

The Animal Within


The Triple Inheritance of Late Pleistocene Rock Art

Abstract This contribution examines the multispecies matrix of parietal art-making in early human evolution. I draw on *New Materialism* and *Human-Animal Studies* and deploy the archaeological evidence from Upper Palaeolithic Franco-Cantabria and Late Pleistocene and Holocene rock art of South America to argue that our understanding of the origin, assembly and motivational background of this imagery can be enhanced if we begin to explore the active involvement of rock formations and nonhuman animals. Building on theoretical insights from Jane Bennett and others, I suggest archaeological evidence for parietal art-making supports the view that rock art is often a hybrid phenomenon and its genesis linked to shifting human-nonhuman assemblages and their varying ‘conactivisms’. Rock art frequently carries a triple inheritance – human, mineral and animal – and as such delineates a human-fashioned synthesis of nature and culture, where natural potentialities and agencies meet situated human behavioural and cognitive horizons. This alternative apprehension of early rock art has important consequences for the evolutionary status of human art-making. Rather than signifying a fundamental withdrawal from nature as encapsulated by the traditional image of the *Homo pictor*, image-making emerges as a powerful ecological practice with the potential to re-configure human-nature relations and to re-insert ‘nature’ into ‘culture’.

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Introduction

Pleistocene rock art is increasingly recognized as a global and universal human cultural heritage. Ongoing archaeological research is not only revealing that this kind of art-making¹ stretches back much further in time than previously thought (Pike et al. 2012; Hoffmann et al. 2018), it also shows that pre-Holocene rock art was widely distributed across the globe (Aubert et al. 2014; 2018a), spanning multiple continents and emanating out of varying material culture ecologies, with every new discovery, such as the hitherto earliest unambiguous hunting scene identified in Indonesia (Aubert et al. 2019), challenging the current *status quo* and considerably expanding the available body of knowledge (Roebroeks 2014). Whether or not these incipient image worlds are to be considered a hallmark of percolating anatomically modern *Homo sapiens* populations or (also) bear the legacy of other now-extinct Late Pleistocene hominin phenotypes, such as the Neanderthals, Denisovans or the recently proposed *Homo luzonensis* from island Southeast Asia (Détroit et al. 2019), remains a hotly debated issue (e.g., Aubert et al. 2018b; White et al. 2019). Although the contested hominin origin of Late Pleistocene rock art is a fascinating topic, with new early-dated evidence from Asia putting more and more pressure on the traditional single species model of art-making, the aim of this contribution is primarily to square the debate and to point towards the all-too-easily overlooked ‘more-than-human’ background of early parietal art-making practices. While there is good reason to view rock art as a quintessential human material, technical and aesthetic production with deep-historical roots, there is also an emerging consensus that nonhuman forces such as the implicated rock cavities themselves (e.g., Lorblanchet 2007; 2010; Robert 2007; 2011; 2017; Hussain 2013, 88–95; Pigeaud 2013a; 2013b; 2018), but also other animal agents, contributed substantially to the genesis, design and development of some Late Pleistocene image worlds (e.g., Hussain and Floss 2015; Porr 2015; Lorblanchet and Bahn 2017, 226–230; Hussain 2019; 2021).

This paper re-visits the influential notion of the ‘participating cave’ (*Cavernes participantes*), originally put forth by Leroi-Gourhan (1965; 1971), and revises its conceptual ramifications by drawing on nascent insights from *New Materialism* (e.g.,

1 Although employing the term ‘art’ in non-Western and/or pre-modern cultural contexts has been rightly criticized on numerous occasions (e.g., White 2003), and *visual culture* is probably the much better rendering (Conkey et al. 1997; Nowell 2017), I wish to conserve the field-specific connotations conveyed by the coinage of ‘rock art’ or ‘cave art’ here, insofar as both call attention to the distinct material substrate or medium on which early imagery is realized. I fully recognize that a contemporary understanding of art, e.g., implicating a separated sphere of action and consumption, a specialized artist, and – in the words of Danto (1964) – a larger, internally differentiated ‘artworld’, can easily mislead the archaeologist or image-anthropologist. Nonetheless, ‘art’, or ‘visual culture’ more broadly conceived may also be defined in a less-pretentious and narrow manner simply as a unique sphere of technical, aesthetic and cultural production (McIver Lopes 2007). Nonetheless, we have to be extremely cognizant, and epistemologically vigilant, about the possible colonial and normative underpinnings of the term ‘art’. Only an inclusive, flexible and amendable notion of art – as for example put forward and defended by Porr (2019) – can serve as a remedy here.

Henare et al. 2007; Bennett 2010; Coole and Frost 2010; Witmore 2014) and other momentous currents of *Speculative Realism* (e.g., Harman 2010; Bryant et al. 2011; Austin et al. 2012). I begin with a brief sketch of the philosophical motivation of this broader enterprise, criticizing the Western anthropocentric conviction that continues to overshadow most attempts of understanding early rock art. I subsequently turn to the idea of the participating cave and explore its connection with emerging approaches to the materiality and agency of caves and rock formations. I then introduce animal others as yet another layer of nonhuman agency and affectivity contributing to the formation, topology and design of early parietal art-making by drawing on the growing corpus of theories, concepts and insight from *Human-Animal Studies* (e.g., Haraway 2007; Kirksey and Helmreich 2010; Ogden et al. 2013). By bringing archaeological evidence from Franco-Cantabria and South America into productive dialogue with these emerging perspectives and theories, the paper develops a new argument for the triple inheritance of Late Pleistocene and Early Holocene rock art. This account not only offers a novel reading of the immense diversity and substrate-specificity of early rock art manifestations, it also facilitates the emphatic recognition of the embedded and ecological nature of rock art phenomena, and de-centres our interpretations from the supposed hominin protagonists. I finally consider the extent to which our understanding of this triple inheritance of early rock art benefits from a discussion and critical articulation of ‘naturecultures’ – a concept presently gaining currency across the environmental humanities – and briefly examine the consequences of my account for the place and significance of image-making in human evolution.

Beyond Philosophies of Access

Albeit *Speculative Realism*, a prolific current of contemporary Continental-inspired philosophy (Harman 2010; Bryant et al. 2011), is a highly textured, heterogeneous and ultimately dispersive enterprise (Morelle 2012), most of its branches, affiliates and figures share a conviction to overcome a series of long-perpetuated Western conceptual prejudices (Sparrow 2014; Morton 2017). The thrust of the critique is directed at the deep-seated philosophical legacy of Descartes and Kant, who are both diagnosed to foster ‘correlative’ thinking and various ‘philosophies of access’ (Latour 1991; Meillassoux 2008; Harman 2010; DeLanda 2016). The former motivates correlationism, which, according to French philosopher Meillassoux (2008), posits that we can only ever hope to have access to the positive, reactive interaction between thought and being and never to any of the two in isolation. The problematization and denial of so-called ‘philosophies of access’, schools of thought that stress the supreme epistemological vantage point of humans and their privileged position as knowing entities over other organisms, takes a similar line, making space for non-anthropocentric forms of knowledge and understandings of reality that do not back away from the limits of the human, however conceived (Harman 2010; Bryant et al. 2011). The leading intuition of *Speculative Realism* is that there must be much more to the world than we can grasp simply by employing human categories and default perspectives, recognizing the possibilities of being-different, otherness and radical ontological alterity (Meillassoux 2008). The anthropomorphic rendering of non-human entities such as rivers, stones and animals – sometimes stigmatized as the ‘pathetic fallacy’ (Ruskin 2001) – is a common

symptom of correlative reasoning and its many excesses. Speculative realists are fundamentally concerned with dismantling this reification of human experience and thought, yet also never become tired of underscoring the ongoing co-fabrication of reality through heterogeneous forces and the experimental weaving of myriad resonating but often-conflicting strings of existence. *Speculative Realism* foregrounds the richness, uneven topology and multidimensionality of the world and its many lived realities, and promises to finally defuse the spectre of anthropocentrism, which haunts the Western intellectual enterprise since its early days.

Material Inheritance

While there is no doubt that rock art, and visual culture more generally, is primarily an *artefact* and by extension owes much of its existence to a hominin producer, narratives on the catalytic role of parietal art expressions in the ‘civilisatory’ process² and the making of humanity as we know it today tend to perpetuate a concept of prehistoric art-making that excludes or at the very least greatly downplays the contribution of nonhumans (cf. e.g., Bahn and Vertut 1998; Bahn 2006; Renfrew and Morley 2009; Petrognani 2013; Guy 2017). In part, this overemphasis of the anthropogenic character of ancient rock art is rooted in the long-standing proclivity to search for the *meaning* of Pleistocene images (for a similar critique, see already Conkey 2009) and discussing early visual culture in relation to the *cognitive* capacities of its makers (see esp. Mithen 1996; 1998; Clottes and Lewis-Williams 1998; Lewis-Williams 2002; Hodgson 2008). What these two influential and authoritative prisms have arguably belittled, however, is a broader, theory-driven concern with the *genesis* and *ecology* of early rock art. This is certainly ironic given the demonstrated aptitude of archaeology to make an important contribution on both of these fronts (e.g., Delluc and Delluc 1984; Lorblanchet 2010; Fritz and Tosello 2015). The traditional approach to parietal art has consequentially foregrounded the representational, emotive and expressive qualities of rock imagery and routinely pondered about their correlational references, delineating an ontological space in which the rocks and cavities *presenting* the images are at best delegated to a role as mere ‘media’ or ‘outlets’ of human ingenuity (Jones 2017). The rock body becomes a resource for art-making. The continuing pre-occupation with rock art in terms of cosmology, magic, religion and, more recently, shamanism (Clottes and Lewis-Williams 1998) further tends to reinforce deep-seated nature-culture stereotypes (cf. Dowson 2007) and to cast early image practices as imbuing dead and meaningless matter with significance and a cultural life, which is not, strictly speaking, their own. Non-signified matter is viewed as inert and passive, whereas art-bearing matter emerges as efficacious and as a crucial history-making

2 With Elias (2000), the ‘civilizing process’ consist of coupled *sociogenesis* and *psychogenesis*, eventually leading to profound changes in human behavior linked to the formation of the state and the emergence of civil societies at the end of the 19th century in Europe. Pre-historic art is often presented as a landmark precondition, a first stepping stone, for this modernity-making development. Note, however, that such portrayal of the significance of early art-making typically remains Eurocentric, presupposes strong evolutionary directionality, and primarily addresses the human.

device. The result is a reprehensible ignorance of the difference-making capacity of the rocks themselves.

The French tradition of rock art research potentially offers a way out of this dilemma. There is a long-standing recognition among French scholars that a cave or rock shelter is anything but a passive canvass for signs and pictures, but rather co-constitutes the rich image worlds we collapse within the term rock art (Lorblanchet 2000, 200–213; Pigeaud 2007; 2018; Bon 2009; Robert 2017). The inherent and genuine activity of matter and the self-organizational capacity of rock art (Pigeaud 2013a) was famously brought to prominence by Leroi-Gourhan's notion of the *Caverne participante* (1965; 1971), subsequently refined and expanded by Lorblanchet (1994; 2010). The fundamental, yet still underappreciated insight furnished by this dynamic research trajectory is that the form, structure, design and spatial organization of early parietal images cannot be separated from the rock matrices on which they are documented (Bosinski 2003; Lorblanchet 2010; Fritz and Tosello 2015). In the words of Bon (2009, 293, my translation), 'putting cave art into context has shown that the cavity [itself] is an essential actor in the development of its decoration'.

As Lorblanchet (1994) and others have shown in some detail, there is a pervasive connection between the 'mode of using' a cave in terms of both parietal *décor* and other practices not directly linked to the fabrication of imagery and the physical and perceptual qualities of the interior cave environment itself (Tosello and Fritz 2004; Robert 2007). Pastoors and Weniger (2011) have made a similar point when calling attention to the structured atmospheric conditions – including lighting, movement possibilities and visual affordances as well as chamber acoustics and anatomy – in relation to different parts of art-bearing underground and/or semi-underground cavities. These factors play a more-than-anecdotal role in the formation of early rock art and are constitutive of the various operational schemes employed by art-making hominins. It is indeed easily overlooked that *chaîne opératoire* theory framing much of this research explicitly recognizes the active and resonating role of the worked materials (Lemonnier 2012), underscoring the dialectic relationship between mind, technique and matter (cf. Hussain 2018; Hussain and Will 2021). The 'contextual turn' within rock art studies more broadly (e.g., Conkey 2010, 275) thus arguably paves the ground for a careful re-assessment of the agency and materiality of rock surfaces and cave interiors.

Recognizing caves, rock shelters and other rock formations as potential actors in the process of parietal art-making does not level their contributions with past hominins who deliberately ventured into these places and chose to engage with them, mediated by their sociotechnical horizons, in particular ways and not others. The agency of rock environments, in other words, is most likely of a different kind than human agency and it is important to acknowledge this fact right at the start. Rocks are non-intentional agents and their agency has less to do with deliberation than with entrapping or enchanting (*sensu* Gell 1992; 1998), and thus with making a difference with respect to those who interact with them. Rock configurations provide a range of specific material, cognitive and perceptual affordances and enact a drawing power that incentivizes receptive actions instead of non-receptive ones. This action is *indirect*, however, and the power dynamics between caves and hominins are unequal. Ling and Cornell (2010) for example try to acknowledge this circumstance by treating rock art

as a 'secondary agent'. Regardless of how precisely rock agencies are conceptualized, however, the biophysical and atmospheric character of cave interiors can fundamentally influence and shape parietal art expressions on various levels and spatial scales (Vialou 2004).

Rocks have poietic qualities (from the Greek word *poiesis*, which means 'to make'): they can for instance initiate human-cave interactions in the course of which something is 'brought into being that did not exist before'. I call this capacity *geopoiesis* to acknowledge the field-specific dispositions of rock formations to catalyse, mould, and scaffold the behaviour of others agents.³ Geopoiesis breaks down untenable nature-culture dichotomies, so that 'nature is no longer fixed at a distance but emerges within the routine interweavings of people, organisms [and rocks] as these [iteratively] configure the partial, plural [and sometimes tension-ridden] spacetime matrices of everyday living' (Hovorka 2008, 97). With Bennett (2010, ix), we can begin to cherish a view of 'vital matter' that counteracts human hubris and the consumptive and instrumentalizing fantasies of the industrialized West. Rocks can then come into view as 'affective bodies' constantly affecting but also being affected by other bodies that permeate and/or enter their local environment, including hominins – a mode of action that Bennett (2010, 23) refers to as 'conactivism'.

Following Bennett's seminal exploration of thing-powers (2010, 1–2), it seems important to distinguish between the negative power of rocks – their 'material recalcitrance' – and their positive, generative powers, if only to free our renderings of matter from their overly deterministic and mechanistic underpinnings. The key to better understanding positive rock-powers is to examine how rocks *connect* to humans, how they *infuse* human behaviour and creativity and how the possibilities they open up *overlap* or not with human horizons. This analysis of human-cave conactivism benefits from a discussion of the interplay between the material and the virtual (esp. Meillassoux 2011), and how the latter – most notably through field-specific capacities, potentialities and tendencies (DeLanda 2015) – modulates the realization of image forms, patterns and compositions (cf. Grosos 2017).

In sum, the material inheritance of early rock art is often underestimated, yet provides a potent agential and motivational background of art-making. There are undoubtedly a myriad of ways in which material factors can influence the human lifeworld and intervene with human action, but scholars have only started to explore these aspects in connection to Pleistocene image worlds, let alone through the lens of *New Materialism*. As I have tried to show in this section, there is much untapped synergetic potential between research into prehistoric rock art and the nascent body of material agency theory and 'ontological' thinking (Herva and Ikäheimo 2002;

3 The inspiration for the term *geopoiesis* comes from Bachelard's seminal phenomenological theory of space and dwelling, initially formulated in *La poétique de l'espace* (1957). Now considered a milestone in architectural and spatial design, the theory posits a close link between the physical make-up of spaces, human modes of dwelling and the imaginary power of specific locations. Bachelard's relational understanding of spatial significance with a particular focus on imagination paves the ground for recognizing the active contribution of natural spaces – in terms of a distinct form of making (*poiesis*) – to the (human) cultural histories they anchor in space and time.

Jones 2017); archaeologists have now moved into the unique position to make a substantial contribution to the growing multidisciplinary endeavour of de-centering our deep-historical narratives from the human, to fully recognise the active involvement of different nonhuman forces in the construction and perpetuation of the deep past, and to ultimately expose the implicated modalities and temporalities.

Animal Inheritance

There is a long-standing consensus in rock art research that animal agency features as a key inspirational background for many early parietal practices (e.g., Mithen 1999; Tosello 2003; Shipman 2010; Lorblanchet and Bahn 2017), given that the large majority of iconic motives from the Pleistocene refers to animals, while humans, landscape components and other environmental qualities such as weather or climate seem to play much less important roles, at least in numerical terms (Sauvet 2019). Still, animals are not merely important when the thematic and symbolic content of early parietal art is considered, their behaviour, ecology and action is often implicated in the composition and design of the imagery and they actively participate in the fashioning of the various rock formations and underground environments on which the art can be found (Lorblanchet and Bahn 2017, 226–230). The overlay between the materiality of rock art, the latter's structure, form and design, as well as the affects and affectivities of animal others thus provide a potent 'conactive' matrix for the emergence of particular images. Again, the involvement of animas can take different forms and their interference introduces a subaltern mode of agency with a wide range of possible effects, yet the accruing 'contact zone'⁴ inevitably transforms the conditions and dynamics of human-rock interaction, and hence art-making. At least three axes of human-animal-cave conactivity may be explored in this regard:

1. *Rock formations and underground cavities as a living space for animals.* Even though this point may sound tautological to some, the rock environments in which early parietal art is encountered are far too often and readily cut off from the web of life in which they are enfolded and thus are effectively treated as a hollow physical container. As material media of image-making practices, rock formations and deep caves are easily cast as Newtonian space-time grids, in which each rock mainly occupies a unique geolocation. This view obstructs the relational qualities of rock structures, which are intimately entangled with the life cycles of various living organisms including fungi, animals and plants. These relationships, often mutualistic in character, can be critical, however, not only for the workable qualities of the rock surfaces

4 According to Pratt (2008, 7), 'contact zones' delineate a 'social space where disparate cultures meet, clash, and grapple with each other, often in highly asymmetrical relations of domination and subordination – such as colonialism and slavery, or their aftermaths'. Haraway (2016) co-opts this notion to describe the interstices of multispecies encounter and to theorize how biocultural and interspecies synthesis is made possible within specific historical contexts (see also Wilson's (2019) application of the notion in her critical multispecies scholarship on Empire and oceans).

in question, but also for the experiential and associative drawing powers of the places they circumscribe. The overall attraction and quality of such localities can be said to derive at least in part from their materiality, but also from the specific lifeworld intersection between hominins and animals who use these places and/or interact with them. This intersection is always *situated*, and depends for example on hominin-employed subsistence practices or sociotechnical contact zones and possibilities. Animals that regularly or even habitually occupy specific rock cavities and underground structures or visit them for particular purposes, e.g., for hibernation such as in the case of the cave bear, may then emerge as meaningful agents with a vital capacity to influence processes of art-creation.

2. *Rock matrices as a document of past animal activity.* The co-presence or pene-contemporaneity of animal others may also be evoked through the many different physical traces they leave behind. Animals who visit or temporarily occupy underground spaces or live close to the target rock formations can re-configure these places or imprint them with their behaviour-specific materialities, spawn so-called ‘ichnofossils’ or elicit and manipulate diagnostic theriofacts (cf. Hussain 2024). Hominin-rock encounters are for example mediated by owl pellets, cave bear claw marks and so-called *Bärenschliffe*, the surfacing remnants of long-deceased animals including cave bears who died during or shortly after hibernation. Animal action may disturb or re-arrange these material configurations as well as interfere with installations or other products of previous hominin visits (Camarós et al. 2017). Such material clues bear witness of the behaviour of significant nonhuman co-dwellers in the hominin environment and entrap the nascent image-makers in a thicket of references, metaphors and meanings. They also document the *nonhuman history* of these places and as such may provide a powerful anchor of hominin story-telling and memory-making. The important point is that both the materiality and visuality of rock structures, but also their aptitude of ‘make-belief’ (*sensu* Wollheim 1998) cannot be fully appreciated if we approach them as Cartesian units severed from the rest of nature. The ‘conactive’ matrices in which these rock formations are embedded render them hybrid localities in which the categories of society and nature merge and overlap. These places are *material* and *animate* at the same time, they record and perpetuate a dynamic sense of *life* which is lost if we over-focalize on negotiating the relative contribution of human and material factors in the formation of the early rock art in question.
3. *Rock formations and underground structures as a product of animal behaviour.* This final point calls attention to the circumstance that the agency of animal others is sometimes implicated in a much more direct and powerful manner in early parietal art-making practices than many traditional views acknowledge. Some animals literally *create* the rock or underground environments in which early rock art is encountered. This deliberate and ongoing animal fabrication of rock morphologies, structures and surfaces may affect the local and global environment of rock art – it can e.g. shape the location and design of images on an individual rock panel or affect the distribution, positioning

and alignment of early imagery on a landscape-scale. Especially animals who are potent *niche constructors* or *ecological engineers* (e.g., Jones et al. 1994; Wright et al. 2002) can become conactively involved in processes of parietal art-making (cf. Hussain 2024). In North America and elsewhere, megaherbivore rubbing behaviour has for example generated super-polished and highly reflective rock surfaces scattered across the landscape (Haynes 2012; Parkman and Erickson 2010), not only providing a well-suited undercoat for rock imagery, especially incisions, but also greatly enhancing the visibility and thus potential significance of the respective localities. A particularly striking example comes from the Late Pleistocene and Early Holocene of South America – and I will return to this case in the subsequent section of the chapter: large borrow-building mammals, probably ground sloths and giant armadillos, are being held responsible for large underground structures dug into rock substrates such as weathered granites, basalts, sandstones and other consolidated sediments (Vizcaíno et al. 2001; Frank et al. 2012a). These borrows and sinuous tunnels have become an integral part of South American paleolandscapes and the characteristic scratches and grooves they bear enwrap them in vibrant animal relationships (Lopes et al. 2017). Such spaces appear to be fundamentally imbued with animal behaviour and thus represent ‘animate’ places *par excellence*. When signified with hominin rock art, they become a paramount example of how nature and culture merge through the interweaving of heterogeneous material, animal and hominin agencies. The ensuing rock art, in other words, emanates from a multi-vocal symphony of natural and cultural forces, vigorously collapsing the boundaries between the human-made and the productions of other biophysical landscape agents.

Taken together, it is surprising that no theory-driven framework currently exists to better link the materiality, animality and humanity of early rock art. Such a framework would not only facilitate the global comparison of rock art ecologies and help to disentangle their heterogeneous geneses in order to elaborate a more inclusive perspective on early parietal imagery, it would also be instrumental for integrating presently isolated theoretical and empirical efforts of bringing the various contributions of nonhumans back into the discussion on early human evolution. As I have attempted to show here, we do not have to embrace a strong notion of animal agency to accommodate this goal: it would be enough to recognise that animal others, through their actions and activities, can substantially shape and transform the behavioural, perceptual and cultural horizons of art-making hominins and in this way influence the form, structure, design and distribution of parietal art expressions. The *chaîne opératoire* of parietal art-making, in other words, is constantly tempered by affective nonhumans, who shape past environments, possibilities and experiences.

Early Rock Art as Natureculture

The observations and arguments outlined in the foregoing sections demonstrate the importance of critically re-considering the nature-culture interface as a *generative* matrix for understanding early image worlds (Herva and Ikäheimo 2002; Hussain and

Floss 2015; Jones 2017; Hussain 2019). Especially parietal art with its tripartite inheritance comprising the cultural horizons and actions of past hominins, the ecological agency of animals and the perplexing drawing powers of rock substrates showcases that a Cartesian, exclusivist rendering of 'nature' and 'culture' often leads to an interpretive impasse, rather than issuing perspectives which propel the discussion further, can readily be linked up with insights and theories from other fields, or more productively be integrated with the emerging evidence from wider human origins studies. It should not come as a surprise, then, that rock art is firmly situated at the nature-culture interface, neither delineating a purely cultural production nor a natural phenomenon unaffected by human interference. Instead, parietal art-making draws into focus the complex, relational interweaving of heterogeneous inputs from both fields of reality and hence forcefully collapses long-standing Cartesian dualities.

While the quality and extent of these inputs is an open empirical question and should be expected to vary across cases and periods, early rock art can then come into view as 'bioculture' (Simberloff 2018), 'ecoculture' (Hussain 2019), 'socionature' (Hovorka 2008, 97) or 'natureculture' (Haraway 2003, 1–5; see also Stache 2017; Malone and Ovenden 2017), absorbing, integrating and synthesizing the actions, affections and materialities of hominins, animals and rocks. As shifting assemblages of humans and nonhumans, deep-historical instances of parietal art-making refer hence back to the wider *ecology* of human life on Earth, disclosing the *distributed origins* of the hominin capacity to make images (Bredekamp 2017). The process through which rock art comes into being may thus be described as *allopoiesis* – defined here as the eco-systemic coalescence of non-identical agents co-fabricating something qualitatively different from the initial configuration. Ignoring the system-theoretical bearings of the term for a moment (Esposito 2001, 249), *allopoiesis* may also be recognized as a generative capacity of bringing forth novelty by relying on specific articulations and inter-modalities of multiple physical and agential qualities.⁵ With Kirksey (2015), we may then posit that rock art forms a diagnostic part of the 'emergent ecology' of shared Late Pleistocene lifeworlds, bespeaking of the growing significance of nonhuman others and the momentous re-assembly of human-world relations more generally.

Rocks as Quasi-Agents in Franco-Cantabrian Cave Art

Delannoy and colleagues (2013) have recently re-centred attention in Pleistocene rock art studies on the active involvement of rock morphologies and geologies in the creation of parietal images and rock art spaces more generally (cf. Delannoy et al. 2018). Drawing on instructive examples from Chauvet cave in Southeastern France and the rockshelter of Nawarla Gabarnmang in Northern Australia, which both document hominin activity stretching back at least 30,000 years, the authors convincingly show that image-bearing rock environments are everything else but 'inert' natural spaces. Their analysis not only exposes the deep history and complexity of hominin rock manipulations, it also indicates that the specific material engagements documented

5 *Allopoiesis* highlights the production of difference and novelty, while the making-together, the co-production of art through the tangled actions of heterogeneous entities, can be framed as a process of *sympoiesis* ('making-with') as outlined by Haraway (2016).

at these sites are shaped by the vibrant materiality of the attendant rock environments themselves. Although Delannoy and colleagues' (2013) examination remains underpinned by a Cartesian 'nature' vs. 'culture' dialogue, their careful morphogenetic analysis of *The Cactus* – a multicomponent stalagmite structure in the Cactus Gallery of Chauvet cave – nonetheless reveals a bidirectional pathway of human-cave interaction, mediated by the dynamic formative history and perceptual salience of the cave body itself. *The Cactus* is shown to originate from a natural arrangement of stalagmites and collapsed roof slabs, in turn attracting hominins and motivating them to further modify the structure, augmenting its geometry and visuality, dislocating rock slabs and intentionally depositing a flint tool within a natural cavity of the emerging structure (Delannoy et al. 2004; 2012; 2013, 15–20). Rather than regarding *The Cactus* merely as an instance of socially constructed, image-bearing underground spaces (*aménagement*), the enigmatic structure from Chauvet's interior may be recognized as a potent testimony of a defiant *Caverne participante* and the creative potential of *geopoiesis* merging hominin cultural, cognitive and behavioural horizons with rock affordances, drawing powers and potentialities.

Similar examples of participating rock matrices and the co-fashioning of parietal art through hominins and rocks are widespread in the Late Pleistocene and are particularly well-documented in Upper Palaeolithic cave art of the Franco-Cantabrian region (Lorblanchet 1994; 2010; Tosello 2003; Bon 2009). Previous and ongoing research shows that the agential qualities of the participating cave bodies are expressed on various spatial scales (Vialou 2004), ranging from the positioning of individual images, panels and image compositions in relation to larger underground cave systems and their atmospheric, physical and hydrological peculiarities to the location, design and execution of specific images on smaller wall segments and rock structures or within more complex pictorial arrangements. Following Robert (2007; 2017) and others, it seems useful to distinguish between larger rock 'structures' in which the parietal images are embedded and their concrete rock 'supports' – i.e., the micro-surfaces which hold the images and sometimes serve as their undercoat (Lorblanchet 1999; Fritz and Tosello 2015). The role of rock features in the formation of parietal art can vary dramatically from case to case (Lorblanchet 2000, 200–213) and it is thus often instructive to compare the precise link between images and rocks with respect to these and cognate categories. Discriminating between *image integration* and *image framing* as two modes of hominin-cave interaction may delineate a valuable point of departure:

1. *Image integration* describes the degree of synthesis between images and rocks, the extent of material amalgamation and structural assimilation, the formal dependency between images and rock substrates and the quality of co-evocation (Robert 2007; Lorblanchet 2010; Fritz and Tosello 2015). In a prototypical case of image integration, selected components of the image-bearing rock surfaces or their structure become an integral part of the image itself, often completing the image, endowing it with shape and depth, or anchoring it within the topology of wall segments. Clefts, ravines, ridges or the natural shape and morphology of wall edges are often important material references in this context (Robert 2017), but image integration may also be achieved in a more

holistic fashion, e.g., with respect to the larger *Gestalt* – both physical and imagined – of the encountered rock shapes and structures. Thus, image integration can be ‘pregnant’ or ‘discrete’ (Sauvet and Tosello 1998), the former often characterized by incomplete motifs and tinkering with associative and imaginative possibilities as well as the many ambiguities, equifinalities and multivocalities of shifting image-rock transactions.

2. *Image framing* describes the way in which an image is mounted onto, wrapped in or encased by a larger rock structure. The frame is typically made up by natural rock morphologies and surfaces such as fissures, protrusions and segmented areas or by varying granularities and textures of the involved superficies. In Franco-Cantabrian cave art, the employed frames range from natural colour transitions or contour lines that delimit or contain the *visual field* of an image to carefully constructed image boundaries that invoke the modern concept of the ‘picture frame’ as a means of focusing attention. The frame defines the immediate frame of reference and manipulates the visual experience as well as modulates attendant non-visual sensations. Image framing thus sheds light on the decisive, co-constitutive role of local rock configurations in processes of parietal art-making and reception. Prototypical natural image frames tend to exploit the affording, associative and metaphorical character of rock structures, while other framing modalities reflect prior hominin surface preparation or rock modification, sometimes but not always conjured by the rocks themselves. Another mode of image framing is based on the exploitation of a matching, complementary or prominent *fulcrum* anchoring and orientating the image within a larger rock matrix (Lorblanchet 2010; Robert 2017). In contrast to the possible exploitation of a natural rock linchpin for purposes of image integration, here the fulcrum does not become an integral part of the produced image itself, but instead plays a central role in the definition and organization of the image’s visual field. The traditional rendering of Western European Upper Palaeolithic cave art as ‘freely floating in space’ and lacking a pictorial baseline, or shared layout, is ultimately rooted in the long-standing neglect of image framing, obtained through the deliberate incorporation of the difference-making and evocative qualities of nonhuman rock formations. The contribution of these rocks is less direct and palpable than in the case of image integration, but it is no less critical and shows that the agency of rockshelters and cavities is complex and multidimensional. Media-theoretical and visual culture approaches to the role of frames in channelling visual communication, setting a non-verbal agenda, articulating salience and negotiating meaning – sometimes conferred under labels such as ‘frame theory’ or ‘frame analysis’ (e.g., Goffman 1974; Fairhurst and Sarr 1996; Scheufele 1999) – have therefore great but hitherto underappreciated potential to fertilizing the investigation of image framing logics in Pleistocene rock art research.

Given this general disparity in the logic, goal and functioning of image integration and image framing, it is perhaps not surprising that the two often play different and at times antagonistic roles in fashioning the image space of Upper Palaeolithic cave art in Franco-Cantabria. There is a broad tendency, for example, of widely tapping into



Fig. 1 | Examples of figurative image integration from Franco-Cantabrian Upper Palaeolithic cave art. The elicited images/motifs are inseparable from the structural, morphological and visual characteristics of the rock surfaces on which they are mounted. A: polychrome ceiling of the *Sala de las pinturas* in Altamira where the famous wisent images are placed on salient rock protrusions; B: large deer (megaceros) from Cougnac, France, whose lower cervical line is formed by a prominent rock shoulder; C: panel of the two horses from Pech-Merle, France, with the left head anchored into a cliff mimicking the outline of a horse head; D: black bison drawing from Ekain, Spain, suspended on a rock edge evoking its dorsal morphology. (A–D: Photographs: Heinrich Wendel, © Wendel Collection, courtesy Neanderthal Museum Mettmann). No scale.

image integration possibilities when figurative art is created, especially zoomorphic and anthropomorphic motifs, and to strongly capitalize on image framing when signs and icons are placed and composed (Robert 2017). Elsewhere, I have referred to this mode of human-rock interactions as *embedded art-making* (Hussain 2013; cf. Hussain and Breyer 2017), during which the confines of the human and nonhuman, but also of the living and non-living, become increasingly blurred, and are likely (re-)negotiated.

Striking examples of figurative image integration in Franco-Cantabrian Upper Palaeolithic rock art comprise the chromatic wisent depictions placed on bulging ceiling structures in Altamira, the large megaceros from Cougnac whose outer neckline is defined by a shadow-casting stalactite curtain and whose right limit is framed by a prominent sinter pillar, the black bison line drawing from Ekain whose dorsal line is constructed by a salient rock edge, the famous dotted horses from Pech-Merle whose right head is suspended to a cliff edge mimicking the outline of a horse head (Fig. 1), and the complex rock structure from Les Fieux whose *Gestalt*, texture and shadow patterns anchor an ibex, pre-empting part of the limbs and body outline, and resembling two larger mammoths filled with drawn mammoth contours and signs (Lorblanchet 2010, 316; cf. Fig. 5B). Further examples include the so-called ‘masks’ from the *Cola de Caballo*, the depths of Altamira, whose integration into attention-provoking, plastic



Fig. 2 | So-called 'masks' evoking the human gaze from the depth of Altamira, Spain. Image-integration follows the morphological *Gestalt* of rock shapes and the act of painting/drawing is minimally invasive and schematic. One may therefore reasonably speak of a practice of working out, highlighting, conjuring or convoking what is already implied, contained or referenced within the rock arrangements themselves. A and B: two masks from the Cola de Caballo of Altamira, Spain, taking advantage of the associative, metaphorical and morphostructural drawing powers of rock surfaces. (A–B: Photographs: Heinrich Wendel, © Wendel Collection, courtesy Neanderthal Museum Mettmann). No scale.

and well-defined rock protrusions invoke the human gaze (Fig. 2), the projected head of a doe mounted on top of a deep cleft forming the lower cervical line (Lorblanchet 2000, 94; Fig. 3), the carefully shaped head of a horse from Cormarque following the natural structure of the rock matrix on which it is mounted (Bahn and Vertut 1998, 99), the vertical wisent head from El Castillo which completes two converging natural rock fissures on the wall (Lorblanchet 2000, 104), or the bird depiction from



Fig. 3 | Examples of Upper Palaeolithic parietal images organized or co-assembled by natural rock features. A: Owl finger tracing from Chauvet cave, France, mounted on top of an overhanging rock-edge invoking a sitting posture (redrawn from Chauvet et al. 1996, Fig. 33); B: schematic ibex next to a vertical row of red dots from Le Travers de Janoye, France, embedded in a salient rock-edge convexity (redrawn from Lorblanchet 2000, 187); C: painted black head of a doe from Altamira, Spain, suspended on a prominent rock cleft completing the figure (redrawn from Lorblanchet 2000, 95). No scale.

Altxerri whose dorsal line and peak are suspended on a protruding rock structure (Robert 2017, Fig. 4).

Notable instances of image framing in Franco-Cantabrian rock art encompass the panel of the five mammoth engravings from Rouffignac placed and oriented in parallel to a band of flint inclusions separating the figures from geometric lines and finger drawings on top of the inclusions, the red horse from the *Galerie Jammes* of

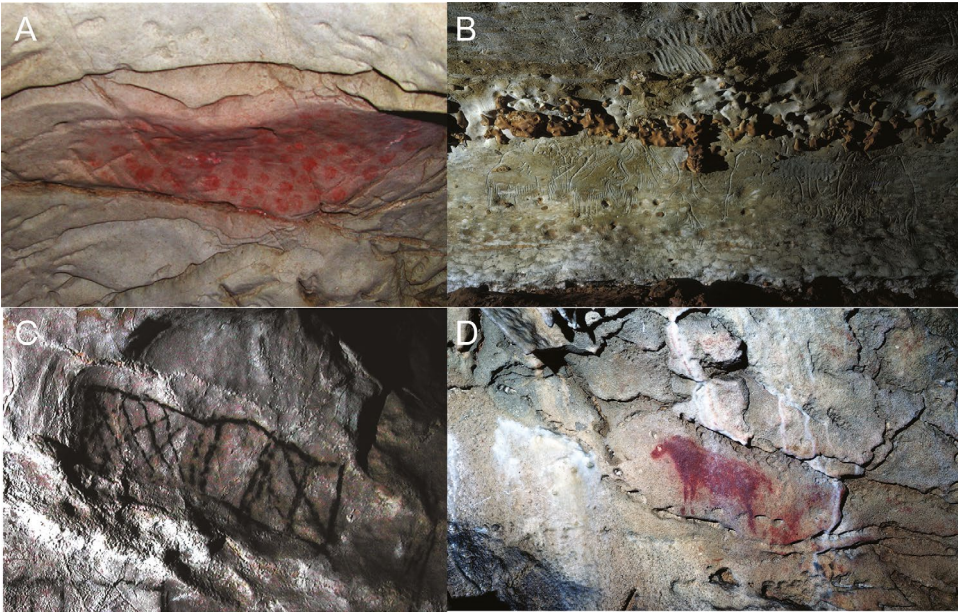


Fig. 4 | Notable instances of image framing from Franco-Cantabrian Upper Palaeolithic cave art. The shown images and image compositions are either delimited by natural rock features, so that their wider visual field is co-determined by the visual affordances and details provided by the local rock environment on which they are found, or their placement is a direct function of these rock characteristics, which then serve to anchor or encase the respective imagery. A: group of red dots from La Pasiega, Spain, edged by a triangular wall segment; B: panel of the five mammoths from Rouffignac, France, bounded to the top by a flint bearing rock layer; C: rectangular sign from Las Chimeneas, Spain, inserted into a natural rectangular rock depression; D: red horse from Le Portel, France, enframed by a natural wall segment. (A, C: Photographs: Eric Robert, reproduced with permission from Robert 2017, Fig. 2; B, D: Photographs: Heinrich Wendel, ©Wendel Collection, courtesy Neanderthal Museum Mettmann). No scale.

Le Portel, which is inserted into a physically outstanding rock segment of the wall, a rectangular sign from Las Chimeneas squarely embedded into a rock depression, and a group of dotted signs from La Pasiega encased by a triangular rock segment underneath a prominent rock shoulder (Fig. 4). Other examples include a bison engraving from Niaux, whose dorsal line is directly attached to a natural rock fissure and whose visual field is strictly delimited by surrounding clefts and rock ridges, a sign with four engraved circles from Faume de Gaume situated in the centre of a prominent rock concavity, a horizontal alignment of red dots from Travers de Janoye following the protruding edge of a central rock formation (Robert 2017, Figs. 4, 6–7; Fig. 3), the panel of ‘swimming reindeer’ from Lascaux exploiting a curved natural rock shoulder to denote the surface of the water (Aujoulat 2004, Pl. 129; Fig. 5), and the arrangement of individual motifs and animal groups on the lion panel from Chauvet cave structured by various natural clefts, depressions, protrusions, surface transitions and other segmenting wall elements (Chauvet et al. 1995, Tafel 81). A similar pattern has been observed on the right wall of the passage sector in Bernifal cave, where a group of mammoths with signs and geometric lines is separated from individual bison and horse figures as well as a complex palimpsest motif by different wall surfaces and

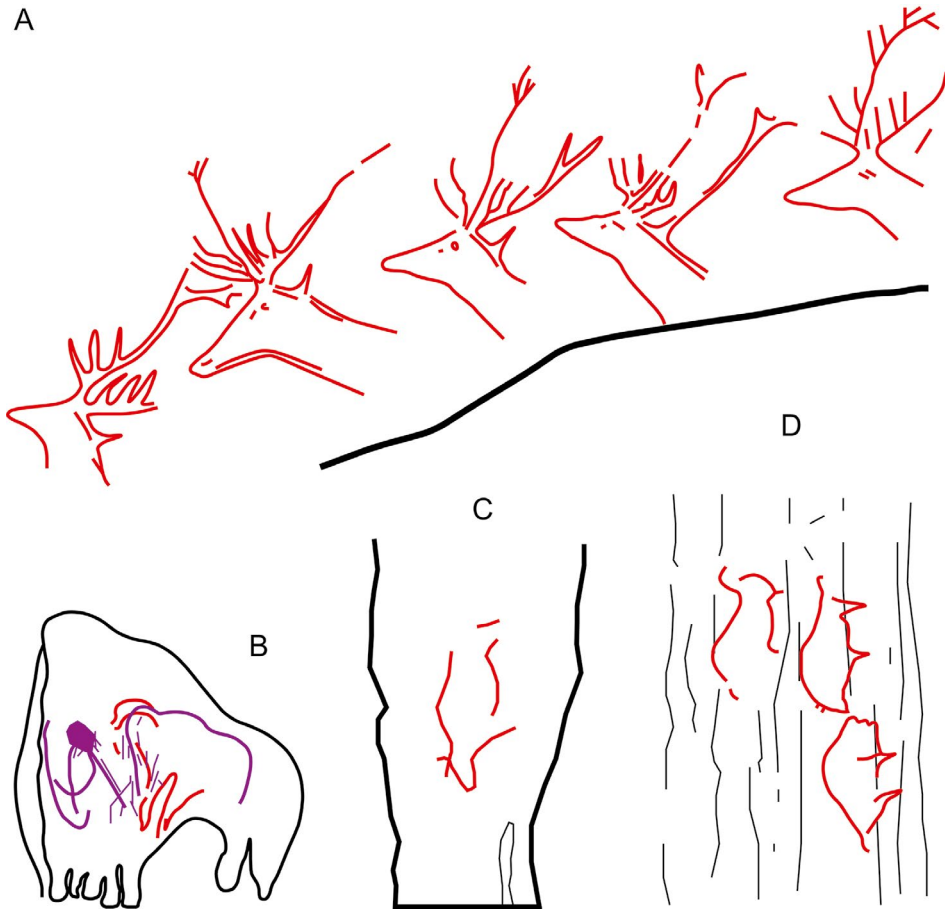


Fig. 5 | Examples of Upper Palaeolithic parietal images structured, arranged or co-assembled by natural rock formations. A: Group of 'swimming (rein)deer' from Lascaux, France, where a natural ravine completes the image (redrawn from Aujoulat 2004, Plate 115); B: stalagmite structure from Les Fieux, France, resembling the body of an animal, possibly a mammoth, and housing an integrated ibex engraving (first stage, red), a backline of a mammoth and a mammoth trunk completing the outline evoked by the stalagmite arrangement (second stage, purple; redrawn from Lorblanchet 2000, 2006); C: red bovine depiction from La Pasiega, Spain, oriented according to the prime visual-physical axis of the image-bearing wall (redrawn from Lorblanchet, 2000, 2004); D: black vertical wisent images from Santimamiñe, Spain, inserted into the natural layering of a cascading stalagmite curtain (redrawn from Lorblanchet 2000, 2004). No scale.

rock morphologies (Robert 2017, Fig. 9). Recent re-examination of Upper Palaeolithic hand stencils from El Castillo and La Garma has revealed a strong locational pattern of these motifs within the interior of the two caves: the makers of the stencils were apparently concerned with 'gripping' rock convexities and other ergonomically fitting concavities, yet also with framing the stencils with or centering them on natural rock fissures or stalagmite structures, letting the authors of the study conclude that not only visual and atmospheric features of cave interiors were constitutive for the images, but also more palpable and visceral qualities of touch and direct grasp (Pettitt et al. 2014; Fig. 6). In all of these cases – and many more could have been enlisted – the cave



Fig. 6 | Red and black hand stencils from the *Salle I* of Gargas, France. The images are placed on a rock surface naturally framed and thus thrown into relief by various rock structures including protrusions, ridges as well as calcite and other highly textured surfaces. (Photograph: Heinrich Wendel, ©Wendel Collection, courtesy Neanderthal Museum Mettmann).

emerges as an *active participant* in the formation of Upper Palaeolithic parietal art. It is through the poignant synthesis, tension-ridden assimilation and explorative merging of natural and cultural inputs that this early rock art comes into being. These images are as much ‘cultural’ as they are ‘natural’: they powerfully illustrate that early image work draws on multispecies registers and is sometimes even *collaborative*, placing the respective rock art firmly into the realm of ‘natureculture’.

Animals as Transitive Agents in the Construction of Rock Art in Upper Palaeolithic Europe and Late Pleistocene South America

Animals provide another complementary window into the *allopoietic* origin of rock art. As discussed in the previous section, animals may be implicated in parietal art-making in multiple ways and just like in the case of supposedly inert rocks, their contribution can be analysed on varying spatial scales, ranging from the animal shaping of entire rock surfaces to the role of localised animal traces in anchoring and organizing different images and image-panels. In most cases, however, animals are not directly involved in the genesis of early rock art – i.e., it is usually difficult to render a strictly *theriopoietic* context of image formation plausible. The animal contribution to rock art tends to be indirect and is for the most part, albeit not exclusively, tied to the tangible interference of animals with parietal art-housing rock surfaces. The relationship between animal agency and the location, structure and design of early parietal art is therefore

mostly *transitive*.⁶ For this reason alone, the animal input to parietal image worlds is easily overlooked, even though animal others constitute an irreducible pillar of the wider ecology of past hominin behaviour, sociality and visual culture (cf. Hussain 2019; 2021; 2024). The role of the cave bear in shaping Upper Palaeolithic parietal art in Franco-Cantabria provides a first inroad to the allopoietic involvement of animals with the creation and spatial coalescence of early rock imagery.

While most underground cavities conserve some kind of animal markings, for example faint yet often widely distributed scratch marks of bats, the claw marks and characteristic surface polish (*Bärenschliffe*) of cave bears are by far the most prominent and attention-eliciting animal traces (Bednarik 1994). Some of these claw marks have erroneously been identified as human parietal productions in early rock art research (Lorblanchet 1989; Ladier et al. 2003), for example in the context of supposed ‘injuries’ and so-called ‘wounded’ figures which were integral to the classic hunting-magic interpretations of Upper Palaeolithic rock art (cf. esp. Lorblanchet 1999, 42). Yet, the obsession of discriminating between anthropogenic products, by implication considered ‘art’, and cave geofacts or theriofacts, by implication re-cast as coincidental and meaningless background activity (cf. Hussain 2024), has obstructed the exploration of how early parietal imagery – both in terms of its design and formation history – actually *relates* to these traces of nonhuman behaviour. Collapsing the nature-culture boundary while remaining cognizant about the foundational heterogeneity of possible inputs to parietal art-making might then offer a way forward. Just as other physical features of the underground world, cave bear claw-marks are often integrated into parietal images or larger image compositions (*image integration*), frame and anchor these images (*image framing*) or organize the formation and layout of the rock art in less-tangible ways (Lorblanchet and Bahn 2017, 229).

In the cave of Aldène, for example, Early-to-Middle Upper Palaeolithic people integrated a series of superimposed claw marks resembling the coat and limbs of a large fur-wielding animal into a synthetic mammoth engraving simply by adding a distinct dorsal line and the characteristic outline of the head and trunk (Sacchi 2003; Fig. 7). The same cave features a cave bear claw mark anchoring the shoulder line of a feline depiction and integrating ‘a series of four prints with a circular engraved construction made with four lines, equal in number to those of the initial claw mark’ (Sacchi 2003; Lorblanchet and Bahn 2017, 229). Other examples where claw marks play a notable role in the co-construction of Upper Palaeolithic image spaces include a hand motif from Bara-Bahau incorporating a claw mark (Lorblanchet and Bahn 2017, 229) or La Croze à Gontran and Margot where human engravings clearly imitate or complete older bear markings (Delluc and Delluc 1983; 1985, 60; Pigeaud 2018, 104). In some

6 A transitive relationship describes an indirect tie involving at least three nodes. In the archaeological case concerned above, the idea is that whenever human rock art (HRA) implicates or refers to an animal other (A), it also implicates or refers to a specific material state (M) which is correlated with or a consequence of the respective animal relationship, so that, set-theoretically speaking, whenever $A \in \text{HRA}$, and $M \in A$, then $M \in \text{HRA}$. In other words, the contribution of nonhuman animals to situated instances of early rock art becomes a matter of *material mediation*, and is thus only rarely expressed directly in the formal and structural properties of the art in question.

cases, the relationship between parietal imagery and cave bear markings is possibly numerical. In the *Galerie Combet* in Pech-Merle, for instance, one encounters a panel in a niche bearing five bear claw marks in close neighbourhood to five red rubbed hands (Lorblanchet 1999, 15; Fig. 7); some of these bear markings are covered with traces of red ochre and the total configuration of human and nonhuman incisions at a prominent position above a narrow passageway suggests that the composition is far from incidental and that humans deliberately imitated the vestiges and gestures of cave bears (Lorblanchet and Bahn 2017, Plate XX).

Albeit difficult to establish with any certainty, the link between early parietal imagery and cave bear markings may indeed go far beyond spatial and formal referencing. Some of the claw mark signatures of bears initially misidentified by prehistorians and speleologists as parietal art in fact bear strong resemblance to engraved or painted signs, especially tectiforms (cf. Ladier et al. 2003; Lorblanchet and Bahn 2017, Fig. 78). This articulation may be taken to signify that at least some of these signs and sign fields were regarded as ‘pregnant’ or ‘imbued’ with cave bear significance, so that the resulting images may be difficult to separate from the animal ecology of past caving experiences. The burial of an Upper Palaeolithic individual in a cave bear hibernation pit directly adjacent to the engraved rock walls of Cussac may support this interpretation (Pigeaud 2018, 105–106), underscoring once again that past and penecontemporary animal agency provided a key motivational background for the formation and spatial assembly of early rock art and its behavioural context.

The second example of animal involvement in the emergence of early rock art that I wish to briefly discuss here brings us to the Late Pleistocene of South America with large, now-extinct herbivores as the main protagonists. Mainland South America houses a rich tradition of rock paintings and engravings but also geoglyphs (large open-air ground images often fully graspable only from an airborne perspective) stretching back at least into the final phase of the Pleistocene period (Podestá and Strecker 2014). Parietal imagery in mainland South American comprises both figurative and geometric motifs and bridges various ecozones and elevations, yet is so far absent from the dark interior of deep-running underground cave systems (Podestá and Strecker 2014). While the enigmatic rock art from the Sierra da Capivara in Northeastern Brazil has been proposed to date back some 48,000 years ago (Guidon 2007) and the Serranía de Chiribiquete rock paintings from Amazonian Columbia estimated to be at least 19,500 years old (Podestá and Strecker 2014, 6831), the presently available direct and reliable chronometric evidence points to an onset of parietal art-making on a continental scale only between ca. 12,000 and 10,000 years ago (e.g., Prous 2013; Neves et al. 2012; Whitley 2013). The emerging picture therefore suggests that the lower temporal horizon of South American rock art overlaps with the distal segment of the Pleistocene geoclimatic period, when the continent’s diagnostic assemblages of large-bodied mammals and birds – including various elephant species, the largest bear in history (*Arctotherium*) and so-called ‘terror birds’ of the *Phorusrhacidae* family – gradually went extinct, and many ecosystems experienced dramatic reconfigurations because of this (cf. Barnosky et al. 2016; Doughty et al. 2016).

Some of these long-vanished animals had a strong impact on the physical and vegetational make-up of the landscape, with large ground sloths and perhaps giant armadillos being responsible for the construction of monumental underground structures

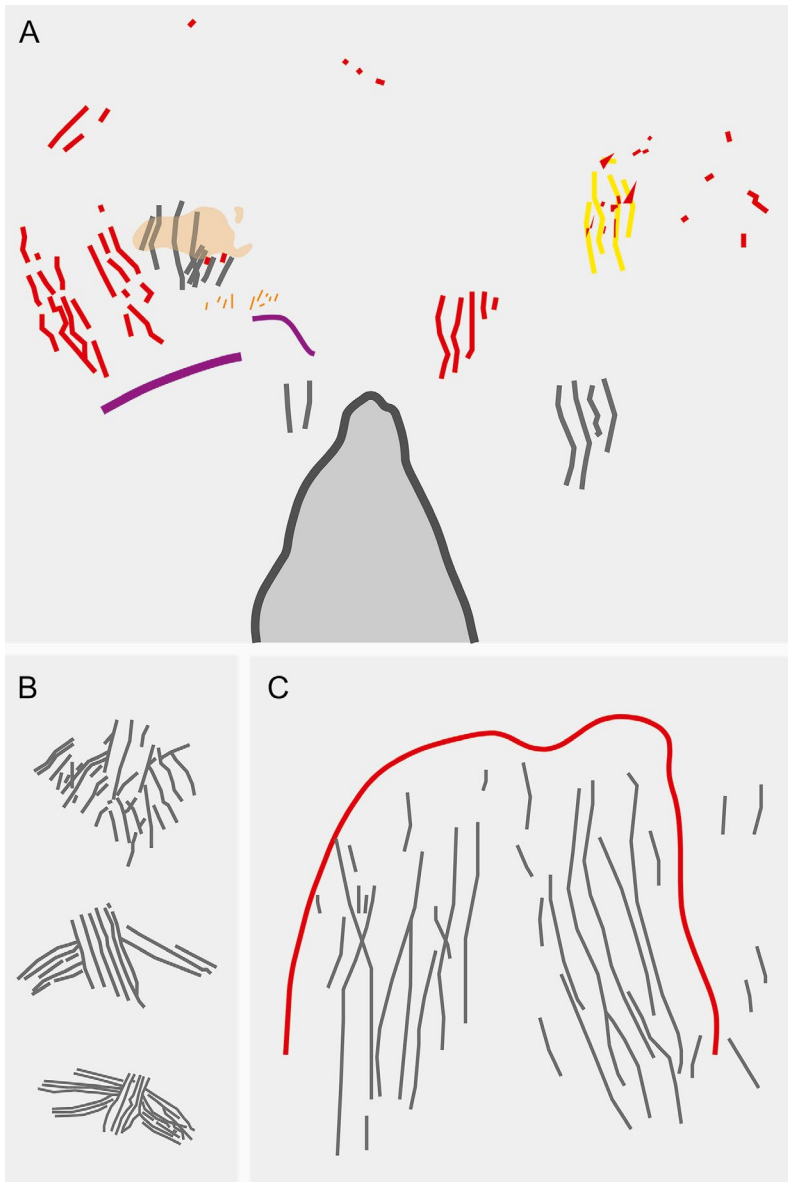


Fig. 7 | Integration, utilization, extension and imitation of cave bear claw marks in Franco-Cantabrian Upper Palaeolithic parietal art. A: Association of possible Gravettian age bear claw marks (dark grey), two engraved lines (purple) as well as human finger drawings, ochre traces and rubbed hands of varying preservation and intensity (yellow-to-red gradient) in the Combel gallery of Pech-Merle cave, France (contour lines of the narrow crawlway anchoring the configuration of natural, anthropic and hybrid images are given in black). B: cave bear claw marks resembling tectiform signs from Rouffignac, France; C: mixed assemblage of a human-engraved cervico-dorsal line (red) and cave bear markings (dark grey) from Aldène, France, forming a mammoth-like image of possible early-to-mid Upper Palaeolithic origin. (A: redrawn from Lorblanchet and Bahn 2017, Plate XX; B: redrawn from Lorblanchet and Bahn 2017, Fig. 78; C: redrawn from Lorblanchet and Bahn 2017, Fig. 79). No scale.

distributed across South America, especially Southern and Southeastern Brazil and Eastern Argentina (Vizcaíno et al. 2001; Lopes et al. 2017) with some notable discoveries in Uruguay and Peru (Hostnig 2019). These widely dispersed subterranean tunnels and burrows come in different shapes and sizes, perhaps suggesting that more than a single species was involved in their construction (Frank et al. 2012a). Even though these animal-made structures are not always easily distinguished from natural rock formations and karst phenomena, they tend to bear salient grooves, claw marks, osteoderm impressions and polished or smoothed-out surfaces, sometimes exhibiting distinct weathering-related colour trajectories, linked to the digging activities of past megafauna (Frank et al. 2012b; Lopes et al. 2017). The morphology, architecture and markings of these underground palaeostructures but also their geographic spread is compatible with *Megatherium*, *Eremotherium*, *Pampatherium* and perhaps *Holmesina* (Cione et al. 2009; Frank et al. 2017; Lopes et al. 2017; Fig. 8) – animal genera known for their notorious burrowing behaviour and heralded as potent *ecological engineers* with matching body-size, physiology and a powerful frontal digging apparatus (Vizcaíno et al. 2001). Most of these potential nonhuman palaeoburrow constructors incrementally disappeared from South American environments at the Pleistocene-Holocene

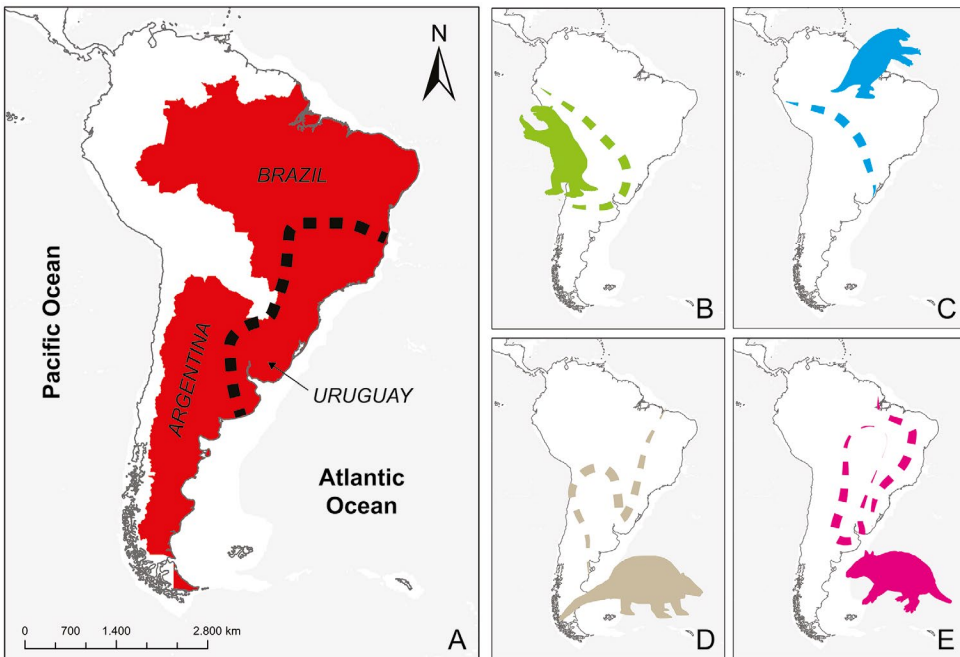


Fig. 8 | Geographic distribution of recorded animal-dug palaeoburrows and tunnels in Eastern South America and reconstructed ecoranges of their possible nonhuman constructors. Area highlighted in red designates the countries in which these animal palaeostructures have so far been identified. A: Black dashed line indicates the area in which over 1,500 animal-made palaeostructures have been documented, spanning the present-day countries of Brazil, Uruguay and Argentina (based on palaeoburrow data by Lopes et al. 2017); B: inferred palaeorange of *Megatherium* (after Cione et al. 2009, 7.4C); C: inferred palaeorange of *Eremotherium* (after Cione et al. 2009, 7.4C); D: inferred palaeorange of *Pampatherium* (after Cione et al. 2009, 7.4E); E: inferred palaeorange of *Holmesina* (after Cione et al. 2009, 7.4D).

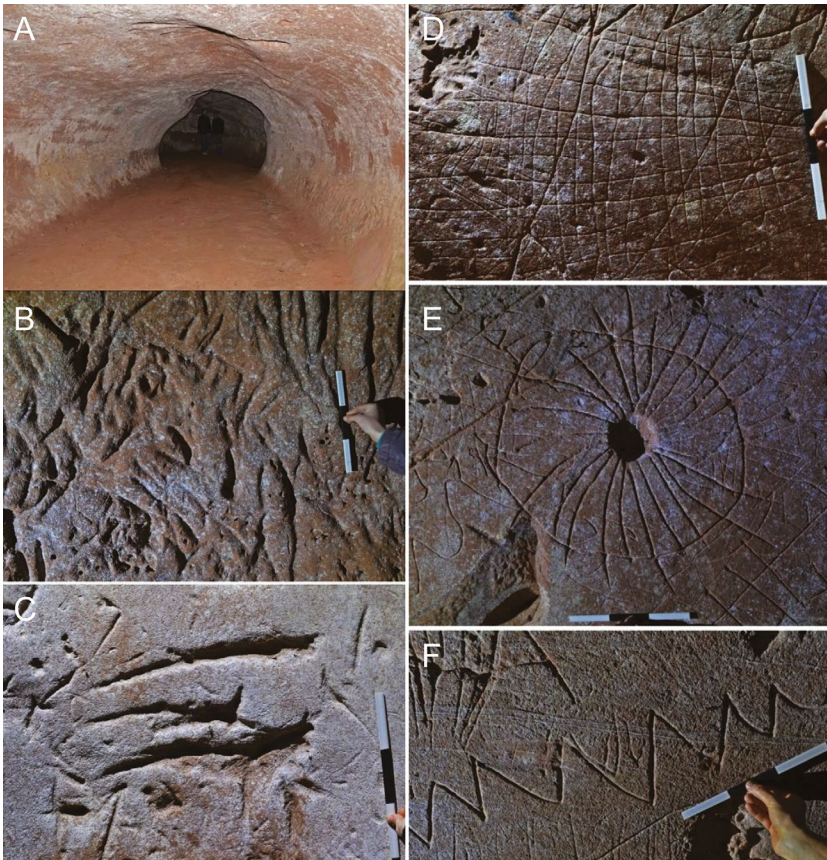


Fig. 9 | Rock art-bearing palaeoburrow of Toca do Tatu, Santa Catarina, Southeastern Brazil. The left row shows some of the main natural features of the underground structure including megafaunal claw marks, the right row presenting a selection of the documented early Geometric art. A: View from the entrance into the North Tunnel of Toca do Tatu; B: characteristic wide grooves documenting past animal digging activity; C: deep parallel wide digging marks; D: engraved geometric grid of human origin; E: anthropic radial grooves; F: human-incised angular ripples. Note that the shown rock art motifs are placed on animal-polished, smooth surfaces bearing a diagnostic white weathering-related coat indicating their antiquity. (A: Frank et al. 2012b, Fig. 3, courtesy Heinrich T. Frank; B-C: Frank et al. 2012b, Fig. 7, courtesy Heinrich Frank; D-F: Frank et al. 2012b, Fig. 9, courtesy Heinrich T. Frank).

transition, although some giant ground sloths for example seem to have persisted on Caribbean islands until to as late as between 6,000 and 4,000 years ago (Steadman et al. 2005). The important point is that some of the respective animal-fabricated underground cavities were *co-opted* by early humans to serve as vital places of parietal art-making, image engagement and perhaps cultural commemoration (e.g., Corteletti 2013, 55; Frank et al. 2012a; Lopes et al. 2017).

In the large sandstone-dug palaeoburrow of Toca do Tatu in Southern Brazil, for example, researchers have recently discovered a set of geometric motifs of human origin with close stylistic affinities with the so-called Geometric and Southern Traditions of the region (Frank et al. 2012b; Fig. 9). Caverna do Rio dos Bugres, another

underground structure in the state of Santa Catarina formed by animal palaeoactivity, similarly hosts a small assemblage of early human engravings with likely similar formative history as the Toca do Tatus imagery (Padberg-Drenkpol 1933). Albeit contextual archaeological evidence is currently lacking for these and other instances of early rock art encountered in palaeovertebrate tunnels (Corteletti 2013, 55), it is reasonable to assume that the images can be attributed to human societies of the Terminal Pleistocene or Early Holocene. While the potential interrelationship between the design, structure and spatial arrangement of this early South American rock art and the animal markings within the subterranean paleostructures themselves opens up an intriguing avenue for future research, it is notable that this parietal art is inextricably bound to human engagement with durable artefacts of transformative and enigmatic animal agency. The fact that the nonhuman creators of these monumental natural places had already vanished from South America or were facing extinction when the images came into being certainly adds an additional mnemonic layer to the materiality of the underground structures and might have imbued them with a 'more-than-human' and possibly ancestral temporality. The palaeoburrows may have then easily been perceived as remnants of a long-perished world in which potent metamorphic others roamed the surface of the Earth, and thus as a place to engage and possibly interfere with this sunken past.

In any case, the link between this expression of early South American rock art and the large-scale subterranean rock and soil constructions of large ground sloths and giant armadillos illustrates that animal behaviour has the capacity to directly shape rock art landscapes and compose places of special material significance. In Southeastern Brazil, Eastern Argentina and perhaps elsewhere in South America (cf. Hostnig 2019), large borrowing animals have *pre-furnished* the physical environment of early human rock art, thus becoming an irreducible component of the motivational background of early parietal art-making in the region. The entanglement of humans, underground tunnels and large burrowing paleovertebrates again underscores the significance of human-nonhuman conactivism in the formation of early rock art traditions. These image worlds, although unmistakably human-authored, carry an important animal legacy, which has to be taken into consideration if the goal is to develop a nuanced and comprehensive understanding of the origin and long-term evolution of the respective rock art landscapes. The meaning-making process conveyed by South American paleoburrow-hosted rock art can at least not be separated from the qualities and consequences of past animal ecologies, and must hence be recognized as a signature product of nature-culture synthesis.

General Ecology and Early Human Image-Making

Just as the *Homo faber* escapes essentialistic and self-contained renderings (Hussain 2018; Ihde and Malafouris 2019), *Homo pictor* (Jonas 1961) emerges as a figure fundamentally shaped by the dynamic interplay of the human and the nonhuman. I have tried to show here that early forms of parietal art-making in the hominin lineage have to be understood against a generative background of *triple inheritance* – both rocks and animals participate in their own ways in the formation and organization of early imagery (Fig. 10). In contrast to Jonas' (1961; Schirra and Sachs-Hombach 2010)

original rendition of the *Homo pictor*, however, this understanding of the status of early image-making in human evolution foregrounds *co-construction*, *coordination* and *mimicry*, instead of a leaping disclosure of near-infinite horizons of human symbolic freedom (cf. Ulama 2012). The triple inheritance perspective on early rock art stresses processual modulation and cross-calibration between heterogeneous actors as a key locus of imagination, creativity and meaning-making. The resulting *Homo pictor* consequently frames a ‘world-open’ (*weltoffen*), inclusive and ecological human art-making condition: human artistic freedom and the exploration of novelty via image-making are *negotiated* through ongoing conversations between shifting hominin horizons and nonhuman agencies. Ironically, then, through the prism of rock art – a long-standing and well-defended stronghold of human exceptionality – the creation and economy

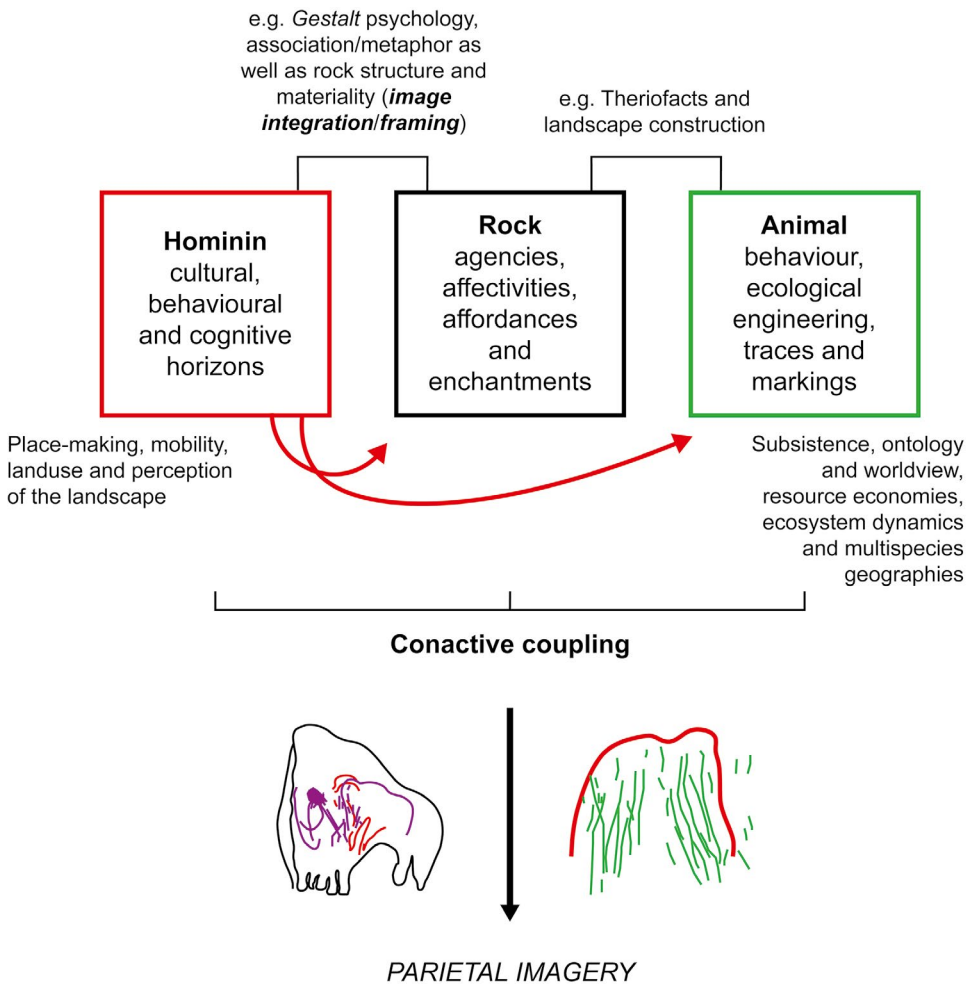


Fig. 10 | Triple inheritance theory of early rock art formation. Parietal imagery comes into view as a situated co-production of humans, animals and rock structures. Albeit the contribution of each trajectory of inheritance may differ dramatically, the organizational, formal and locational patterns of early rock art are hypothesized to be a result of the shifting interweaving of the horizons, behaviours, materialities and ecologies of these three agents.

of meaning can thus hardly be separated from its ‘natural’ framing, serving both as a scaffold and vibrant alterity mediating seeing, acting and knowing in the visual world. Rather than ‘leaving nature behind’ or evolving into a creature ‘out-of-nature’, the nascent *Homo pictor* may then bring about a fundamental re-configuration of the human-world nexus.

As a game-changing datum in human evolution, hominin image-making furnishes the capacity to *remodel* ecological relationships, *amplify* specific interactions and not others, radically *re-imagine* the role and significance of nonhuman others as well as to *thicken* and *variegate* the web of affordances, references and tacit meaning regulating how hominins engage with nature and perpetuate their everyday, social and seasonal rhythms of life. In this view, the *Homo pictor* is nothing less than a derivative of prolonged multispecies⁷ life, sharing and co-habitation, yet *Homo pictor* also becomes a decisive actor in the continuous *crafting* of novel human-nonhuman assemblages and historically unprecedented ecological relationships and articulations. Image-making, from this point of view, thoroughly transforms what it means to be in-the-world – it becomes an *instrument* of experience, vision and action (Joyce 2008, 37) – yet nonetheless fails to eclipse our *ecological condition* – the fundamental human susceptibility, openness and sensibility for nonhuman others and their agentivity. The theory-driven analysis of early expressions of parietal art offered here bespeaks of this constitutive ‘ecological transparency’ of visual culture and the human lifeform as a whole, showing that approaches underpinned by so-called ‘philosophies of access’, which cast the world into subject-object binaries, tend to fall short in recognizing the multispecies dynamics contributing to the formation, design and perpetuation of some of the earliest practices of art-making documented in human evolution.

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7 Multispecies refers to the diverse agential qualities mustered by nonhumans, who co-inhabit time and space with humans and variously contribute to the formation of a shared lifeworld, recognized here as the fundamental baseline of seeing, acting in and knowing the world. The term ‘multispecies’ is thus maximally inclusive and amendable to different lifeforms, both living and non-living. The term is thus mobilized in a similar way as Haraway’s (1991; 2007) convocations of ‘humanimal’, ‘emergent natureculture’ and ‘multispecies’, which all stress the textured, heterogeneous constitution of life incorporating the agencies and affectivities of animals, materials and technologies.

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