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*This month's Museletter is my response to Bob Labaree's essay "[Darwin's Endless Forms Most Beautiful: What's Musical About Biology and Why Does That Matter?](#)", which was itself based on previous conversations he and I had about the relationship between music, creativity, and nature.*

## **Nature Is Intentionally Beautiful**

In his essay "[Darwin's Endless Forms Most Beautiful: What's Musical About Biology and Why Does That Matter?](#)", Bob Labaree posed four questions about music and nature, which I could summarize as:

1. Are the virtuosic inventions of a virus on a par with the virtuosic inventions of an Aretha Franklin or a Niccolò Paganini?
2. Is the link between nature's beauty and human creativity just metaphorical?
3. Do biological and musical systems rely on common processes for their creativity?
4. Why does any of this matter?

Rather than responding to Bob's questions and related thought-provoking musings one by one, I'd prefer to jot down my own thoughts on the subject in a (hopefully) semi-coherent way; perhaps the result will address all four questions implicitly if not explicitly.

### **Aesthetics and sexual selection**

Charles Darwin's second book, following upon *On the Origin of Species by Means of Natural Selection*, has received far less attention than its elder sibling. *The Descent of Man, and Selection in Relation to Sex* was, in large part, Darwin's attempt to address a problem that had gnawed at him ever since the publication of *Origin*. He wrote, "The sight of a feather in a peacock's tail, whenever I gaze at it, makes me sick!" The feather is unquestionably beautiful, but its evolution is nearly impossible to explain in terms of fitness and natural selection. Why is nature so filled with apparently useless beauty?

Darwin's solution to the conundrum was the principle of sexual selection. In species that reproduce through sex, the successful transmission of an individual's genes to the next generation depends not just on that individual's relative vigor, size, or strength (qualities we intuitively, though often

mistakenly, associate with fitness), but also on its ability to attract a mate. Females of the species often choose males with whom to get it on (more rarely it's the other way around), and the criteria for choosing or being chosen sometimes appear bizarre.

Consider the bowerbird of Australia. The adult male builds a bower (which is an elaborate structure that's not a nest and has no other use) to attract a female. Various bowerbird species build differently sized and designed bowers; some carefully arrange colored objects—pebbles, petals, feathers, insects, bottlecaps—to decorate the structure. Why do these birds go to so much trouble? Meticulous research has shown that artistic effort on the part of the male, and selective aesthetic preference on the part of the female, have coevolved in a self-reinforcing feedback process. In the male bowerbird, and many other creatures, the power to attract a mate has become inextricably tied to the activity of producing expressions of beauty that have no other practical value and are not signs of overall fitness. Beauty has become an end in itself.

Many evolutionary biologists have tried to explain such displays by hypothesizing natural selection benefits. Maybe the ability to expend apparently useless effort on display is itself a fitness cue. The logic goes like this: with the ownership of a Ferrari, a beautiful automobile whose practical usefulness is severely limited, a man may hope to broadcast a signal to desirable women in the vicinity, saying, "Look at me! I am so rich that I can afford to waste lots of money on this pretentious piece of automotive art! What good genes I have!" However, ornithologist Richard O. Prum, in his recent book *The Evolution of Beauty*, makes a convincing case that aesthetic displays often aren't tied to objective measures of competitive fitness, and sometimes actually reduce fitness. "Individual organisms," he writes, "wield the potential to evolve arbitrary and useless beauty completely independent of (and sometimes in opposition to) the forces of natural selection."

### **Beauty beyond sexual selection**

While it seems to start as a strategy for mate attraction, the production of beauty can persist when mating is not an issue. This is notable, for example, in the case of bird songs. Even though males ramp up their singing during mating season, birds of many species continue making their music throughout the year and appear to enjoy doing so; they even appear to enjoy the songs of their rivals.

Moreover, investment in display can proceed to such extremes that it leads to "aesthetic decadence," contributing to a species' decline and even extinction. When the males and females of a given species come to agree that only a particularly extravagant display—one whose costs impair the species' survival abilities—is a requirement for mate choice, then attraction can truly become fatal. The fossil record probably holds plenty of examples, though teasing out the exact cause of extinction in any given case is often difficult (the [Irish elk](#), with its impossibly bulky antlers, is probably a good example-candidate). It's perhaps easier to show instances of aesthetic decadence among creatures still living, such as the club-winged manakin, a small bird that lives in the Amazon rainforest. The male courts its potential mate by clapping his wings together at over 100 times per second, faster than the flapping of a hummingbird's wings, producing an oboe-like tone. Females adore the sound and choose their mate based on the excellence of his wing-

clapping performance. Unfortunately, however, in order to effectively make their unique sound, club-winged manakins need solid wing bones—which they have duly evolved. As a result, their flight is slow and clumsy, putting them at a distinct disadvantage compared to other birds.

Prum suggests that sexual selection played a significant role in human evolution. For example, our greater cooperativeness or docility (as compared to our closest ape relatives) may have evolved through sexual selection. Put simply, primordial women may have chosen to mate with men who were less aggressive than others, in order to increase their own safety and autonomy and to reduce the likelihood of male infanticide (in most primate species, males have a horrific tendency to kill young offspring sired by their rivals).

Human art and music may also have originated via sexual selection. The first cave paintings and bone flutes appeared roughly 40,000 years ago, about the same time stone tools took a leap in terms of their sophistication. Paleolithic paintings of animals and humans are exquisite and expressive; and ancient flutes, made from mammoth and vulture bones, produce tones with the same tonal relationships (whole tones, half tones) as the tones produced by modern musical instruments like the piano or guitar. We also see evidence of body art and decoration around that time. Moreover, as soon as we had language, we probably started using it playfully and creatively to make songs, poems, sagas—and jokes. Little of this had to do with survival needs.

Later, the development of communications technologies—from writing to the printing press, sound recording, motion pictures, radio, television, the internet, and more—drove the evolution of aesthetics in a multitude of new directions, and enabled the development of extreme levels of artistic sophistication.

The obsessiveness with which we have come to pursue artistic production and appreciation is easily illustrated by violin playing. Watch and hear [Hilary Hahn](#) performing Paganini's 24<sup>th</sup> Caprice on YouTube. A dozen or more notes may fly by each second, each perfectly in tune, and each perfect also in articulation and tone color. Hahn's two hands are engaged in entirely different tasks that must somehow be exactly synchronized. And the point of the exercise isn't just to make no mistakes while doing several nearly impossible things simultaneously, but to confidently create beautiful and moving music. With all due respect to brain surgery, I can say with some confidence that no activity by a human or any other animal requires as much digital precision as top-level fiddling does. And it's not just the violinist's fingers that are involved, but wrists, arms, and back muscles—and, first and foremost, the brain. Finger exercises (which every serious violinist spends hundreds of hours on, to the weary aggravation of all within hearing distance) are useless without a trained "ear"—which really means a highly trained *brain*—that can recognize tiny variations in pitch and rhythm, and make nearly instantaneous corrections on the fly.

However, my example primarily illustrates many humans' utter devotion to aesthetics, to a degree that is difficult to justify in terms of either natural selection or sexual selection. Yes, many teenage boys buy a Stratocaster and take guitar lessons in order to impress the girls. But I find it difficult to imagine that such a motive would compel a five-year-old child to begin practicing a supremely difficult musical instrument several hours a day and to

continue doing so all through adulthood. Nor is pursuit of fame or financial reward an adequate explanation. Are violinists more physically fit than other humans? Do they live longer? Do they leave more offspring? Do they tend to make higher salaries? Do they attract more desirable sexual partners? My past experience as a volunteer board member of a local musicians' union, of which most members were professional symphony orchestra players, leads me to doubt that any of these is reliably the case (though learning a musical instrument does seem to give children an advantage in math and reading). Why should people devote so much more effort to developing the skill of violin playing than any of a hundred other skills that are much less demanding and that might have a better chance of leading to wealth or social prominence?

The sports devotee will recognize a similar obsession. Any serious long-distance runner, basketball player, mountain biker, baseball player, or tennis player exhibits a similar level of compulsion, and the subjective experience of an outstanding performance in any sport can be described as aesthetic. Devotion to athletics can perhaps more readily be explained in terms of competition, selection, and fitness (and the financial rewards for professional-level performance are sometimes astronomical), but the pursuit of excellence in sports and the arts is, in both cases, quasi-spiritual.

### **Modern aesthetic decadence**

As a result, we live in an aesthetic human world. Nearly every surface in a modern city is *designed*. Cars, houses, office buildings, and tools of all kinds—from motorcycles to fountain pens—have become canvases for the creative imagination. And we are immersed in entertainment of every imaginable variety—from background music to podcasts to television crime dramas. Typical modern urbanites “consume” art almost from the moment they wake up till the moment they fall asleep at night.

The question must arise as to whether at least some of this exuberant aesthetic production is “decadent” in the evolutionary sense, in that it reduces our species' survival prospects. Unfortunately, the notion of aesthetic decadence is weighted with prejudice and with some rather awful history: Hitler thought virtually all modern art was decadent and ordered many important paintings and sculptures destroyed; during the 1930s and early '40s, artists like Ernst, Mondrian, and Duchamp fled their homelands to avoid harassment or worse—as did composers such as Hindemith and Schoenberg. Though Stalin's politics were diametrically opposed to Hitler's, the Soviets likewise regarded modernist composers as decadent, periodically making life hellish for Shostakovich and Schnittke. One person's decadence is another's masterpiece.

However, in my opinion the contemporary world does provide persuasive evidence of aesthetic decadence. What I have in mind is music and art produced specifically for commercial purposes. Advertising art can be clever and entertaining: that helps it sell products. But advertising is one of the pillars (along with cheap energy and consumer credit) of consumerism, and consumerism is in turn an engine of economic growth. As the economy grows, it chews up and digests ever-greater swathes of the natural world, leaving depletion, pollution, and habitat destruction in its wake. Our survival is very much in peril as a result.

In a capitalist society, commerce influences nearly all art and music, though to greatly varying degrees. Professional hip-hop artists and singer-songwriters struggle to find a unique “voice” that will appeal to agents, concert bookers, and fans willing to buy tickets or downloads. This constant striving for uniqueness is specific to the modern commercial milieu: in pre-capitalist or pre-industrial societies, multi-generational tradition guided aesthetic preference to a much greater degree. One could say that capitalism produces greater artistic variation, thereby speeding up aesthetic evolution. But if the species is rapidly evolving toward decadence and possible extinction, then its proliferation of increasingly varied forms of art and music is destined to be short-lived, however ingenious and enjoyable those forms may be.

### **Back to the four questions**

Is the link between music and nature’s creativity more than metaphorical? If nature creates beauty through sexual selection, then beauty is inherent in nature. It may be too much to suppose that bacteria enjoy beauty (they reproduce asexually, after all). But, in most multi-celled organisms, perhaps even including flowering plants, the potential for artistic enjoyment arguably exists. Though we can’t directly monitor the subjective experience of a snail, it must be able to enjoy at least the rudiments of aesthetic rapture.

In his essay, Bob Labaree discusses the lawfulness of both music and nature. Through this lawfulness, biological and musical systems do indeed rely on common processes for their creativity. In the 19<sup>th</sup> century, Hermann von Helmholtz investigated the physics of the vibrating string (which is the basis of the music of the guitar, sitar, oud, the violin family of instruments, and the piano), the vibrating air column (same for wind and brass instruments and the pipe organ), and vibrating membranes (percussion instruments), and revealed the underlying patterns by which oscillations combine to produce the experiences of consonance, dissonance, and harmony. All musical creativity plays upon those inherent patterns. The Western diatonic scale may be an arbitrary cultural convention in some respects, but scales in general share a non-arbitrary foundation: they are all built upon the inherent characteristics of vibration. The octave will always be the most consonant of tone intervals, whatever you choose to call it and however you choose to divide it.

The universe is teeming with vibration—whether of sound or electromagnetism, including, but extending far beyond, the light spectrum. Indeed, energy and matter may both be described in terms of wave interference patterns. Moreover, organisms are electric. Every living cell persists by pumping protons across a membrane, creating an electrical charge that is the source of its respiratory power. Organisms also communicate through sound and light (as well as smell and touch). Thus the inherent laws of vibration and rhythm resonate from atoms to galaxies, from cells to symphonies. We constantly and intuitively play with these laws to create beauty.

Perhaps the greatest musical satisfaction is to be found in situations where several brains become entrained in the process of creating beauty together in the moment—as occurs in a good performance by a string quartet, symphony orchestra, or jazz ensemble. In the last case, even collective composition can occur instant-by-instant—a miracle at least as thrilling as the murmuration of starlings.

## A beautiful future?

The most telling question Bob asks is, why does any of this matter? Of course, it matters to our understanding and appreciation of music, and our understanding of evolution. But does it matter to our survival?

Perhaps not over the short term. For the next few decades, humanity will be dealing with the consequences of a two-century party, during which a portion of us burned ever-increasing amounts of cheap fossil fuel in order to gain ever-more power over the environment and other humans. The rewards for industrialization came quickly and were unprecedented in scope; the costs, unprecedented in severity, are only now coming into view. They include climate change, overpopulation, overconsumption, pollution, destruction of natural habitat, depletion of natural resources, and more. Everything will depend on our abilities to reduce consumption of energy and materials, and transform our economy into one that's smaller, circular, and sustainable, without devolving into blame for dashed expectations and deadly competition for scraps left over from the party. It's hard to see how aesthetic efforts could do much more than cheer and motivate pro-social behavior during this crucial period when so much will be unraveling.

Over the longer term, aesthetics could conceivably nudge human evolution in a direction different from our recent one. We are striving and competitive animals. Having spent tens of thousands of years developing extraordinary powers of communication and invention, we are driven to find ways to use these abilities to our advantage. However, building empires and fortunes tends to get us into trouble. How shall we harmlessly occupy our big brains and our extraordinary tool-making abilities? Innumerable cultures have come up with essentially the same answer: strive for beauty, serenity, and wisdom. The need for benign ways to channel outsized human capabilities is one of the reasons societies have devoted large portions of their hard-won material and labor surpluses toward building beautiful temples; it's also one of the reasons prominent families in traditional societies encouraged some of their sons and daughters to become monks, nuns, artists, and musicians.

Spirituality and the arts also fill basic human needs for community. Seasonal festivals, rife with concentrated aesthetic and spiritual experiences, make life fun by celebrating the cycles of time. David Fleming, author of *Surviving the Future*, was one of the few futurists who could see humans in three dimensions as complex beings with needs and drives. He wrote:

Celebrations of music, dance, torchlight, mime, games, feast and folly have been central to the life of community for all times other than those when the pretensions of large-scale civilization descended like a frost on public joy. Carnival is a big word: it spans the buffoonery of the Feasts of Fools, the erotic Saturnalia of Rome, the holy holidays of the Church's calendar and the agricultural year, and local days of festival in which communities, for most of history, have put down their work and concentrated on enjoying themselves.

Fleming believed that carnival must play a key role in any future culture that's worth the effort in building it.

What would be needed to keep such a culture on track? We needn't speculate too much; it's more edifying to consult the findings of history and anthropology: while some societies cultivated kings and trading empires, others stayed modest and moderate. They did so by deriving their food from hunting and gathering or gardening, rather than from farming. They maintained cultural mechanisms such as the potlatch to prevent the accumulation of wealth. They cultivated a deep skepticism of hierarchy. And they spent their spare time singing and dancing.

I don't pretend to know what a future post-industrial aesthetic culture might look or sound like. I would like to think that at least some of the best artistic achievements of the industrial era will survive, at least in vestigial ways. If there are forms of aesthetic decadence, other than advertising, that should be avoided, it will be up to future generations to identify and discourage them—hopefully by prosocial rather than authoritarian methods. For the foreseeable future, we will have our hands full getting past the ugliness of cultural disintegration. We'll need whatever morsels of beauty we can preserve or produce just to keep ourselves sane.

At first thought that may seem like a relatively unimportant role for the arts; but, from the standpoint of people in the midst of turbulent cultural change, it may make a world of difference.

*Portions of this essay are drawn from my forthcoming book Power: On the Origins of Social Inequality and Climate Change.*