A short chronology for Chauvet cave.

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Introduction: Chauvet, the most dated cave in the world?

Discovered in 1994, the >420 figurative and non-figurative images in the Chauvet-Pont-d'Arc cave (Ardèche, France) constitute some of the most impressive examples of Upper Palaeolithic cave art known to science. The images were initially identified on that basis of style, content and technique as Mid and Late Upper Palaeolithic (Gravettian-Early Magdalenian) in age, but the results of a preliminary radiocarbon dating program led to the reassignment of many of the cave's impressive charcoal drawings to the Early Upper Palaeolithic (Aurignacian). If this assessment is valid our whole understanding of the development of >25,000 years of Upper Palaeolithic art would be shown to be incorrect. Debate began almost immediately, however, and continues to this day, although the scholarly community has largely accepted uncritically these preliminary results.

We are among a small but growing minority which believes that the current chronology of human and animal activity in Chauvet is unrepresentative and problematic, and urge that the radiocarbon dating for its art as it stands should be *wholly rejected*. No comprehensive statement about the number of radiocarbon dates that have been produced on materials from the cave exists: we estimate that about 99 have been published. Ostensibly this is a large sample - Valladas et al. (2004, 82) referred to it as "le mieux daté du monde" - but this is actually misleading. It probably contains the world's most comprehensively dated hearth in the world (29 measurements on a single hearth), but this does not make its art the best dated; instead it is the most problematic. About 47 of the published measurements are on charcoal fragments, of which over 40 derive from its floor. The *entire* case for an early age of its art rests solely on six dubious measurements on charcoal from three images on one artistic panel in the Hillaire Chamber (e.g. Valladas et al. 2003, 2005). Comprehensive pretreatment and measurement information has never been published, and for only one image was the charcoal split into humic and humin fractions. These were taken at face value to indicate an Aurignacian age for the art, although they were clearly problematic and were eventually retracted (see below). We have no confidence in the remainder.

We believe that the debate over the age of Chauvet's art is nearing its conclusion. As the Chauvet team has been unable to address the numerous contradictions of their model point by point, we suggest that their 'long chronology' should now be rejected. In its place we put forward here a short chronology for the cave. We suggest that this is a more appropriate default chronological model for Chauvet, at least until it can be modified or eliminated on scientific grounds. It will be seen that *all* evidence from the cave indicates artistic activity over several phases from the Gravettian to Early Magdalenian. More speculatively some of the cave's red images *may* belong to the Aurignacian, although ironically these are not among the images which the Chauvet team have suggested belong to this period.

The debate so far

Ten years ago, we raised in this journal a number of reservations about the age of the Chauvet art (Pettitt and Bahn 2003). A reply published in the same issue (Valladas and Clottes 2003) failed to address our points, or any of those raised previously in Züchner's comprehensive stylistic critiques (e.g. 1995, 1996, 1999a, b). Further problems were raised subsequently (Pettitt and Pike 2007; Pettitt 2008; Pettitt et al. 2009) which were ignored, as has a major critique by the *doyen* of the southeast French Upper Palaeolithic and a respected scientist (Combier and Jouve 2012). This literature is replete with examples of the problems, anachronisms, tautologies, unjustified assumptions, selective arguments and mistakes in the Chauvet team's attempts to support its long chronology.

We do not intend to rehearse or develop our critique of what we term the 'Chauvet long chronology'. Suffice it to say that the main tenet of this model is that its art is of Aurignacian and Gravettian age and that the former includes its sophisticated panels of charcoal drawings. We will address recent attempts to bolster the long chronology in detail elsewhere (Pettitt and Bahn in prep.). We begin by summarizing the themes of a decade-long debate, before concentrating on the cave's art, using this to propose a far simpler – and more likely – chronology for Chauvet's artistic phases.

- *The few dates on the art itself cannot be trusted and do not reflect the age of the art.*

  Initial stylistic assessments suggested that Chauvet's art was Gravettian and Solutrean (Clottes in Chauvet et al. 1995), but this view was rashly abandoned when minute samples of charcoal removed from four drawings yielded radiocarbon measurements in the order of 30-32 ka BP (Valladas et al. 2001, 2005). Despite the chemically complex nature of cave walls, this was treated as routine dating: no experimental procedures were followed, nor has information pertinent to the independent evaluation of methods and results been published, despite having been called for ten years ago (Pettitt and Bahn 2003). Serious questions remain about the efficacy of the dating program in general (Combier and Jouve 2012, 143-9). Measurements published on humic and humin fractions on charcoal from a horse head depiction yielded statistically distinct results, which were inexplicably accepted initially but on the basis of a subsequent critique (Pettitt and Bahn 2003) were withdrawn (Valladas et al. 2005, 111). This serious methodological error throws the remaining few 'dates' on the cave's art into doubt. Even if one can take them at face value the results – which date the production of the charcoal (i.e. lighting of the hearths) and not the creation of the art – is not demonstrably relevant.

- *The wider radiocarbon dating program for the cave indicates only that a small and unspecified number of hearths were lit in the cave 30-32 ka BP*

and other human activity occurred after this. It is irrelevant to the age of the art.

The Chauvet team's response to critiques about the dating methodology was the Chauvet laboratory intercomparison programme (Cuzange et al. 2007). Three laboratories produced 29 radiocarbon measurements on charcoal from a single hearth. This dates the burning of the hearth alone, not the use of resulting charcoal to create art that could have occurred at any time subsequently (Pettitt and Bahn 2003 *contra* Clottes 2003b, 214). How much activity do the hearths represent, and of what kind? Most of the samples dated are individual charcoal lumps, which were dispersed by the cave's considerable water action (Geneste 2003, 45). These do not in any way relate to the question of the age of the art.

- *The attribution of some of the cave's art to the Aurignacian is highly problematic and requires a number of assumptions that are not justified.*

The Aurignacian is remarkably sparse – if not completely absent - in the region (Pettitt 2008. Combier and Jouve 2012, 139-41); Ardèche "was not one of the recognized Aurignacian habitations of France. *It is important to make this point clearly*" (Combier and Jouve 2012, 140 our emphasis). Among European art that derives from clear Aurignacian contexts there are *no* parallels with Chauvet's art whatsoever (e.g. Delluc and Delluc 1991; Serangeli 2004); attempts to compare Chauvet's art with Aurignacian examples such as the portable carvings of southwest Germany are inappropriate, incorrect, and tautologous (Pettitt et al. 2009 *contra* Tosello and Fritz 2005). Assuming there are Aurignacian depictions of animals in Chauvet thus requires an unfeasible set of assumptions and distortions of data. In any case Chauvet's art has often been seen as *unique* (Clottes 1996).

- *The number of entrances used by the cave's artists has not been established, and the closure of the current entrance has been inaccurately dated: whatever the case, data are consistent with access to the cave until at least to 18 ka BP, possibly much later.*

The Chauvet team have advanced contradictory statements on the apparent closure of the cave's current entrance, which could have occurred as early as 22 ka BP, possibly 19 ka BP, or as late as 15 ka BP (Delannoy et al. 2003, 2004, 2012a, b, 2013; Sadier et al. 2012a, b). Taking their results uncritically, i.e. assuming the current entrance was the only one, and that the dating by cosmogenic isotopes of the cliff collapse said to seal it is reliable, resulting age ranges at two sigma do not constrain the art to a pre- 20 ka BP period, but are entirely consistent with activity in the cave several millennia later (Pettitt and Bahn in prep). Specialists admit, however, the probability that other entrances existed (Le Guillou 2003; Delannoy et al. 2004; Combier and Jouve 2012, 132), and a picture of multiple or changing points of access into the cave fits better with the changing spatial foci of the cave's art from phase to phase, as we discuss below.

- *The archaeology and palaeontology on the cave's floor ARE chrono-culturally undiagnostic and ARE irrelevant to the age of Chauvet's art.*

The remains of cave bears are abundant in the cave, and they were probably denning on numerous occasions from at least as early as 37 ka BP to at least as late as 23 ka BP (Fosse and Philippe 2005). Recent analyses of the cave bear remains have been taken to suggest their local extinction around 23 ka BP (Bon et al. 2008, 2011): this is based on unclear sampling strategies (Pettitt and Bahn in prep.) although again accepting this uncritically it is entirely in accord with this species being represented in the cave throughout the Gravettian, as we discuss below. The few dated torch wipes also belong to this period (Valladas et al. 2001, 2005), whereas one hearth dates to 30-32 ka BP. The purpose, extent and cultural context of this apparently earliest human activity in the cave is totally unclear and need bear no relation to its art (Pettitt 2008; Pettitt et al. 2009; Combier and Jouve 2012). The small number of lithic artefacts recovered from the cave has been used to support the long chronology (Geneste 2003, 2005), although there is no reason to assume they are connected with the art, and in any case they are culturally undiagnostic (Pettitt 2008; Pettitt et al. 2009; Combier and Jouve 2012). A single *sagaie* that lacked sufficient carbon for dating has a close parallel from the Solutreo-Magdalenian of Lascaux (Pettitt 2008).

- *In all cases the cave's art can be attributed to the Gravettian, Solutrean and Magdalenian. Wide artistic parallels with securely dated art from elsewhere makes this the most parsimonious – and most likely - interpretation.*

Numerous parallels exist for technical, stylistic and thematic attributes of the Chauvet art. With the exception of a small number of traits which are found *throughout the Upper Palaeolithic* and which cannot therefore function as chrono-cultural markers, in *all* cases some of Chauvet's art dates to no earlier than the Gravettian, and much of it dates to no earlier than the Solutrean and/or Magdalenian (Züchner 1995, 1996, 1999a, b; Pettitt et al. 2009; Combier and Jouve 2012, 142-3).

Chauvet's art: stratigraphic, stylistic and thematic perspectives

The starting point for understanding of Chauvet's art has been its division into two series; red and black. Clottes (1995, 81-116) drew attention to superimpositions from which it can be inferred that much (but not all) of the cave's 'red series' of images and signs were created earlier than most (but not all) of its 'black series'. This superimpositioning occurs, for example, on the Dauget Pendant in the Chamber of the Skull (Feruglio and Baffier 2005, 153. See also Alcolea and de Balbín 2007). While the red series is relatively homogeneous and genuinely seems to pre-date much of the black series, the latter, however, is heterogeneous and represents at least two distinct phases, thus at least two periods. Relatively simple animal outlines were created in both red and black, although only the black series contains the cave's impressive charcoal drawings

of horses, bison and lions. On technical grounds, therefore, it is over-simplistic to speak of an earlier 'red' and later 'black' series, whereas in reality there is an earlier series of relatively simple animal outlines and signs generally in red but with black examples, followed by several phases of exclusively black depictions. As Züchner (e.g. 1999a), Alcolea and de Balbín (2007) and Combier and Jouve (2012) have argued, the red animals can be assigned to the Gravettian and perhaps early Solutrean on the basis of stylistic comparison with examples clearly shown to relate to these periods, and nobody would argue with this (see Table 1). It follows therefore that most (but not all) of the cave's black images must be younger than the red, i.e. they must be late- or post-Gravettian.

The earliest phase of the black series is characterized by animal outlines drawn with technically simple (although highly naturalistic) methods, whereas the later phase includes the several phases of preparation of the cave walls, stump shading, considerable attention to detail, group composition, perspective and movement, as well as a number of stylistic and thematic traits not seen *anywhere* else before the Solutrean (Feruglio and Baffier 2005, 152: see Table 1). Some thematic differences also seem apparent between the two; Feruglio and Baffier (2005, 154) note that the first phase includes depictions of cave bear, reindeer and mammoth, the former of which does not appear later. Thus thematic, stylistic and technical differences distinguish all three recognized phases.

A spatial distinction between most of the red and black images is also evident. Most red signs and animal outlines are located close to the cave's current entrance, whereas the black drawings and engravings are located in the cave's current central and rearmost areas (e.g. Chauvet et al. 1996, 111-3). Clear stylistic and spatial distinctions occur between the cave's depictions of cave bears (which cluster close to the current entrance) and lions (deeper in the cave). Assuming that the two are contemporary, Robert-Lamblin (2005) inferred a symbolic distinction between the two, but this is hard to justify. The cave bears are drawn as simple outlines, mostly in red; the lions, most in black, vary technically but are usually drawn with stump shading, considerable attention to detail, and are usually incorporated into scenes which depict perspective and movement (Clottes and Azéma 2005a, b). It is therefore highly likely that they belong to separate periods; the black and red outline drawings of bears in the earlier, and the black charcoal drawings of lions in the later. It is impossible to quantify the time separating these: as Feruglio and Baffier (2005, 153) note "les deux phases de dessins noirs sont séparées par un temps difficilement quantifiable".

We can use the activities of another of the cave's denizens to improve this picture further. Cave bears, which were clearly denning in the cave between at least 37 ka BP and 22 ka BP (Bocherens et al. 2006), left numerous claw marks on its walls, many of which 'deface' red and black depictions. Where claw marks clearly overlie lines in both black and red in the End Chamber (Clottes 2003a, ill. 125) these lines clearly form part of relatively simple outline paintings of lions in both red and black (ibid., ill. 126), assigned to the first black phase of the art by Feruglio and Baffier (2005, 158). As one of these is depicted in red – 'sandwiched' between the two black examples – it constitutes clear evidence of

the contemporaneity of simple red and black images during the cave's earlier phase. All other images defaced by claw marks are similarly simple, e.g. on the Panel of the Rhinoceros in the Megaloceros Gallery (Feruglio and Baffier 2005, 150-2). As we hope we can safely assume that the bears were not making decisions about which art to deface and which to ignore, the stratigraphic information of bear defacing provides an important chronological marker within the art phases. Numerous examples of claw marks deface the images of the *first* black phase, but *none* deface images of the second (Feruglio and Baffier 2005). Thus if we can assume that the bears had not "religiously respected" the latter (to use the amusing phrase of Alcolea and de Balbín 2007, 447) we can infer that the cave bears were present in the cave during/after the creation of the red series and the earliest black series, but were *not* present during/after the creation of the second black series. The Chauvet team conclude that cave bears did not use Chauvet after 23 ka BP (Bon et al. 2007, 2011; although taking errors into account this should be 22 ka BP), and thus we can infer that the art of the second black series must be younger than 22 ka BP. Further support for this relative chronology is the fact that the depiction of cave bears in Chauvet's art is always technically simple –fitting the earlier outline phase - and in *no case* is this species depicted in the second black phase (Feruglio and Baffier 2005, 157).

We can also use examples where art is clearly superimposed *upon* claw marks or other art to develop the relative chronological scheme. Examples of this fall into two groups: the second series of black drawings, and engraved animals. A stump shaded charcoal drawing of a bison is superimposed upon claw marks on a wall perpendicular to the Lion Panel (Chauvet et al. 1996, figure 92). For example the three lions of the left panel in the Hillaire Chamber noted above - which are covered by claw marks - are overlain by a simple outline engraving of a mammoth, clearly visible in figure 79 of Chauvet et al. 1996. Fine engraved lines – some of which seem to be part of animal engravings similar to a mammoth engraved in the Morel Chamber - are superimposed upon bear claw marks (Le Guillou 2003, 62). Therefore, stump-shaded charcoal drawings and engraved animal outlines *must* post-date the simple red and black series and bear denning, and *must* be younger than 23/22 ka BP.

Such a relative scheme fits what we know of the wider artistic context against which we must surely evaluate Chauvet's art. In *all cases* wider thematic, stylistic and technical parallels support the notion that Chauvet's function as an artistic sanctuary spans the Gravettian/Solutrean/Early Magdalenian and may even have persisted until the Middle Magdalenian (e.g. Züchner 1999a, b and see Table 1). The complex, four-phase sequence of production employed in the depiction of horse, aurochs and lions of the second black phase (Tosello and Fritz 2005), and the attention to anatomical detail, perspective and movement has no parallels elsewhere before the Solutreo-Magdalenian (Züchner 1995, 1996, 1999a, b; Alcolea and de Balbín 2007, 446; Pettitt et al. 2009). In Azéma's erudite analysis of the depiction of movement in Upper Palaeolithic art the overwhelming number of examples are post-Gravettian (Azéma 2004, 2010). The Chauvet team assign the cave's mostly naturalistic depictions of reindeer to the Aurignacian, yet no depictions of reindeer occur before the Magdalenian in any Palaeolithic art, parietal or portable (Djindjian 2004; Züchner 1999a).

Feruglio and Baffier (2005, 154) assign reindeer to the first of the black series on stylistic grounds; this would imply therefore that in Chauvet this species was depicted in the Gravettian. But what are the grounds on which this assignation is made? Stylistically one can discern an earlier phase in which reindeer are depicted "statiques et proportionnés, modelés et détaillés" and a later in which they are "plus souvent en movement, aux extrémités non-terminées, aux membres démesurés et aux formes quasi expressionistes". We see no reason why reindeer need not belong to two post-Gravettian (i.e. Solutrean and Magdalenian) phases; there are several similarities between these two broadly-differing stylistic conventions (e.g. shoulder pelage is always depicted as a sinuous line) and no stratigraphic distinction between the two is apparent; we therefore suggest they are best viewed as part of a stylistic continuum and thus probably close in time.

The 'confronted rhinos' provide a useful example of how best to interpret what seem initially to be contradictory sets of data. These animated and stump drawn images are clearly an integral part of the Panel of Horses in the cave's Hillaire Chamber (Fritz and Tosello 2003). The composition, style and techniques demonstrable on this panel show clearly how it belongs – indeed could serve to define – the cave's second black phase. As we have discussed above this must post-date 23 ka BP. Despite this, *three* questionable radiocarbon measurements on a sample of charcoal from one of the two rhinos have been taken at face value to indicate that this image, and thus that the *whole panel of horses* dates to 30-32 ka BP, i.e. up to ten millennia before the cave bears became locally extinct. Despite the chrono-stylistic problems such an acceptance raises, cave bears would in this case have religiously avoided the most technically achieved of Chauvet's art. The alternative, of course, is that either there is something wrong with the radiocarbon measurements that exist, or that – pertaining to the creation of the charcoal in the cave – they bear no relation to the age of the creation of the art. Neither of these scenarios has been adequately addressed by the Chauvet team, despite the fact that Valladas et al. (1992, 985) acknowledge that it is a serious possibility. As ostensibly more systematic measurements of charcoal from the art have now been withdrawn, one cannot uphold the questionable measurements as a reliable indication of the age of the rhinos. The reputation of the long chronology for Chauvet may stand or fall on the confronted rhinos; what an apt symbol for academic debate.

A short chronology for Chauvet cave

A handful of highly-problematic radiocarbon measurements were used over a decade ago to suggest against all other indications that Chauvet's earliest art is Aurignacian. No further dates have been added, nor has information pertinent to the complex chemistry of the samples been published. If we ignore these results – and we can justifiable do so for the reasons stated above – all lines of evidence point towards a parsimonious set of phases for activity in Chauvet cave, which we summarise here. We can of course only consisder those phases of activity for which there is tangible evidence; we do not mean to imply that these are the *only*

phases of activity in the cave. We regard the issue of whether there are any 'Aurignacian age' examples of art in the cave as genuinely open; although ironically if such exist we suggest a different set of examples drawn from sound parallels elsewhere, which the Chauvet team have missed.

- Cave bears den in the cave's central galleries. This is repeated frequently from at least 37 ka BP until their regional extinction by or after 23 ka BP.

- Humans – either *Homo neanderthalensis* or *Homo sapiens* - entered the cave at least once, either through the current entrance chamber or the Morel Chamber. They light at least one hearth. They *may* have left a small amount of art; if this were the case we suggest it would be elements of the red series; some combination of hand stencils, dots and lines (Pike et al. 2012).

- Humans (culturally Gravettian *Homo sapiens*) entered the cave around 28 ka BP, leaving torch wipes and at least one hearth, and art in the form of simple, naturalistic animal outlines in both black and red and a *tracé chinois*. Among the art they depict cave bears, having observed this animal in the cave's locale, possibly as part of wider activities that included moving the bones/carcasses of cave bears around. If examples of the red series do not belong to the earlier phase, they will belong to this phase. Artistic activity is restricted in the main to the cave's outermost chambers, probably relating to access (through the current entrance and/or Morel Chamber).

- A later period of culturally Gravettian activity is possible. Some of the red series or early phase black series could belong to this period, although this is unclear. Cave bears could still be extant at this time.

- The cliff face exterior to the current entrance collapses somewhere between 22 and 15 ka BP, partially - or wholly - sealing this entrance.

- The entrance to the cave is now elsewhere, perhaps the northern wall of the Gallery of Crosshatchings. Solutrean/Early-Magdalenian activities include the movement of cave bear bones and stalactite blocks, and the creation of most of the second phase of the black series,. Unsurprisingly this has numerous thematic, stylistic and technological similarities with Solutreo-Magdalenian art from elsewhere, from which it derives. Activity occurs much more frequently in the cave's 'depths' than in previous phases, due to the redefined entrance/s.

Until the unlikely long chronology has been proven beyond reasonably doubt we suggest that our short chronology fits best the partially-represented and partially-studied palaeontology, archaeology and art of the cave. As a result it should stand as the default hypothesis for activity in Chauvet until it can be eliminated scientifically.

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Chauvet trait	**Known age range**	**Specific parallels**	**References**
Handprints/stencils	Aurignacian and early Gravettian	Numerous, e.g. Gargas, Cosquer	Pettitt et al. in press.
Style of red animals including rhinos and cave bears	Gravettian/Early Solutrean	Cougnac	Züchner 1999a, b and references therein.
Red cave bears	Gravettian	Grande Grotte at Arcy-sur-Cure	Züchner 1999a and references therein.
Dots (red and black)	Aurignacian, Gravettian, Solutrean, Early Magdalenian		Villaverde 1994. Züchner 1999a, b.
Butterfly/birdlike signs	Gravettian and Solutrean	Roucadour, Pech-Merle, Cussac, El Castillo, La Garma	Züchner 199a, b and references therein. Combier and Jouve 2012.
Crosses	Late Solutrean/Early		Züchner 1999a, b.

	Magdalenian		
Rectangle crossed by lines	Late Solutrean		
Lattices (poorly published)	Late Solutrean/Early Magdalenian		Züchner 1999a, b and references therein.
Wavy lines combined with animals	Magdalenian	Parpalló	Züchner 1999a, b and references therein.
Animal depictions: three dimensionality	Late Solutrean and Magdalenian		Villaverde 1992
Black series rhinos, including M-like ears	Magdalenian	Les Trois-Frères	Züchner 1999a, b and references therein.
Aurochsen	Gravettian, Solutrean, Early Magdalenian, Late Magdalenian		Züchner 1999a, b and references therein.
Horns of aurochsen depicted in side view (not twisted profile) and with S-twist	Early to Late Magdalenian: possibly Early to Middle Solutrean	Parpalló, Mas d'Azil, La Vache, Teyjat, Trou de Chaleux, Levanzo: **Ebbou and Les Deux Ouvertures near to Chauvet**	Züchner 1999a, b and references therein. Combier and Jouve 2012.
Black bison depicted with heavy heads and voluminous bodies	Magdalenian	Angles-sur-l'Anglin, Font-de-Gaume, El Pindal	Züchner 1999a, b and references therein.
Depiction of Y-shaped legs on bison	Gravettian and younger	Cosquer, Gabillou, Parpalló	Clottes 2003b, 58
Rows of animal heads in profile or frontal view	Magdalenian (portable art)		Züchner 1999a, b and references therein.
Groups of animals	Late Solutrean/ Early Magdalenian onwards	La Madeleine, Lascaux	Züchner 1999a, b and references therein.
Depiction of felines	Very rare before early Magdalenian in western Europe: regularly depicted thereafter	Lascaux, Gabillou, La Marche, Trois-Frères, Les Combarelles,	Züchner 1999a, b and references therein.

		La Vache	
Depiction of felines with open mouths and hanging jaws, in lines stalking mammoths	Gravettian	Roucadour	Combier and Jouve 2012. Lorblanchet 2010.
Depiction of deer	Gravettian, Solutrean, Early Magdalenian	Chufin, Covalanas, Lascaux	Züchner 1999a, b and references therein.
Depiction of reindeer	Middle Magdalenian onwards	Gabillou, Trois-Frères, Les Combarelles, Tito Bustillo	Züchner 1999a, b and references therein. Djindjian 2004.
Duck-billed horse heads	Gravettian and Solutrean	Lascaux, Cosquer	Züchner 1999a, b and references therein.
General characteristics of horse depictions	Magdalenian	Cosquer	Combier and Jouve 2012. Clottes and Courtin 1996.
Ogival/horseshoe-shaped belly of mammoths	Gravettian and Early Solutrean	Pech-Merle, Cougnac, Roucadour, Jovelle, La Grèze, Cueva del Arco B, Pindal, El Castillo. **Chabot, Le Figuier, Oullins and Les Deux Ouvertures near to Chauvet**	Combier and Jouve 2012.
Depiction of *Megaloceros*	Gravettian and Early Solutrean, possibly Early Magdalenian	Pair-non-Pair, Le Combel, Cougnac, Cosquer, Roucadour, La Garma, Lascaux	Züchner 1999a, b and references therein. Combier and Jouve 2012.
Black-painted hump on withers and oblique lines crossing the body of *Megaloceros*	Gravettian	Cougnac	Combier and Jouve 2012.
Depiction of owls	Middle Magdalenian	Trois-	Züchner 1999a, b

		Frères, Enlène, La Vina	and references therein.
'Sorceror' ('bison man')	Magdalenian	Numerous, e.g. Trois-Frères, St Cirq, Gabillou	Züchner 1999a, b and references therein.
Depiction of movement in animals	Late Solutrean/Early Magdalenian	Lascaux, Parpalló	Züchner 1999a, b and references therein. Azéma 2004, 2010.
Depiction of distal limbs unconnected to main body of animals	Late Solutrean/Early Magdalenian	Lascaux	Clottes 2003b, 51-2.
Realistic vulvas	Magdalenian	Laugerie-Basse, Angles-sur-l'Anglin	Züchner 1999a, b and references therein. Combier and Jouve 2012.
Giant-based *sagaie*	Late Solutrean/Early Magdalenian	Lascaux	Pettitt 2008.

Table 1. Summary of thematic, stylistic and technical aspects of Chauvet's art, and the chronology of parallels elsewhere. Note that in almost all cases these are consistent only with an attribution to the Gravettian-Magdalenian, and with the exception of aspects of the red series are *never* consistent with an attribution to the Aurignacian. Note also how aspects shared with the nearest caves with art to Chauvet – which must surely form their regional context – are Gravettian and Solutrean.