

How Ancient is Art?

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ABSTRACT

In this paper I suggest that music and dance of an artful kind could pre-date the emergence of our species by several hundred thousand years. Our progenitor, *H. heidelbergensis*, had the necessary physiological resources and social capacities. And she inherited older modes of moving and vocalizing that could have laid the foundations for dance and music. Admittedly, for her, these artistic activities would have been more about sharing and expressing emotions than about symbolizing abstract ideas or conveying complex thoughts. But that is something for which song and dance are ideally suited. Accordingly, the common assumption made by many paleoarchaeologists in discussions of the origins of art and of psychological modernity — that art is a distinctively *sapiens* attribute presupposing the kind of complex mentality that may be unique to our species — is mistaken. As well, there are some philosophical morals about the nature of art to be teased from the facts of its ancient origin.

KEYWORDS

evolution
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beauty
music
dance



Analytic philosophers of art have shown comparatively little interest in the deep origins of art. The same applies, though to a lesser degree, to their consideration of non-Western art. Their concern was more often stimulated by the challenge to traditional conceptions of the nature of Fine Art generated by the avant-garde of the twentieth century, beginning with Duchamp's readymades and going on to conceptual art.¹ Fair enough. But in this paper I will draw some philosophical morals from reflections about the conditions under which the earliest art — the art of prehistory — arose.

Admittedly, claims about the earliest art cannot avoid being speculative. We are in the domain of paleoarchaeology, which deals with shards and fragments the significance of which is often controversial and hotly debated. And we will focus on song and dance, the existence of which usually must be a matter of inference rather than of artifactual record. Inevitably, the conclusions reached should be understood to be conditional and qualified.

Though we are in the domain of paleoarchaeology, we must be wary of what paleoarchaeologists say about art. They use the term so liberally that it denotes any marked surface, decorated object, or item of adornment. For instance, crudely perforated shells that may have been strung together are referred to as "art."² In fact, for these scientists "art" serves as a term of art.³ By contrast, our interest will be in items and behaviors that are much nearer to our ordinary notion of art. They may not be complex or sophisticated, but they should invite the label "art" in a fashion that is coextensive with what we reserve the term for in its normal, broad use.

As will be outlined presently, paleoarchaeologists also tend to assume that art is a marker of symbolic thinking and advanced intellectual capacities. Philosophers of art tend to share this assumption. We will examine and reject this idea later.

We will turn to the philosophical morals at the close. First, we need to hunt out early candidates for art-status, to assess their plausibility, and to locate their earliest examples.



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The tradition of European cave art (painting, engraving, etc.) extended from 36-11,000 years ago in the Upper Paleolithic.⁴ It coincided with the creation of carved figures,⁵ purpose-made musical instruments,⁶ the decoration of practical objects,⁷ the adornment of the person and her clothing,⁸ burial with grave goods,⁹ ritual observances,¹⁰ and “spiritual self-awareness.”¹¹

It used to be held that Neanderthals (*H. neanderthalensis*) in Europe did not behave in this fashion, or anyway, not until they encountered our species, *H. sapiens*, not long before their eventual extinction about 35-30,000 years ago.¹² But there is evidence at least of the use of body adornments,¹³ including an eagle talon necklace pre-dating the arrival of Cro-Magnon *H. sapiens* in Europe by 80,000 years.¹⁴ Still, by comparison, Neanderthals were not driven, as were Cro-Magnons, to be artistic.

Yet this Upper Paleolithic flowering of cultural activity was apparently unprecedented in our earlier *sapiens* ancestors. Our species first emerged about 195,000 years ago, but evidence of behavioral modernity — of symbolic, abstract thinking — was not obvious in the archaeological record before the “creative explosion” that took place in Europe in the Upper Paleolithic.¹⁵

To explain the suddenness of this alteration in the absence of outward anatomical change — for instance, in brain size — it has been posited both that a mutation led to the rewiring of our brain¹⁶ and that the mirror-neuron system had achieved its modern form.¹⁷

Many elements in this story about the dawning of modern modes of cognition in our *sapiens* forerunners have been challenged, however.¹⁸ Art of similar antiquity is found in Asia and Africa.¹⁹ And evidence of earlier isolated periods of advanced lithic technologies, ritual behaviors, abstractly marked items, such as ochre crayons and shell necklaces, can be found in Africa and the Middle East going back more than 100,000 years.²⁰ Accordingly, some have claimed the existence of art in these earlier times — for instance, the engraved ostrich shells of Diepkloof rock shelter dated to 65-55,000 years ago.²¹

With respect to music, we might apply more abstract reasoning.²² Sophisticated but different forms of music are found in *every* culture and people though the groups concerned have often been isolated for a very long time.²³ Our species originated in Africa and later spread to other parts of the globe. Together, these facts suggest that sophisticated forms of music must

have existed earlier in Africa. Given its ubiquity and complexity, music must have left Africa with *H. sapiens* emigrants rather than being invented subsequently in every isolated community.²⁴ So when did members of our species leave Africa? After an earlier visit by *H. sapiens* to the Middle East and perhaps further, the current consensus puts the primary global spread of our species as initiated from Africa about 60,000 years ago.²⁵ Sophisticated forms of music must have pre-dated that.

It is now widely thought that there was not a sudden light-bulb moment in Europe. Either modern ways of thinking emerged gradually in our species over scores of millennia, or our first *sapiens* ancestors were psychologically modern from the outset but could express this in only limited, temporary ways given the fragile life-circumstances under which they existed.²⁶

However these competing accounts are to be reconciled, it is worth noting an assumption about art that they seem to share: namely, that it presupposes a mind like ours; one that can explore fictional and counterfactual scenarios, manipulate abstract symbols, coin metaphors, and make unexpected cross-domain connections. It undoubtedly took imagination to discern the form of a bison in the bulge of a cave wall and creativity to sketch the animal in charcoal with a skill that captured its inimical likeness and brought it vividly to life. And it took planning and sophisticated knowledge to appreciate where to place holes in a vulture's wing-bone in order to produce a flute with the favored musical scale. Art, it is implied, is the product of clever thinkers, such as we are and our previous hominin forebears were not.

We will now query that assumption for the cases of music and dance.



One way of questioning the *sapiens* origin of art would be by arguing that our predecessor species were more intellectually capable than is widely assumed. Certainly, there is scope for suggesting that they must have had

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considerable practical intelligence.²⁷ Multi-part, composite tools are at least 300,000 years old.²⁸ Moreover, about a million years ago, *H. erectus* executed horse hunts that must have required forward planning and the assignation to individuals of different functional roles within the overall enterprise.²⁹ At about the same time, exchange networks for trading goods over scores of miles began to develop, suggesting that sophisticated communication between groups was possible.³⁰ About 500,000 years ago, *H. heidelbergensis* — the ancestor we share with Neanderthals — also used complex, cooperative hunting techniques.³¹ Some people think that these ancients had complex languages.³² But even if they did not, they were apparently capable of planning and sophisticated interpersonal communication.

It has only recently been discovered that *H. erectus* in Java engraved shells with geometric patterns not less than 430,000 years ago.³³ So if the carved ochre crayons at Blombos cave dating from 75-100,000 years ago testify to the advanced psychology of African *Homo sapiens*, as is generally thought, these Javanese shells might suggest that abstract and symbolic thinking is more ancient even than our species.³⁴



The other way of arguing that art might pre-date our species involves demonstrating that in at least some of its forms, it does not require abstract or symbolic modes of thought. A sense of beauty or awesomeness and an urge to express emotion might suffice. This is what we now consider.

The creation of “special” bifacial hand axes from 400,000 years ago suggests that craftspeople of the time were sometimes motivated by aesthetic goals. About two percent of axes were worked on far beyond what practicality required.³⁵ They were finely worked to be highly symmetrical. Some made a feature of fossils or crystals. Others were of unusual or colorful material. Some were outsized and not easily used. And many of the most striking examples do not seem to have been used as butchering tools.

Some writers identify these as the first artworks.³⁶ That is possible, I think. But in any case, we can discern aesthetic motives (among others, perhaps) behind their production. These were people who were drawn to beauty and took the time to create it. Indeed, seemingly they gave it priority over more practical matters on some occasions.

An even better candidate for the earliest *pre-sapiens* art, I would suggest, is non-artifactual. It is vocal music and dance.³⁷ *H. heidelbergensis* possessed the physiological prerequisites for song: fine tongue and thoracic breath control, descended voice box and appropriate hyoid bone structure, hearing geared to detect and process the pitchbands in which the species vocalized, the neural resources to process and store patterned sound strings, and so on.³⁸ Moreover, these hominins lived in social groups and depended on coordination, communication, and cooperation,³⁹ so they had the social capacity to make group music and could benefit from doing so.⁴⁰ If they had language, their songs might have articulated simple thoughts. But just as easily, their songs could have been composed of meaningless, repeated vocables.

Since *H. heidelbergensis* belonged to a hunter-gatherer community, she probably shared with us an instinctual predilection for entraining to music, that is, to match and share movement to a regular musical pulse. As in hunter-gatherer communities everywhere, this would mean that music regularly evoked dance.⁴¹ This form of dance need not have been highly choreographed or designed to convey a narrative. It might have been more like a rumba line with people swaying, moving, and stomping in time to the music, say, around a fire. Such music may have been accompanied by percussion, generated by items that came readily to hand, by body slaps, or by the rhythmic rattle of adornments on the dancers' limbs.

Music-making of a quite developed kind is often more about emotional expression and group entrainment and coordination than about abstract or symbolic thought.⁴² Individuals with mental deficits can be highly musical.⁴³ Very young children can participate in group dancing and singing. Music-making is a practical skill that calls for "know-how" but need not require "knowing that," the capacity to verbally cognize and articulate what is done.⁴⁴ What matters, then, is not whether *H. heidelbergensis* qualified as what we would nowadays call an intellectual but whether she was inclined to vent her feelings in a musical fashion, perhaps while interacting with her baby or while cooperating with her fellows. If her group

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celebrated their successes and mourned their losses, these ancients would have found applications for the musical capacities that they possessed. And if she danced and sang, the Neanderthals that later descended from her species likely did as well.⁴⁵



There is considerable overlap in the many neural regions involved with music and language.⁴⁶ We do not know which aptitude came first. Some authors regard music as an evolutionary by-product of language.⁴⁷ Others see music as prior.⁴⁸ Indeed, it is possible that language is best seen as a special case of music.⁴⁹ In any event, there obviously were vocal precursors to music; and if music is ancient, these must be even older.

Of course, our hominin predecessors vocalized as do much older species. They issued alarm and contact calls; perhaps they defended their territories or attracted mates by vocalizing; they cooed and clucked at their babies; they vented their rage, despair, and grief with howls, sobs, and screams.⁵⁰ One suggestion is that what distinguished the vocalizations of hominins from those of the more distant ancestors we share with apes was the hominins' adoption of synchronous chorusing, which led eventually to music.⁵¹

Another candidate precursor for music is infant-directed speech (aka motherese), the melodically inflected, highly repetitive mode in which we address our babies and pets.⁵² Infant-directed vocalizing — which obviously need not take the form of speech in the sense of language — was likely practiced by hominin species pre-dating our own.⁵³ And it must have provided a natural source, if not for the coordinated group singing and dancing described previously, then for the lullaby, which universally displays soothing expressive qualities and smooth, descending melodic contours.⁵⁴

The main alternative hypothesis is that both music and language had a common ancestor, known as protolanguage or musilanguage.⁵⁵ On the standard account, this was not confined to interactions with infants but

employed as part of a more general form of (verbal-cum-gestural-cum-facial-cum-behavioral) communication between all members of the group. It is reasonable to see some version of this ancestral form of communication existing between ancient pre-*sapiens* species, given their cooperative hunting and social practices as described above. Over millennia, expressive slides and glides, fragmentary melodic phrases, beats, and rhythms were combined, repeated, and developed until something recognizable as music emerged.⁵⁶ Meanwhile, joint action and cooperation laid down the basis for beat-entrained movement, behavioral mimicry and coordination, turn-taking, and complementarity in mutual actions, which were the facilitators for dance.⁵⁷

Perhaps music has more than one prehistoric source. But in any case, given the number of very ancient potential forerunners, it is plausible to think that the earliest music itself was made as much as 500,000 years ago.



In this paper it has been suggested that music and dance of an artful kind could pre-date the emergence of our species by several hundred thousand years. Our progenitor, *H. heidelbergensis*, had the necessary physiological resources and social capacities. And she inherited older modes of moving and vocalizing that would have laid the foundations for dance and music. Admittedly, for her, these artistic activities would have been more about sharing and expressing emotions than about symbolizing abstract ideas or conveying complex thoughts. But the expression of emotion is something for which song and dance are ideally suited. Accordingly, the common assumption made by many paleoarchaeologists in discussions of the origins of art and of psychological modernity — that art is a distinctively *sapiens* attribute presupposing the kind of complex mentality that may be unique to our species — is mistaken.




What philosophical lessons, apart from a wariness of *sapiens* chauvinism about art-creation, can we draw from this discussion, assuming it to be sufficiently convincing?

The first art was made by people who could not (yet) have had the concept of art; they might also have lacked a language in which to express that concept. They aimed at prominent aesthetic effects and thereby succeeded in making art even if they could not have thought of themselves as doing so.⁵⁸ In addition, they made art in the absence of the kind of institutional scaffolding and artworld backdrop that we take for granted.

Art had many kinds of precursors. Its emergence via bootstrapping may not have been clearly acknowledged. Nevertheless, at some point, someone recognized a difference between the aesthetic effects of art and those of its precursors. The objects that became known as bona fide artworks perhaps displayed higher levels of technical skill, originality, and complexity than their merely artifactual precursors. And the earliest music and dance perhaps achieved a higher degree of emotional arousal and required a level of group coordination and entrainment that was somehow more involved than what other forms of interpersonal communication called for. Philosophers of art ought to take into account that the powerful aesthetic effects which distinguished art from its predecessors did not demand of the participant great cognitive sophistication. Children surely joined in the singing and dancing. We tend to think of art as cognitively sophisticated and lexically centered, which it often is. But not all art has to be like this, and at its outset these qualities might not have been central. In addition, we tend to assume that art is created by the few for distanced, disinterested contemplation by the many, which it often is. But not all art has to be like this. Many of the attributes identified as art-central in Europe's eighteenth century might apply to high-end Fine Art, but art is broader in its use and appeal than that. At its origins, art was more likely functional and community-involving.⁵⁹

Bearing this last point in mind, we can see that it will be more appropriate in considering art to work out what capacities it calls for, the

occasions for their application, and the benefits that might result, rather than focusing narrowly on the artifact produced (if there is one), especially if we are to give music, dance, and oral traditions of drama, poetry, and storytelling their due. Art is as much a matter of behavior and interpersonal interaction as it is a matter of material culture. 

Notes

- 1 For elaboration, see Stephen Davies, "Defining Art and Artworlds," *Journal of Aesthetics and Art Criticism* 73 (2015): 375–384.
- 2 Typical here are Randall R. White, "Production Complexity and Standardization in Early Aurignacian Bead and Pendant manufacture: Evolutionary Implications," in *The Human Revolution*, ed. P. Mellars and C. Stringer (Edinburgh: Edinburgh University Press, 1989), 366–390, and Marian Vanhaeren, "Speaking with Beads: The Evolutionary Significance of Personal Ornaments," in *From Tools to Symbols: From Early Hominids to Humans*, ed. by F. d'Errico and L. Blackwell (Johannesburg: Witwatersrand University Press, 2005), 525–553.
- 3 As is conceded by Andrew J. Lawson, *Painted Caves: Paleolithic Rock Art in Western Europe* (Oxford: Oxford University Press, 2012), 10–11.
- 4 Note that those who painted Lascaux cave were as far from those who painted Chauvet cave as they are from us today.
- 5 Discussed by Jill Cook, *Ice Age Art: Arrival of the Modern Mind* (London: British Museum, 2013).
- 6 See Nicholas J. Conard, Maria Malina, and Susanne C. Münzel, "New Flutes Document the Earliest Musical Tradition in Southwestern Germany," *Nature* 460 (2009): 737–740; Iain Morley, *The Prehistory of Music: Human Evolution, Archaeology, and the Origins of Human Musicality* (Oxford: Oxford University Press, 2013).
- 7 See Cook, *Ice Age Art*.
- 8 See Paul Pettitt, *The Paleolithic Origins of Human Burial* (London: Routledge, 2011); Erik Trinkaus, et al., *The People of Sunghir: Burials, Bodies, and Behavior in the Earlier Upper Paleolithic* (Oxford: Oxford University Press, 2014).
- 9 See Robin I. Dunbar, *The Human Story: A New History of Mankind's Evolution* (London: Faber & Faber, 2004); Pettitt, *The Paleolithic Origins of Human Burial*; Trinkaus, et al., *The People of Sunghir*.
- 10 See J. David Lewis-Williams, *The Mind in the Cave* (London: Thames & Hudson, 2002); Dunbar, *The Human Story*.
- 11 As discussed by Ian Tattersall, *Masters of the Planet: The Search for our Human Origins* (London: Palgrave Macmillan, 2012).

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- 12 Skeptics about Neanderthal mental abilities include Brian M. Fagan, *Cro-Magnon: How the Ice Age Gave Birth to the First Modern Humans* (London: Bloomsbury Press, 2010); Chris Stringer, *Lone Survivors: How We came to be the Only Humans on Earth* (New York: Times Books, 2012); Tattersall, *Masters of the Planet*. On the timing of Neanderthal extinction: Clive Finlayson, *The Humans who went Extinct: Why the Neanderthals died out and We Survived* (Oxford: Oxford University Press, 2009) suggests that the last Neanderthals lived at Gibraltar and died out 28-24,000 years ago.
- 13 Those claiming Neanderthals employed body decorations include Francesco d'Errico and João Zilhão, "A Case for Neanderthal Culture," *Scientific American* 13 (2003): 34–35; M. Peresani, et al., "Late Neandertals and the intentional removal of Feathers as Evidenced from Bird Bone Taphonomy at Fumane Cave 44 ky B.P., Italy," *Proceedings of the National Academy of Sciences USA* 108 (2011): 3888–3893; João Zilhão, "The Emergence of Language, Art and Symbolic Thinking: A Neanderthal Test of Competing Hypotheses," in *Homo symbolicus: The Dawn of Language, Imagination and Spirituality*, ed. C. S. Henshilwood and F. d'Errico (Amsterdam: John Benjamins, 2011), 111–131; Clive Finlayson, et al., "Birds of a Feather: Neanderthal Exploitation of Raptors and Corvids," *PLoS ONE* 7, no. 9 (2012): e45927.
- 14 See *The Independent*, "Neanderthals made jewellery from eagle talons in Europe 80,000 years before *Homo sapiens* arrived," Accessed March 15, 2015, <http://www.independent.co.uk/news/science/neanderthals-made-jewellery-from-eagle-talons-in-europe-80000-years-before-homo-sapiens-arrived-10101493.html>. See also J. Zilhão, "The Emergence of Ornaments and Art: An Archaeological Perspective on the Origins of 'Behavioral Modernity'," *Journal of Archaeological Research* 15 (2007): 1–54; C. Q. Choi, "Heavy brows, high art? Newly unearthed painted shells show Neandertals were *Homo sapiens*'s mental equals," *Scientific American* (March 2010): 18–19a; and Ker Than, "World's oldest Cave Art Found — Made by Neanderthals?" *National Geographic*, June 14, 2012, <http://news.nationalgeographic.com/news/2012/06/120614-neanderthal-cave-paintings-spain-science-pike/>.
- 15 As alleged by John E. Pfeiffer, *The Creative Explosion: An Inquiry into the Origins of Art and Religion* (New York: Harper and Row, 1982).
- 16 As held by Richard G. Klein, *The Human Career: Human Biological and Cultural Origins* (Chicago: University of Chicago Press, 2009).
- 17 As argued by Vilayanur Ramachandran, *The Emerging Mind* (London: Profile Books, 2003).
- 18 Critics of the "creative explosion" hypothesis include Sally McBrearty and Alison S. Brooks, "The Revolution that Wasn't: A New Interpretation of the Origin of Modern Humans," *Journal of Human Evolution* 39 (2000): 453–563; Kim Sterelny, *The Evolved Apprentice* (Cambridge, MA: MIT Press, 2012).
- 19 As discussed by Paul Mellars, "Rethinking the Human Revolution: Eurasian and African Perspectives," in *Rethinking the Human Revolution*, ed. P. Mellars, K. Boyle, O. Bar Yosef, and C. Stringer (Cambridge: McDonald Institute for Archaeological Research, 2007), 1–11; Robert G. Bednarik, "Pleistocene Palaeoart of Asia," *Arts* 2, no. 2 (2013): 46–76; M. Aubert, et al., "Pleistocene Cave Art from Sulawesi, Indonesia," *Nature* 514 (2014): 223–227.
- 20 See Christopher Henshilwood, "The Origins of Symbolism, Spirituality, and Shamans: Exploring Middle Stone Age Material Culture in South Africa," in *Becoming Human: Innovation in Prehistoric Material and Spiritual Culture*, ed. C. Renfrew and I. Morley (Cambridge: Cambridge University Press, 2009), 29–49; Stringer, *Lone Survivors*; Tattersall, *Masters of the Planet*.

- 21 Ostrich shell art: Johan De Smedt and Helen De Cruz, "A Cognitive Approach to the Earliest Art," *Journal of Aesthetics and Art Criticism* 69 (2011): 379–389.
- 22 Here I adapt an argument that has been applied to the history of syntactically complex languages in Christopher Collins' *Paleopoetics: The Evolution of the Preliterate Imagination* (New York: Columbia University Press, 2013).
- 23 As noted by, among others, John Blacking, *How Musical is Man?* (Seattle: University of Washington Press, 1973); Donald E. Brown, *Human Universals* (Philadelphia: Temple University Press, 1991); Bruno Nettl, "An Ethnomusicologist Contemplates Universals in Musical Sound and Culture," in *The Origins of Music*, ed. N. L. Wallin, B. Merker, and S. Brown (Cambridge, MA: MIT Press, 2000), 463–472.
- 24 Gary Tomlinson disagrees in *A Million Years of Music: The Emergence of Human Modernity* (New York: Zone Books, 2015). He proposes that pitch-structured, metrically organized music was independently created by different human groups between forty and twenty thousand years ago.
- 25 As documented in Spencer Wells, *The Journey of Man: a Genetic Odyssey* (New York: Random House, 2002); Finlayson, *The Humans who went Extinct*; Fagan, *Cro-Magnon*; Stringer, *Lone Survivors*; Tattersall, *Masters of the Planet*.
- 26 See John J. Shea, "Homo sapiens is as Homo sapiens was: Behavioral Variability versus 'Behavioral Modernity' in Paleolithic Archaeology," *Current Anthropology* 52 (2011): 1–35.
- 27 Steven J. Mithen, *The Prehistory of the Mind: A Search for the Origins of Art, Religion, and Science* (London: Thames & Hudson, 1996) has argued, however, that pre-*sapiens* hominin species lacked an integrating general intelligence. It has been suggested, though, by Ian Cross, "The Evolutionary Nature of Musical Meaning," *Musicae Scientiae* 13, 2 Suppl. (2009): 179–200, that music helps break down the barriers between modularly separate modes of thinking. For discussion of this last hypothesis, see Stephen Davies, *The Artful Species: Aesthetics, Art, and Evolution* (Oxford: Oxford University Press, 2012), 179–181.
- 28 Ibid.; Tattersall, *Masters of the Planet*.
- 29 See Collins, *Paleopoetics*.
- 30 See Ben Marwick, "Pleistocene Exchange Networks as Evidence for the Evolution of Language," *Cambridge Archaeological Journal* 13 (2003): 67–81.
- 31 For discussion, see Bo Gräslund, *Early Humans and their World*, trans. N. Price (London: Routledge, 2005); Finlayson, *The Humans who went Extinct*; Stringer, *Lone Survivors*.
- 32 As argued by Spencer Wells, *Pandora's Seed: the Unforeseen Cost of Civilization* (New York: Random House, 2010); Collins, *Paleopoetics*.
- 33 See Josephine C. A. Joordens, et al., "Homo erectus at Trinil on Java used shells for tool production and engraving," *Nature*, Accessed December 3, 2014, doi:10.1038/nature13962. Their abstract notes: "The manufacture of geometric engravings is generally interpreted as indicative of modern cognition and behavior ... Together, our data indicate that the engraving was made by *Homo erectus*, and that it is considerably older than the oldest geometric engravings described so far ... [T]his discovery suggests that engraving abstract patterns was in the realm of Asian *Homo erectus* cognition and neuromotor control."
- 34 See Henshilwood, "The Origins of Symbolism, Spirituality, and Shamans."
- 35 See Raymond Corbey, Robert Layton, and Jeremy Tanner, "Archaeology and Art," in *A Companion to Archaeology*, ed. J. L. Bintliff (Oxford: Blackwell, 2004), 357–379.

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- 36 Biface hand axes as art: Marek Kohn and Steven Mithen, "Handaxes: Products of Sexual Selection?" *Antiquity* 73 (1999): 518–526; Geoffrey F. Miller, *The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature* (New York: Doubleday, 2000); Riva Berleant, "Paleolithic Flints: Is an Aesthetics of Stone Tools Possible?" *Contemporary Aesthetics* 5 (2007): <http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=488>.
- 37 For reviews of theories on the evolutionary origins of music, see Steven Brown, "Evolutionary Models of Music: From Sexual Selection to Group Selection," *Perspectives in Ethology* 13 (2000): 231–281; Elvira Brattico, Pauli Brattico, and Thomas Jacobsen, "The Origins of the Aesthetic Enjoyment of Music — A Review of the Literature," *Musicae Scientiae* 13, 2 Suppl. (2009): 15–39; Ian Cross and Iain Morley, "The Evolution of Music: Theories, Definitions and the Nature of the Evidence," in *Communicative Musicality: Exploring the Basis of Human Companionship*, ed. S. Malloch and C. Trevarthen (Oxford: Oxford University Press, 2009), 61–82; Aniruddh D. Patel, "Music, Biological Evolution, and the Brain," in *Emerging Disciplines*, ed. M. Bailar (Houston: Rice University Press, 2010), 91–144; Morley, *The Prehistory of Music*.
- 38 As discussed by Dunbar, *The Human Story*; Robert A. Foley, "Music and Mosaics: The Evolution of Human Abilities," in *Music, Language, and Evolution*, ed. N. Bannan (Oxford: Oxford University Press, 2012), 27–57; Morley, *The Prehistory of Music*.
- 39 See Dunbar, *The Human Story*; Finlayson, *The Humans who went Extinct*.
- 40 See Morley, *The Prehistory of Music*.
- 41 On the intimate connection between music and dance, see Dunbar, *The Human Story*; Ian Cross, "The Nature of Music and its Evolution," in *The Oxford Handbook of Music Psychology*, ed. S. Hallam, I. Cross, and M. Thaut (Oxford: Oxford University Press, 2009), 3–13; Morley, *The Prehistory of Music*.
- 42 An idea that is recognized in Ian Cross, "Music as an Emergent Exaptation," in *Music, Language, and Evolution*, ed. N. Bannan (Oxford: Oxford University Press, 2012), 263–276; Clive Gamble, "When the Words Dry Up: Music and Material Metaphors Half a Million Years Ago," in *Music, Language, and Evolution*, ed. N. Bannan (Oxford: Oxford University Press, 2012), 81–106; Morley, *The Prehistory of Music*.
- 43 Sufferers of the form of autism known as Williams syndrome are often drawn to and skilled at music. See David Huron, "Is Music an Evolutionary Adaptation?" in *The Cognitive Neuroscience of Music*, ed. I. Peretz and R. Zatorre (Oxford: Oxford University Press, 2003), 57–75; Daniel J. Levitin, *This is your Brain on Music: The Science of Human Obsession* (New York: Dutton, 2006), 259–260; Aniruddh D. Patel, *Music, Language, and the Brain* (Oxford: Clarendon Press, 2008), 371.
- 44 See Stephen Davies, "The Know-how of Musical Performance," *Philosophy of Music Education Review* 12, no. 2 (2004): 56–61.
- 45 For discussion of Neanderthal singing, see Steven J. Mithen, *The Singing Neanderthals: the Origins of Music, Language, Mind, and Body* (London: Weidenfeld & Nicolson, 2005); Edward D. Hagen and Peter Hammerstein, "Did Neanderthals and other Early Humans Sing? Seeking the Biological Roots of Music in the Territorial Advertisements of Primates, Lions, Hyenas, and Wolves," *Musicae Scientiae* 13, 2 Suppl. (2009): 291–320.
- 46 For reviews, see Patel, *Music, Language, and the Brain*; Philip Ball, *The Music Instinct* (London: Bodley Head, 2010); Stefan Koelsch, *Brain and Music* (Chichester: Wiley-Blackwell, 2012); Patrick Rebuschat, et al., eds., *Language and Music as Cognitive Systems* (Oxford: Oxford University Press, 2012), pt. 4; Michael A. Arbib, ed., *Language, Music, and the Brain: a*

- Mysterious Relationship* (Cambridge, MA: MIT Press, 2013), pt. 4; Morley, *The Prehistory of Music*.
- 47 For example, Steven Pinker, *How the Mind Works* (London: Penguin Books, 1999); Dean Falk, "Hominid Brain Evolution and the Origins of Music," in *The Origins of Music*, ed. N. L. Wallin, B. Merker, and S. Brown (Cambridge, MA: MIT Press, 2000), 197–216; John D. Barrow, *The Artful Universe Expanded* (Oxford: Oxford University Press, 2005); Johan De Smedt and Helen De Cruz, "Toward an Integrative Approach of Cognitive Neuroscientific and Evolutionary Psychological Studies of Art," *Evolutionary Psychology* 8 (2010): 695–719.
- 48 Such as Morley, *The Prehistory of Music*.
- 49 Ibid.
- 50 As discussed by Charles Darwin, *The Descent of Man and Selection in Relation to Sex* (London: D. Appleton, 1880), pt. 3, ch. 19.
- 51 This view is defended by Björn Merker, "Synchronous Chorus and Human Origins," in *The Origins of Music*, ed. N. L. Wallin, B. Merker, and S. Brown (Cambridge, MA: MIT Press, 2000), 315–327; see also Steven Brown, "Contagious Heterophony: A New Theory about the Origins of Music," *Musicae Scientiae* 11 (2007): 3–26.
- 52 Infant-directed speech as ancestor of music: Juan G. Roederer, "The Search for a Survival Value of Music," *Music Perception* 1 (1984): 350–356; Irenäus Eibl-Eibesfeldt, "The Biological Foundations of Aesthetics," in *Beauty and the Brain: Biological Aspects of Aesthetics*, ed. I. Rentschler, B. Herzberger, and D. Epstein (Basel: Birkhäuser, 1988), 29–68; Ellen Dissanayake, *Art and Intimacy: How the Arts Began* (Seattle: University of Washington Press, 2000); Ellen Dissanayake, "If Music Is the Food of Love, What About Survival and Reproductive Success?" *Musicae Scientiae* 12, special number (2008): 169–195; Sandra E. Trehub, "Musical Predispositions in Infancy: An Update," in *The Cognitive Neuroscience of Music*, ed. I. Peretz and R. Zatorre (Oxford: Oxford University Press, 2003), 3–20; Dean Falk, "Prelinguistic Evolution in Early Hominins: Whence Motherese?" *Behavioral and Brain Sciences* 27 (2004): 491–541; W. Tecumseh Fitch, "The Evolution of Music in Comparative Perspective," *Annals of New York Academy of Sciences* 1060 (2005): 29–49; Candace S. Alcorta, Richard Sosis, and Daniel Finkel, "Ritual Harmony: Toward an Evolutionary Account of Music," *Behavioral and Brain Sciences* 31 (2008): 576–577; Mario Baroni, "Music, Musicality, and 'Musilanguage'," *Musicae Scientiae* 12, special number (2008): 197–213; Jaap Panksepp, "The Emotional Antecedents to the Evolution of Music and Language," *Musicae Scientiae* 13, 2 Suppl. (2009): 229–259.
- 53 See Falk, "Prelinguistic Evolution in Early Hominins"; Fitch, "The Evolution of Music in Comparative Perspective."
- 54 On lullabies as musical universals: A. Fernald, "Meaningful Melodies in Mothers' Speech to Infants," in *Nonverbal Vocal Communication: Comparative and Developmental Aspects*, ed. H. Papousek, U. Jürgens, and M. Papousek (Cambridge: Cambridge University Press, 1992), 262–282; Anna M. Unyk, et al., "Lullabies and Simplicity: A Cross-cultural Perspective," *Psychology of Music* 20 (1992): 15–28; Sandra E. Trehub, et al., "Adults Identify Infant-directed Music across Cultures," *Infant Behavior & Development* 16, no. 2 (1993): 193–211; Sandra E. Trehub, et al., "Maternal Singing in Cross-cultural Perspective," *Infant Behavior & Development* 16, no. 3 (1993): 285–295.
- 55 For defenses and/or discussions of the view, see Steven Brown, "The 'Musilanguage' Model of Music Evolution," in *The Origins of Music*, ed. N. L. Wallin, B. Merker, and S. Brown (Cambridge, MA: MIT Press, 2000), 271–300; Jean Molino, "Toward an Evolutionary View of

How Ancient is Art?

Music and Language,” in *The Origins of Music*, ed. N. L. Wallin, B. Merker, and S. Brown (Cambridge, MA: MIT Press, 2000), 165–176; Björn Merker, “The Conformal Motive in Birdsong, Music and Language: An Introduction,” *Annals of New York Academy of Sciences* 1060 (2005): 17–28; Mithen, *The Singing Neanderthals*; Martin F. Gardiner, “Responses to Music: Emotional Signaling, and Learning,” *Behavioral and Brain Sciences* 31 (2008): 580–581; Gertraud Fenk-Oczlon and August Fenk, “Some Parallels between Language and Music from a Cognitive and Evolutionary Perspective,” *Musicae Scientiae* 13, 2 Suppl. (2009): 201–226; Gamble, “When the Words Dry Up”; Stephen Davies, “Protolanguage,” in *Music in the Social and Behavioral Sciences: An Encyclopedia*, vol. 2, ed. W. F. Thompson (London: Sage Reference, 2014), 914–916.

- 56 For such an account, see Brown, “The ‘Musilanguage’ Model of Music Evolution.”
- 57 For instance, see Roger T. Dean, Tim Byron, and Freya A. Bailes, “The Pulse of Symmetry: On the possible Co-evolution of Rhythm in Music and Dance,” *Musicae Scientiae* 13, 2 Suppl. (2009): 341–367.
- 58 For further discussion of this and following points, see Davies, “Defining Art and Artworlds.”
- 59 This point has long-been advocated by Ellen Dissanayake; see her *What is Art For?* (Seattle: University of Washington Press, 1988).

References

- Alcorta, Candace S., Richard Sosis, and David Finkel. "Ritual Harmony: Toward an Evolutionary Account of Music." *Behavioral and Brain Sciences* 31 (2008). 576–577.
- Anon. "Neanderthals made jewellery from eagle talons in Europe 80,000 years before *Homo sapiens* arrived." *The Independent*. Accessed March 15, 2015. <http://www.independent.co.uk/news/science/neanderthals-made-jewellery-from-eagle-talons-in-europe-80000-years-before-homo-sapiens-arrived-10101493.html>.
- Arbib, Michael A., ed. *Language, Music, and the Brain: a Mysterious Relationship*. Cambridge, MA: MIT Press, 2013.
- Aubert, M., A. Brumm, et al. "Pleistocene Cave Art from Sulawesi, Indonesia." *Nature* 514, (2014). 223–227.
- Ball, Philip. *The Music Instinct*. London: Bodley Head, 2010.
- Baroni, Mario. "Music, Musicality, and 'Musilanguage'." *Musicae Scientiae* 12, special number (2008). 197–213.
- Barrow, John D. *The Artful Universe Expanded*. Oxford: Oxford University Press, 2005. Expanded edition.
- Bednarik, Robert G. "Pleistocene Palaeoart of Asia." *Arts* 2, no. 2 (2013). 46–76.
- Berleant, Riva. "Paleolithic Flints: Is an Aesthetics of Stone Tools Possible?" *Contemporary Aesthetics* 5, (2007). <http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=488>.
- Blacking, John. *How Musical is Man?* Seattle: University of Washington Press, 1973.
- Brattico, Elvira, Paul Brattico, and Thomas Jacobsen. "The Origins of the Aesthetic Enjoyment of Music – A Review of the Literature." *Musicae Scientiae* 13, 2 Suppl. (2009). 15–39.
- Brown, Donald E. *Human Universals*. Philadelphia: Temple University Press, 1991.

How Ancient is Art?

- Brown, Steven. "Evolutionary Models of Music: From Sexual Selection to Group Selection." *Perspectives in Ethology* 13 (2000). 231–281.
- . "The 'Musilanguage' Model of Music Evolution." In *The Origins of Music*, edited by N. L. Wallin, B. Merker, and S. Brown, 271–300. Cambridge, MA: MIT Press, 2000.
- . "Contagious Heterophony: A New Theory about the Origins of Music." *Musicae Scientiae* 11 (2007). 3–26.
- Choi, C. Q. "Heavy brows, high art? Newly unearthed painted shells show Neandertals were *Homo sapiens*'s mental equals." *Scientific American* (March 2010). 18–19a.
- Collins, Christopher. *Paleopoetics: The Evolution of the Preliterate Imagination*. New York: Columbia University Press, 2013.
- Conard, Nicholas J., Maria Malina, and Susanne C. Münzel. "New Flutes Document the Earliest Musical Tradition in Southwestern Germany." *Nature* 460 (2009). 737–740.
- Cook, Jill. *Ice Age Art: Arrival of the Modern Mind*. London: British Museum, 2013.
- Corbey, Raymond, Robert Layton, and Jeremy Tanner. "Archaeology and Art." In *A Companion to Archaeology*, edited by J. L. Bintliff, 357–379. Oxford: Blackwell, 2004.
- Cross, Ian. "The Nature of Music and its Evolution." In *The Oxford Handbook of Music Psychology*, edited by S. Hallam, I. Cross, and M. Thaut, 3–13. Oxford: Oxford University Press, 2009.
- . "The Evolutionary Nature of Musical Meaning." *Musicae Scientiae* 13, 2 Suppl. (2009). 179–200.
- . "Music as an Emergent Exaptation." In *Music, Language, and Evolution*, edited by N. Bannan, 263–276. Oxford: Oxford University Press, 2012.
- . and Iain Morley. "The Evolution of Music: Theories, Definitions and the Nature of the Evidence." In *Communicative Musicality: Exploring the Basis of Human Companionship*, edited by S. Malloch and C. Trevarthen, 61–82. Oxford: Oxford University Press, 2009.
- Darwin, Charles. *The Descent of Man and Selection in Relation to Sex*. London: D. Appleton, 1880. Revised and augmented edition. First edition 1871.

- Davies, Stephen. "First Art and Art's Definition." *Southern Journal of Philosophy* 35 (1997). 19–34.
- . "The Know-how of Musical Performance." *Philosophy of Music Education Review* 12, no. 2 (2004). 56–61.
- . *The Artful Species: Aesthetics, Art, and Evolution*. Oxford: Oxford University Press, 2012.
- . "Protolanguage." In *Music in the Social and Behavioral Sciences: An Encyclopedia*, edited by W. F. Thompson, Vol. 2, 914–916. London: Sage Reference, 2014.
- . "Defining Art and Artworlds." *Journal of Aesthetics and Art Criticism* 73 (2015). 375–384.
- Dean, Roger T., Tim Byron, and Freya A. Bailes. "The Pulse of Symmetry: On the possible Co-evolution of Rhythm in Music and Dance." *Musicae Scientiae* 13, 2 Suppl. (2009). 341–367.
- d'Errico, Francesco, and João Zilhão. "A Case for Neanderthal Culture." *Scientific American* 13 (2003). 34–35.
- De Smedt, Johan, and Helen De Cruz. "Toward an Integrative Approach of Cognitive Neuroscientific and Evolutionary Psychological Studies of Art." *Evolutionary Psychology* 8 (2010). 695–719.
- . "A Cognitive Approach to the Earliest Art." *Journal of Aesthetics and Art Criticism* 69 (2011). 379–389.
- Dissanayake, Ellen. *What is Art For?* Seattle: University of Washington Press, 1988.
- . *Art and Intimacy: How the Arts Began*. Seattle: University of Washington Press, 2000.
- . "If Music Is the Food of Love, What About Survival and Reproductive Success?" *Musicae Scientiae* 12, special number (2008). 169–195.
- Dunbar, Robin I. *The Human Story: A New History of Mankind's Evolution*. London: Faber & Faber, 2004.
- Eibl-Eibesfeldt, Irenäus. "The Biological Foundations of Aesthetics." In *Beauty and the Brain: Biological Aspects of Aesthetics*, edited by I. Rentschler, B. Herzberger, and D. Epstein, 29–68. Basel: Birkhäuser, 1988.

How Ancient is Art?

- Fagan, Brian M. *Cro-Magnon: How the Ice Age Gave Birth to the First Modern Humans*. London: Bloomsbury Press, 2010.
- Falk, Dean. "Hominid Brain Evolution and the Origins of Music." In *The Origins of Music*, edited by N. L. Wallin, B. Merker, and S. Brown, 197–216. Cambridge, MA: MIT Press, 2000.
- . "Prelinguistic Evolution in Early Hominins: Whence Motherese?" *Behavioral and Brain Sciences* 27 (2004). 491–541.
- Fenk-Oczlon, Gertraud, and August Fenk. "Some Parallels between Language and Music from a Cognitive and Evolutionary Perspective." *Musicae Scientiae* 13, 2 Suppl. (2009). 201–226.
- Fernald, A. "Meaningful Melodies in Mothers' Speech to Infants." In *Nonverbal Vocal Communication: Comparative and Developmental Aspects*, edited by H. Papousek, U. Jurgens, and M. Papousek, 262–282. Cambridge: Cambridge University Press, 1992.
- Finlayson, Clive. *The Humans who went Extinct: Why the Neanderthals Died Out and We Survived*. Oxford: Oxford University Press, 2009.
- . et al. "Birds of a Feather: Neanderthal Exploitation of Raptors and Corvids." *PLoS ONE* 7, no. 9 (2012). e45927.
- Fitch, W. Tecumseh. "The Evolution of Music in Comparative Perspective." *Annals of New York Academy of Sciences* 1060 (2005). 29–49.
- Foley, Robert A. "Music and Mosaics: The Evolution of Human Abilities." In *Music, Language, and Evolution*, edited by N. Bannan, 27–57. Oxford: Oxford University Press, 2012.
- Gamble, Clive. "When the Words Dry Up: Music and Material Metaphors Half a Million Years Ago." In *Music, Language, and Evolution*, edited by N. Bannan, 81–106. Oxford: Oxford University Press, 2012.
- Gardiner, Martin F. "Responses to Music: Emotional Signaling, and Learning." *Behavioral and Brain Sciences* 31 (2008). 580–581.
- Gräslund, Bo. *Early Humans and their World*. Translated by N. Price. London: Routledge, 2005.
- Hagen, Edward D., and Peter Hammerstein. "Did Neanderthals and other Early Humans Sing? Seeking the Biological Roots of Music in the Territorial Advertisements of Primates, Lions, Hyenas, and Wolves." *Musicae Scientiae* 13, 2 Suppl. (2009). 291–320.

- Henshilwood, Christopher. "The Origins of Symbolism, Spirituality, and Shamans: Exploring Middle Stone Age Material Culture in South Africa." In *Becoming Human: Innovation in Prehistoric Material and Spiritual Culture*, edited by C. Renfrew and I. Morley, 29–49. Cambridge: Cambridge University Press, 2009.
- Huron, David. "Is Music an Evolutionary Adaptation?" In *The Cognitive Neuroscience of Music*, edited by I. Peretz and R. Zatorre, 57–75. Oxford: Oxford University Press, 2003.
- Joordens, Josephine C. A., Francesco d'Errico, et al. "Homo erectus at Trinil on Java used shells for tool production and engraving." *Nature*. Accessed December 3, 2014. doi:10.1038/nature13962.
- Klein, Richard G. *The Human Career: Human Biological and Cultural Origins*. Third Edition. Chicago: University of Chicago Press, 2009.
- Koelsch, Stefan. *Brain and Music*. Chichester: Wiley-Blackwell, 2012.
- Kohn, Marek and Steven Mithen. "Handaxes: Products of Sexual Selection?" *Antiquity* 73 (1999). 518–526.
- Lawson, Andrew J. *Painted Caves: Paleolithic Rock Art in Western Europe*. Oxford: Oxford University Press, 2012.
- Levitin, Daniel J. *This is your Brain on Music: The Science of Human Obsession*. New York: Dutton, 2006.
- Lewis-Williams, J. David. *The Mind in the Cave*. London: Thames & Hudson, 2002.
- McBrearty, Sally and Alison S. Brooks. "The Revolution that Wasn't: A New Interpretation of the Origin of Modern Humans." *Journal of Human Evolution* 39 (2000). 453–563.
- Marwick, Ben. "Pleistocene Exchange Networks as Evidence for the Evolution of Language." *Cambridge Archaeological Journal* 13 (2003). 67–81.
- Mellars, Paul. "Rethinking the Human Revolution: Eurasian and African Perspectives." In *Rethinking the Human Revolution*, edited by P. Mellars, K. Boyle, O. Bar Yosef, and C. Stringer, 1–11. Cambridge: McDonald Institute for Archaeological Research, 2007.
- Merker, Björn. "Synchronous Chorus and Human Origins." In *The Origins of Music*, edited by N. L. Wallin, B. Merker, and S. Brown, 315–327. Cambridge, MA: MIT Press, 2000.

How Ancient is Art?

- . “The Conformal Motive in Birdsong, Music and Language: An Introduction.” *Annals of New York Academy of Sciences* 1060 (2005). 17–28.
- Miller, Geoffrey F. *The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature*. New York: Doubleday, 2000.
- Mithen, Steven J. *The Prehistory of the Mind: A Search for the Origins of Art, Religion, and Science*. London: Thames & Hudson, 1996.
- . *The Singing Neanderthals: the Origins of Music, Language, Mind, and Body*. London: Weidenfeld & Nicolson, 2005.
- Molino, Jean. “Toward an Evolutionary View of Music and Language.” In *The Origins of Music*, edited by N. L. Wallin, B. Merker, and S. Brown, 165–176. Cambridge, MA: MIT Press, 2000.
- Morley, Iain. *The Prehistory of Music: Human Evolution, Archaeology, and the Origins of Human Musicality*. Oxford: Oxford University Press, 2013.
- Nettl, Bruno. “An Ethnomusicologist Contemplates Universals in Musical Sound and Culture.” In *The Origins of Music*, edited by N. L. Wallin, B. Merker, and S. Brown, 463–472. Cambridge, MA: MIT Press, 2000.
- Panksepp, Jaap. “The Emotional Antecedents to the Evolution of Music and Language.” *Musicae Scientiae* 13, 2 Suppl. (2009). 229–259.
- Patel, Aniruddh D. *Music, Language, and the Brain*. Oxford: Clarendon Press, 2008.
- . “Music, Biological Evolution, and the Brain.” In *Emerging Disciplines*, edited by M. Bailar, 91–144. Houston: Rice University Press, 2010.
- Peresani, M., et al. “Late Neandertals and the intentional removal of Feathers as Evidenced from Bird Bone Taphonomy at Fumane Cave 44 ky B.P., Italy.” *Proceedings of the National Academy of Sciences USA* 108 (2011). 3888–3893.
- Pettitt, Paul. *The Paleolithic Origins of Human Burial*. London: Routledge, 2011.
- Pfeiffer, John E. *The Creative Explosion: An Inquiry into the Origins of Art and Religion*. New York: Harper and Row, 1982.
- Pinker, Steven. *How the Mind Works*. London: Penguin Books, 1999.
- Ramachandran, Vilayanur. *The Emerging Mind*. London: Profile Books, 2003.

- Rebuschat, Patrick, Martin Rohrmeier, John A. Hawkins, and Ian Cross, eds. *Language and Music as Cognitive Systems*. Oxford: Oxford University Press, 2012.
- Roederer, Juan G. "The Search for a Survival Value of Music." *Music Perception* 1 (1984). 350–356.
- Shea, John J. "Homo sapiens is as Homo sapiens was: Behavioral Variability versus 'Behavioral Modernity' in Paleolithic Archaeology." *Current Anthropology* 52 (2011). 1–35.
- Sterelny, Kim. *The Evolved Apprentice*. Cambridge, MA: MIT Press, 2012.
- Stringer, Chris. *Lone Survivors: How We came to be the Only Humans on Earth*. New York: Times Books, 2012.
- Tattersall, Ian. *Masters of the Planet: The Search for our Human Origins*. London: Palgrave Macmillan, 2012.
- Than, Ker. "World's oldest Cave Art Found — Made by Neanderthals?" *National Geographic*. June 14, 2012.
<http://news.nationalgeographic.com/news/2012/06/120614-neanderthal-cave-paintings-spain-science-pike/>.
- Tomlinson, Gary. *A Million Years of Music: The Emergence of Human Modernity*. New York: Zone Books, 2015.
- Trehub, Sandra E. "Musical Predispositions in Infancy: An Update." In *The Cognitive Neuroscience of Music*, edited by I. Peretz and R. Zatorre, 3–20. Oxford: Oxford University Press, 2003.
- , Anna M. Unyk, and Laurel J. Trainor. "Adults Identify Infant-directed Music across Cultures." *Infant Behavior & Development* 16, no. 2 (1993). 193–211.
- . "Maternal Singing in Cross-cultural Perspective." *Infant Behavior & Development* 16, no. 3 (1993). 285–295.
- Trinkaus, Erik, Alexandra P. Buzhilova, et al. *The People of Sunghir: Burials, Bodies, and Behavior in the Earlier Upper Paleolithic*. Oxford: Oxford University Press, 2014.
- Unyk, Anna M., Sandra E. Trehub, Laurel J. Trainor, and E. Glenn Schellenberg. "Lullabies and Simplicity: A Cross-cultural Perspective." *Psychology of Music* 20 (1992). 15–28.

How Ancient is Art?

Vanhaeren, Marian. "Speaking with Beads: The Evolutionary Significance of Personal Ornaments." In *From Tools to Symbols: From Early Hominids to Humans*, edited by F. d'Errico and L. Blackwell, 525–553.

Johannesburg: Witwatersrand University Press, 2005.

Wells, Spencer. *The Journey of Man: a Genetic Odyssey*. New York: Random House, 2002.

———. *Pandora's Seed: The Unforeseen Cost of Civilization*. New York: Random House, 2010.

White, Randall R. "Production Complexity and Standardization in Early Aurignacian Bead and Pendant manufacture: Evolutionary Implications." In *The Human Revolution*, edited by P. Mellars and C. Stringer, 366–390. Edinburgh: Edinburgh University Press, 1989.

Zilhão, João. "The Emergence of Ornaments and Art: An Archaeological Perspective on the Origins of 'Behavioral Modernity'." *Journal of Archaeological Research* 15 (2007). 1–54.

———. "The Emergence of Language, Art and Symbolic Thinking. A Neanderthal Test of Competing Hypotheses." In *Homo symbolicus: The Dawn of Language, Imagination and Spirituality*, edited by C. S. Henshilwood and F. d'Errico, 111–131. Amsterdam: John Benjamins, 2011.