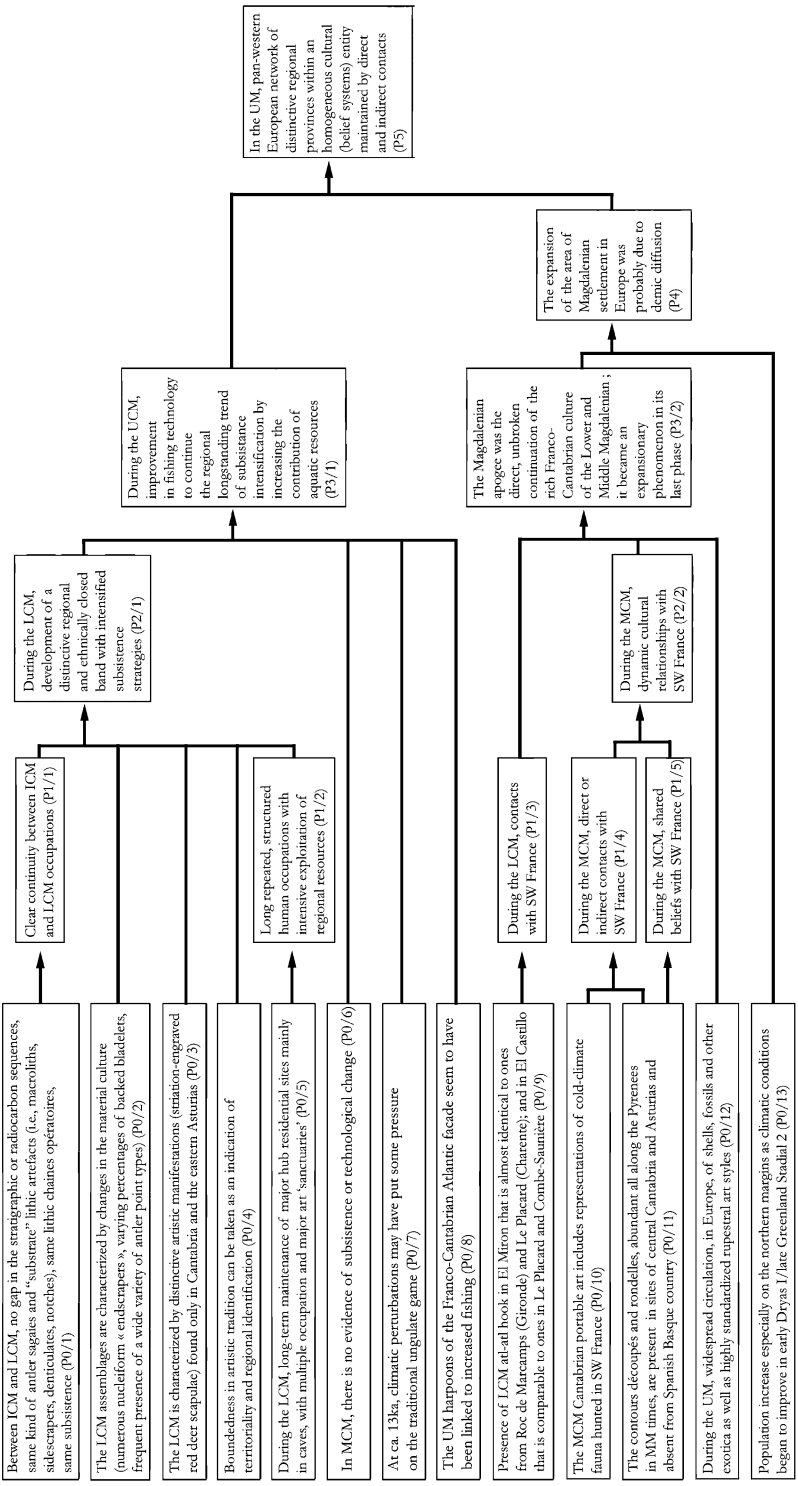

Fig. 1 Synoptic view of the scientific construct presented in this paper ("logicist diagram") by Valentine Roux

Asturias, the Magdalenian has been abundantly researched since Sanz de Sautuola's work at Altamira in the 1870s and is now dated by scores of radiocarbon dates from dozens of sites between about 20.5–14 cal kya (Corchón 2005a; González Sainz and Utrilla 2005; González Sainz 2007; Utrilla 1996, 1997, 2007). The Magdalenian, which can be grossly divided into a long early part and a shorter late part, respectively, before and after the invention of the true antler harpoon at ca. 15.6 cal.kya, followed upon the Solutrean at the end of the Last Glacial Maximum and ended near the close of the Last Glacial. The natures of both the Solutrean–Magdalenian and Magdalenian–Azilian (Epi-Magdalenian) transitions are debated, as are the numbers and reality of temporal subdivisions of the Magdalenian *per se*. There are about 60 sites each with early and late Magdalenian levels in the coastal provinces of Asturias, Cantabria, Vizcaya, and Guipúzcoa (plus the interior Basque provinces of Alava and Navarra) (Straus *et al*. 2000a, b). As a consequence of several recent excavations throughout the region [including my own long-term work in El Mirón Cave with Manuel González Morales, with 78 radiocarbon dates, 50 of which pertain to the Magdalenian and Azilian (Straus and González Morales 2003, 2007a, 2010)], it may be possible to subdivide the Magdalenian into Initial, Lower, Middle, and Upper phases, with beginning dates of 20.5, 19, 17, and 15.6 cal kya, respectively. Cantabrian Spain, along with the other peripheral coastal regions of Iberia and the southern half of France, had been a major refugium for human populations during the late LGM with cultural manifestations known as the Solutrean and the Franco-Cantabrian region witnessed the development of the Magdalenian *sensu lato*.

It was from the southwestern refugia that human populations recolonized the uplands (mountains and *mesetas*) and the northerly regions of western and central Europe during the course of Oldest Dryas and the Late Glacial Interstadial (Straus 1991; Housley *et al*. 1997; Jochim *et al*. 1999). The expansion of the Magdalenian world took place during its Middle and Upper phases; without a new major range contraction during the Younger Dryas cold crisis, it nonetheless stabilized in the forms of the Azilian and Federmesser Epi-Magdalenian cultures of the southerly and northerly regions, respectively (Straus and Goebel eds. 2011).

Histoires Accumulées de la Courte Durée

As the theme of the Nanterre workshop was "continuities and discontinuities", the question of the behavioral significance of palimpsest deposits would seem to be relevant. One of the signal characteristics of the Lower Cantabrian Magdalenian is the formation of thick horizons without obvious sterile layers. Most famous are the strata in Altamira (Freeman and González Echegaray 2001) and El Castillo [the latter up to 2 m thick, but dug out by H. Obermaier before World War I (Cabrera 1984)], but others have been found in such coastal zone sites as El Juyo (Barandiarán *et al*. 1985), El Cierro, Cualventi (see Lasheras *et al*. 2005/06), and now—for the first time in a montane site—El Mirón (Straus *et al*. 2008; Straus and González Morales 2008). In the outer (vestibule) sector of the latter site, the Initial, Lower, and Middle Magdalenian occupations are characterized by a mass of dark, highly organic, "chocolate" brown silty, clayey loam with varying amounts of limestone clasts and waterworn cobbles from the adjacent erosional slope an ancient alluvial deposit in the

inner cave. This massive deposit, which extends across the whole vestibule and once also lay in the form of a wedge banked up atop the face of the erosional slope at the vestibule rear, is packed with faunal remains, stone knapping debris and tools, bone artifacts, fire-cracked rocks (FCR), and powdered charcoal and ochres. In short, it is highly anthropogenic in nature and one of its main features is the presence of many hearths, often filled with FCR, accompanied regularly by burnt flints and bones and sometimes associated with pits or external ash concentrations (Straus and González Morales 2007b; Nakazawa *et al*. 2009). While far from the near-pristine resolution of the hearths, carcass-butchery or flint-knapping concentrations of Pincevent, Verberie, Etiolles, Champréveyres, Monruz, Andernach, or Gönnersdorf (see papers in Taborin 1994; Zubrow *et al*. 2010; also Bosinski 2007), the hearths that have been dissected at El Juyo by Freeman and González Echegaray (e.g., 1984), at La Garma by Arias *et al*. (2005), and at El Mirón by Straus and González Morales (2007b) do lend themselves to the analysis and limited reconstruction of fire-centered activities.

The practical question facing us field archaeologists is to what extent can we generalize about the patterns of site spatial organization and functional use from such palimpsest deposits? Or, for that matter, how can one deal with the repeated cobble-stone pavement layers of Duruthy and Dufaure, twin Magdalenian rockshelter sites on the northern edge of the French Basque Country (Arambourou 1978; Straus 1995; Dachary 2006), where nonetheless some spatial patterning relating to specific activities can be discerned (Akoshima 1995). Absent the kinds of Pompeii-like "moments in time" (albeit with their own occupational discontinuities) we see in the Magdalenian sites of Île-de-France, the shore of Lac de Neuchâtel, or the banks of the Middle Rhine, I have advocated for assuming that palimpsest formations in the Cantabrian caves represent averaged-out residues of redundant individual human occupations (Straus 1979, 1990, 1997; Straus and Clark 1986; Straus and González Morales 2007b). The idea is that the location and (at least for a certain span of time, until significantly altered by ceiling and wall rock-fall, changes in talus angle, dripline, interior dripping and drainage, etc.) physical characteristics of each cave condition even determine its likely utility to human groups practicing a regular, scheduled exploitation of a territory. Thus, a cave that fitted the characteristics of a seasonal base camp for a given system of territorial exploitation by a forager band would more often than not be used in that way, with consequently similar placement of different, functionally incompatible and thus segregated activity areas and their resultant, more-or-less standardized ranges of residues. The repeated, reiterated structuring of activities could continue as long as physical characteristics of the cave and the principal human uses of the site remained the same. Given the general impossibility of demonstrating strict contemporaneity between lenses of occupation debris in different places within a cave, even if contained within the "same" stratigraphic horizon, if our assumptions about the redundant nature of site-use are correct, the idea is that we can extrapolate from separate activity/depositional episodes to form an image of a site's place within a structured settlement–subsistence system during a particular span of time. This idea can be tested by analyzing faunal remains for indicators of standard carcass butchery/processing and identical seasonality, for example. If carcasses were processed in the same ways (i.e., to obtain the same products for on- or off-site consumption) and if there are no discordant seasonality

results from different sectors of the same level, the hypothesis of redundant site use would be supported. Similarly, the discard of the same kinds of lithic raw materials in different areas within a single stratigraphic horizon would tend to support the redundancy hypotheses. The presence of complementary but spatially incompatible activity residues in consistently different parts of the site area within a single horizon (e.g., weapon elements in certain areas, carcass butchery remains in others, different sizes and contents of hearths in separate areas, needles and awls always in particular areas) could also support the redundancy idea. The reality of redundancy can be demonstrated by trying to untangle the complex deposit compounding and site cleaning that undoubtedly took place if people returned to do the same range of activities in the same places within a cave, conditioned by each previous occupation, its natural or anthropogenic "site furniture", and the physical constraints of the cavity.

In El Mirón, the fact that particular spits, lenses, or levels (all rather arbitrarily defined units) display multiple, very closely spaced (and indeed sometimes stratigraphically inverted) radiocarbon dates suggests the rapidity of the formation of highly anthropogenic horizons [notably the Lower Magdalenian, where a recent experiment in "thin-sectioning" parts of one rich horizon (Level 17) into about a dozen excavation "spits", each no more than about 3–4 cm thick, to do content analysis, seems promising in the definition of shifts in local artifact deposition and hence activities in one 9.5 m^2 area (Fontes *et al*. 2012)]. Overall "continuity" of site use contrasts with notable discontinuities or gaps in the radiocarbon record or much slower sedimentation in layers with far weaker anthropic signals in other parts of the Mirón pre-Neolithic sequence, namely the Upper Magdalenian, Azilian, and Mesolithic. In the latter periods, the occupations became more episodic or rhythmic, with times of little or no human visitation and at least a couple of clear depositional hiati (between ca. 11–9.7 cal kya and ca. 9.4–6.6 cal kya) (Straus *et al*. 2001), a situation which changed abruptly and dramatically with the "arrival" in the cave of the early (for north Atlantic Spain) but full-blown Neolithic at ca. 6.6 cal kya (Straus and González Morales 2012).

Are the Normative Magdalenian Subdivisions Examples of the *Moyenne Durée*?

Having been skeptical of the cultural reality of the Périgord-centered Breuil–Peyrony–Cheynier–de Sonneville–Bordes numbered Magdalenian subdivisions (0–VI), based on lithic *fossiles directeurs* for the early phases and osseous ones for the later ones, especially as applied to Cantabrian Spain, for some time I argued for a simple Early vs. Late Magdalenian subdivision. But the multiplication of high-quality excavations in recent years [as famously urged by the late Leroi-Gourhan (1983: 254)] has led to considerable refinement in our knowledge and dating of the Magdalenian phenomenon, including an understanding of times when northern Atlantic Spain seems to have been closely tied to developments in neighboring SW France and other times when it seems to have been taking a more separate path of cultural development and expression. The mass of radiocarbon dates (including many by AMS) run over the past 30 years at many sites including El Mirón, and, frankly, a number of surprising discoveries of works of portable art (as well as more mundane analyses of lithic and osseous artifacts assemblages made under controlled conditions

with fine-mesh water screening) have given us a nearly entirely new record to interpret (e.g., Corchón 2005b; González Morales and Straus 2009). Nonetheless, in some aspects, the patterns of shifts in the archaeological *gestalt* of various chronological time-slices have ended up partially confirming some of the original subdivisions of the Magdalenian that had been conceived during the first half of the twentieth century. But now the shifts in cultural expression can be validated and interpreted both within the framework of a broader continuity and expansion of a general Magdalenian phenomenon and in light of detailed information on changing adaptations to well-defined climatic phases of the post-LGM Last Glacial. Current formulations for Cantabrian Spain include Initial, Lower, Middle, Upper, and even Final Magdalenian phases, the latter possibly overlapping with the transition into the epi-Magdalenian Azilian.

Initial Magdalenian

The nature of the transition from the Solutrean human cultural response to the Last Glacial Maximum (LGM) to the subsequent Initial Magdalenian in Vasco-Cantabria is the subject of considerable debate. It does seem to have occurred later (as is even more true in Mediterranean Spain and Portugal) than the Solutrean–Badegoulian (a.k.a. Magdalenian 0) transition in southern France (20.5 or 19.2 cal kya vs. 21.7 cal kya). In Spain, at least there seems to have been a "desolutreanization" process: the gradual abandonment of large, one-piece, lethal, but fragile and thus "expensive" foliate, shouldered and stemmed projectile points and their progressive replacement by composite weapon tips made up of "cheap", expendable backed bladelets and resilient antler *sagaies* (Straus 1983, 2000; de la Rasilla and Straus 2007). This technological shift might be what is envisioned by the difference between reliable vs. maintainable artifacts (Bleed 1986). But, at least locally, some Cantabrian assemblages (notably in El Mirón) are prominently characterized by the presence of large flakes and flake tools ("archaic"-looking sidescrapers, denticulates, and notches), very often made on non-flint raw materials (e.g., quartzite, limestone, mudstone, poor-quality chert) of local origin in those areas that lack good-quality flint. Part of the debate has to do with the fact that such "Mousteroid" industries seem to appear recurrently throughout the Upper Paleolithic, including the Solutrean as at La Riera Cave in eastern Asturias (indeed sometimes these kinds of artifact assemblages had been mis-attributed to the Mousterian in the days before radiocarbon dating at sites without complete stratigraphic sequences) (Straus and Clark 1986). Since these kinds of tools may well reflect on-site functional activities (which need to be tested via micro-wear analysis) and (in areas without high-quality flint) limited (seasonal or situational) human mobility or social barriers to access to good flint sources, it remains problematic as to whether large flake-sidescraper-denticulate-notch-rich assemblages between 20.3 and 19.3 cal kya actually constituted a distinct Magdalenian cultural phase or simply evidence of a functional facies. Putative Initial Magdalenian assemblages need to be studied by multiplying inter-site comparisons of content (including the contrasting of macrolithic and microlithic components—when do they co-occur or not, and under what other circumstances?), functional analyses (of ones on both flint and non-flint materials), faunal (including seasonality) analyses, etc. As matters stand, it could be argued that the Initial Magdalenian at particular,

long-sequence sites such as El Mirón represents a simplification of technology in the context of low mobility and small territories. But this begs the question as to what changed about Last Glacial environments (if anything relevant to the lives of foragers) with the first (subtle) hints of climatic amelioration in early Oldest Dryas that possibly led, on the one hand, to experimentation with new weapons (and the gradual abandonment of Solutrean points, which conceivably could have had an additional aspect of social prestige, though this would be difficult to prove) and, on the other, to conceivably lessened social contacts that had characterized the network of (nonetheless regionally stylistically distinctive) Solutrean site clusters. Indeed, the latter notion would seem to be contradicted if the Initial Magdalenian industry is to be viewed as a pan-Iberian phenomenon, the result of the diffusion of technological ideas of simplification, perhaps even (according to Bosselin and Djindian 1999, *pace* Straus and Clark 2000; Banks *et al*. 2011) related to the somewhat earlier French Badegoulian, despite the lack or scarcity of diagnostic *raclettes* (small, quadrangular, backed pieces that can resemble gun flints) and transversal burins in Cantabrian Spain. As an aside, the recurring nature of such archaic-looking industries includes manifestations as Mesolithic facies throughout Iberia (see papers in Alday 2006).

Lower Cantabrian Magdalenian

The next technological change, characterized by some assemblages with numerous nucleiform ("goat's foot") "endscrapers" [whose functionality as bladelet cores and/or thick mini-scrapers continues to be debated (see Keeley 1988; LeBrun-Ricalens *et al*. 2006 vs. Utrilla 1984; Utrilla *et al*. 1986), and which may have varied among occupations, sites, or regions], varying percentages of backed bladelets and the frequent presence of a wide variety of antler point types, including quadrangular section ones sometimes decorated with "tectiform" engravings, is somewhat different by being clearly regional in nature (i.e., geographically limited and highly distinctive), while nonetheless continuing to share some basic characteristics with the classic French Magdalenian III, including the absence of proto-harpoons or other distinctive Magdalenian IV markers (Utrilla 2007; see below). Beginning at ca. 19.3 cal kya, the Lower Cantabrian Magdalenian (LCM) is so distinctive that at least one early prehistorian (J. Carballo) thought it should be called the "Altamiran" since the first site with such material to be excavated was in fact Altamira (by M. Sanz de Sautuola in 1876–1879). Despite these changes, there is clear continuity between Initial and Lower Magdalenian occupations; at El Mirón (as at El Rascaño), there is no gap in the stratigraphic or radiocarbon sequences, the assemblages contain many of the same kinds of antler *sagaies* and "substrate" lithic artifacts, and subsistence evidence is identical. Preliminary lithic technological analyses point to different *chaînes opératoires* for the production of flakes, blades, and bladelets, with considerable continuity between Initial and Lower Magdalenian industries in each sector of Vasco-Cantabria as determined by characteristics of available raw materials (Cazals and Bracco 2007). Some flakes were used in turn as cores and at some sites (generally where flint was abundant) bladelets were key objectives of knapping activity and became even more important relative to flakes in the Middle Magdalenian together with a diversification of projectile tips, according to M. Langlais (2011), whose analyses, however, mainly involved French and Catalan sites (and only two in the

Spanish Basque region). General similarities can be found in terms of basic blank production strategies between certain sites in Cantabrian Spain and others in SW France, but inter-regional artistic/decorative similarities became far tighter later on, in the Middle Magdalenian (Cazals and Bracco 2007).

If boundedness in artistic tradition can be taken as an indication of territoriality and regional identification (perhaps at the expense of inter-regional network-building and maintenance), then it may be the other distinctive artifactual manifestations of the LCM that best hint at the nature of the cultural change that it represented. Known since H. Alcalde del Río's early twentieth century excavations in both Altamira and Castillo, but only well dated in recent years (notably at El Mirón), this cultural entity is characterized by red deer scapulae with engraved and striated images of red deer hinds (and other ungulates) (Gonzalez Morales *et al*. 2007). [Ambiguity as to whether these unique objects might have first been made during the Solutrean at Altamira was dispelled by the direct AMS dating of one of the disputed finds from Alcalde's excavation (Freeman and González Echegaray 2001).]

The striation-engraved scapulae have been found only at sites in the modern provinces of Cantabria and eastern Asturias (an area ca. 150 km long by ca. 25 km wide that includes 10 major, albeit short, river valleys)—not in the Basque Country or in France—and they generally date between ca. 19.3–18.2 cal kya. Identical striation-engraved images of hinds have been found on the walls and ceilings of Altamira (where they underlie and thus predate the 17.5 cal kya polychrome bison paintings) and other sites in the region (González Sainz 2005).

This time range corresponds to the latter part of Oldest Dryas, still a climatically rigorous period, immediately prior to the Last Glacial Interstadial. Relative to the Initial Magdalenian, there does not seem to have been any significant climatic change that could explain the cultural organization of the LCM. It could be hypothesized that the LCM represents the development (out of the Initial Magdalenian) of a distinctive regional and ethnically relatively closed band, with intensified subsistence that included heavy situational specialization in red-deer hunting on the coastal plain and major interior valley floors and in ibex hunting on steep, rocky hill- and mountain-slopes and overall diversification that included significant exploitation of shellfish and some fish at near-coastal sites. This was a system based on the establishment of a limited number of major hub residential sites, mainly along the coastal plain, but also (as now known from El Mirón) at certain strategic caves in the montane interior, combined with satellite (logistical?) camps, best manifested by ibex-hunting sites (one of which, El Rascaño, also yielded a striation-engraved scapula) (Straus 1986, 1987). The richness of the residential sites, often containing many works of portable art and located in the same caves that had major art "sanctuaries", with dense archaeological palimpsest deposits packed with hearths, fire-cracked rock, and other features, suggests long, repeated, structured human occupations with very intensive exploitation of regional resources in relative isolation from the French Magdalenian world. If distinctive works of art, coupled with particular tool types, can be markers of an identifiable human group with time depth in a geographically bounded region, then the LCM is a very good candidate for such a real "entity", despite its antiquity and will all relevant caveats (see Conkey 1980).

Nonetheless, despite the well-defined Cantabrian regional identity we propose as having had social significance during the LCM, contacts with the rest of the Magdalenian world continued, though perhaps at a low level of intensity [as has been argued in terms of similarities between certain Cantabrian and Mediterranean Spanish antler *sagaie* decorations and stone tool assemblages probably resultant from diffusion along the Ebro River valley during this time (Utrilla 1997)]. Evidence of at least limited contacts with SW France is suggested by the presence of a short, simple spear-thrower hook from the LCM horizon in El Mirón that is almost identical in form and proportions to ones from Roc de Marcamps (Gironde) and Le Placard (Charente), a type of atl-atl hook that is not currently known from any other sites (González Morales and Straus 2009). The Mirón piece joins only one other atl-atl known from the Lower Magdalenian of Cantabria (in El Castillo) and that other piece is in turn very similar to a different atl-atl hook possibly from the Lower Magdalenian of Le Placard and another one from the Upper Solutrean of Combe-Saunière (Dordogne). The scarcity of atl-atl hooks in northern Atlantic Spain and their frequency in the Magdalenian of France might suggest that the latter region was the source either of the objects themselves or of the design ideas. The human societies of the Cantabrian region were to become even more significantly integrated into a wider Magdalenian sphere in the latter part of Greenland Stadial 2, so the scope of my discussion from the northern Spanish perspective widens appropriately.

A Burst of Pyrenean Creativity and Influence: the "New" Middle Magdalenian of Cantabria

New excavations and discoveries of rare objects count. Until the late J. Fortea (1981) began excavating sites in the Nalón River valley of central Asturias (the western border of the Franco-Cantabrian Upper Paleolithic culture area), the existence of a Middle Magdalenian (MM) in north Atlantic Spain was largely theoretical. Certainly, in terms of lithic artifacts, there is no break between the LCM and MM, and the inter-site variation that does exist in the record probably has more to do with local lithology and/or site functions than with technological shifts. Without any apparently significant environmental change in late Oldest Dryas (despite earlier palynological claims for minor warming episodes) and no evidence of subsistence or notable technological change (a very few "proto-harpoons", whose function is ambiguous), the MM (16.5–15.5 cal kya) is defined essentially by works of portable art (ornaments) which almost certainly came from the French Pyrenees. If the very uneven presence of *contours découpés* and *rondelles* in a (growing) number of Cantabrian sites is indicative of social contacts, people in this region must have had far more intensive relations with people to the north and east than in earlier Magdalenian times (Corchón 2005b; Schwendler 2005). Indeed, this makes sense given the major role of the Isturitz "supersite" in the French Basque Country, near the easiest passage between the western Pyrenean and Vasco-Cantabrian regions (Bahn 1983). This vast cave and several others in the French Pyrenees and along their northern flanks were major production loci for a number of distinctive types of portable art objects or ornaments. While people in SW France at this time massively hunted reindeer and, on the plains of Aquitaine, saiga antelope, red deer remained the subsistence mainstay in Cantabrian Spain (with ibex being the targets of hunting at

sites in steep, rocky, montane habitats there and in the Pyrenees). Nevertheless, Cantabrian portable art dating to this period includes representations of cold-climate fauna (reindeer, wooly rhino, mammoth) that were not (or rarely) hunted there, but which may indicate direct or indirect contacts with SW France. The *contours découpés* (small perforated effigies of horse or caprine heads cut out of hyoid bones), so abundant all along the Pyrenees in MM times, have been found in small numbers in La Viña, Las Caldas, Tito Bustillo (with a cache of four), and La Garma or ersatz copies thereof (in Las Caldas, Tito Bustillo, La Garma, and El Juyo), and a handful of *rondelles* (disks cut out of scapula blades, usually decorated and centrally perforated) have been found in La Viña, Llonín, and El Linar, with possible stone imitations in Las Caldas and Tito Bustillo (Corchón 2005c; Corchón and Rivero 2008). What is surprising is that, although one of the few "traditional" MM sites (Ermittia—typified by a proto-harpoon) is located in the heart of the Spanish Basque Country and the MM fossil director "factory" of Isturitz is in the adjacent French Basque Country, no *contours* or *rondelles* have been found in the entire area between the Bidasoa and Miera rivers (i.e., Euskadi and eastern Cantabria), except for the unusual *contour découpé* of a bird figure in a level dated to ca. 16.5 cal kya from Ekain Cave in Guipúzcoa (Altuna 2010). The concentration of MM markers is in the Magdalenian "far West", as if they had been transported directly to central Cantabria and Asturias—not traded "down the line" from group to group, each of which otherwise would have "taken a cut" of these exotic objects. Also curious is the absence in all of north Atlantic Spain of spiral motif sculpted antler wands, another hallmark of the Pyrenean MM and exceptionally numerous at Isturitz. Trade in exotica seems to have been selective. It was the activation of trade cross-cutting the ecological frontier of the Pyrenees that most dynamically assured cultural continuity as expressed by symbols (and presumably reflecting shared beliefs) during the Middle Magdalenian. This period was also one of extraordinarily intensive activity in the realm of cave art, with, for example the extraordinary polychrome bison (and other ungulates) of Altamira, the bison (+cervids) scene in Covaciella, the horse paintings of Tito Bustillo, and many of the most sophisticated bison paintings of El Castillo and La Garma (González Sainz 2005, 2007).

Climatic Correlation. But was it the Cause?

It is now clear that the northward expansion of human settlement (into northern France and beyond) began before the climatic warming at the close of the Oldest Dryas part of the Pleniglacial, but it is also apparent that increases in humidity, leading to growth of graze and ungulate movement into open but newly viable pastures, made this movement possible. Then, at ca. 14.7 cal kya temperatures began to rise dramatically. This was the start of the Late Glacial Interstadial (a.k.a. Greenland Interstadial 1; a.k.a. Meiendorf–Bølling–Allerød). At last, there were marked environmental changes, notably the spread of woods. This would have significant effects on the faunal resources of Magdalenian hunters in many of the territories of France (extinction or extirpation of some species and most particularly the eventual replacement of reindeer by red deer). But in Cantabria (like the rest of Iberia), red deer and ibex continued to be the principal game, supplemented (as in SW France and elsewhere) by increasing amounts of salmon and other fish (Straus 1992; Altuna 1995; Marín 2010). The Upper Magdalenian is normatively

defined by the development of "true" harpoons (and barbed leister prongs) at ca.15.6 kya (uncal.) (i.e., a millennium before the abrupt warming event). On the other hand, some of the specific chrono-cultural markers of the Middle Magdalenian (*contours découpés*) disappeared, though others (*rondelles*) persisted longer in France. The lithic assemblages of the Upper Magdalenian often continue to contain high percentages of backed bladelets, but there are special tools that characterize functional and regional variants throughout this phase of a cultural complex—the Magdalenian—that had achieved its maximal geographic extension in western and north-central Europe during the early part of the Late Glacial Interstadial. The stylisically distinct harpoons of the Franco-Cantabrian Atlantic facade and of the Levantine–Andalusian Mediterranean facade functionally seem to have been linked to increased littoral, estuarine, and riverine fishing. It is noteworthy that there is evidence of deep sea fishing at Nerja Cave in Málaga (one of the main harpoon-containing sites), as there is at a few other sites in the central and eastern Mediterranean areas (Aura *et al*. 2001). If climatic perturbations had put some pressure on the traditional ungulate game, then improvements in fishing technology may have been culturally selected for in order to continue the longstanding trend of subsistence intensification by increasing the contribution of aquatic resources. Harpoons may simply be the archaeologically surviving indicators of an artifactual complex that may have included boats, nets, and weirs as well as fish smoking or drying racks.

But the Upper Magdalenian is also characterized by very widespread circulation of shells, fossils, and other exotica, including works of portable art, as well as highly standardized rupestral art styles (finely engraved slabs with naturalistic images of horses, bovines, and caprines, images of stylized "claviform" women, frontal views of ibex, black outline rupestral drawings of lively horses, bison, cervids, and caprines). There is no question that this Magdalenian apogee was the direct, unbroken continuation of the rich Franco-Cantabrian culture of the Lower and Middle Magdalenian, but in its last phases it became an even more expansionary phenomenon. As an example, the Cantabrian Upper Magdalenian (notably Tito Bustillo Cave in Asturias) shares with the sites of Andernach and Gönnersdorf in the German middle Rhine Valley, Petersfels near Lake Constance, Kohlerhöhle near Basel, and several sites in the Rhône Basin of eastern France the presence of small *Homalopoma sanguineum* shells, a species of Mediterranean mollusc (Alvarez 2001, 2002). The regional Cantabrian population on the Atlantic shore, at 43° north latitude, was linked "down-the-line" with human groups as far away as eastern Germany and Poland, continental regions some 10° further north. The Upper Magdalenian was a pan-Western European network of social relations, vastly transcending ecological zones, its symbols, expressed in rock art [a fact recently driven home by the discovery of engravings of Magdalenian style at Creswell Crags in central England (Bahn *et al*. 2003)] and especially in portable art, prized exotica and personal ornaments gave unity to widely dispersed bands. The geographical scale of the cultural network had once again moved up a notch. From an adaptationist perspective, the underlying hypothesis is that, especially on the risky northern frontier of the Magdalenian world during the Late Glacial Interstadial, with its climatic vicissitudes, maintenance of social contacts and ties through visitation, seasonal or other collective rituals, exchange, and intermarriage (all physically manifested by the circulation of objects and indicative of shared beliefs and values) would have provided groups with "insurance policies" in

times of crisis (failure of reindeer herds, unusually brutal winters, etc.). Support for this "risk-reduction" hypothesis would be the cessation of the extremely widespread circulation of exotic items (e.g., Mediterranean shells in Germany, Seine and Loire Valley fossils in Belgium), flints and minerals found hundreds of kilometers from their geological outcrops (e.g., Alvarez 2001, 2005; Rensink 1993; Leesch *et al*. 2004; Féblot-Augustins 1997; Otte and Straus 1997; Floss 1991; Schwendler 2005), and art/ornament styles (e.g., Bosinksi and Schiller 1998), when the open steppe–tundra environments with herds of migratory reindeer and horses were replaced by thickening forests populated by less mobile, more solitary red and roe deer and boar and in whose clearings and fringes there were more humanly edible plants foods. This is generally true.

In this regard, the differences between northern and southern Europe at the end of the Magdalenian are telling. In the North, humans continued a "Paleolithic" settlement–subsistence strategy based on high mobility hunting of reindeer over large territories [attested by widespread circulation of items such as particular stemmed projectile point types, ochre, and "chocolate flint" across the North European Plain (e.g., Schild 1996)] during the return of stadial conditions in Younger Dryas (Greenland Stadial 1), ca. 12.7–11.5 cal kya—Ahrensburgian, Brommian, Swiderian, etc. (Eriksen and Bratlund, eds. 2002). Then this lifeway crashed with the onset of Holocene conditions. In contrast, in the South, broad-spectrum subsistence adaptations (almost "Mesolithic" in character) had been underway at least since Allerød times (last third of the Late Glacial Interstadial). Culturally, this is classified as the Azilian/Federmesser, an epi-Magdalenian phenomenon (with considerable technological continuity, albeit simplified) which saw the disappearance of rupestral art and representational portable art (replaced by geometric engravings or paintings on pebbles and a few osseous artifacts) (Olive and Valentin 2005; Fernández Tresguerres 2007). If the grandiose naturalistic art of the Magdalenian had given sense to existence, served as a focus for social gatherings (possibly related to seasonal group hunts), magico-religious activities, information storage and dissemination, and/or *rites de passage*, then when that kind of life went obsolete in the Franco-Cantabrian "homeland" of the Magdalenian, eventual disappearance of the art could be pegged to the cumulative, generalized ecological change of the Interstadial (González Sainz 2005; González Morales 1991). The existence of a time lag in the disappearance of the art, having continued throughout Bølling and the possible, albeit subtle cooling of Older Dryas, suggests just how powerful the ideology underlying it seems to have been, until it finally became patently irrelevant by about 14 cal kya. Strikingly, while in the North Younger Dryas allowed humans to keep up a Paleolithic lifeway for another millennium, in the South this episode had little effect on the adaptations of humans despite some documented retreat of temperate trees and regrowth of meadows and heaths. In regions like Cantabrian Spain, the development of Mesolithic-like adaptations, but with simplified Epi-Magdalenian (i.e., "Azilian") technologies, just continued at least a half a millennium into the Holocene (Preboreal) (Straus 1996, 2010, 2011). The point is that environmental determinism must be tempered with the realization that regionally deep-rooted foraging cultures, with their longstanding traditions and patterns of life, had considerable inertia and resilience—an ability to take a fairly wide range of climatic variation in stride. The Upper Magdalenian is a good example of how some technological inventions became innovations that had been selected for in the face of changing environments AND

of how some aspects of traditional culture could be adapted to new environments (e.g., the new North), while surviving with modifications in their homeland (i.e., the old South) despite changed environments, probably because of fundamentally stable, diverse resource bases in ecologically complex high-relief areas.

Conclusions: The Continuity of a Magdalenian Cultural Identity

In the grand scheme of the Paleolithic, the subcontinental area of Western Europe witnessed human responses to the gradual, uneven improvement of climatic conditions after the Last Glacial Maximum. Humans dealt with changes in flora and fauna, growing their populations, expanding their hunting ranges and lifetime and core territories into once-abandoned uplands and northern plains, eventually spreading into areas that may never have been settled by humans before, at latitudes above 50° North. Along the way, they created archaeological sites (notably caves in southern France and in Spain) that attest to long periods of stable, regularly patterned, continuous local habitat exploitation, with repeated, functionally redundant place-occupations that have left us some massive palimpsest deposits. These are analogous to the repetitive episodes of occupation at such open-air sites as Pincevent, Etiolles, Champréveyres, Monruz, Andernach, or Gönnersdorf (Zubrow *et al*. eds. 2010; Taborin, ed. 1994; Bosinski 2007; Leesch *et al*. eds. 2004), but, unlike them, impossible to discretely dissect over significant areas. However, like them, they display discontinuities—periods of non-occupation or shifts in the intensity and/or functional roles of occupations that may be of either a strictly local, situational nature, or reflective of reorganizations of humans use of a broader territory, nonetheless all the while within the overall parameters of a Magdalenian cultural tradition.

Technological innovations driven by new demographic and/or resource realities, or in some cases representing functionally neutral "fads" spread via ever-denser social networks, new forms of art and ornamentation reflective of independent, regionally focused developments or more active inter-regional social relations mark distinct chapters in an ongoing history of human settlement in long-occupied regions and environmentally "pulled" and demographically "pushed" expansion into new ones. The Magdalenian story is one that must be interpreted at the broadest level (that of the *longue durée*), in light of geological/geographical/ecological realities and in terms of its historical contingency as the heir to the Solutrean survival of the Last Glacial Maximum. Its regional and chronological subdivisions seem to reflect both environmental and social shifts, evidenced by proxy indicators of social contacts of regional or inter-regional character, as well as apparent responses to new subsistence and population realities. Transcending ecological boundaries as their collective territory re-expanded, Magdalenian peoples seem to have shared symbols that must have been related to underlying belief systems that gave meaning to their lives and allowed people living in disparate circumstances—ultimately from Portugal to Poland—to indirectly participate in a continuous cultural patchwork quilt of regional solutions to survival in a Late Glacial world. At its close, as one end of that world tried to keep living a Paleolithic herd-hunters' existence in the North while the other, southern, end was becoming one of Mesolithic *coureurs des bois*, fishers and gatherers, that unity collapsed in the ultimate discontinuity.

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