

## Art, Rock Art and Climate Change

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We propose that art, and in particular rock art, may significantly contribute to our understanding of people's conceptions of themselves and of their relation to the environment in times of climate change. As such, a deeper understanding of rock art will support innovative research that can significantly contribute to the exploration of the *human dimensions* of climate change.

While we take it for granted that all claims regarding a given body of art need to have a firm empirical base, we argue that to make full use of this resource means to give an important role to disciplines from the humanities and the arts that focus on interpretation, such as hermeneutics (Moro Abadía, González Morales 2012), art theory (Heyd 2012) and aesthetics (Heyd, Clegg 2005, Heyd, Clegg 2008). We hold that such interpretation is possible without ethnocentrism, notwithstanding the caution that needs to be taken when concepts such as art are imported from our own cultural background to engage with manifestations made by people who, in many respects, must be supposed to be immersed in fundamentally different contexts from us (Heyd 2012, 2013).

We do not, in any case, argue for a causal connection between changes in climate and either the production or the content of rock art, nor do we propose to argue from the content of rock art pictures to their dating in relation to particular climatic episodes in prehistory. We suppose, rather, that dating is accomplished in other ways.

This paper has three parts. We begin by outlining the potential relevance of the arts, for understanding human responses to environmental changes, such as are provoked by significant change and variability in climate, insofar as they may allow us greater access to the mentalities or worldviews of their makers than many other aspects of material culture. We apply this perspective to rock art, particularly from the Pleistocene, and conclude by making some suggestions for future research strategies that exploit these possibilities, appealing to Holocene analogues that may plausibly parallel Pleistocene cases.

### CLIMATE CHANGE, THE HUMANITIES AND THE ARTS

For the most part climate change is being studied from the perspective of the bio-physical sciences, and, as such, involves the use of a diversity of tools and methods ranging from individual observations of unusual weather events, retrieved from historical archives, to statistical analysis of temperatures collected by machines on satellites and observatories on land and sea; from climate analogues of prior historical and prehistoric periods, based on various kinds of proxies such as ratios of oxygen isotopes, to highly sophisticated mathematical models of global climate, which attempt to integrate a great number of diverse, climate-relevant, physical processes.

1) Regarding aims and objectives, one may ask where priorities should be placed. For example, should efforts be focused on persuading governments to commit to and implement mitigation policies? Or on persuading citizens to take individual action on mitigation, even if governments fail to do so? Or should the development of social tools, designed to help people adapt and cope with already inevitable climate change, be prioritised? Or should efforts be directed toward a complete system change in global economics and trade relations? Or should all of these goals be pursued simultaneously?

2) Foggârât is a subterranean tunnel system collecting water at the bottom of a mountain precipice, leading it further into the open land where it can be extracted through sizeable holes in the ground above the tunnel. The Garamantes were a Saharan population located in what today is the Fezzan area in Libya.

3) Notably, both the so-called Mediaeval Warm Period and the Little Ice Age had other, not so favourable or even very unfavourable effects in other regions of the world, as Fagan clearly articulates (Fagan 2008, 2000).

Research concerning the human dimensions of climate change, however, is much less advanced for a diversity of reasons, including lack of funding, uncertainty about methodologies, lack of consensus on aims and objectives, and so on.<sup>1</sup> Recently, the social sciences have gained some ascendancy through the investigation of the factors that are relevant in order to achieve mitigation of, and adaptation to, climate change. This includes a wide-ranging set of areas, including research regarding the value of indigenous knowledge systems about weather, climate, and how to cope with climatic changes (Green, Billy, Tapim 2010). The humanities and arts, however, have so far only played a marginal role, despite their potential value in providing a better understanding of why humanity has reached this point in its history and how we may address its consequences (Rodning 2010).

It would seem rather obvious that, in order to obtain a good understanding of human responses to climate change, a grasp of the cultural dimensions, explored by fields as diverse as history, archaeology, anthropology, literature, philosophy and the arts, would be apposite, since human behaviour is always mediated by beliefs, values, practices, material culture and so on. Moreover, since neither experimentation nor long-term observation of human responses under conditions of climate change is feasible (except in very limited ways, and contemporaneously – thus allowing the process that is to be prevented to take its course), consideration of ‘experiential analogues’ from previous historic and prehistoric periods, may constitute the method of choice to gain an understanding of the effect of climatic change on ways of seeing and acting, and on the self-understanding of people.

In its extreme, such an analogy may reveal that a technology that was successful for a certain period of time still might not prevent the collapse fuelled by climatic factors (Le Quellec on the Garamantian irrigation system of the foggârât, 2006: 182–183).<sup>2</sup> As of late, a number of revealing studies have been undertaken to clarify the role of climate in historical events and processes, possibly contributing to the weakening and collapse – or rise – of state formations and even civilizations (for some cases of collapse, see Weiss, Bradley 2001; for the rise of civilization, see Brooks 2006). Books have been written, for example, on the impact of climate in the Mediaeval Warm Period and the Little Ice Age (e.g. Fagan 2008, 2000). Very recently McGowan, Marx, Moss et al. (2012) postulated changes in rock art motifs in the Kimberley region of northwest Australia from GwionGwion to Wandjina figures as being associated with a period of rapid climate change, but this proposal was critiqued by Peter Veth from a rock art view point (see Egan 2012).

In the context of the study of the human dimensions of climate change, the arts have so far played a very minor role in the completion of the stories of human adaptation to, and exploitation of, climate changes and variations. The development of the arts has indeed been mentioned at times to provide illustrations of wealth circulating in climatically favourable historical periods that favoured good crops in Europe, such as the Mediaeval Warm Period. Brian Fagan, for example, mentions the building of costly Gothic cathedrals or the sponsorship of “*illuminated manuscripts*” and “*ethereal woodwork*”, which demand highly trained professionals and especially skilled labour, and could be supported through the food surpluses of the period (Fagan 2008: 26). In contrast, such activities had to take second place to the struggle for survival during times in which the climate generally was less favourable, as, for example, during the Little Ice Age in Europe.<sup>3</sup>

The arts also receive some mention in connection to climate change variability when imagery contained in visual artworks (generally paintings) is appealed to, as illustrating surprising weather conditions. For example, paintings of hunting scenes in the Netherlands (Pieter Bruegel the Elder, *Hunters in the Snow*, 1565), in which a superabundance of snow is to be seen, are referred to in order to illustrate the fact that climate was considerably different in Central Europe during the Little Ice Age than now (see, e.g., Budde 2001, Jones 2006).

This way of referring to the arts shows how the history of art may provide evidence for changes in society, which themselves may be associated with environmental changes brought about by transformations of climate. To date there has been very little emphasis, however, on the potential

contribution that the arts can make in facilitating a grasp of the self-understanding of people in the face of the environmental changes that they live through. Likely the main reason for this is that, for most periods in recent human history, historians have had available a diversity of other resources for this task, such as more or less objective documentary sources (written texts). If historians, however, were without access to written texts throughout what presently count as 'historical' periods, paintings, sculptures and architectural works certainly would play a much more fundamental role in the reconstruction of mentalities and worldviews.

In any case, when pursuing the human dimensions of climatic changes a thoroughgoing grasp of human perspectives, held during a very much greater period of time than usually studied by historians, is relevant. At least two reasons can be adduced. First, despite the still-prevalent tendency among non-specialists to think of humanity as coinciding with the period for which we have written testimony, anatomically modern humans (as well as their close Neanderthal cousins) have been on the planet for at least 200,000 years. We have, moreover, no grounds to think that the capacity for experience of *Homo sapiens* from earlier times was any the less wide-ranging or deep prior to their integration in urban settings and the development of writing. Rather, given their greater dependence on their environments, people's experience of climatic transformations, for all we know, was in fact more acute than it has been since people took cover in urban systems (cp., for example, Diamond 1999, who argues for the superiority in many respects of Papua Guinean natives over 'civilised' Europeans).

The other reason is that, while we may think that humanity has lived through some very significant changes and variations in climate throughout the Holocene (the last 11,000 years), this period has been characterized by its calmness in comparison to the preceding hundreds of thousands of years, which have been called *The End of Reign of Chaos* (Burroughs 2005). In other words, most periods of significant climate upheaval experienced by human beings occurred prior to the Holocene, which means, however, that there is a very long period of time, of relevance for historians interested in human responses to changes and variations in climate, for which there are no standard documentary sources. This necessitates the use of indirect evidence, available through the study of archaeological remains in combination with the application of retrospective climate science.

The archaeological evidence from the period prior to the Holocene has made possible the reconstruction of complex and diverse cultures on the basis of, for example, the lithic industries, faunal and plant distributions, and so on, evident in the record (see e.g. Finlayson, Carrión 2007). In terms of the reconstruction of mentalities or worldviews, though, reliable resources are scarce. For this reason our best sources probably are, on the one hand, analogues derived from contemporary anthropological research, on the assumption that similar life conditions entail similar lifeways. So, if people in a period of the past had to endure recurrent droughts with a certain set of tools, and did so successfully, we may suppose that their social and cultural capital was based on the same capacity which we find among human groups exposed to similar circumstances in more recent periods for which we have anthropological evidence.

If, on the other hand, we are to rely on actual evidence from pre-historical periods, it would stand to reason that the more intellectually demanding, emotionally expressive, spiritually significant, meaningfully elaborated and technically advanced, manifestations would be the best sources to grasp people's mentalities. In the absence of written sources, extant *art* manifestations offer themselves as the best alternatives because the multi-level encoding of perception, cognition and intentional communication of art can hardly be gleaned from any other source. The potentially high degree of informativeness of art means that parietal art on rock surfaces and portable art may be important resources if we are to obtain a reasonable grasp of the human perspectives during periods of significant climate change and variation. This is agreement with Mithen (1996), who called for ecological interpretations of Palaeolithic art, demanding an encompassing view of as many archaeological sources as possible in order to understand art as "*acting as the stimulus for creative thought about the future (...) creating multiple scenarios of future worlds*" (1996: 95). His proposal is that both art as stimulus for creativity and as encyclopaedic memory, stored within the art

(Mithen 1996: 86), were important cornerstones of human adaptation to ice age living conditions and changes.

The testimony of art would seem to be especially relevant in view of the problematic fact that we cannot determine whether changes and variations in climate would have been noticeable within the life spans of any one individual. Consequently, art gains weight as a source since, through its foundation in beliefs and traditions that are *of generation-spanning persistence*, art opens access to the *longue durée* of cultural percepts (Braudel 1958, Clottes 1999a, 1999b, argues that French cave art shows that beliefs and attitudes may have lasted for many thousands of years).

## PREHISTORIC ART: AN OVERLOOKED SOURCE FOR RESEARCH?

To some, there seem to be reasons to *limit* our reliance on art as a source of information because of the well-known problems represented by the distortion of its concept through the 'high art' tradition in European culture, its consequent normative implications, and the pervasive problems in determining the adequacy of the interpretation of its particular manifestations (see Heyd, Clegg 2005, Heyd 2012). Given the dearth of other richly informative sources in pre-historic contexts, however, its potential utility should not be dismissed out of hand.

To begin, we may ask the question: to what extent *can* art, reasonably, be relevant for an understanding of the mentalities of prehistoric people? This is a reasonable question to pose if we assume that art is limited to the margins of human life, produced only by unusually gifted individuals, and that most people are mostly occupied with the everyday of making a livelihood, including, e.g., cognitive scoping of one's proximate environments, socialization, and, over long periods, the eventual improvement of tools that would make life a little easier. The assumption that art-making was marginal, however, is not supported, since we have reason to believe that artistic activity, at least in terms of the painting of bodies, production of necklaces, decoration of habitations, engraving of cupules and so on, was commonplace from time immemorial (see e.g. Taçon 2006, regarding body painting, Dissanayake 1992).

Moreover, one may initially suppose that the role of art in life, and its capacity to represent people's mentalities, is minimal even in contemporary times, if one thinks of art solely in terms of 'high art', as present in art galleries, opera houses, or high literature. More open-ended ways to think about art, however, seem quite reasonable, once we move away from the limited (and limiting) concept of high art, elaborated in the 19<sup>th</sup> century, and accept a description of art that is adequate to the plethora of artistic manifestations the world over, throughout the ages. It is beyond the scope of this paper to develop this topic here, though it seems clear that art has to do with modifications of spaces, processes, events or objects that in some way have become perceptually enriched (Dissanayake 1992) such that they transmit further perspectives, afford further experiences, and facilitate further engagements, beyond their apparent instrumental value (also see Heyd, Clegg 2005).

Notably, people don't just act to survive and reproduce in the most cost-effective, low-energy, way, as we may mistakenly assume based on popular, reductionist, evolutionary accounts. In fact, people use make-up, carefully choose their mode of dressing, engage in 'body-building', even tattoo their bodies; they dress and participate in the choreographies of sport, dance and shopping; they choose particular architectural designs for their houses, engage in gardening, decorate their houses, make elaborate meals. Even everyday ways of communicating are overlain with artistry, which we only take note of in rare moments of leisure: while the art of letter writing may have become rare, messaging, texting, twittering and making Facebook entries today comes with a vast choice of icons and smileys to visually upgrade what otherwise would be plain text.

Viewed in this broader way it turns out that, at least in the contemporary world, individuals and communities tend to use artistic means of varied sophistication all the time to communicate their stance with regard to each other, concerning the human groups and environment in which



they are embedded, and regarding the human condition as a whole (see Lenssen-Erz 2012 for a prehistoric case study). So, even if, in the normal course of the everyday, people can be prompted to give 'objective' information about themselves and their environment, their attitudes, mentalities or worldviews, and overall behavioural outlooks nonetheless normally also show evidence of the use of 'artistic' modes. Furthermore, the consumption of art, in terms of the products of popular media, such as music, television and film, probably constitutes one of people's most significant uses of non-productive time (as soon as the basic needs of livelihood are covered, Maslow 1970). This is confirmed by surveys that show that the viewing of television occupies a very substantial part of conscious daytime among a majority of our urban contemporaries.<sup>(4)</sup>

Certainly, the adjudication of these contemporary products and activities to art may be debatable. Here we do not pretend to settle this issue, but it seems clear enough that peoples from all times likely engaged in creative activities that did not have a direct utilitarian use, and that these activities probably constitute an important marker of their mentalities or worldviews. We shall not attempt to settle here the identifying marks of art either, but want to appeal to a feature that typically has been attributed to artworks, and which would also give us grounds to think of objects from the prehistoric context as falling under this category. So, as an initial working hypothesis we propose that objects, events or processes that are understood to be art are distinguished from the remainder of objects made by human beings by their characteristic, perceptually accessible, 'excess of meaning'.<sup>(5)</sup> What we mean is that, notwithstanding the particular uses in practical (utilitarian), ritual, legal, or moral contexts of the objects, events or processes under consideration, their presumed art status is correlated with the supposition that they contain more meaningful information than required to carry out the function or task in question.<sup>(6)</sup>

Our fundamental claim is that, in virtue of their apparent 'excess of meaning', such objects, events and processes transmit, in a more or less deeply inflected way, part of the lived experience of members of particular human groups, and consequently betray particular viewpoints on lifeways and mentalities, that is, on ways of seeing self and one's place in the world of one's time. The consequence is that art, as a token of people's agency, always already represents its makers as subjects, insofar as artworks are intentional marks in space-time that, through their inherent reflexivity, point back at their makers.

This is evident in a variety of ways. Representations of the Virgin Mary in Peru created during the Baroque period, for instance, were given certain traits (not present in their European counterparts), that have since been identified with features of the religious and everyday world of the *Native* people who painted them. In this way, the paintings betray how Catholic doctrine had been trans-culturated by subaltern peoples who had come under the sway of colonial hegemony (also see Heyd 2007). It has similarly struck many observers, for example, that an Upper Palaeolithic atlatl or spear thrower may be decorated with the highly expressive representation of a lion, which seems to indicate a number of things about the mentality of its maker: she or he had to employ aesthetic and artistic judgment, had to choose which animal was to be represented and in which particular mood and whether it would be appropriate for the context of its use, and so on.

The 'excess of meaning' of artworks does not only implicate its makers as subjects, but also points toward a shared, social-communicative context, since all meaning is dependent on systems of meaning, even if the particular representation is intended as an expression of a purely personal perspective. As Wittgenstein (1953) and Saussure (1983) have long ago argued, the meaningfulness of any part of human discourse is dependent on a pre-existing language or system of signs, such that a difference in utterance or gesture may make a difference in meaning. This is a notion that largely can be extended to communication through artistic manifestations.

None of this is intended to settle the question whether some particular object, process or event counts as art (but see Heyd, Clegg 2005, Heyd 2012, for further discussion). It only points toward some features that make those things, that through their apparent 'excess of meaning' identify themselves as equivalent to artworks, worthy of exploration for the potential access that they may give to the worldviews of their makers and the human groups in which those makers were embed-

4) Television programming, which utilises all the forms of perceptual enrichment possible for this medium offers more (or something else) than objective information, even if we may be reluctant to grant 'high art' status to its output.

5) We borrow this term from Baudrillard (e.g. Baudrillard 1994: 79-86), though his use of it is quite different from ours.

6) We are aware of the fact that for some readers the term 'excess' may imply a negative normative judgement. We do not, however, intend to transmit this meaning. By using this term we would like to transmit, rather something in parallel to the 'excess of care' noted with regard to everyday use objects, such as knives, which has led researchers to suppose that other aims, e.g., aesthetic or religious, may be posited. In this respect, the approach is akin to what has been called the "costly signaling theory" (Blige Bird, Smith, Bird 2001, Blige Bird, Smith 2005). It is also related to the notion of "artification" or "making special" used by Dissanayake (1992) to distinguish art from other artefacts. There are differences among these approaches and the key idea of "excess of meaning" discussed here, though, which it may be worthwhile to discuss at some other time.

ded. Given that much rock art, especially much of the Pleistocene art found in Franco-Cantabrian caves, would seem to offer an abundant 'excess of meaning', we propose that these manifestations potentially may constitute a very rich way of accessing the self-understanding of their makers.

As these makers of rock art quite likely would have understood themselves as integrated with their natural surroundings, their environment with its particular local features may, furthermore, be expected to have found reflection in their artworks.<sup>7</sup> Since art constitutes a kind of interaction with, or discourse on, our world, rather than a strict report or a description of actual conditions, we may assume that rock art presents people's lived-in environment in terms of an artistic rendition of its tangible, as well as intangible, forces.<sup>8</sup> This being said, we are not herewith pretending to offer a developed theory of the role of rock art in people's perception of their environments, but only intend to offer some reasons for taking seriously the suggestion that art may serve as a valuable research source in the context of the exploration of the human dimensions of climate change (see Rodning 2010).

## PROPOSALS FOR FURTHER RESEARCH

Further challenges in using rock art as a source for understanding human responses to climate change have to be considered. First, the uncertainty of dating rock art is a constant threat to accurate association of sites to particular populations of a certain period. It may be unclear, furthermore, how any presumed association of rock art pictures to particular periods is to be understood if we are unclear about the range of relevant interpretations of the images themselves. We need to suppose, moreover, that, even if any particular trait (such as a motif or style) is successfully identified with a particular period in the rock art record, such traits will be underdetermined by climate fluctuations or changes, given the perceptually slow appearance of the latter and the press for representation of other, more salient, elements of social and ritual significance. This difficulty is illustrated, for example, in Sauvet and Włodarczyk (2008) who have shown that the structural principles of motif choice in south-western European ice age art remained stable throughout the Upper Palaeolithic. Clottes, moreover, has argued that the evidence from Palaeolithic cave art from Southern France shows that the attitudes to caves, and the general pattern of behaviour with regard to them, remained constant for about 20,000 years (Clottes 1999a). So, what kind of information about the way humans stood in relation to environmental transformations provoked by climate change may we obtain? Despite these complications we may find that certain associations may turn out to be of explicative value.

In particular, we propose the consideration of associations between, on the one hand, important changes or variations in climate, and, on the other, a) the appearance or disappearance of particular motifs, b) significant increases or decreases in variability of motifs or styles over a certain territory, c) over time, the production of rock art, and the discontinuation of such production, in areas that in principle are suitable for such production in terms of materials (wall space, painting or engraving surfaces and materials), and d) the utilization of particular motifs in time periods in which their use would seem surprising, given the actual environmental conditions that prevailed during the production of the art.

As noted from the start, the goal, in any case, is *not* to find a systematic correlation that may indicate causation of artworks under particular climatic changes, even if this would be interesting, but rather, to survey in which ways the production of rock art is sensitive to climate change and, as far as possible, to interpret such sensitivity. There are case studies from the period subsequent to the Pleistocene that may be illustrative. For instance, with regard to new motifs, Paul Taçon, Meredith Wilson and Christopher Chippindale (1996) showed how the introduction in rock art of the motif of the Rainbow Serpent in Northern Australia probably reflects changes in mentality during the Pleistocene-Holocene transition. They suggest that the new Rainbow Serpent motif appears to

7) In fact, their relationship with their natural surroundings likely will have been part of their identity, which itself would have been further formed, negotiated and communicated through art production.

8) Notwithstanding the apparent disparity between the proportions of representations of certain animals in the rock art record and the proportions of the animals themselves in the wild at the respective times. It may well be that, notionally, certain animals had a higher importance than others (because they were relevant for the self-identity of the group, for example), even if actual encounters would have been few (e.g. Lewis-Williams, Dowson 1989: 118-141).



Fig. 1  
The Rainbow  
Serpent painting,  
Lakefield National  
Park in Queensland  
(Australia).



be connected to a context in which the effects of climate change led to tensions and conflicts. They conclude that the widespread presence of the image of the Rainbow Serpent, shared across diverse territories, may mean that it served as a socially unifying symbol.

It has been suggested, moreover, that significant increases in variability of motifs or styles over a certain territory constitute evidence for greater territorialisation, such that at least some of the art content served as a distinguishing symbol. Such a strategy may in part be a response to shrinking resources due to climate change as can be observed in middle Holocene Sahara (Lenssen-Erz forthcoming). A suggestive case comes from the early Holocene, in connection with a drying up of the landscape in the York Peninsula (in NE Australia) after a long period of high levels of precipitation. In this context, David and Lourandos (1998) have argued for an association of increased regionalization of rock art styles with greater territorial control patterns. Smith and Ross (2008), moreover, have raised the question whether the increase in rock art complexes, the increase in motif diversity, and the greater differentiation between rock art complexes, in Central Australia in the period 1500–1000 BP, may be a consequence of interactions with ENSO-driven climate variability.<sup>9</sup>

The supposition that the production of rock art may be associated with particular modes of occupation of territory (Lenssen-Erz forthcoming) also seems to be evidenced on larger time scales, spanning major changes and variations in climate. Barton, Clark and Alison (1994) have argued that in Europe, in relation to the generalized temperature downturn and the latter upturn phases during the last glacial period, significantly greater production of rock art (in contrast to portable art) seems associated to the ‘refuge’ period, characterized by increases in population aggregation. Interestingly, d’Errico, Vanhaeren, Sánchez-Goñi et al. (2001) have argued for the direct correlation between increased Franco-Cantabrian rock art production and the Heinrich 2 event (which caused a global change of climate by affecting the thermohaline circulation), even though the more proximate causal link may have rather been the accessibility of caves in the area.

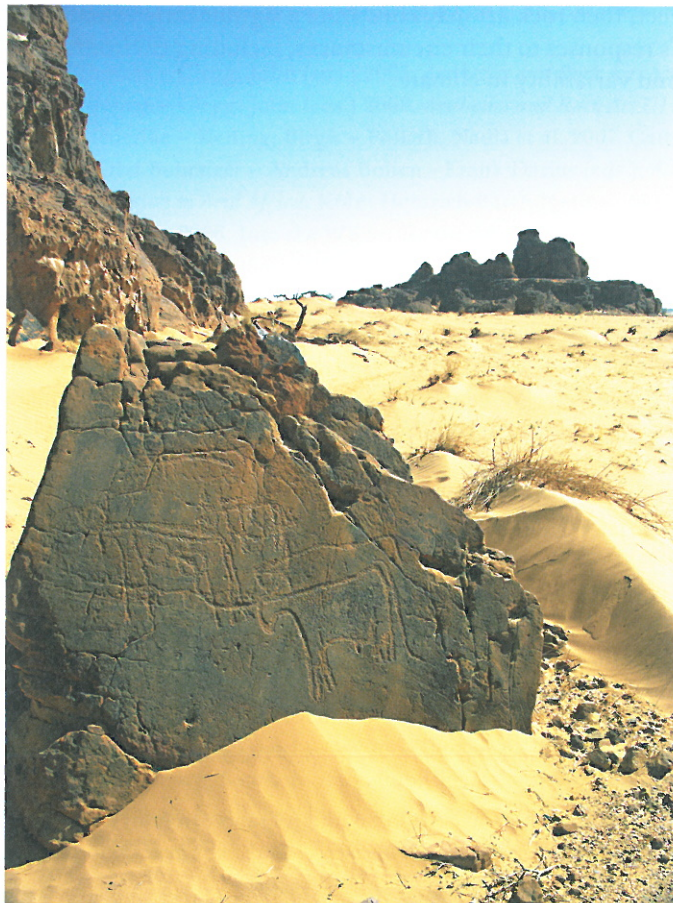
9) ENSO stands for El Niño Southern Oscillation.



The absence of change in motifs and the continuity in rock art production, despite significant climate change, also may tell us something about the mentalities of the makers of such manifestations. As a case study from the Holocene we may consider the rock art from the Sahara, which one of the authors (Lenssen-Erz 2007, 2012, forthcoming) has recently studied. In the fourth millennium BCE, cattle pastoralists started to settle the Ennedi Highlands in Eastern Sahara when climate deteriorated after the Holocene climate optimum. As Kröpelin, Verschuren, Lézine et al. (2008) have shown for the Ouninaga region (only 250km north-west of the Ennedi), annual precipitation declined from 250mm around 4000 BCE to 150mm at c. 2300 BCE until, around 700 BCE, it reached the level of 50 mm that prevails until today. Throughout this time these pastoralists made representations on rock (pictographs and petroglyphs), which favoured cattle as a primary motif. Cattle, in fact, had enormous socio-economic, cultural, and environmental importance for these people, as can be deduced from archaeological and rock art evidence (Jesse, Keding, Pöllath et al. 2007, Keding, Lenssen-Erz, Pastoors 2007). From the beginning of their presence in the area these herders had to face the environmental degradation of their lifeworld to a condition suited for camel nomadism or at best small stock herding but not for cattle herding. Nevertheless, their symbolic repertoire continued to be focused on cattle and they even stopped representing goats, which are much better adapted to the then prevailing aridity and which must have had more economic weight than their neglect in the art would suggest (see e.g. Le Quellec 2007: 182).

It seems that art production was part of a package of means counterbalancing climatic deterioration with 'soft skills', which entailed the application of social, communicative or emotionally relevant measures, while possibly ignoring the necessity to react with 'hard skills', which may have demanded radical change in herd compositions and moving out of the area. The ideology of priori-

Fig. 2  
Ennedi Highlands,  
Chad - cattle in  
the desert. Rock  
art may reflect  
climate change in  
unexpected ways.  
Cattle engravings  
between 3000 and  
5000 years old.





tizing cattle in the representations was confirmed with every new picture, thus constantly renewing the consensus on these epistemes with additional artistic behaviour. (We speculate that following these consensual aesthetic norms made actual matters of concern “good to think”, i.e. good to understand and remember, even if it meant that the representations idealized the faunal landscape of the actual climatic conditions.) This mismatch of representations, on the one hand, and actual domesticated fauna (those possible to keep under changing climatic conditions), which lasted for some centuries, on the other, possibly enhanced the resilience of this society under conditions of climate change. Yet, in the end, of course, the wheel could not be turned back, and the ultimate response to climate change partly was for people to move into more favourable regions, and partly to adapt to the new economy of camel herding.

## CONCLUSION

Certainly there are many questions left open by the approach proposed by us here. We may ask, for example, whether, during the Pleistocene, art may have constituted a behavioural adaptation through unconsciously evolving processes, or whether art could provide some kind of epistemic counterbalancing against instabilities caused by climate change, or whether art may have supported the postponement of radical adaptive changes. Irrespective of the answer to questions such as these, we can conclude that artistic behaviour likely reflects the interplay of the cognitive dispositions, emotional make-up, and practical skills, manifested in the presence of the particular conditions for the production and reproduction of life that human groups have had to contend with in times of environmental change. If this is correct, then rock art may constitute a significantly valuable resource for our understanding of people's responses to their circumstances, including environmental transformations provoked by changes and variability in climate.

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