



EVOLUTIONARY PERCEPTUAL CONSTANTS IN ROCK ART MOTIFS

Livio Dobrez *

SUMMARY

At the 2007 XXII Valcamonica Symposium I gave an early account of a new approach to rock art studies which I wanted to introduce to this— itself new — discipline. Without playing down the role of archaeological/anthropological perspectives, I was seeking to formulate a theoretical basis for rock art studies which would not involve historical reconstruction. At the time I characterized this approach as a reception-oriented hermeneutics, i.e. one focussed on present perceptual factors rather than on the attempt to recuperate the original intentions of the makers of rock art. The methodology was to be phenomenological, i.e. reliant on an analysis of perception—the way we see both real and depicted objects and in particular rock art. What I wish to do now is to report on the way in which that initial proposal has developed, especially with the utilization of scientific evidence drawn from cognitive (perceptual) psychology and the neurophysiology of the human visual system. The result continues to represent a new line on the study of rock art, one based on universalist assumptions rather than on historical investigations—in this case one based on the universality of our visual system which has not changed its fundamentals for hundreds of thousands, indeed millions, of years.

RIASSUNTO:

Durante il XXII Simposio di Valcamonica 2007 diedi il resoconto preliminare di un nuovo approccio allo studio di arte rupestre. Senza sminuire il ruolo di punti di vista archeologici/antropologici, stavo cercando di formulare una base teorica per studi di arte rupestre che non comportassero ricostruzione storica. Allora definivo questo approccio un'ermeneutica della ricezione, vale a dire un approccio focalizzato su fattori percettivi attuali piuttosto che sul tentativo di recuperare le intenzioni originali dei creatori dell'arte rupestre. La metodologia doveva essere fenomenologica, cioè basata su un'analisi della percezione del nostro modo di vedere entrambi gli oggetti reali e rappresentati e, in particolare, l'arte rupestre. Quello che vorrei fare ora è di riferire il modo in cui si è sviluppata la proposta iniziale, in particolare con l'utilizzo di prove scientifiche tratte dalla psicologia cognitiva (percettiva) e dalla neurofisiologia del sistema visivo umano. Si tratta sempre di un nuovo filone di ragionamento sullo studio dell'arte rupestre, che si basa su ipotesi universalistiche piuttosto che su indagini storiche, nello specifico basato sull'universalità del nostro sistema visivo che effettivamente non è cambiato per centinaia di migliaia, anzi milioni, di anni.

In this article I want to comment on historical and non-historical approaches to the study of rock art, eventually focussing on my own methodology, which is non-historical or universalist. The historical paradigm has been central to rock art studies from the beginning and continues to be so today. This paradigm, which involves an attempted reconstruction of the past on the basis of an analysis of artefacts—in the case of rock art, images—is more or less indispensable to humanities and social sciences disciplines, including archaeology, though it plays a minor role in strictly scientific research. It may seem so necessary in rock art work—much of it dependent on scholars trained in archaeology—as to appear a natural procedure. We need to recall, however, that the historical paradigm is itself historical. That is to say, it came into being at a particular time in history. That time was the late eighteenth/early nineteenth century, when historical reconstruction was consciously thematized and historical hermeneutics systematized, notably by Schleiermacher at the university of Berlin. This tradition of interpretation dominated nineteenth-century theory and practice and its procedure was

guided by the remarkable ambition to know the past in something like the way the past knew itself, that is, to read the “original intention” behind an artefact (verbal, visual etc.). In the twentieth century theoretical attention shifted to the reception of the artefact in the present—indirectly through the work of Husserl, directly through that of Ingarden and Gadamer—but practice continued to rely on the clearly productive reconstruction model. In Italy Schleiermacher's influence was evident in the *circolo ermeneutico* in Rome under the leadership of Emilio Betti, transmitted to the United States via E.D. Hirsch. Nowhere is this approach better exemplified than in Anati's rediscovery of Europe's forgotten history at Valcamonica and the foundation of the Centro Camuno di Studi Preistorici.

This is not to say, however, that all rock art methodology has been historicist. For a start there was fallout from the development—initially via linguistics (Saussure, Jakobson), then anthropology (Lévi-Strauss)—of structuralism, which prioritized the synchronic, the system rather than the historical sequence (Leroi-Gourhan). Hedges in the United

* Australian National University, retired

States, Lewis-Williams in South Africa and Bednarik in Australia went on to propose other, quite different, non-historical or universalist theses focussing on the phenomenon of phosphenes. It is not necessary to comment on these ongoing approaches, some sympathetic, some opposed to the shamanic reading of rock art. What I want to note here is a strand in rock art hermeneutics which is less concerned with the reconstruction of past cultures, past intentions, than with experiences common to all humans (for Lewis-Williams, *trance*)—or cognitive neural structures also common to all humans (for Bednarik, structures which might indicate how humans came to be). Despite existing controversies, I do not see why, in a discipline-in-the-making such as rock art studies, we should not encourage maximum methodological variety. In particular, and *pace* the shamanic debate, I do not see why the reconstruction paradigm favoured by archaeologists should not comfortably coexist with various universalist options.

In my work an ahistorical approach focussed on visual perception combines a number of disciplinary strands, some coming from philosophy (phenomenology), some from art history, some from cognitive (perceptual) psychology and neurophysiology. The central assumption is the fact that the visual system has remained largely unaltered since our ancestors diverged from monkeys c. twenty million years ago. It is true that the brain is far from static. It changes as we grow. It even changes from day to day. This is the phenomenon of neuroplasticity. It is also true—and this has been investigated in the field of epigenetics—that, contrary to classical Darwinian thinking, some of these local changes may be passed on to our children. So at the level of neural circuitry the brain is in a state of flux, with new circuits being established, others consolidated, still others falling into atrophy. However, this flexibility does not in normal circumstances affect basic neural functions, that is, the hardwired elements in the system. This is the case with the system of special interest to me, viz the visual. We have no reason to think our visual perception—the way we see—has changed over considerable evolutionary time. This becomes evident when we consider that, prior to the arrival of fMRI scanning, which has enabled us to chart the working of the brain in humans, research on the visual system was mostly carried out on monkeys, usually macaques. When non-invasive scanning was developed it was found that there were fundamental homologies between the monkey and human visual systems—essentially, that what had been discovered in monkeys was the case for humans. A very simplified diagram (Fig. 1) shows the broad arrangement valid in each case, with initial processing of light in the earlier, occipital lobe, areas of V1, V2 and V3, subsequently splitting into two neural pathways discovered in 1982 by Ungerleider and Mishkin. These two pathways are the “ventral” down to the inferior temporal lobe, which mostly processes focussed, i.e. foveal, images of objects, and the “dorsal” up to the parietal lobe, which mostly processes peripheral vision, in particular the location of objects in space and their movement.

What is the relevance of this for rock art studies? It tells us, first and foremost, that when we look at a rock art marking of any kind anywhere in the world and of any age we see exactly what the original makers of the rock art saw—because we have the same visual system they had, twenty, fifty thousand years ago, indeed millions of years ago. That is my first premise. The second constitutes my specific thesis, viz that evolution has geared our relatively stable visual system to register not a random assemblage of things in the world but given complex structures—already given and complex as a result of evolutionary imperatives. Let me explain the implications of both of these premises, bearing in mind that my interest is in the way we see images. I think that if we focus on the phenomenon of perception itself we can understand rock art—indeed all images, i.e. all visual art—in an entirely new way. In so doing we link rock art studies both to art studies in general and to evolutionary perspectives, combining a humanities-based analysis with neuroscience.

Let me turn to the first premise mentioned above. There is much confusion in rock art research on the issue of what we see when we observe rock art images. On the basis of historicist assumptions, i.e. assumptions which foreground cultural specificity, some researchers will assert that we cannot be sure we, in our cultural present, see what the makers of the rock art saw. This is perfectly true if by “seeing” we mean an understanding of the time-specific meaning, e.g. the symbolism, associations etc., of a particular image. Naturally we have very little knowledge of this kind, especially if we are dealing with very ancient rock art. So we make intelligent guesses, work by analogy etc. While it offers few certainties and usually at best some probabilities, the method works. It has, for example, reconstructed the likely way of life of the Camuni over the past 10,000 or so years. But to read the meaning of rock art in this way is a quite different enterprise from simply seeing what is on the rocks. To “see” in the sense of “visual perception” rather than in the sense of “understanding cultural meaning” is a universalist project, for which we do not require knowledge of the original intentions of the people who made the images. Of course this project does not contradict historicist analysis. It is just different. Because the basics of the visual system have remained the same since the making of the rock art (in evolutionary terms an extremely short period) we may assume that where we see a pecked circle the makers, whatever they intended by it, also saw a *circle*—and not a *square*. To assume otherwise makes no methodological sense, since if we take seriously the assertion that we do *not* see what the makers saw we condemn all study of rock art to complete relativism. Indeed, if we adopt this position we can, strictly speaking, say nothing at all about rock art. On the other hand, the assertion that we *do* see what the makers saw has sound neurophysiological backing.

But I cannot emphasize enough that there is a critical *caveat* in all this. Precisely because analysis of our perception of images is independent of cultural considerations, it must operate at a rather general

level. That level should be dictated by evolutionary considerations and not lapse into the area which properly belongs to historicist studies. We can say we see a circle and not a square, but we cannot use evidence from visual perception to e.g. settle the current debate in the United States as to whether the marks on that cliff at Sand Island, Bluff, Utah, represent or do not represent a mammoth. The kind of visual analysis I propose cannot settle those questions of specific identification of e.g. an animal in rock art which are the regular concern of those who record images. Does this leave me with a methodology which permits me to do very little? I do not think so, though I want to make clear that it does *not* permit me to do much of what archaeology-oriented researchers do. It certainly permits me, on occasion, to clarify questions asked by such researchers—and for this I refer the reader to critiques I have made of certain rock art methodologies, and also to collaborative work I have undertaken with Keyser and others in the USA (DOBREZ 2011a; KEYSER *et al.* 2013; KEYSER *et al.* 2015).

What *can* be done most constructively with the method of perceptual analysis I am advocating relates to the second premise stated above, viz that (a) observation of art—ancient and modern, on rocks and other forms of support (wood, canvas, paper etc.)—as well as (b) evolutionary logic suggest that we see images in particular predetermined ways. We see images in particular ways because, long before we made images, we developed to see real-life images in those same particular ways. I have tried to elaborate elements of such a visual taxonomy in the belief it has some advantages unavailable to representational taxonomies in current general use. But before outlining the new elements I am seeking to introduce into rock art discourse I need to give a brief account of existing taxonomic methodologies.

Rock art researchers have borrowed the art-historical terminology of “motif” and “style”, but have necessarily been tentative in their categorization. Leaving aside history-based categorizations (as well as actual or possible categorizations reliant on the phosphene thesis, which I lack space to consider here), rock art taxonomies understandably tend to minimalism. Thus we have “zoomorphs” and “anthropomorphs”, with further identification frequently contested. We have “scenes”, a category intuited rather than defined. We have “abstract” marks, either understood as “representational without our knowing what they represent”, or as non-representational after the manner of Peirce’s “symbolic” sign. A (figurative) representation is judged “realistic” or “naturalistic”—meaning that it “looks like” the real thing. By this logic a Picasso horse would be “realistic” insofar as it is recognizably a horse—whereas what rock art scholars usually intend (problematically) by “realism” is an image in line with post-Renaissance European depictive conventions (of which photography is the recent outcome). Sometimes representations will be judged “simple” or “complex”, often in a value-laden way, without very precise definition of these terms. In

general, taxonomic minimalism *works*, in a rough and ready practical way, but the difficulty is that its elements remain largely unanalysed and impressionistic—despite its intense desire to approximate a scientific methodology.

The case with art history taxonomies is somewhat different. Again, there is an abundance of fine, indeed highly sophisticated, history-based categorization, that is, an abundance of thoroughly analysed chronologies (“Renaissance” to “mannerist” to “baroque”, or “impressionist” to post-impressionist” to “modernist” to “postmodern” etc.). Then there are those working models which are the product of relatively recent *bricolage*, a randomly accumulated set of types such as “landscape”, “portrait”, “still life”, or, very recently, types such as “conceptual art”, “performance”, “installation”, “video art”, “digital art” etc. For the most part (in some cases very obviously!) these kinds of categories are unlikely to be sufficiently fundamental to have application to rock art. Some, if not all, formal categories such as those staples of art criticism listed by Arnheim (“balance”, “shape”, “form”, “space”, “light”, “colour”, “movement”, “dynamics”, “expression”) may well have application to rock art, provided they are sufficiently basic to claim possible universality (even if, in any given case, they are also coloured by cultural specifics). In addition, they would of course have to be applied with a clear sense of the unique aspects of rock art and without anachronism. An ambitious classical taxonomy like Wölfflin’s “linear vs. painterly”, might find application. However, for this to be possible it would need to be well and truly purged of its historical Eurocentrism. The “linear/painterly” distinction, in the first instance conceived as a characterization of the stylistic shift from Renaissance to baroque in European art—and at a pinch handy to differentiate European and east Asian stylistic preferences—might be further broadened to include the deep-time traditions of rock art. No one has done this, but I think it is quite possible, if we read Wölfflin (as he could never have read himself!) in genuinely universalist, that is, fundamental, terms, with the currently-available help of neurophysiology. In which case (see Fig. 1) the “linear” mode might be linked to activity in the early visual system (V1) and the “painterly” to the presumed colour-processing area in the ventral processing pathway (V4).

This last example of a possible procedure combining rock art studies with the discipline of art history by way of universalizing options offered by neuroscience brings me to the specific field I am endeavouring to sketch out. What I would like to envisage is a taxonomy for images, including rock art, which is less ad hoc and inadequately theorized than the working models presently in use. In saying this I again stress I am not talking about historical reconstruction models, which have their own logic, which have been much debated in the last century or so, and which cannot be given justice in the short space of this article. A taxonomy based on evolutionary perceptual constants would be one way—not, of course, the only way—

of sidestepping some of the theoretical difficulties of current dominant non-history-based rock art methodologies. It would at least have the advantage of (a) applying to *all* images, including rock art ones, thus bringing together the now awkwardly separate disciplines of rock art and art history, and (b) applying to everyday visual perception, indeed *grounding* the way we see pictures of things in the way we see things themselves. This last is accepted as fact by the majority of cognitive psychologists who as a matter of course use pictures in experiments. The nexus between perceiving things and pictures of things was famously disputed by the great perceptual psychologist Gibson, but even staunch admirers such as Hagen have chosen not to follow the master in this respect. Moreover there is now considerable neurophysiological evidence that we process real and represented visuals in the same neural areas, even, in some cases – in the one neuron (DOBREZ 2013c). All this not to suggest that we normally confuse representation and reality – though *trompe l'oeil* effects obtain in art and have their equivalents in life.

In this article I will give some account of two possible ways of seeing with corresponding representational forms which I have analysed in the past decade. In an everyday situation it is imperative to very quickly register that something is facing you or coming towards you. It could be a matter of survival. In this situation precise recognition of the approaching figure is less important than awareness of its movement. As it happens perceptual psychology has investigated this as the phenomenon of “looming”. It also happens that full-frontal representations, often large and featuring prominent eyes (which establish eye-contact with the observer) recur in rock art. They may be more obviously active, like the Quinkans at Cape York, Australia (Fig. 2), or less obviously active, like the figures at Barrier Canyon, Utah (Fig. 3). Or they may be reduced to a face, like the *sorcier/stregone* at the Vallée des Merveilles, Mont Bégo. In each case, though, we register a certain type of activity, in particular an observer response of “looming”, i.e. of a figure coming towards the observer. Religious ikons around the world tend to exhibit looming features, though full-frontal secular images may do so just as well. At Valcamonica one thinks especially of frontals such as the “orantes” – or a striking case such as the Naquane “Cernunnos”. Scandinavian petroglyphs include comparable frontals in forms dubbed “Thor” or “Odin”. Australia notably features frontal Wandjinas (with large eyes) and in the USA, in addition to Barrier figures, we have Classic Vernal and Dinwoody ones. I have termed all such images Performatives and have described them in detail (DOBREZ 2007, 2008, 2010a, 2010/2011, 2012), linking our perception of them to work on the centrality of the face/eye in human interactive behaviour and also to those sections of the visual system which process object-identification (the inferotemporal TE and, more precisely, the Fusiform Gyrus and so-called Fusiform Face Area or FFA). In the most recent work on this, I have stressed the role of motion-perception in the process, i.e. the fact that

looming figures prompt a response of “coming towards me” (DOBREZ 2013c). That has meant an additional stress on the neurophysiology of perceived motion in MT/V5, located in the Superior Temporal Sulcus (STS) of the dorsal visual pathway (Fig. 1).

Clearly in life not all movement is directed towards the observer. It may be a case of registering varieties of frontoparallel movement, figures passing *across* your visual field, possibly interacting not with you but among themselves. While this situation does not immediately engage you, it may change and suddenly engage you. Consequently it is of utmost importance to be responsive to it, i.e. prepared. This situation is less critical than that of “X looming/approaching”, but it is critical nonetheless. It involves the perception of others, human or animal, in the form of an *event*, “something happening”. Representations of events constitute (verbal or visual) narratives, usually referred to in rock art studies (and in pictures generally, as well as theatre and film!) as “scenes”. As with frontals or Performatives, narrative images constitute a major and fundamental category of depiction. Rock art scenes are frequent in southern Africa (Fig. 4) and in the Sahara. In Australia they occur as Gwions or Bradshaws in the Kimberley, and so-called Mimi art in the more dynamic styles of Arnhem Land. In the Americas they occur in the Biographic tradition of the northwestern USA and southwestern Canada, the Red Linear of Texas and northern Mexico, and in the Serra da Capivara, Brazil. In Europe the best known are those of the Spanish Levant (Fig. 5), though it is equally easy to identify scenes in the petroglyphs of Valcamonica. Finally, Madhya Pradesh, in central India, has many fine examples of this type. So we have a second kind of visual situation with clear evolutionary import plus a large and geographically widespread representational category corresponding to it. Again, I have sought to analyse this type of depiction, chiefly but not solely in rock art, with more precise definitions of the type than were previously available, and with reference to experiments on motion carried out in perceptual psychology and to the neurophysiology of motion-perception, in particular the MT/V5 area of the Superior Temporal Sulcus (STS) in the dorsal processing pathway (Fig. 1). For a very much more detailed account of this the reader is referred to DOBREZ 2007, 2008, 2010a, 2010b, 2010/2011, 2011b, 2013c. It may be worth noting here that in the case of both Performative and narrative images/compositions, I do not see neurophysiology as providing an “explanation” of visual phenomena. All perception has its neural correlates or substrates, but knowing about these certainly does not exhaust the phenomenon. At the same time, details of neural operations frequently help to give us fresh perspectives on the phenomenon – or at the very least they gratifyingly confirm what we have judged on the basis of observation.

In the above analysis I at all times suggest that we do not see the world “bit by bit”, in some sort of additive way. Rather, evolution has hardwired the visual system to register reality in “packages”, as particular

specifiable units of some complexity, units ultimately defined not by logic but by the necessity of survival. The perception of looming and event-perception – the scene – are plausibly two of these perceptual packages. It therefore comes as no surprise that they have their equivalents in art, the types I term Performative and Narrative. Defining representational types by way of likely perceptual fundamentals, that is, perceptual constants, avoids the element of the arbitrary in current (non-historical) rock art taxonomies.

There are other perceptual/representational categories which may be taken as constants in human history, and so as constituting genuine universals in life and art. In collaboration with Patricia Dobrez, I have investigated a possible third category, termed the Canonical (Fig. 6). This category involves simple recognition of an object (in life) or an image of an object (in art) and has its own set of defining features, analysed in terms of

the phenomenon of salience-perception in a number of articles (DOBREZ and DOBREZ 2013a, 2013b, 2014). And indeed we may postulate further categories, which the constraint of space does not permit me to mention here. At this point it suffices to summarize by saying that a new discipline like rock art studies is as inclusive as we wish to make it. Without playing down the role of the historical approach coming especially from archaeology I want to argue the case for a greater involvement of the discipline of art history in rock art work, as well as for more input from soft and hard sciences – from the point of view of my interests, cognitive psychology and neurophysiology. In the foregoing I have sketched an outline of a particular methodology which combines a number of disciplines so as to shed new light on the most exciting art of all in the most exciting of all museums, the one in the open air. Here, at the Centro Camuno, it is everywhere around us.

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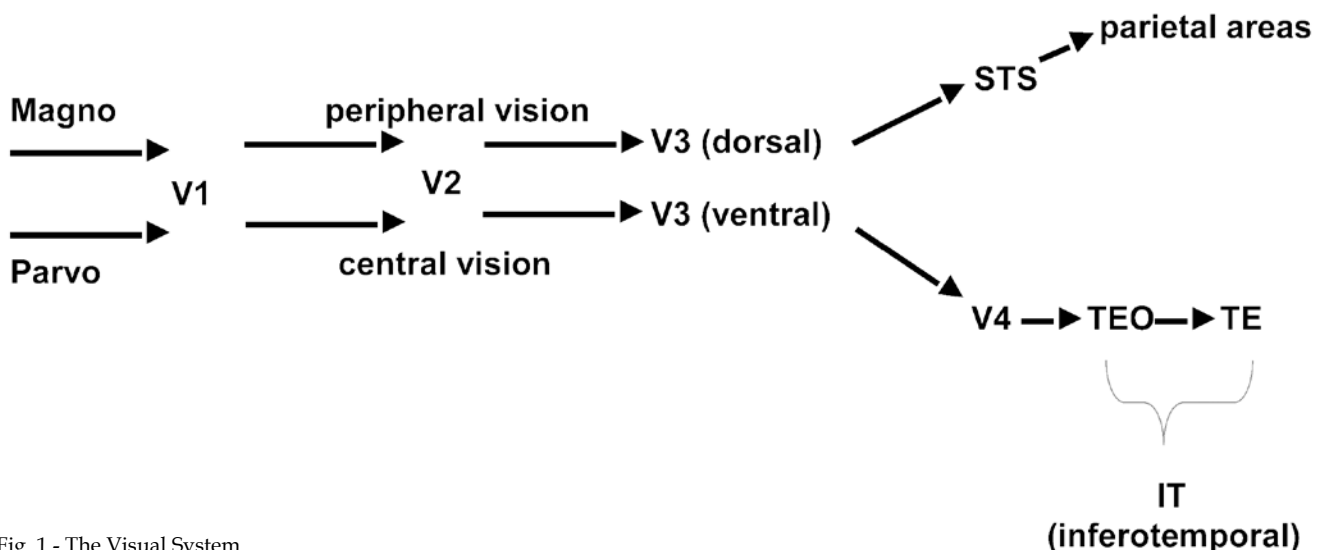


Fig. 1 - The Visual System

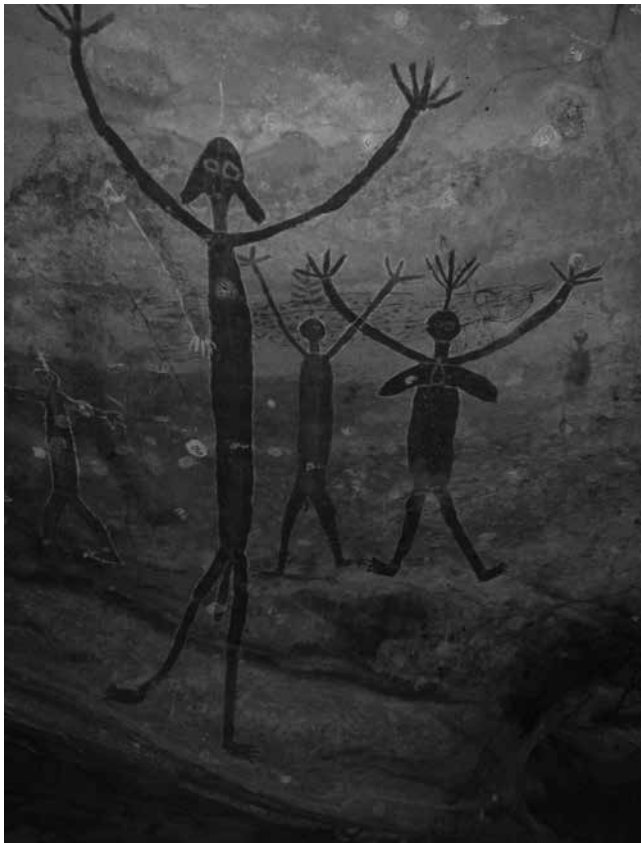


Fig. 2 - Quinkan shelter, Cape York, Queensland, Australia



Fig. 3 - Barrier Canyon, Utah, USA



Fig. 4 - Noukloof Mountains, Namibia



Fig. 5 - Cova dels Cavalls (model), Museu de la Valltorta, Tirig, Spain

Fig. 6 - "Canonical" horse, Marsoulas (model), Parc de la Préhistoire, Tarascon-sur-Ariège, France.

