

## **Cave Art, Autism, and the Evolution of the Human Mind**

Nicholas Humphrey

*The emergence of cave art in Europe about 30,000 years ago is widely believed to be evidence that by this time human beings had developed sophisticated capacities for symbolization and communication. However, comparison of the cave art with the drawings made by a young autistic girl, Nadia, reveals surprising similarities in content and style. Nadia, despite her graphic skills, was mentally defective and had virtually no language. I argue in the light of this comparison that the existence of the cave art cannot be the proof which it is usually assumed to be that the humans of the Upper Palaeolithic had essentially 'modern' minds.*

Man is a great miracle', the art historian Gombrich was moved to say, when writing about the newly discovered paintings at the Chauvet and Cosquer caves (Gombrich 1996, 8). The paintings of Chauvet, especially, dating to about 30,000 years ago, have prompted many people to marvel at this early flowering of the modern human mind. Here, it has seemed, is clear evidence of a new kind of mind at work: a mind that, after so long a childhood in the Old Stone Age, had grown up as the mature, cognitively fluid mind we know today.

In particular it has been claimed that these and other examples of Ice Age art demonstrate (i) that their makers must have possessed high-level conceptual thought: e.g. 'The Chauvet cave is testimony that modern humans ... were capable of the type of symbolic thought and sophisticated visual representation that was beyond Neanderthals' (Mithen, quoted by Patel 1996, 33), or 'Each of these painted animals ... is the embodiment and essence of the animal species. The individual bison, for example, is a spiritual-psychic symbol; he is in a sense the "father of the bison", the idea of the bison, the "bison as such" (Neumann 1971, 86); (ii) that their makers must have had a specific intention to represent and communicate information: e.g. 'The first cave paintings ... are the first irrefutable expressions of a symbolic process that is capable of conveying a rich cultural heritage of images and probably stories from generation to generation' (Deacon 1997, 374); or, more particularly, 'This clearly deliberate and planned imagery

functions to stress one part of the body, or the animal's activity ... since it is these that are of interest [to the hunter]' (Mithen 1988, 314); and (iii) that there must have been a long tradition of artistry behind them: e.g. 'We now know that more than 30,000 years ago ice age artists had acquired a complete mastery of their technical means, presumably based on a tradition extending much further into the past' (Gombrich 1996, 10).

The paintings and engravings must surely strike anyone as wondrous. Still, I draw attention here to evidence that suggests that the miracle they represent may not be at all of the kind most people think. Indeed this evidence suggests the very opposite: that the makers of these works of art may actually have had distinctly pre-modern minds, have been little given to symbolic thought, have had no great interest in communication and have been essentially self-taught and untrained. Cave art, so far from being the sign of a new order of mentality, may perhaps better be thought the swan-song of the old.

The evidence I refer to, which has been available for more than twenty years now (although apparently unnoticed in this context) comes from a study made in the early 1970s by Lorna Selfe of the art-work of a young autistic girl named Nadia (Selfe 1977; 1983; 1985).

Nadia, born in Nottingham in 1967, was in several respects severely retarded. By the age of six years she had still failed to develop any spoken language, was socially unresponsive and physically



**Figure 1.** Painted horses from Chauvet Cave (Ardeche), probably Aurignacian.



**Figure 2.** Horses by Nadia, at 3 years 5 months.

clumsy. But already in her third year she had begun to show an extraordinary drawing ability: suddenly starting to produce line-drawings of animals and people, mostly from memory, with quite uncanny photographic accuracy and graphic fluency.

Nadia's ability, apart from its being so superior to other children, was also essentially different from the drawing of normal children. It is not that she had an accelerated development in this sphere but rather that her development was totally anomalous. Even her earlier drawings showed few of the properties associated with infant drawings . . . Perspective, for instance, was present from the start. (Selfe 1977, 127).

These drawings of Nadia's, I now suggest, bear astonishing parallels to high cave art.

Figure 1 shows part of the big horse panel from Chauvet, Figure 2 a drawing of horses made by Nadia - one of her earliest - at age three years five months. Figure 3 shows a tracing of horses from Lascaux, Figure 4 another of Nadia's early drawings. Figure 5 shows an approaching bison from Chauvet, Figure 6 an approaching cow by Nadia at age four. Figure 7 a mammoth from Peche Merle, Figure 8 two elephants by Nadia at age four. Figure 9 a detail of a horse-head profile from Lascaux, Figure 10 a horse-head by Nadia at age six. Figure 11, finally, a favourite and repeated theme of Nadia's, a rider on horseback, this one at age five.

The remarkable similarities between the cave paintings and Nadia's speak for themselves. There is first of all the striking naturalism and realism of the individual animals. In both cases, as Clottes (1996a, 114) writes of the Chauvet paintings, 'These are not stereotyped images which were transcribed to convey the concept "lion" or "rhinoceros", but living animals faithfully reproduced.' And in both cases, the graphic techniques by which this naturalism is achieved are very similar. Linear contour is used to model the body of the animals. Foreshortening and hidden-line occlusion are used to give perspective and depth. Animals are typically 'snapped' as it were in active motion - prancing, say, or bellowing. Liveliness is enhanced by doubling-up on some of the body contours. There is a preference for side-on views. Salient parts, such as faces and feet, are emphasized - with the rest of the body sometimes being ignored.

Yet it is not only in these 'sophisticated' respects that the cave drawings and Nadia's are similar, but in some of their more idiosyncratic respects too. Particularly notable in both sets of drawings is the tendency for one figure to be drawn, almost

haphazardly, on top of another. True, this overlay may sometimes be interpretable as a deliberate stylistic feature. Clottes (1996a, 114), for example, writes about Chauvet: 'In many cases, the heads and bodies overlap, doubtless to give an effect of numbers, unless it is a depiction of movement.' In many other cases, however, the overlap in the cave paintings serves no such stylistic purpose and seems instead to be completely arbitrary, as if the artist has simply paid no notice to what was already on the wall. And the same goes for most of the examples of overlap in Nadia's drawings. Figure 12, for example, shows a typical composite picture made by Nadia at age five - comprising a cock, a cat, and two horses (one upside-down).

In Nadia's case, this apparent obliviousness to overlap - with the messy superimpositions that resulted - may in fact have been a positive feature of her autism. Autistic children have often been noted to be unusually attentive to detail in a sensory array, while being relatively uninfluenced - and even maybe unaware of - the larger context (see the discussion by Frith & Happe 1994). Indeed such is their tendency to focus on parts rather than wholes that, if and when the surrounding context of a figure is potentially misleading or confusing, they may actually find it easier than normal people to ignore the context and see through it. Shah & Frith (1983) have shown, for example, that autistics perform quite exceptionally well on the so-called 'hidden figure' test, where the task is to find a target figure that has been deliberately camouflaged by surrounding lines.

There is no knowing whether the cave artists did in fact share with Nadia this trait which Frith (Frith & Happe 1994) calls 'weak central coherence' (see also Pring *et al.* 1995). But if they did do so, it might account for another eccentricity that occurs in both series of drawings. Selfe (1977, note to pl. 33) reports that Nadia would sometimes use a detail that was already part of one figure as the starting point for a new drawing - which would then take off in another direction - as if she had lost track of the original context. And it seems (although I admit this is my own *post hoc* interpretation) that this could even happen half-way through, so that a drawing that began as one kind of animal would turn into another. Thus Figure 13 shows a strange composite animal produced by Nadia, with the body of giraffe and the head of donkey. The point to note is that chimeras of this kind are also to be found in cave art. The Chauvet cave, for example, has a figure that apparently has the head of a bison and the trunk and legs of a man.



**Figure 3.** Painted and engraved horses from Lascaux Cave (Dordogne), probably Magdalenian.



**Figure 4.** Horses by Nadia, at 3 years 5 months.



**Figure 5.** *Painted bison from Chauvet Cave (Ardeche), probably Aurignacian.*



**Figure 6.** *Cow by Nadia, at approximately 4 years.*



**Figure 7.** *Painted mammoth from Peche Merle (Lot), probably Solutrean.*



**Figure 8.** *Elephants by Nadia, at approximately 4 years.*

What lessons, if any, can be drawn from these surprising parallels? The right answer might of course be: none. I am sure there will be readers - including some of those who have thought longest and hardest about the achievements of the Ice Age artists - who will insist that all the apparent resemblances between the cave drawings and Nadia's can only be accidental, and that it would be wrong - even impertinent - to look for any deeper meaning in this 'evidence'. I respect this possibility, and agree we should not be too quick to see a significant pattern where there is none. In particular, I would be the first to say that resemblances do not imply identity. I would not dream of suggesting, for example, that the cave artists were themselves clinically autistic, or that Nadia was some kind of a throwback to the Ice Age. Yet, short of this, I still want to ask what can reasonably be made of the parallels that incontrovertibly exist.

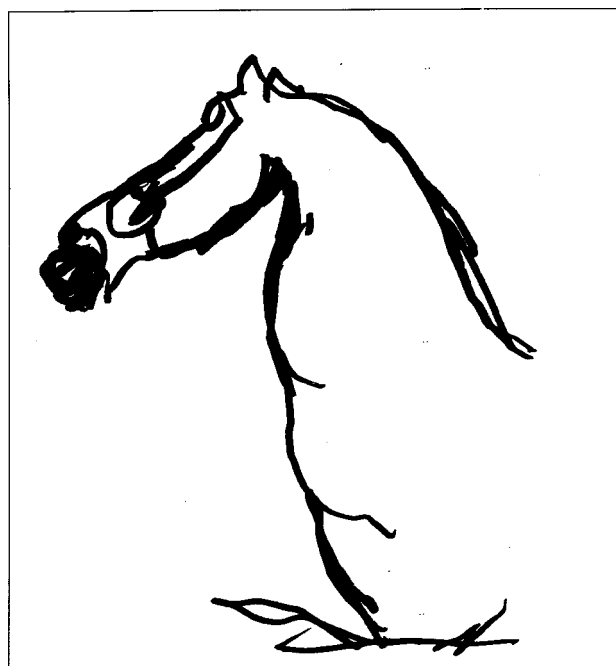
To start with, I think it undeniable that these parallels tell us something important about what we should *not* assume about the mental capacities of the cave artists. Given that Nadia could draw as she did *despite* her undeveloped language, impoverished cognitive skills, apparent lack of interest in communication, and absence of artistic training, it is evident that so too *could* the cave artists have done. Hence the existence of the cave drawings should presumably *not* be taken to be the proof, which so many people have thought it is, that the cave artists had essentially modern minds. Tattersall (1998, 16), for instance, may claim that '[Chauvet] dramatically bolsters the conclusion that the first modern people arrived in Europe equipped with all of the cognitive skills that we possess today'; but he is clearly on less solid ground than he supposes.

Next - and I realize this is bound to be more controversial - I think it possible that the parallels also tell us something more positive about what we *can* assume about the artists' minds. For suppose it were the case that Nadia could draw as she did *only because* of her undeveloped language and other impoverishments. Suppose, indeed, it were more generally the case that a person not only *does not need* a typical modern mind to draw like that but *must not have* a typical modern mind to draw like that. Then the cave paintings might actually be taken to be proof positive that the cave artists' minds were essentially pre-modern.

In Nadia's case there has in fact already been a degree of rich speculation on this score: speculation, that is, as to whether her drawing ability was indeed something that was 'released' in her only because her mind failed to develop in directions that in



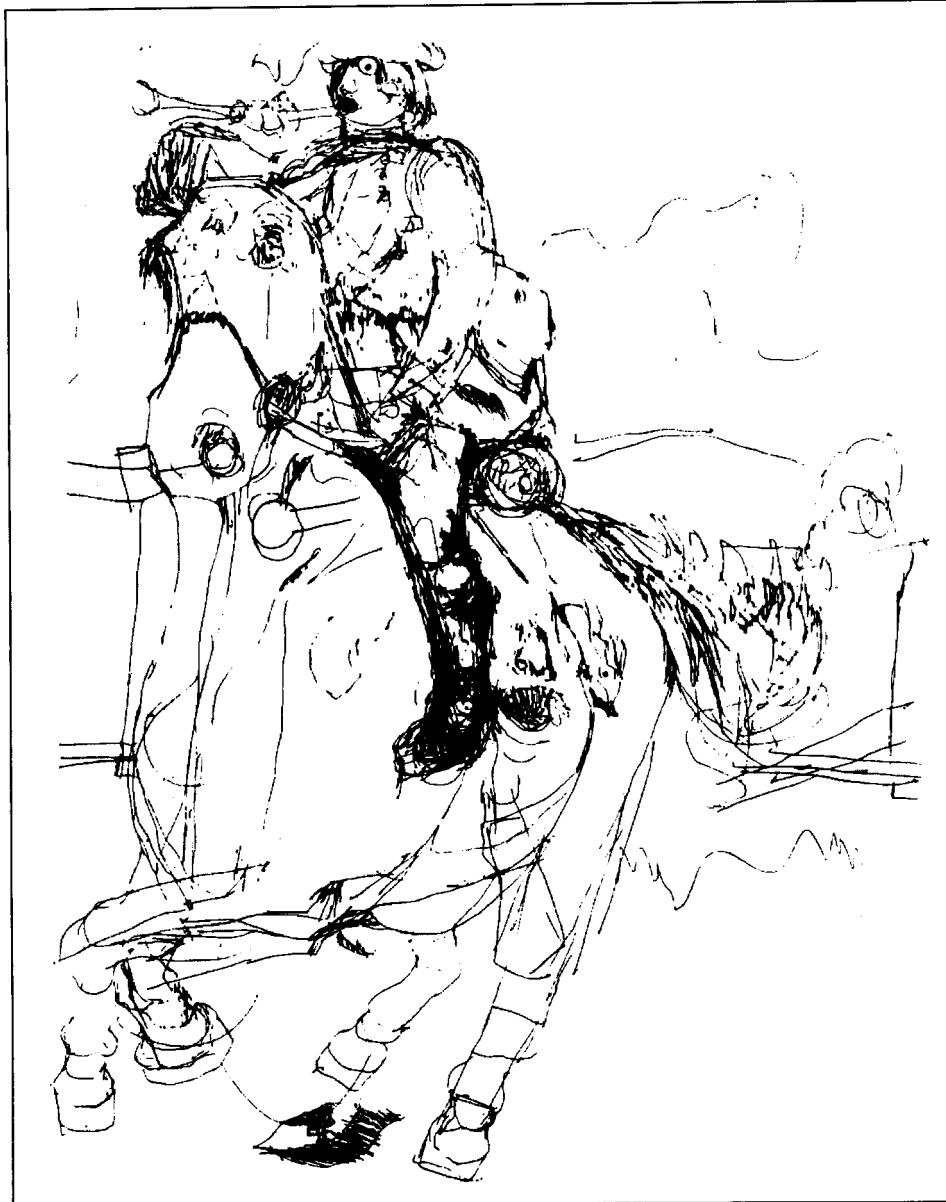
**Figure 9.** Engraved horsehead from Lascaux (Dordogne), probably Magdalenian.



**Figure 10.** Horsehead by Nadia, at approximately 6 years.

normal children more typically smother such ability. Selfe's hypothesis has always been that it was Nadia's language - or rather her failure to develop it - that was the key.

At the age of six years Nadia's vocabulary consisted of only ten one-word utterances, which she used rarely. And, although it was difficult to do formal tests with her, there were strong hints that



**Figure 11.** *Horse and rider by Nadia, at 5 years 6 months.*

this lack of language went along with a severe degree of literal mindedness, so that she saw things merely as they appeared at the moment and seldom if ever assigned them to higher level categories. Thus

it was discovered that although Nadia could match difficult items with the same perceptual quality, she failed to match items in the same conceptual class. For example, she could match a picture of an object to a picture of its silhouette, but she failed to match pictures of an armchair and a deck chair from an array of objects that could be classified on their conceptual basis (Selfe 1985, 140).

It was this very lack of conceptualization, Selfe believes, that permitted Nadia to register exactly how things looked to her. Whereas a normal child of her age, on seeing a horse, for example, would see it - and hence lay down a memory of it - as a token of the category 'horse', Nadia was simply left with the original visual impression it created.

Selfe went on to examine several other autistic subjects who also possessed outstanding graphic skills (although none, it must be said, the equal of Nadia), and she concluded that for this group as a whole the evidence points the same way:

It is therefore proposed that without the hypothesized domination of language and verbal mediation in the early years when graphic competence was being acquired, these subjects were able to attend to the spatial characteristics of their optic array and to represent these aspects in their drawing. . . These children therefore have a more direct access to visual imagery in the sense

that their drawings are not so strongly 'contaminated' by the usual 'designating and naming' properties of normal children's drawings. (Selfe 1983, 201).

Thus, whereas a normal child when asked to draw a horse would, in the telling words of a five-year-old, 'have a think, and then draw my think', Nadia would perhaps simply have had a look at her remembered image and then drawn that look.

This hypothesis is, admittedly, somewhat vague and open-ended; and Selfe herself considers it no



more than a fair guess as to what was going on with Nadia. Most subsequent commentators, however, have taken it to be at least on the right lines, and certainly nothing has been proposed to better it. I suggest therefore we should assume, for the sake of argument at least, that it is basically correct. In which case, the question about the cave artists immediately follows. Could it be that in their case too their artistic prowess was due to the fact that they had little if any language, so that their drawings likewise were uncontaminated by 'designating and naming'?

There are two possibilities we might consider. One, that language was absent in the general population of human beings living in Europe 30,000 years ago. The other, that there were at least a few members of the population who lacked language and it was from amongst this subgroup that all the artists came. But this second idea - even though there is no reason to rule it out entirely (and though the philosopher Daniel Dennett tells me it is the one he favours) - would seem to involve too much special pleading to deserve taking further, and I suggest we should focus solely on the first. Then we have to ask: Is it really in any way plausible to suppose that human beings of such a relatively recent epoch had as yet not developed the capacity for full-scale language? The standard answer, coming from anthropology and archaeology, would certainly be: No. Human spoken language surely had its beginnings at least a million years ago, and most likely had already evolved to more or less its present level by the time the ancestral group of

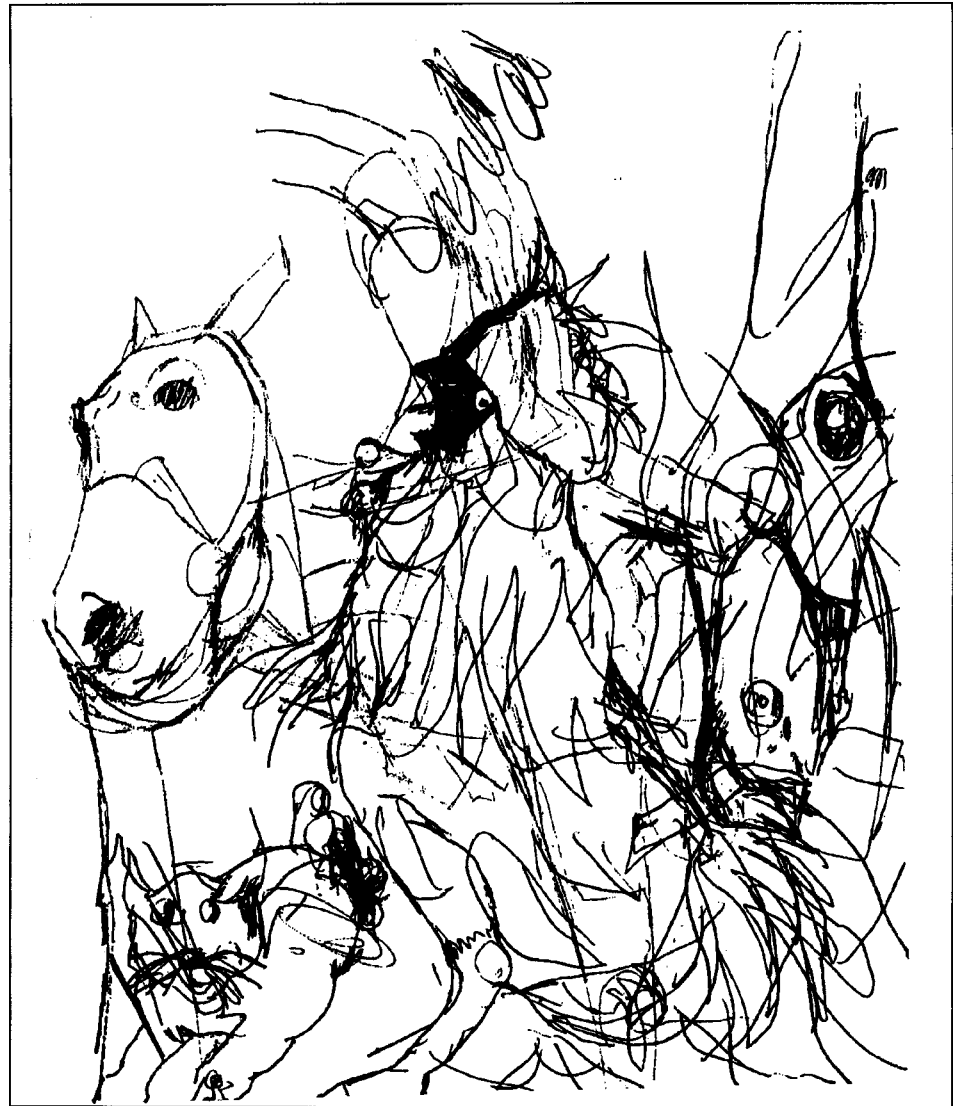
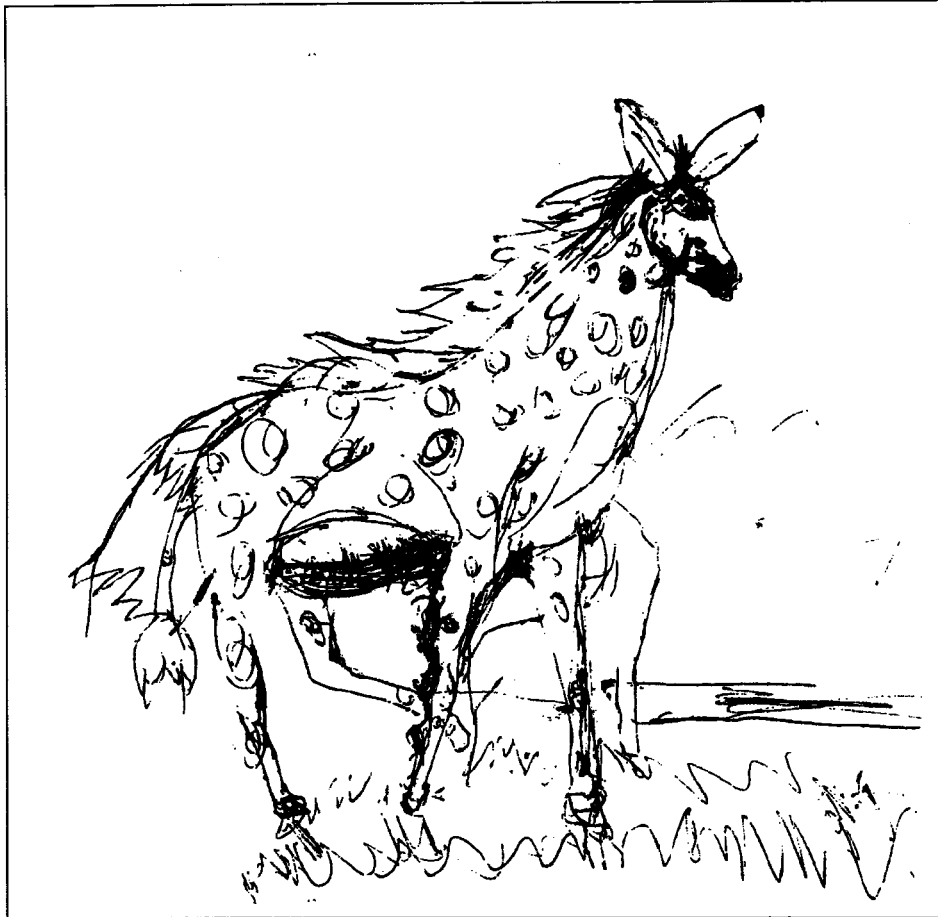


Figure 12. *Superimposed animals by Nadia, at 6 years 3 months.*

*Homo sapiens sapiens* left Africa around 150,000 years ago. By the date of the first cave paintings, therefore, there can be no question of there being any general deficiency in people's capacity to name or designate.

Yet there are revisionist ideas about this in the air. Everybody agrees that *some* kind of language for *some* purpose has likely been in existence among humans for most of their history since they parted from the apes. But Dunbar (1996), for example, has argued that human language evolved originally not as a general purpose communication system for talking about anything whatever, but rather as a specifically social tool for negotiating about - and helping maintain - interpersonal relationships. And Mithen



**Figure 13.** *Composite animal, part giraffe, part donkey, by Nadia at approximately 6 years.*

(1996) has taken up this idea and run with it, arguing that the 'linguistic module' of the brain was initially available only to the module of 'social intelligence', not to the modules of 'technical intelligence' or 'natural history intelligence'. So that, to begin with, people would - and could - use language only as a medium for naming and talking about other people and their personal concerns, and not for anything else.

Even so, this idea of language having started off as a sub-speciality may not really be much help to the argument at hand. For Mithen himself has argued that the walls around the mental modules came down at latest some 50,000 years ago. In fact he takes the existence of the supposedly 'symbolic' Chauvet paintings to be good evidence that this had already happened by the date of their creation: 'All that was needed was for a connection to be made between these cognitive processes which had evolved for other tasks to create the wonderful paintings in Chauvet Cave.' (Mithen 1996, 163). Therefore, other

things being equal, even Mithen could not be expected to countenance the much later date that this line of thinking that stems from Nadia indicates.

Suppose, however, that while Mithen is absolutely right in his view of the sequence of changes in the structure of the human mind, he is still not sufficiently radical in his timing of it. Suppose that the integration of modules that he postulates did not take place until, say, just 20,000 years ago, and that up to that time language did remain more or less exclusively social. So that the people of that time - like Nadia today - really did not have names for horses, bison, and lions (not to mention chairs). Suppose indeed that the very idea of something representing 'the bison as such' had not yet entered their still evolving minds. Then, I suggest, the whole story falls into place.

J.M. Keynes (1947) wrote of Isaac Newton that his private journals and notebooks reveal him to have been not the first scientist of the age of reason but the last of the magicians. Now likewise we might say that the cave paintings reveal their makers to have been not the first artists of the age of symbolism but the last of the innocents.

But 20,000 years ago? No language except for talking about other people? In an experiment with rhesus monkeys I did many years ago (Humphrey 1974), I found clear evidence that rhesus monkeys are cognitively biased towards taking an interest in and making categorical distinctions between *other rhesus monkeys*, while they ignore the differences between individuals of *other species* - cows, dogs, pigs and so on. I am therefore probably more ready than most to believe that early humans might have had minds that permitted them to think about other people in ways quite different from the ways they were capable of thinking about non-human animals. Even

so, I too would have thought the idea that there could still have been structural constraints on the scope of human language until just 20,000 years ago too fantastic to take seriously, were it not for one further observation that seems to provide unanticipated confirmation of it. This is the striking difference in the representation of humans as opposed to animals in cave art.

Note that the hypothesis, as formulated, makes a testable prediction. If before 20,000 years ago people had names available for talking about other human individuals but not for other animals, and if it were indeed this lack of naming that permitted those artists to depict animals so naturalistically, then this naturalism ought *not* to extend to other human beings. In other words, representations of humans should either be missing altogether from the cave paintings, or if present should be much more stereotypical and modern.

But, behold, this is exactly what is the case. As a matter of fact there are no representations of humans at Chauvet. And when they do occur in later paintings, as at Lascaux at 17,000 years ago, they are nothing other than crudely drawn iconic symbols. So that we are presented in a famous scene from Lascaux, for example, with the conjunction of a well-modelled picture of a bison with a little human stick-figure beside it (Fig. 14). In only one cave, La Marche, dating to 12,000 years ago, are there semi-realistic portrayals of other humans, scratched on portable plaquettes - but even these appear to be more like caricatures.

Nadia provides a revealing comparison here. Unlike the cave artists, Nadia as a young girl had names neither for animals nor people. It is to be expected therefore that Nadia, unlike the cave artists, would in her early drawings have accorded both classes of subject equal treatment. And so she did. While it is true that Nadia drew animals much more frequently than people, when she did try her hand at the latter she showed quite similar skills. Nadia's

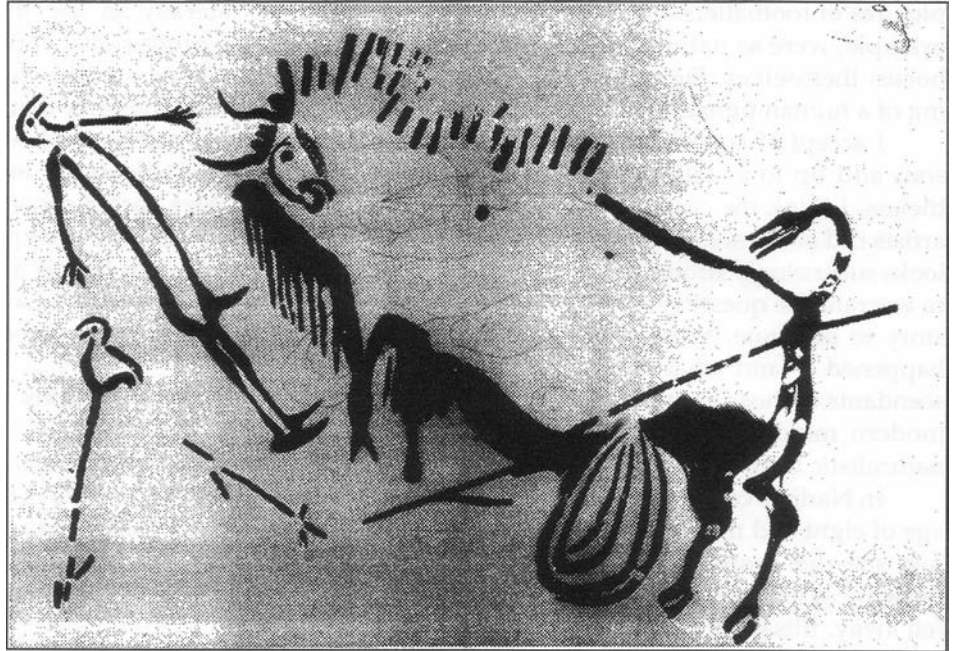


Figure 14. *Painted bison and human figure, Lascaux (Dordogne), probably Magdalenian.*

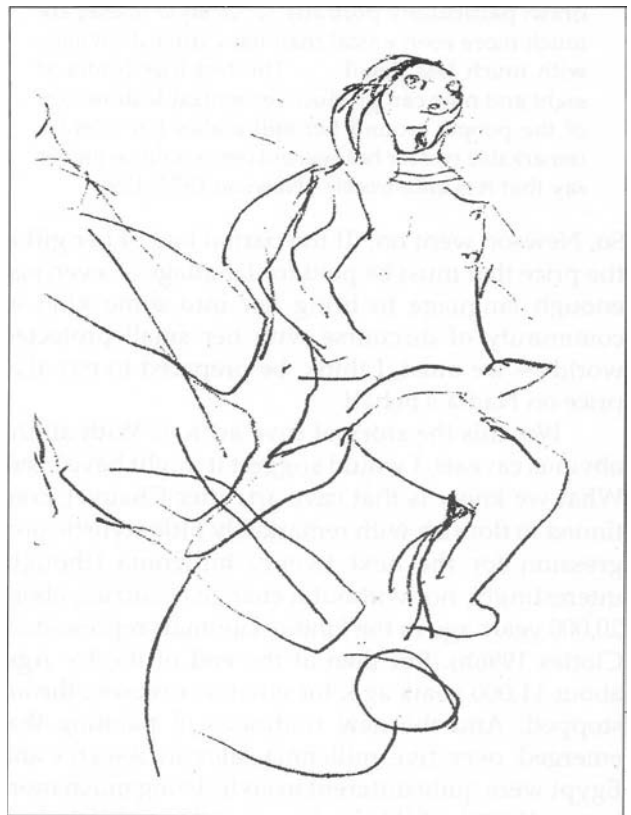


Figure 15. *Human figure by Nadia, at approximately 4 years.*

pictures of footballers and horsemen at age five, for example, were as natural-looking as her pictures of horses themselves. Figure 15 shows Nadia's drawing of a human figure, made at age five.

I accept of course that none of these comparisons add up to a solid deductive argument. Nonetheless, I think the case for supposing that the cave artists did share some of Nadia's mental limitations looks surprisingly strong. And strong enough, surely, to warrant the question of how we might expect the story to continue. What would we expect to have happened - and what did happen - when the descendants of those early artists finally acquired truly modern minds? Would we not predict an end to naturalistic drawing across the board?

In Nadia's case it is significant that when at the age of eight and more, as a result of intensive teaching, she did acquire a modicum of language, her drawing skills partly (though by no means wholly) fell away. Elisabeth Newson, who worked with her at age seven onwards, wrote

Nadia seldom draws spontaneously now, although from time to time one of her horses appears on a steamed up window. If asked, however, she will draw: particularly portraits . . . In style [these] are much more economical than her earlier drawings, with much less detail . . . The fact that Nadia at eight and nine can produce recognizable drawings of the people around her still makes her talent a remarkable one for her age: but one would no longer say that it is *unbelievable*. (Newson 1977, 129).

So, Newson went on, 'If the partial loss of her gift is the price that must be paid for language - even just enough language to bring her into some kind of community of discourse with her small protected world - we must, I think, be prepared to pay that price on Nadia's behalf.'

Was this the story of cave art too? With all the obvious caveats, I would suggest it might have been. What we know is that cave art, after Chauvet, continued to flourish with remarkably little stylistic progression for the next twenty millennia (though, interestingly, not without a change occurring about 20,000 years ago in the kinds of animals represented; Clottes 1996b). But then at the end of the Ice Age, about 11,000 years ago, for whatever reason, the art stopped. And the new traditions of painting that emerged over five millennia later in Assyria and Egypt were quite different in style, being much more conventionally childish, stereotyped and stiff. Indeed nothing to equal the naturalism of cave art was seen again in Europe until the Italian Renaissance, when life-like perspective drawing was reinvented, but now

as literally an 'art' that had to be learned through long professional apprenticeship.

Maybe, in the end, the loss of naturalistic painting was the price that had to be paid for the coming of poetry. Human beings could have Chauvet or the Epic of Gilgamesh but they could not have both. I am sure such a conclusion will strike many people not merely as unexpected but as outlandish. But then human beings are a great miracle, and if their history were not in some ways unexpected and outlandish they would be less so.

### Acknowledgements

I am grateful to Daniel Dennett, Uta Frith, Roger Lewin, and Steven Mithen for their comments on a first draft of this paper. Nadia's drawings are reproduced with kind permission of Lorna Selfe and Academic Press.

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REPLY BY NICHOLAS HUMPHREY

**Bahn** remarks that one of the joys of being a specialist in prehistoric art is the stream of strange ideas that come his way. I should say that one of the joys of being a non-specialist is to have an opportunity such as this to be listened to, enlarged upon and corrected by scholars who know the field better than I do. There is a wealth of thought-provoking material in these commentaries. Rather than responding point by point and author by author, I shall try to address some of the common issues raised. But I should start by apologizing for what **Bahn** calls the "basic mistakes" in my paper, of which the worst example seems to be that I got the date of the La Marche engravings wrong. The two sources I consulted did describe the main occupation of the cave as being in the 12,000's (Haddingham 1979, p.239, Lewin 1997, p.472), but I accept **Bahn's** own estimate that the engraved plaquettes probably date to before 14,000 years ago (and may all my basic mistakes be as basic as this one).

The main purpose of my paper was to challenge the over-confident "modernist" (with a small m) interpretation of Ice-age art (not to mention other aspects of Upper Palaeolithic culture) that pervades both academic and popular accounts. As Robert Darnton has written in a different context, "Nothing is easier than to slip into the comfortable assumption that Europeans [of the past] thought and felt just as we do today – allowing for the wigs and wooden shoes" (Darnton 1985, p. 12). And equally I would say nothing is easier than to slip into the assumption that the Ice-age artists created pictures in the way and even for some of the reasons that modern artists do today – allowing for the reindeer picks and tallow candles. "We constantly need to be shaken out of a false sense of familiarity with the past," Darnton continued, "to be administered doses of culture shock".

What I set out to demonstrate in the first part of the paper was the shocking truth that there are quite other ways of being an artist than the one we take for granted. Nadia's skill was such that, if we did not know the provenance of her drawings, we might well assume that they came from the hand of someone with

all the promise of a young Picasso. Yet Nadia was mentally disabled. She lacked the capacity to speak or to symbolize, and she created her art only for her own amusement (if for anything at all – see **Bloom** and **Frith**). I argued, therefore, that just as we might so easily misinterpret Nadia's drawings if we were to come across them cold, so there is the possibility that we may have already been misinterpreting cave art. At the very least scholars should be more cautious than they have been before jumping to grandiose conclusions about the mentality of the Ice age artists.

Now, to this, the negative argument of the paper about what we should not conclude about cave art, two kinds of objection are raised.

The first consists in denying that there is in fact any significant similarity between cave art and Nadia's. **Bahn** claims he simply cannot see the similarity. **Zubrow** thinks it might be due to selective sampling, or else merely chance. **Mithen** has reservations about the drawing techniques and says he sees "a glaring difference in the quality of line: Nadia appears to draw in a series of unconnected lines, often repeated in the manner of a sketch, while the dominant character of cave art is a confidence in line single authoritative strokes or engraved marks."

But, as Selfe's description of Nadia's technique makes clear, **Mithen** is making more of this technical difference than is warranted. "Nadia used fine, quickly executed lines. Her motor control was highly developed. . . Her lines were firm and executed without unintentional wavering. . . She almost invariably appeared to have a definite idea about what she was drawing so there were no wasted lines" (Selfe 1979, pp. 8 and 103). And if **Bahn** and **Zubrow** think the overall similarities are non-existent or accidental, all I can say is: look again. Or, better, do not rely on the few illustrations of this paper, but take the hundred or so drawings by Nadia in Selfe's book and match them however you will with works from Chauvet or Lascaux. **Mithen** comments on "the remarkable continuity in subject matter and style of Upper Palaeolithic art." I defy anyone with an eye

for style not to see how easily Nadia's drawings could have been part of this same tradition (indeed how they are in some ways closer to Chauvet on one side and Lascaux on the other, than Chauvet is to Lascaux!).

It is not fair perhaps to play the connoisseur and question the aesthetic sensitivity of those who will not see things my way. But I confess that, when **Bahn** asks why I make so much of Nadia in my paper as against other savant artists such as Stephen Wiltshire, and implies that Stephen Wiltshire's drawings would have made an equally good (or, as he thinks, bad) comparison for cave art, it does make me wonder about the quality of his critical judgment. For I'd say it should be obvious to anyone with a good eye that Nadia's drawings of animals demand this comparison whereas Stephen Wiltshire's drawings of buildings simply do not.

The second kind of objection to the negative argument about what we should not conclude about cave art is at a different level. It consists in claiming that what this argument does is to treat cave art as if it were an isolated phenomenon, whereas it ought properly to be considered in the context of the rest of the surrounding culture. **Mithen** and **Tattersall**, for example, both concede that the argument about cave art being produced by minds similar to Nadia's might possibly go through, if the art was all we had to go on. But, and **Knight** says this too, when the achievements of Upper Palaeolithic culture are considered as a whole, this interpretation simply does not wash. There is too much else in the archaeological record that speaks to the presence at this time of sophisticated, symbol-using, language-saturated minds: evidence of body decoration, music, funerary rituals, elaborate trade networks, and so on. If human beings were so far advanced in all these other areas, surely they must have been using the same high level mental skills in their art also.

This sounds persuasive, until we realize that it largely begs the question. I'd agree it might be unarguable that, if it were certainly established that these other cultural activities really occurred in the way that archaeologists imagine and

involved those high level skills, then it would follow that art did too. But what makes us so sure that Upper Palaeolithic humans were engaging in ritual, music, trading and so on at the level that everyone assumes? One answer that clearly will not do here is to say that these were the same humans who were producing symbolic art! Yet, as matter of fact this is just the answer that comes across in much of the literature: cave art is taken as the first and best evidence of there having been a leap in human mentality at about this time, and the rest of the culture is taken as corroborating it.

Of course another answer might be that high level symbolic thought had to be involved in these other activities because when we ourselves engage in similar activities today, we use our full range of mental skills to do so. But, again, this is precisely the kind of logic I (and Darnton above) mean to question. Just as there are ways of drawing beautiful and complex pictures that are not our ways, we should be alert to the possibility that there are ways of having intense and meaningful social engagements that are not our ways – including forms, though not exactly our forms, of trade, ritual, dance and so on. In particular, we should not assume any necessary role in any of these things for universal, cross-domain language.

I turn now to the positive argument that I mounted in the second half of the paper, about what perhaps we can conclude about cave art: namely, that the people who produced it not only might not have had modern minds like ours but really did not – and in particular that they did still have minds more like Nadia's, with underdeveloped language. I am hardly surprised that this suggestion has met with more scepticism and hostility than the first, and indeed that **Dennett** is virtually alone among the commentators in looking kindly on it – for it is of course closer to the kind of no-holds-barred “what if?” speculation that philosophers are familiar with than it is to normal science.

But there may be another reason why **Dennett** likes this argument, while others do not. For I realize now that there has been a general misunderstanding of my position, one that I did not see coming, but which if I had seen I should have tried to



head off earlier. It appears that all the other commentators, except for **Bloom** and **Frith** and possibly **McManus**, have taken it for granted that when I talk about the difference between a pre-modern and modern mind (or a linguistically restricted / unrestricted mind, or a cognitively rigid / fluid mind) I must be talking about a genetically determined difference in the underlying brain circuitry. That's to say, that I must be assuming that humans were in the past born with a pre-modern mind, while today they are (except for unfortunate individuals such as Nadia) born with a modern mind.

But this not my position at all. For, in line with **Dennett's** own ideas about recent cognitive evolution (Dennett, 1992, 1996) I actually think it much more likely that the change from pre-modern to modern came about not through genetic changes in innately given "hardware" but rather through environmental changes in the available "software": in other words I think that pre-modern humans became modern humans when their environment – and specifically the linguistic and symbolic environment inherited through their culture – became such as to reliably program their minds in quite new ways.

In the longer run, of course, there must also been important genetic changes. No modern environment could make a modern human of a chimpanzee or even of one of our ancestors from say 100,000 years ago. Still I'd suggest that, over the time period that concerns us here, genetic changes in the structure of the brain actually account for very little. It is primarily the modern twentieth century cultural environment that makes modern humans of our babies today, and it was primarily the pre-modern Upper Palaeolithic environment that made pre-modern humans of their babies then (so that, if our respective sets of babies were to swap places, so would their minds).

Now I realize that in this regard the analogy I drew with Nadia and with autism was potentially misleading. For, as **Bahn** does well to point out, Nadia like most autistic children almost certainly had some kind of congenital brain abnormality (although the evidence is unclear as to whether, as **Bahn** claims, there was specific damage to her temporal lobes). Unlike the pre-modern

humans we are talking about, Nadia did not have underdeveloped software but rather she had damaged hardware. In fact as **McManus** cleverly points out, since Nadia had a damaged version of a modern mind she might better be labeled post-modern rather than pre-modern (although I'm not sure where that gets us). At any rate, if it was not clear before, I should make it clear now that the similarity I see between Nadia and pre-modern humans is at the level of the functional architecture of their minds rather than of the anatomy of their brains. Specifically, both pre-modern humans (because of their culture) and Nadia (because of her brain damage) had very limited language, and in consequence both had heightened pictorial memory and drawing skills.

I hope it will be obvious how, with this being the proper reading of my argument, some of the objections of the commentators no longer strike home. In particular there need be no great problem in squaring my suggestion about the relatively late arrival of modern minds in Europe with the known facts about the geographic dispersion of the human population. **Bloom** and **Frith** rightly observe that a genetic trait for modernity cannot have originated in Europe as late as I suggest and subsequently spread through the human population, because in that case there is no way this trait could have come to be present in the Australian aborigines whose ancestors moved to Australia 50,000 years ago. **Mithen** is worried by the same issue and reckons the only answer (by which he is clearly not convinced) is that there might have been convergent evolution. But if the change from pre-modern to modern resulted from a change in the cultural environment rather than in genes, then, wherever this cultural development originated, it could easily have spread like wildfire in the period between say 20,000 and 10,000 years ago – right the way from Europe to Australia, or, equally possibly, from Australia to Europe.

The emphasis on culture rather than genes will also I hope lay to rest the anxieties, expressed in different ways by **Bahn** and **Zubrow**, about whether my views can be taken to have sinister implications for human rights. I confess I do not think that political correctness has much relevance to scientific debate,

but I am glad that on this occasion there is no serious case to answer.

There are however other important issues that I still need to address. First, the question of whether there really is any principled connection between graphic skills and lack of language. Several commentators (**Bloom** and **Frith, McManus**) note that lack of language is certainly not sufficient in itself to "release" artistic talent, and indeed that the majority of autistic children who lack language do not have any such special talent at all. But this is hardly surprising and hardly the issue. The issue is whether lack of language is a necessary condition for such extraordinary talent to break through. And here the evidence is remarkably and even disturbingly clear. For, as Snyder and Thomas say in the paper cited by **McManus**, "no normal preschool child has been known to draw naturalistically [*italics theirs*]. Autism is apparently a necessary condition for a preschool child to draw an accurate detail of natural scenes" (Snyder and Thomas 1997, p. 95).

While it is true that all known artistic savants have in fact been autistic, I agree with **McManus**, and indeed it is an important part of my argument, that autism as such is probably not the relevant condition. Rather, what matters primarily is the lack of normal language development that is part and parcel of the syndrome. I stressed in my paper the fact that when Nadia did at last begin to acquire a little language at eight years old, her graphic skills dramatically declined. If Nadia were alone in showing this pattern, it might not mean much. But in fact it seems to be the typical pattern – in so far as anything is typical – of other children who have shown similar artistic talents at a very young age. And it provides strong corroborative evidence for the idea that language and graphic skills are partly incompatible.

**Bahn** is right to point out that there have been exceptions to this general rule. But he is far from right to hold up the case of Stephen Wiltshire as a knock-down counterexample. As I mentioned above, Stephen Wiltshire's drawings are so different in style from cave art that I would never have thought to discuss

them in the present context. But, seeing as **Bahn** makes so much of Stephen Wiltshire's case, I should relay a few of the relevant facts (of which Sacks (1995) provides a good review).

Stephen Wiltshire, like Nadia, was severely autistic as a child and failed to develop language normally. He began to produce his drawings at the age of seven, whereas Nadia began earlier at age three. But like Nadia Stephen still had no language when this talent first appeared. At age nine however he did begin to speak and understand a little. And it is true that, in contrast to Nadia, Stephen's artistic ability thereafter grew alongside his language rather than declined. But what makes his case so different from Nadia's is that Stephen, who was much less socially withdrawn than Nadia, was intensively coached by an art teacher from the age of eight onwards. There is every reason to think therefore that the continuation of his ability into adolescence and adulthood was not so much the persistence of savant skills, as the replacement of these skills by those of a trained artist.

Although **Bahn** quotes me as suggesting that "a person must not have a typical modern mind to draw like that", he must realize it is no part of my argument to claim that no person with full possession of language can ever draw naturalistically – even with training. How could I possibly claim this – given the obvious presence in the contemporary world of countless people with language who have indeed learned to draw perfectly well? Rather, the "draw like that" in my statement clearly refers to the ability to draw like Nadia – in other words, spontaneously, without formal training or access to the cannon of tricks we learn in art school. The point is that for normal people this ability never comes that easily. As Gombrich has written "this imitation of visual reality must be very complex and indeed a very elusive affair, for why should it otherwise have taken so many generations of gifted painters to learn its tricks" (Gombrich 1960, p. 18). But in Nadia's case the imitation of visual reality seems, by contrast, to have been very simple and direct.

Returning to the issue of why Nadia's skills declined, **Bahn** speculates that a more plausible explanation than the advent of language is the death of Nadia's mother at about the same time. But **Bahn** fails to acknowledge that neither of the psychologists who actually worked with Nadia and her family considered this a likely explanation. Nor does he mention (presumably because it wouldn't suit) that Stephen Wiltshire also had a parent die, his father: but in his case the death occurred at the beginning of his drawing career rather than the end of it.

Given that savant skills generally do come to an end, unless perhaps as in Stephen Wiltshire's case there is active intervention by a teacher, is there really any parallel for this in the history of art? On this question I regret that, in the flourish of the final paragraphs, I oversimplified a story that in reality has several complex strands. It is true, as I stated, that at end of the last Ice-age the tradition of cave art in the Franco-Cantabrian region where it had flourished for the previous twenty millennia came to a surprising end. But **Bahn** is right to take me to task for not acknowledging the persistence of rock paintings elsewhere, and especially the newer tradition that took off in Southern Spain about 11,000 years ago and which seems to have links with African art down to nearly the present day.

These later paintings from the Spanish Levant and Africa are so different both in content and style from the ones we have been discussing, that I have no hesitation in reasserting that "the art stopped". But I am still somewhat embarrassed that **Dennett** should take this to be "the critical piece of evidence" in favour of my theory. For I agree I was exaggerating when I wrote that naturalistic painting died out altogether in Europe at the end of the Ice-age, until it was reinvented in the recent middle ages. There are certainly fine examples of naturalism to be found in Spanish-Levantine rock art, and, from a later period, in Greek vase painting and Roman murals (and, further afield, in the rock art of the San bushmen.)

Yet, what kind of examples are these, and what do they tell us? I think it undeniable that, for all their truth to visual reality, they are still relatively formulaic and predictable:

copy-book art that lacks the extraordinary freshness of vision that makes us catch our breath on first seeing Chauvet or Lascaux - as Newson said of Nadia's post-language drawings, "remarkable but no longer unbelievable". And if they have that copy-book feel to them I expect that is because that is really what they are: already we are into the modern era where learned tricks of artistry are having to substitute for the loss of the innocent eye.

I avoided any discussion in my paper of the motivations - individual or social - for creating Ice-age art. But none of the commentators on the paper have been so cautious. And since **Bloom** and **Frith's** observations, especially, are provocative, let me join in finally with my own pennyworth.

Nadia, it seems, drew for the sake of her own pleasure in the drawing. "She drew intensively for varying intervals of time but not for more than one minute. . . After surveying intently what she had drawn she often smiled, babbled and shook her hands and knees in glee" (Selfe 1979, p. 8). But she had no interest in sharing her creation with anyone else. And, as **Bloom** and **Frith** point out, it is characteristic of autistic artists generally that "they produce, but do not show."

This prompts these authors to continue: "It is interesting to speculate about a species, different from modern humans that did not have ostensive communication, yet was able to outperform them in artistic production." But, though I doubt this is what they had in mind, the fact is we already know of many other species that come close to doing just what they suggest: in other words that produce "artistic displays" without any insight into what they are doing or why they do it and without any conscious intention to communicate. And the place where it happens most dramatically and obviously is in the context of courtship and sexual advertisement. The nightingale with its song, the peacock with its tail, the octopus with its dance . . . True, in such cases the aesthetically brilliant display is at some level meant to impress another individual; but the communication is certainly not ostensive nor consciously thought out - rather it is species-typical behaviour that has evolved by sexual selection as a way

by which the artist is able to signal his or her quality to a prospective mate.

Sexual selection is increasingly being recognized by human biologists as having been a potent factor in human evolution. Miller (1998) believes that there is hardly any aspect of human skilled performance that has not been profoundly influenced by the exigencies of mate choice. And **Mithen** (1998) has recently speculated that the main use of Acheulean hand axes by early humans may have been by males to woo females, with the axe being a reliable token of the axe-maker's skills. I would suggest it is quite possible that cave art evolved in this context as well: with painting after painting being produced by fired-up young men (probably men, but possibly women too) as an implicit demonstration of the artists' potential qualities as sires and parents.

Would this be "art for art's sake", as some of the first theorists of cave art argued? Not quite. But it would be art, stemming from the soul and body of the artist, offered like the song of a bird in celebration of a mystery, without the artist needing to be in any way aware of how his own sake was being served.

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