Meditations on Objective Aesthetics in World Music

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Abstract. This essay opens a dialogue between ethnomusicology and neo-Darwinism as promulgated by biologist Richard Dawkins and others. The first half engages quantum physicist David Deutsch’s much-discussed The Beginning of Infinity (2011), which integrates neo-Darwinism with the epistemology of objective knowledge developed by Karl Popper. Along the way Deutsch suggests that aesthetics with universal reach, akin to scientific facts, must be discoverable. Both Deutsch and Dawkins argue that traditional (meaning non-post-Enlightenment) societies squelch unfettered knowledge creation in order to preserve themselves, and hence are unlikely to develop objective knowledge. Yet ethnomusicologists show that music can express social values but also point beyond them to unsuspected realms. If there exist aesthetic facts with universal reach in traditional music, can they be identified in these realms? Can ethnomusicology be an arena for discussing such questions? The second half of the essay engages in an analysis of a Ba-Benzele Pygmy tune in search of its objective aesthetic properties and their implications.

An Encounter

Several years ago I went to hear biologist and radical atheist Richard Dawkins address a packed hall to promote his 2006 book The God Delusion, a provocative salvo in his effort to defend science against the perceived dangers of a public sphere dominated by discourses of faith. The book savages religion, especially Christianity, Judaism, and Islam. It mocks their power and depicts violence and intolerance as central to their legacies, juxtaposing this with scientific method hailed as objective knowledge and liberation from ignorance.¹ With Abraham, Mohammed, and Jesus all on trial, and the ghost of Charles Darwin prosecuting, I felt somewhat timid when, during the Q and A, I identified myself as an

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ethnomusicologist, and spoke up for the smaller religions of the world and the value of their cultural achievements. If the big three need to go, I asked, what about all the rest, whose depravities, I submitted, are perhaps milder? Dawkins coldly shot back that religious, authoritarian societies are all mendacious, and should renounce their heritages to embrace the overwhelming evidence for science. But he allowed, in an aside that he may well have thought generous, that their cultures ought to be documented and preserved in archives and museums. I shuddered, thinking of the implications for the Balinese, the Kaluli, or the Suya, just to name some icons of ethnomusicology’s disciplinary heritage.

But Dawkins’ splash of ice water also bore some inconvenient truth—not for the Balinese, Kaluli, or Suya, but for me. He roused my ethnomusicologist persona’s deep-seated relativist conscience to waken to some restive voices beneath: namely, that part of me curious about music’s place in the natural order, that guardian of the cultural order. Is it foolish to wonder if the deepest questions about music one may live long enough to ponder will not devolve only to humanist and culturally relative answers? I would be far from the first to ask. Such questions may even take human volition out of the equation and explain what music is “really” for, since somewhere deep down we know that the music is playing us, and not the other way around; and that it is part of something bigger than us, as are we.

Dawkins is front-and-center in the boisterous encounter between the natural sciences and the humanities that is a conspicuous strand in new-millennial culture. On the one hand there is inchoate synergy. For example, The God Delusion’s alarm over worldwide intensification of religious fundamentalism is felt by scientists and humanists alike. But following upon decades of mutual unease, scientism and humanism often clash. A recent instance of the public brouhaha over the clash of values is the print-feud between a redoubtable figure from each camp—articles by linguist-cognitivist Stephen Pinker and philosopher-critic Leon Wieseltier—in the New Republic (respectively: August 6 and September 3, 2013). Their exchange fueled the fire, with Pinker claiming that science is the only reliable source of knowledge (but that it is beneficent), and Wieseltier granting science no “license to extend its categories and its methods beyond its own realms, whose contours are of course a matter of debate.”

Yet the “synthetic understanding of human affairs” that Pinker conjures at one point feels both inevitable and necessary. From such a perspective, “knowledge from the sciences can contribute to the humanities without taking them over” (Pinker: September 26, 2013). Keeping one’s eyes on such a prize motivates those who find the conflict shrill. A modest exploration toward such a perspective, involving music and discourses of scientific knowledge, is the subject of this essay. However, the knowledge targeted is not that of empirical cognition studies or analysis of acoustic data—as might be expected since they are at the
heart of musicology’s “systematic” aspects and the most likely terrain to share with the hard sciences—but rather the potential for scientific objectivity to shed light on hoary universal questions of aesthetics and beauty. Hence the inquiry is philosophical. In ethnomusicology these topics have usually been eschewed and felt to be distasteful, since in the Western scholarly tradition notions of objective beauty are strongly linked to discredited nineteenth century Eurocentrism and the particular values of European arts.

I am interested instead in a reconstructed, meta-cultural notion of aesthetics from a neo-Darwinist vantage. Dating from the turn of the twentieth century, neo-Darwinism at first referred to a set of specific revisions to Darwin's work. But it has grown into an encompassing synthesis of Darwinian evolutionary theory, genetics, neurobiology and even, for some, fields as disparate as astrophysics, epistemology, and more, all coalescing into a metanarrative capable of shedding light on the most far-reaching questions not only about organisms and their evolution, but about physical reality itself. As I will explain, some scientists, emboldened by modern neo-Darwinism's sweep and implications, have extended its reach to include aesthetics and other issues strongly felt (by Wieseltier and his ilk) to belong exclusively to the humanities.

Linking music to nature under Dawkins’ critical eye leads to thoughts of the study of universals, to which I see three approaches. One is the classic quest for features present in most or all musics; suffice to say that this search has borne fruit over the decades but also led to some shoulder-shrugging. Another is the current and influential study of musical experience, the brain and psychology of music, and the biology and evolution of music. All are fruitful and yet, our many and fast-accumulating studies of cognition still do not come remotely close to capturing the richness of musical experience, or to satisfying our thirst for insight into what it means. Thus we advance, but sometimes suspect that the questions answered may not correspond to some others that we can barely formulate.

A third approach to the study of universals has to do not with what makes music humanly significant and satisfying, but what makes it autonomously significant and satisfying, in the way that scientific theories of reality and the laws of physics are. The notion of autonomous significance is indelibly linked to a perception of a natural order, a higher reality hidden in music. For example, the sense, often thematized in many societies, that music and mathematics manifest shared principles, exerts permanent, inexorable fascination. They are two abstract worlds of human experience offering contradictory yet unified versions of the real: that is, each has both an elaborately patterned surface and a highly ordered essence. The infinitely non-repeating numerical value of π, for instance, is to the utter simplicity of the ratio between circumference and radius that it represents, as the complex and unstable sonic particulars of a particular musical utterance is to the elegance of its underlying system.
That music and mathematics suggest a higher unity is all the more compelling because of the utter dissimilarity of their media. The contrast is perhaps especially strong in light of the fact that music exclusively provides temporal experience, while mathematics does not. Among the enduring benefits of both, however, is their capacity to vividly stimulate awareness and experience of fundamental and unresolvable paradoxes of existence. They bring us to potentially transformative consciousness of the coexisting discrete and continuous properties of both space and time. The status of π as an irrational number (that its exact value is indeterminate) exemplifies this for the mathematics of physical space, and the impossibility of precisely calibrating the temporal features of a sound event does so for music. In Western humanism alone the weight of history borne by such enduring questions of aesthetics, the natural world, and the world of the products of the human mind, accumulate from Plato to Galileo to Kant to Euler to Derrida.

Music and (Meta)-Culture

Ethnomusicology’s enduring, human frames of reference have been cultural anthropology and the associated cultural relativism. Dawkins’ retort to me reveals as well as anything that science sees relativism as something of very limited use—as data, perhaps, but not value. It deals with the physical world, of which music and its associated technologies is a part, and holds that the relativist’s mantra of “turtles all the way down” couldn’t be more wrong. Relativism teaches that cultural systems are internally true, but science sees its ace in the hole as an emergent meta-awareness of the commonalities among diverse and mutually irreconcilable cultural systems—and meta, because it is on a higher, etic level, is considered better; comparative knowledge, always an advance over particular. Anything else is demoted to the level of the parochial: that is, innocent of comparison. By eschewing relativism, science has no access to the truths of cultural meaning, while ethnomusicology (and other humanisms), by eschewing scientific universality, has precious little access to the meta-view.

Though many of us are secularists and embrace scientific explanations as a foundation for our beliefs about physical reality, we remain conflicted when it comes to whether its universalizing method should it be applied to the human affairs under our professional purview. Science stops working for us then because it seems disrespectful or even dehumanizing. We have been gathering data on musical practices and values, investing both discernment and compassion in the cultures and individuals we study. We are deep among the leaves and branches of people and local practices, able (with effort) to look up through the trees of their social formations, but immobilized by fear of losing sight of the leaves if we try to see the forest of humanity as a whole—even if we think one day we ought to.
Our field’s most recent and noted encounter with scientific method has been through the writings of Judith Becker (2004, 2009, 2011), in which she helpfully introduces us to some of the growing number of researchers willing to meet humanists half way to embrace cultural particularity. She also entreats ethnomusicologists to join her in going the complementary distance (2009:492–96). Becker’s interest is in scientific method of the clinical psychological kind—the use of a laboratory technology to measure physical responses to music, amass data, and venture hypotheses; her challenge is to hold fast to the tenet that such experiments must fold in cultural variables. Though attitudes have begun to change, this was something until recently dismissed by scientists as either impractical or too complex. Becker uses laboratory data alongside ethnography, combining quantified measurement of physical phenomena with other data. With these interventions she joins an intermittent line of modern systematic musicology dating to Helmholtz (1877). Another new avenue has been the blending of DNA analysis with musical and other data to make hypotheses about cultural groups and their ancient histories (Grauer 2011).

My line of inquiry is on a different plane: I seek to engage certain contemporary scientists who have publicly ventured into humanities territory with bold claims about morality and aesthetics. In the Anglophone world alone figures such as Stephen Jay Gould, Daniel Dennett, Richard Dawkins, Lawrence Krauss, and David Deutsch (plus others of lesser celebrity), extend science into the discourse on morality and society so as to view human affairs through a neo-Darwinist universal lens. While contemporary philosophy and science share a common ancestor in Natural Philosophy of the nineteenth century and earlier, in our specialized era for science to reach so far is audacious. At their most strident, they conflate all forms of religion and cultural relativism and consign them to obsolescence. With complete confidence in the Western cultural conditions that have given rise to science, they have at times denigrated the capacity of other cultures to bring forth knowledge of value. Others (Stephen Jay Gould and the physicist Richard Feynman, notably) are bridge-builders urging coexistence.

Musicology has not yet advanced a response to these thinkers, who, when they engage music, can be counted on to discuss Western art music. One may warm to their audacity but not their myopia, and contend that music in any cultural context can create knowledge of universal value via channels that musicologists are specially equipped to navigate. But in order to make the case, so as to meet scientist-interlocutors on their own turf, it is clear that music must first be lifted out of any particular cultural context and viewed it in neo-Darwinian terms. Whatever its role in evolution, music is a consequence of evolution and, therefore, a component of our developing genetic heritage. It must thus have significance at that level, which is meta- with respect to its meanings within the sphere of human relations. There will be no discussion with science unless this
criterion is allowed. Without it, music would always remain a low-level artifact of culture, “merely” expressive, and not an actual shaper of human understanding of objective reality.

And, not least, to the extent that one subscribes to the values of scientific method, critical inquiry, and anti-authoritarianism purveyed by science, urging music even provisionally out of the culturally relativist sphere in which it usually dwells and into the space of universals is a productive self-interrogatory act for ethnomusicology. Aghast by Dawkins’ call for the wholesale conversion of traditional cultures to the perspective of science, my encounter with him became a provocation to find a way to respond within a discourse faithful to ethnomusicology that he still might consider. And, equally, to mount a defense of what traditional cultures may have to teach him about objective reality. My premise in the rest of the essay is to interweave this goal with neo-Darwinist discourses of biology and epistemology.

Deutsch, Dawkins, and Popper

Quantum physicist David Deutsch’s *The Beginning of Infinity* (2011) sets out a general epistemology: a theory of everything. His modus operandus is the relentless stripping away of parochial perspectives to achieve a view on the nature of what he argues is humanity’s pivotal significance in the cosmos. To put it as pithily as possible, he says that our role is to create knowledge about the cosmos by explaining it, so we can transform it (2011:93–95). To make this case he relies on neo-Darwinism à la Dawkins, and Karl Popper’s theory of knowledge creation, developed most fully in *Conjectures and Refutations* (1963).

Neo-Darwinism’s core concept can be understood as a process: replication leading to variation, followed by isolation and selection. But the process is no longer seen as a purposeful and directed one, unlike the way that organisms’ “struggle for existence” was so central to the original theory of evolution as Darwin was at pains to describe it (Darwin 2006 [1859]). Selection is thus “blind” and can only be accidentally purposeful, or unwittingly so from an anthropocentric point of view. In neo-Darwinism, the basic unit is the replicator: anything capable of generating a copy of itself (Dawkins 1976:264). The gene, a particular kind of replicator, exists only to survive by replicating in the immediate term—and not necessarily to find advantageous long-term prospects. Since genes are short-sighted, evolution is random and leads to many dead ends, as the history of species shows. Indeed most life has replicated in environments that initially were receptive but ultimately hostile and led to extinction. Some forms of life are graced with survival, in favorable environments. Only humans, though, thrive in unfavorable environments—that is, the harsh, often lethal geoscores of our planet—by learning how to transform them.
Thus, for evolutionary reasons not yet fully understood, at some point genetic replication took a leap to a higher level of universality in the form of human thought, which, according to Popper’s epistemology—to be described in a moment—advances by a process that is suggestively analogous to genetic evolution. Some hominids were selected over other creatures to develop communicative skills like speech and music, and this led to humanity’s inventions of environment-transforming technologies. The analogy breaks down a bit since genes evolve to fill environmental niches while memes—replicating human ideas—evolve to impact upon the environment.

Figure 1 illustrates all this by representing the features of genetic evolution and knowledge creation as analogous. Each of the two theories (neo-Darwinism and Popperian knowledge creation) describes a basic unit of transmission (the gene, the meme), brought about via a three-part process (replication: variation: selection), and propagated in a vehicle (organism, explanation [of reality].) While the top row of the figure is what is ordinarily thought of as “evolution” because it engages biological replicators, Deutsch (2011:78–105) and Dawkins (1976:189–201) submit that knowledge creation is actually a kind of evolution, but at a higher level of universality. Genes, which have no purpose in the paradigm, have their “task,” as it were, continued with

Figure 1. A Neo-Darwinian model: Continuity and analogy between the process of genetic evolution and that of knowledge creation, including evidence for objective aesthetics, manifest in the analogy between interspecies and intersubjective communication
purpose by memes. (The rightmost column of the figure will be addressed later, in the section on objective aesthetics.)

The idea that an organism and an explanation—one material the other not—are analogous at the level of the entire process can be understood best in terms of the contrast between the survival behaviors of the corresponding units of transmission: the gene’s lot is to adapt to its environment; the meme’s is to transform it. Human agency is continuous with—but at a higher level of universality than—genetic replication, variation, and selection because viable memes do not replicate unwittingly through sexual reproduction like genes, but rather advance and benefit from human communication, creativity, and criticism. And this is the heart of Popper’s epistemology: knowledge does not come from observation or induction or any such method. It involves the free inquiry of conjecture—that is, creative and imaginative guessing in the realm of theories about the world—followed by criticism, testing, and eventually selection. Objective knowledge accrues from conjectures about reality that survive this process.

Objectivity must not be understood as eternal. Some genes replicate but are not selected and so fail to survive. Similarly, conjectures, for Popper, are eventually falsified—shown to be bad explanations or ones in need of improvement—and either die or adapt. This process of criticism and falsification leads to objective explanations of reality that are continually refined. It is the perpetual tightening of the “ratchet wrench” that is human culture (Fitch 2010:162).

For Deutsch, the rapidity of transformation brought about by the replication and selection of memes is the beginning of an infinity of knowledge creation—to which the whole of genetic evolution was a modest and inefficient precursor. Especially in the post-Enlightenment, post-religious West, he claims—and Dawkins would agree—we create increasingly more objective knowledge than we ever have. Needless to say, on the basis of their critiques, Deutsch dismisses the family of postmodernisms (home of rather more circumspect views on objectivity) outright, tartly remarking that if their defenders are skeptical of objective knowledge they should apply the principle to themselves first of all (2011:314).6

Deutsch’s Challenge

I will use one facet of Deutsch’s thought, which intrigues me, to critique a second one, of which I am doubtful. The first facet is that the idea that knowledge—objective knowledge that has stood up to falsification and criticism—is limited to so-called scientific discourses is itself parochial. There should exist also things like objective aesthetics as well as objective morality and other kinds of knowledge. We just need to discover them. Objective morality would be a series of permanent concepts about proper behavior that underlie human culture while objective aesthetics suggests comparably permanent notions of beauty.7

Deutsch considers the making of fundamental distinctions between scientific
and aesthetic and moral knowledge as our own parochial traps. He is saying that if our species is driven to seek knowledge for survival’s sake, nothing in particular decrees whether it ought to be linguistic or non-linguistic, scientific, or in fact, musical or any other kind. In all cases the reach of our explanations must submit to laws, and these laws are none other than the laws of physics. Or, to paraphrase him sweetly: everything in the cosmos is explainable. Objective aesthetics must exist and should be knowable.

The second facet is Deutsch’s notion that the social conditions enabling the free inquiry that make the discovery of objective knowledge possible have only existed, with limited exceptions, in anti-authoritarian, post-Enlightenment, post scientific-revolution, open societies. Traditional societies, mainly being irreducibly authoritarian in nature and with strict belief systems in place, disallow creativity and free inquiry. Deutsch does not deny that exceptions, such as high classical civilizations (Greece, India, China), did produce objective knowledge, only that they collapsed before they converged upon what would have been an inevitable (according to Deutsch) formulation of a sustainable scientific method in harmony with Popper’s criteria. And he does not say that this means that other authoritarian societies are uncreative, rather that their creativity tends to feed back to reinforce rather than destabilize the authoritarianism. This is closely related to the issue raised by my Q and A exchange with Richard Dawkins.

If one therefore conditionally accepts the premise of the first facet—that there are objective laws of aesthetics to be discovered—how can it be used to interrogate the second facet through the lens of music? What I ask is if or how a music’s ability to encode various sorts of critiques of the culture that fostered it can pass under the radar of cultural authoritarianism, and thereby potentially be a part of the inexorable, gene-and-meme powered search for objective knowledge that Deutsch imputes to our species. Actually these are things ethnomusicologists already study, but the idea is to see them not in the frame of cultures, but in the context of Deutsch’s view of the unitary context encompassing the universal continuity between genes and memes.

And, in a complementary line of inquiry, does music encode aesthetic principles that lie permanently beyond culture? Taking our view of music as something that is culturally expressive to be anthropocentric, I experiment with generalizing the view, and take music to be a form of universal explanatory knowledge-creation instead. What role do the aesthetics of music play in mankind’s explanations of reality? This is the question I shall pursue in some depth below.

Music and Objective Aesthetics

Deutsch (2011:361) broaches the notion of an objective aesthetics by making the childlike observation that flowers are beautiful. He notes that humans
universally think of flowers as beautiful but, for example, they do not necessarily think of roots, branches, and leaves that way. People also think waterfalls and rainbows are beautiful, but these are not living things and do not have the crucial appearance of design for a purpose that evolution conferred on flowers. Indeed flowers’ particular design arose in a special cross-species context with insects that co-evolved with flowers in a mutually attractive and beneficial duet in which the flowers are fertilized and the insects nourished. Why should it be the case that humans are drawn to something that is none of their business—rather the business of the insects and flowers themselves? Deutsch thinks there is a clue here to the principles of objective aesthetics such that human minds, which are capable of universal explanations, can recognize it. But what is it?

Now here is some serendipity from another world. The following excerpt from a 1972 interview with anthropologist Claude-Levi Strauss poses exactly the same problem that Deutsch does:

In 1939 I found myself at the Maginot line at the border of Belgium, Luxembourg and France, working as a liaison to greet any British troops that might arrive. But none came, and strictly speaking I had nothing to do. And I think it was then, one day, when I was stretched out on the grass looking at the flowers and especially a cluster of dandelions, that I became a structuralist (though I did not yet know what to call such ideas) by trying to conceive of the laws of organization that must necessarily preside over an arrangement so complex, harmonious and subtle as that which I was contemplating, and I could not imagine that it could have resulted from a series of accumulated vagaries of chance.

In his flash of insight, Levi-Strauss, like Deutsch, intuits that the evolution of genes has placed the objective criteria for beauty right before his eyes. How can this thought lead us to consider whether human artistic production can accomplish something akin to what the flower genome has achieved? Deutsch cautions that there are two categories of human aesthetics—parochial ones that work at the cultural or individual level, and universal ones that embody objective aesthetic facts. He may not have been in a position to see this, but we, as cultural relativists, can assert that such aesthetic facts, assuming they exist, might nonetheless be coded in the expressive language of a given human culture and thus be inaccessible to outsiders. The relationship between flowers and insects has a parallel aspect. Because flowers reach across several (insect and human) species to communicate their appeal they do seem to embody what I am calling universal principles of aesthetics. But among the flowers and insects themselves, there are “cultural” codes, evidently, because not all insects are drawn to all flowers: they form specific culture-like pollination communities and ecosystems. Thus do the universal and the cultural coexist in that domain.

When humans create art, they are not engaging in a cross-species encounter: we may admire the sound of a bird’s song, for example, but birds do not sit through our symphonies, and we don’t need birds for survival like flowers need.
insects. So can human art have universal beauty? Yes, Deutsch conjectures, and, as with flowers and insects, it may overlap or require disentangling from the parochial kind (2011:364). Universal aesthetics are possible in human expression, but, says Deutsch, we should bear in mind that the amount of information needed to bridge the genetic gap between a flower and an insect is actually smaller than the analogous gap between any two human minds. Flowers and insects evolved their aesthetics unwittingly through natural selection, hence they are an expression of their genes. Humans evolved theirs—through genes plus knowledge creation and explanation—to a much greater degree of specificity and individuality, thus the greater gap. But we do not yet understand what humanly created universal aesthetics are and what their criteria are.

The notion that two people have less in common than a flower and a bee may strike some as preposterous. I would argue differently from Deutsch, however. You and I can communicate about music because the evolution of our species has made intersubjectivity possible. When we negotiate an intersubjective communication, we refine our mentally constructed individual theories of reality and try come to some agreement. And we bring to each such encounter our accumulated life experience, which includes for each of us, it seems to me, some version of Levi-Strauss’ epiphany. So even if we are not as perspicacious as Levi-Strauss, we still, at some level, intuit, respond to, and are shaped by the clues about objective aesthetics that nature and evolution provide.

Flowers may seem to us to exhibit an aesthetic perfection precisely because we humans didn’t make them. And they may seem to have nothing at all to do with the human inner symbolic universe that makes music possible. But that is too anthropocentric a perspective. If we zoom out can we not also imagine that, in the words of Levi-Strauss, we ourselves are possessed of an “arrangement so complex, harmonious, and subtle” that we have our own sort of flower-like perfection? This is what Levi-Strauss argued with regard to myth, and his many penetrating observations about music, both of which he alleged, in the *The Raw and the Cooked*, to have a basis in universal structures (1983:24). Of course such ideas fell out of fashion in Anglophone humanities scholarship long ago.

The forces of evolution produced the pollen that flowers use to communicate with insects, and they also produced the music that humans use to communicate with one another. In the non-parochial realm that is the context for this discussion, these two phenomena constitute an equivalence class. This idea is represented in the rightmost column of Figure 1, above.

**Applications: Objective Aesthetics**

What universal explanatory knowledge can music encode via intersubjectivity? Still thinking in terms of a riposte Dawkins would not dismiss, I can now bring the strands together with an extended analysis of a Central African tune
that I aver to be a neat parcel of objective aesthetic properties. The discussion
suggests regarding musical structures (events, utterances) as potential explana-
tors of objective aesthetics. Creative musicians and deep listeners know that
flash of transcendence that comes when one encounters a structure that is "just
right"—in which everything is precisely in a position from which it could not
be moved, though it might require considerable effort to be verbally explicit
about why. Such music echoes a line that Peter Shaffer put into the mouth of
Mozart in the play “Amadeus” (1981), and which Deutsch cites in his chapter
on aesthetics (2011:353). Referring to a passage in the Requiem Mass, Mozart,
in the play, says “displace one note and there would be diminishment; displace
one phrase and the structure will fall.”

Consider whether music can be falsified, as in the Popperian model of
knowledge creation. One’s first thought is no, because music has no absolute
truth value and it does not make statements about the physical world. Yet, with-
out doubt, most music can be criticized and improved (ask any composer), and
in some cases perhaps perfected. I suggest that a musical structure of extraordi-
narily tight and efficient design can be understood as a good explanation in the
Popperian sense, hence a kind of objective knowledge. By tight and efficient, and
by explanation, I mean just what Popper or Deutsch would mean: something
hard to vary without fatally wounding its coherence. The musical coherence
must have a certain complexity and information density that focuses our per-
ceptions, and can be gauged in terms of there existing several independent and
interdependent architectonic levels, supported multiply by each musical event,
such that a change in any one would gash the web.

Because music structures have no direct object referent in the real world
(ie, it is not known what they serve as explanations for), I construe that music
with such features is, in and of itself, a type of knowledge, namely, to at last be
explicit about it: objective aesthetic knowledge in music is a maximally elegant
and efficient structure in which rigorous principles of symmetry and proportion
are organized as sound in time in the way only music can. Obviously I do not
know—one cannot know—but perhaps such structures could be understood as
mimetic of nature: a tensile crystalline structure (or— a flower?). Perhaps the
creation of such music, whether by conscious design, or intuitive, or collective
effort, and no doubt some conjectural luck in choosing the notes and rhythms
that “feel right,” reflects innate striving for what Levi-Strauss called “laws of or-
ganization” governing the natural world. It animates the principles of evolution
and encodes them in organized sound.

Most music attains immense organizational and perceptual complexity, plac-
ing it well beyond the capacity of analytical discourse to do more than account
for some of its emergent properties. The example I choose is brief and efficient
enough to allow approaching an exhaustive inventory of its structural relations
and this is its value in the argument I construct. Not that it lacks complexity, and
not that I am claiming that its aesthetic value is de facto superior to anything else: it is just admirably clear. While demonstrating structural coherence in music normally depends on using the heuristics of a given cultural context—which is what most music analysis tries to show—cases such as the one I present have a directness and clarity that mitigates this problem.\textsuperscript{15}

“Hindehu” (actually the name of the papaya-stalk whistle used in combination with the singing voice) was recorded among the Ba-Benzélé in 1965 in the Central African Republic by Simha Arom (Arom and Taurelle 1966). The piece is familiar due to its appropriations by Herbie Hancock and, later, Madonna, both critiqued in Feld (2000:256–259). Hancock, however, altered the music in such a way as to botch many of the design features making the original so perfect, and Feld did not point this out.\textsuperscript{16} Arom’s analysis of the original (1998) is rich, and I include most of the points he made below, adding further observations of my own.\textsuperscript{17}

“Hindehu” (Music Example 1 and Figures 2 to 5) is, as Arom says, “strictly” cyclic and repetitive. The musician plays only two minor variants over the course of the recording. Each cycle is 36 pulsations long. The music uses three pitches, notated as F, G, and A. I will call the whistle pitch, notated as D, the drone. Some of the features (especially I.1–4, below) are organized so as to create a veritable glossary of characteristic African music traits; others are special to “Hindehu.”

I. Six Rhythm and Pulsation Features (based on Arom 1998)

1. The 36 pulsations are grouped (12 x 3) by the musician, internally or by handclaps. Claps were not provided for Arom in the original recording, but were provided in a second one, made in 1986, when he returned to ask the same musi-
cian to demonstrate how one would clap (Arom 1998:326). (In the intervening decades the music's metric orientation was obscure to him.)

2. The 36 pulsations are grouped (9 x 4) by the recurring drone onsets; together with the clapped pulse they create a classic African 3:4 cross-rhythm, albeit especially prominent here.

3. The composite rhythm of the pitches and the drone creates three groups of twelve pulsations (Segments A, B, and C) each subdivided into \(3 + 2 + 2 + 3 + 1 + 1\) pulsations. The two 1s at the end can be combined (using conventional gestalt principles) to make 2, giving a duration series of \((3 + 2 + 2 + 3 + 2)\).

4. Beginning at any rotation of this pattern one can group the 12 as 5 + 7 in a total of eight ways, as shown in figure 2. This is the well-known African rhythm principle of *imparity*, or (half+1/half -1): the grouping of a segment into two prime number durational values just before or after the halfway point, at which there is no onset (Arom 1984:57).

5. Exactly half of the pulsations have an event onset; the rest are empty. Within each segment, there are three pitch (vocal) and three drone (whistle) onsets in alternation, giving a total of 6 onsets per segment. There are 18 onsets in the entire 36-pulsation cycle, with a total of exactly 9 pitch onsets and 9 drone onsets.

![Figure 2. Rhythmic imparity at every rotation of the durations in the 12-pulse segments](image-url)
6. The onsets in each segment are arranged such that the *inter-onset intervals* (IOI) between the pitch and the drone notes are 3, 2, and 1, in that order. Thus, each pitch has a unique duration with respect to the following drone note, and since the drone comes every fourth pulsation, 3, 2, and 1 pulsations efficiently exhaust the durations that are possible (at the given density).

To sum up the rhythmic features, a total of ten ways to group the rhythm either in threes, fours, or combinations of five and seven, are manifest. The overall rhythmic density is fifty percent, and in each segment each of the three drone notes is approached by one and only one event, each with one of three distinct durations.

**II. Four Pitch Features (based on Arom 1998)**

7. In each segment, only three pitch-events are sounded—one of them twice, and the other one once. The combinations are all different: A and G in the first segment, A and F in the second, and G and F in the third. Thus one pitch is excluded from each segment.

8. Each pitch occurs exactly three times over the whole cycle: twice in one segment, and once in a different segment. No segment includes all three pitches, which ensures contrast between the segments (which are otherwise bound by the same rhythmic constraints described above).

9. Pitches in the third segment constitute a sequence (in fact, an exact transposition) down one scale-step from those in the first. The second segment has a different contour and interval series: pitch change comes after the first note rather than the second, and the second note is immediately repeated, not the first note. One may simply say that this slight irregularity provides further pitch-structure contrast (see the footnote, however).

10. With respect to the clapped pattern of three pulsations: the pitch A coincides with it twice (beginning of segments 1 and 2), G once (beginning of segment 3), and F not at all; hence each pitch has its own particular arrangement.

**III. Four Additional Observations (not made by Arom):**

11. The original 12-pulse duration series (see I.3) of $3 + 2 + 2 + 3 + 3 + 1 + 1$ pulsations, if rotated by one onset position so that the 1s bookend it, becomes $1 + 3 + 2 + 2 + 3 + 3$: a palindrome. This holds if one similarly rotates the full 36-pulse cycle; i.e., if one hears the cycle as beginning from the last drone note in Music Example 1.

12. One finds the imparity principle operative at the level of the full 36-pulsation cycle, such that beginning from any onset of the $3+2+2+3+2$ grouping, one can group the whole as $(17 + 19)$. Only the first possibility is illustrated in figure 3 (to save space).

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Figure 3. Rhythmic imparity at the level of the full 36-pulsation cycle
13. The irregularity described in point 9 is enriched when one views the movement from the first to the third segment as overlaid with a higher symmetry in the general structure of pitch content. Understood this way, pitch movement takes place in two identical stages, one pitch at a time: first the initial segment’s G becomes the second segment’s F. Then the second segment’s A (still present from the first segment) becomes the third segment’s G.

14. Considering each of the pitches as an independent stream and measuring its IOI values over the full 36-pulsation cycle gives the three IOI series in figure 4. At left they are shown beginning from the first occurrence of each pitch, per Music Example 1. These are rearranged at right to highlight 1) the IOI of 5 in each stream, and 2) the systematic addition and subtraction of 5 pulsations to generate the other IOIs. A and G’s pulse streams exhibit rhythmic imparity: the 5 and 12 in A’s sum to 17, and the 5 and 14 in G’s sum to 19.

Taken together, the fourteen features applied to the eighteen events in the cycle, create a tensile structure in which each event supports multiple design elements. It is literally the case that changing any single note would cause the structure to fall apart.

Consider a thought experiment to verify this (readers are invited to invent others). Suppose we wished to keep everything as is but change only the pitch streams so that they have a common IOI of 7 rather than 5 (as was illustrated in figure 4). This has appeal because 7 is the complement of 5 when subdividing each 12-pulse segment for rhythmic imparity, and because F’s stream already contains an IOI of 7. By making this change might we be able to create a kind of alternate “Hindehu,” preserving the other features? Alas, no, it isn’t possible.
To see why, consider the second 12-pulse segment. The two As therein have an IOI of 5. So:

- If we shift the first one ahead (leftward in the transcription) two pulses, to create an IOI of 7, and swap it with the G occupying that spot, it would mean that the pitch content of the second segment would contain A, G and F: all three pitches, thus unbalancing the careful meting out of two pitches per segment.
- If we move the second A two pulses back (rightward), it clashes with a drone note.

Comparable havoc would ensue if we tried to change G’s stream.

Figures 5, 5a and 5b present circular representations of “Hindehu” in which the features just described are more intuitively grasped. Figure 5’s outer circle shows the claps, the adjacent one the drone, and the three inner ones the pitches in descending order (F is innermost); the dotted lines partition sections A, B and C. The three pitches can be seen spiraling inward on an undulating wave-shape per the transposition process described in feature II.9, beginning from 12:00 and moving clockwise.

There is one last feature to describe, based on a brief extrapolation through elementary Euclidian geometry. “Hindehu’s” 36 pulsations each translate to 10 degrees on the circumference of the circles (36 x 10 = 360 degrees), so an IOI of 5, for example, describes an arc of 50 degrees. Extending the endpoints of an arc into a circle to where they converge, creates an angle of one half of the arc’s value, thus a 50 degree arc creates an angle of 25 degrees. Figure 5a shows only the three inner circles, rotating them "out of time" to align the IOIs of 5 (per the right side of figure 4) and connecting the onsets to form triangles inscribed into the circles, each with sides corresponding to the IOIs. The pitch A, for example, with IOIs of 5, 12, and 19, circumscribes arcs of 50, 120, and 190 degrees, and inscribes a triangle with angles of 25, 60, and 95 degrees.

The triangles inscribed by the IOI series of the three pitches in “Hindehu” are shown as X, Y, and Z, in Figure 5b. They have, respectively, angles of <25, 35, 120>, <25, 70, 85>, and <25, 60, 95>. All share the 25, while the remaining six angles (two of each triangle) have a marvelous interlocked relationship: Y’s 70 is double X’s 35; X’s 120 is both double and complementary to Z’s 60 (complementary means that they sum to 180, and thus have the same cosine); and Z’s 95 is complementary to Y’s 85. Thus, aside from the crucial identity relation created by the common angle of 25, each angle of each triangle has a unique elementary connection to an angle in another: by doubling, complementarity, or both. 19

“Hindehu” is an Explanation: Some Comparisons

This inventory of features shows that “Hindehu” structure cannot be falsified, in the sense of “better designed.” It could not be more efficiently ordered than it is without sacrificing the satisfying complexity. The complexity is held in
Figure 5. A Circular Representation of Hindehu.

Figure 5a. Circular representations of the rhythms of Hindehu’s pitches rotated to align their shared IOI of 5, and the triangles they inscribe.

Figure 5b. Relationships between the triangles shown in Figure 5a.
check by the music’s brevity and limited number of elements. This tight construction elevates it to the level of objective aesthetic value. To locate the aesthetic value in the structure is to align musical structure with mathematical order, and I would cite this rationale to defend that assertion against a critique claiming that musical structure is a parochial Western concern. The possibility to circumscribe and understand the interrelationships is what makes “Hindehu” such a suitable case study.

Examples of other music with objective aesthetic value are doubtless plentiful, but excessive complexity usually renders efforts to fully inventory the relationships highly challenging, placing any effort to falsify the structure out of reach. Examples that come to mind do, however, furnish suggestive possibilities for comparison. In Africa, the mbira dzavadzimu tradition offers some. The kashaura (basic) part of well known pieces such as “Nhemamusasa” have multiple rhythm grouping levels and directed pitch-processes similar to those in “Hindehu”, and are still highly constrained, but so much richer that it would take too long to describe them (but see Berliner 1978, Scherzinger 2010, and especially Brenner 1997). “Nhemamusasa,” for instance, uses 7 pitches instead of 3 spread over more than two octaves, and a 48- rather than 36-pulsation cycle. Mbira players speak of the infinity of distinctive patterns perceptible in their music (Berliner 1978:129–131).

Something striking emerges when comparing “Hindehu” or “Nhemamusasa” to music highly constrained in a closely related way, but not cyclic. A cycle is a closed, discrete compositional space (perhaps akin to a cell or a gene, if the analogy is not too forced) in which each component of the system must function in relation to all others. Repetition in cyclic time requires all interrelations to be fully rotatable; that is, operative beginning from any point in the system. If the cycle is brief like “Hindehu”s, one hears the relations over and over and in close temporal proximity, such that they are reinforced, stable, and can be experienced in many ways. Breaking the continuity of repetition extends them into potentially infinite lines, creating a canvas for free composition. Constraints on freely composed music in non-cyclic time are of an entirely different sort than those in strict cyclic time—a condition bringing to mind Robert Frost’s epigram “free verse is like tennis without the net.”

To illustrate with sharply contrasting examples, consider two works in the Western tradition celebrated for tight organization: The “Cancrizans” (crab canon) from J.S. Bach’s Musikalische Opfer (1747), and the Symphony, Opus 21 by Anton Webern (1927). Bach’s canon is a palindrome in which a voice and its retrograde are heard simultaneously for 18 measures of 4/4 time. Unlike “Hindehu,” the rhythms do not form conflicting rhythmic groups (except for quarter-note displacement creating basic contrapuntal suspensions). But the pitch language is a different story. With a range just shy of two octaves, it uses all twelve pitch classes of the equal tempered scale. Its complexity is articulated
within the rich “gestalt space” or syntactic field—“a controlling, determining fundamental entity or function by means of which syntax and signs can be said to operate”—of European harmonic tonality (Grauer 1996:1.3.4). Like “Hindehu,” not a note could be moved without toppling the structure. But, unlike the way “Hindehu” “fills” a generic cyclic template identical to countless others, Bach’s structure was personally designed by him; it is unique to the piece. He could have made it longer, or shorter, or composed it in many ways.

As Bach’s oeuvre amply demonstrates, many kinds of comparably irreproachable canonic structures are possible. The bedrock of tonal syntax (in Bach’s time an evolving syntax, to be sure) facilitates this. “Hindehu” is like an equation that can be written in the few paragraphs in which I did so above; an equation for the crab canon would fill many pages and require extensive advance study in the musical language. Indeed the amount of acculturation needed to understand Bach’s structures (to internalize the rules of the syntactic field) is immense, making the objective, hard-to-vary objective aesthetic properties of each tone trickier to tease out. If the objective aesthetic properties are there in both, they are easier to articulate in “Hindehu.”

The Webern piece is tight and spare, and, in the first movement, a palindromic double canon constructed over five octaves using the twelve-tone method, with each pitch-class consigned to a specific register and arrayed symmetrically around a central pitch, A (440). The absence of tonality consigns the music to a one-dimensional negative field of the surface, functioning in direct opposition to the gestalt structure of the more familiar positive syntactic field” (Grauer 1996:1.8.3); the “simple, one-dimensional pitch “space” of the sound-spectrum” (ibid:1.8.6). But Webern’s heuristics, as ingenious as “Hindehu”’s or Bach’s, and far more complex than either, are an idiolect. The music’s objective explanatory qualities are surely present, but the signals they emit are faint owing to their extreme complexity and the obstacles to intersubjective understanding the syntax presents.

“Hindehu” is probably very old, and the result of an intuitive or collective process of compositional design not unlike a successful instance of natural selection—or like the analogous conjecture and criticism germane to Popperian knowledge creation. That it was composed spontaneously is credible because of the extreme constraints provided by the brief cyclic structure: the full pattern lasts barely as long as the “perceptual present” of five to seven seconds. That it arose in an oral tradition suggests that the music may have evolved slowly with many stages of adding refinements as in an evolutionary process (but not necessarily; it could have been an individual’s inspiration). What I am trying to say, and there is no use beating about the bush, is that either way, the music has an intuitive intelligence behind it. With such a remark I am wary of unintentionally reinforcing stereotypes about the “naturalness” of African music (especially of Pygmies), but clichés always contain grains of truth that ought not be obscured.
Structures like “Hindehu”s are among many kinds of unwritten expressive media found in diverse traditions spanning music, ludic pastimes, geomancy, and visual arts that together constitute an unverbalized “natural mathematics” (Chemillier 2007). If such structures are explanations, what are they explanations of, beyond the cultural functions and uses (including, literally, for survival) that ethnomusicology and other—ologies have shown them to have? What problem(s) are posed to which they are solutions? I do not know, but will conjecture that their design efficiency (due to the multiple role of each of their features in creating and maintaining a structure) models desiderata for material technological advance, which is none other than the human ability to transform the environment, as articulated by Deutsch. To conflate the aesthetic and the practical as such human inventions do is a non-parochial characteristic of our species.

Music, Authority, and Time

Dawkins rejects authoritarian and traditional cultures because they do not embrace the “right” kind of knowledge, but he does not see that music can foment conditions for free inquiry; it may be an authoritarian society’s best glimpse of it, in fact. Here we can hearken back to the idea that the arts (including music) can implicitly critique power structures (Neuman 2008:8). Deutsch writes that any objective knowledge generated within authoritarian societies is either repressed and never comes to light or is perverted to support the bad explanations of reality that sustain the polity (2011:379–86). But I doubt it would occur to him that music can be subversive—and not so much when explicitly political or with text (although that, too), but, instead, in instances when its structures inexorably evolve to suggest unsuspected narratives of temporal experience. Innovation in musical time organization is catnip luring human actors to new experiences and concepts, models of discourse, and interrelationship not otherwise expressed in power structures.

By coding its explanations distinctively, anti-authoritarian music may gradually catalyze social change. It has potential to leapfrog over (or slip under) authority, agitate for individual dignity, sustain progressive hopes, and stimulate the kind of rapid knowledge growth that Deutsch associates with post-Enlightenment societies. Of course music often doesn’t do this at all: it may serve authority just as easily (Dave 2014). Nonetheless, stories of clarinetist Ivo Papasov’s wedding bands performing fusion musics “beyond the State’s reach” (Buchanan 2006:173) in the 1980s, for instance, were an assault on the political system of the time, and aroused its ire. There are so many cases, from coded messages of empowerment in slave spirituals to the songs of Dalit liberation (Sherinian 2013).

Music may also raise consciousness subliminally, as I will briefly suggest with a Southeast Asian example. The Beckers’ classic study (1981) of “iconicity”
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links the cyclic structures of gamelan and traditional values and power structures of Javanese and Balinese nobility. This reinforces a view that music and other so-called static domains of knowledge mainly “reflected” one another, and provided symbolic legitimacy for centralized monarchies (Geertz 1980). But more recent views emphasize countering forces at work (Tenzer 2006, McGraw 2013). While by cultural convention cyclic time is taken to symbolize the glories of the traditions of authority and permanence from the Golden Age of kings, the music’s involuted melodic and rhythmic symmetries complicate this by suggesting motion, change, creativity and conjecture. These creative forces energize an evolving legacy of thought and problem solving in the guise of musical design, creating an opposition to any propensity for bland repetition. The phenomenon inspires thoughtful musicians to reflect, sometimes at the level of a profound questing, on the aesthetic anomalies of their own music’s structure.

We often speak of music’s “time”, by which we refer to many things: its durations and sound patterns, the bodily entrainment, physiological rhythms, and coordinated social responses it engenders, its feel and groove, the temporality it evokes (mundane, spiritual, mythic, etc.), and more. In what sense, though, could musical time draw the attention of scientists seeking knowledge of physical reality? The analysis of “Hindehu” has suggested one way.

Marvin Minsky wrote (1982:5) that as children, when we need to understand time, it is “in music we find out!” My most valuable lesson learned from engaging in a lot of analytical work on music of diverse provenances is that every musical utterance—whether at the magnitude of the tone, phrase, work, event, or ongoing cultural practice—constructs distinctive layers of temporal stasis and motion. Musical stasis and motion ought to annihilate one another, yet they don’t. Reflecting on the immense temporal hierarchy in which each musical moment is embedded, the diversity and consistency of our experiences of musical time are both complementary and contradictory, and throw up a stimulating mirror to our experience of the world. Some musics, like intensely cyclic ones, engage us bodily “in” time—an essential aspect of human togetherness—while others, with thick layers or extended forms, urge us to contemplate time’s flow from without, as it were, because we are struck by how human problem-solving manipulated time to construct them. Each musical experience is, to adapt a marvelous coinage of John Rahn, a little “life one lives alongside one’s own life” (1993:53).

We are somewhat accustomed, in ethnomusicology, to think, as Emile Durkheim proposed in 1915, that time, hence musical time, is culturally constructed. But in light of the meditations I have been sharing with you, we know that that cannot be the whole story. The question could perhaps be re-posed like this: In what sense does all music comment on time itself? What knowledge about time do our genes have, that we unwittingly perform on their behalf when we musick? We can ask these same questions with respect to individual works of
music, and cultural styles, but also with respect to the full human enterprise of music and what it tells us about reality. It is certainly the case that the possibilities for organizing music have increased hand-in-hand with the growth of musical technologies, and gradually complexified as both the intellectual and physical resources needed to construct complex temporalities have accumulated over the longue durée of music’s history.

Of what use are the foregoing meditations? We remember Levi-Strauss’ words, which were Steven Feld’s choice for an epigraph to Sound and Sentiment (1990)—Music and myth are like the conductors of an orchestra, whose listeners are the silent performers (Levi-Strauss 1983:17). This could hardly be truer than it is for “Hindehu,” whose order and symmetry surely “conduct” the Ba-Benzélé, training their eyes on the prize of glimpsing transcendent reality and gaining objective knowledge thereof.

I espoused no new theories or concepts about music in the preceding, but I framed familiar ones in a context of evolutionary genetics. I sketched the idea of genetically motivated principles of musical aesthetics. If such a notion has practical use it is unlikely to involve formulation of specific principles other than the general ones of order and elegance I have suggested. These qualities align with other contemporary aestheticians stressing perception over intrinsic value, such as Schaeffer (2004), who writes of discernment and the human effort or “cost” of producing aesthetic experience; or Molino’s judgments of intensity, complexity, and unity (2009:356, drawing on Beardsley 1981:466). But re-thinking aesthetics as an aspect of evolution may help reframe master questions about music and what it is for.

The binaries “perception as opposed to intrinsic value”—and, synonymously, process contrasted with object, or constructionist as alternative to materialist—have been central to the recent history of ideas. In closing, I bring this cohort of dualisms to the surface and acknowledge a final motivation for writing this essay. Musicology, ethno- and otherwise, has pushed back hard against the latter of each of these pairs, saying good riddance to the suffocating space of the fixed musical work, the biases of representation, the autonomy of musical sound. Small’s Musicking (1998), Hasty’s Meter as Rhythm (1997), and innumerable others have decried the impoverishment we impose on our knowledge if we do not regard music as unfolding experience. In biology, too, to be sure, the deterministic, materialist stance of neo-Darwinism mobilizes many, many critics. One of them, biologist Denis Noble (2008:2), even uses the metaphor of music as his opening parry to upend the deterministic, gene-centered view of life—because to a music-lover like him music could be nothing other than a process. His whole argument for the nondeterministic complexity of living beings begins by showing that just as a CD discharging its digital material into a listener’s ear could never be taken to be the whole
of music, so too could genes never be the whole explanation for life on earth. And how very true this is, but let us also always be skeptical of the zeitgeist. If the autonomous object fully recedes from our consideration we repress something as real as the structure of a flower that should not be forgotten.

And in a rejoinder to Richard Dawkins’ fatwa against traditional cultures that sparked this discussion: “Hindehu” and its ilk are kinds of fixed statements about reality that mock with divine laughter any objectionable, and perhaps even heinous, authoritarianism present in their cultural crucibles. Dawkins needs to see that the crucibles must evolve at their own pace for who knows when—whether despite or because of human agency—another such indispensable revelation may emerge.

Acknowledgements

With sincere thanks to Molly Tenzer, Judith Becker, William Benjamin, Joseph Glaser, Victor Grauer, Richard Kurth, Bob Labaree, David Lemon, Ethan Lustig, Dan Neuman, Philemon Poux, Dana Rappoport, John Roeder, and Roger Savage, each of whom inspired, critiqued, or otherwise provoked the writing of this essay. I feel special gratitude to Jim Hogan, a clear-eyed deep thinker and old friend who introduced me to David Deutsch’s books and who is always ready to discuss them.

Notes

1. The term “objective,” as will become clear, refers not to literal or permanent fact or truth, but to the best existing explanation of a phenomenon, i.e., that has been refined through criticism and selection.

2. In the latter half of the twentieth century, the broad influence of Thomas Kuhn’s Structure of Scientific Revolutions (1962) was one of numerous forces that undermined humanists’ faith in science’s claims to objectivity (to Kuhn’s dismay). It inspired other scientists to disagreement as well. Kuhn was ultimately challenged and largely refuted by figures like Karl Popper, whose main ideas will be summarized below. The Kuhn/Popper dispute rages in Lakatos and Musgrave 1970. It was carried further in Maxwell 1972.

3. Rothstein 1995 deals at length and with great imagination about the relationship of music and mathematics, but exclusively with reference to Western music. In light of the arguments I will advance later, I submit that the complexity of the repertoire Rothstein engages (Beethoven and Chopin among others) renders the subject with an intricacy that never clarifies matters as much as it could.

4. The argument over whether music is a bona fide evolutionary adaptation is ongoing; recent literature on the subject includes Wallin et al 2000, Mithen 2006, Fitch 2006, and many others.

5. The discredited phrase “survival of the fittest” is even less pertinent here. It was coined by Darwin’s contemporary, Herbert Spencer, who independently reached many conclusions similar to Darwins’ in his own research.

6. Deutsch’s allusion is to the inescapable paradox of relativism: if everything is relative, then relativism itself must be. Science says that is absurd, and that relative truths are subordinate to objective ones subsuming them. But relativism does not grant science’s meta-objectivity. (Most of us grasp reality as either relative or universal, but not both at once.)

It is apt to consider some real-world consequences of this core dispute in postmodern hermeneutics, scientific method, and neo-Darwinism. It would take too long to do this thoroughly: even
the fearless Deutsch does not pay postmodernism more heed than the obnoxious remark just cited in the main text, but this is because he does not consider it a fish worth frying. I am guided by my larger aim, which is to perform the persona of the relativist “elevating” science—as if it needed help—from the realm of personal conviction (a belief doubtless shared by most ethnomusicologists) to that of professional conviction, to see what falls into place. I touch on four mini-topics.

1. Science and postmodern hermeneutics. Deutsch is far from alone in his outrage. The Sokal hoax of 1996 is a quintessential example (Sokal 1996). NYU physics professor Alan Sokal penned an article intentionally written as an inane parody of postmodern discourse, submitted it as if it was serious, and to his perverse satisfaction had it accepted and published in the prominent peer-reviewed journal *Social Text*. Some scientists not favorably inclined to the academic trends that had given rise to such a journal in the first place felt vindicated by Sokal’s laying bare of the putative mystifications, obfuscations, and outright nonsense in such published thought. Sokal unmasked himself, and he and his colleague Jean Bricmont exposed their intentions and developed their critique in subsequent books (Bricmont and Sokal 1999, Sokal 2010). Most of their ire was for the French school of deconstructionists (Lacan, Kristeva, Deleuze, etc.).

Noam Chomsky (2013) supports Sokal et al strongly and suggests that the polysyllabic neologisms of postmodern discourse stem from their initiators’ desire to be seen as legitimate in the same way science is (perceived to be). But Chomsky also acknowledges that critics have important concerns at heart, such as the fact that women and minorities are underrepresented in scientific research. However, for Chomsky and others, such reasonable critiques should never cause the baby to be tossed out with the bath water, that is, extend to denying the value of experimental method and scientific objectivity itself. (In music this would be akin to letting critiques of male hegemony in Western art music composition impugn the value of works by Bach, Beethoven, etc.)

2. Irreproducible Science Research. Science is very self-critical and wary of flaws in its method. Fraudulent research, perhaps motivated by ambition, the lure of media attention, or competition for funding, is a major embarrassment not unknown to science, though a few bad apples are surely not the worst detriment to a world where accountability to extreme rigor is highly prized. The deeper self-questioning and genuine anxiety comes when experimental results are evidently irreproducible. This is a nightmare scenario for the scientific method, because corroboration is the gold standard for verification. Human fallibility, the complexity of crunching enormous amounts of data, flaws in experimental design, random “noise” from unforeseen experimental factors, the sometimes difficult-to-extrapolate significance of statistical or probabilistic results, mere obstinacy in adherence to crumbling paradigms, and insufficient editorial oversight for publication all play roles. Scientists are unbowed and believe the problems can be addressed with better safeguards, stricter vigilance, and improved laboratory technologies. The editors of *Nature* trained the light of critique on themselves in a recent special publication collecting articles that scrutinize the topic (Nature Archive n.d.).

3. Challenges to Neo-Darwinism. Darwin’s (1859) theory of natural selection preceded Gregor Mendel’s 1866 work on genetics. Their joint effect superseded prior notions of evolution, notably those of Jean-Baptiste Lamarck (1744–1829), who argued that acquired traits of the parent could be passed down to offspring from one generation to the next (“soft inheritance”). How ironic, then, that more than a century later, a kind of neo-Lamarckism—the field of epigenetics—has ascended. It reconstructs soft inheritance with the claim that not all hereditary processes are strictly-speaking genetic, rather that genetic expression can be affected by conditions impacting life at the subcellular level. An example would be certain kinds of mutation through substance or environmental exposure that alter DNA and RNA function. The so-called fertility drug DES, for instance, a synthetic hormone administered from the 1940s to 1960s to American women, caused many of their children to develop cancers, and these mutations were often expressed in future generations also. Biologists like Dennis Noble (2008) link epigenetics and other biology subfields to question whether genes are the sole

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loci of evolution, as Dawkins (1976) argued. Epigenetics asserts that the genome is a dynamic enterprise constantly interacting with its environment, and that evolution can be accelerated, slowed, or otherwise influenced by myriad factors. Going far beyond epigenetics are Rupert Sheldrake’s radical post-materialist writings (2012 and many others).

Dawkins’ meme concept (op cit.) is also susceptible to critique. It was intended as a way to think about the evolution of ideas as though analogous to gene evolution, as illustrated above in figure 1. The idea of meme has itself replicated like a meme, and been subject to criticism and selection; but like a gene, not always because the selected meanings are “better.” The meme has been called too facile, indistinguishable from related notions such as “concept” or “sign”, but is nonetheless by now embedded in popular discourse, so much so, say many, as to have been drained of any of its originally intended usefulness.

4. **Metacritique?** In a lecture to the Danish Royal Academy, Bruno Latour rallies humanism and science to unite against what he identifies as the true villain, capitalism (Latour 2014). He despairingly anoints capitalism as the omniscient definer and usurper of the mantle of “reality” in contemporary life, describing it as a set of forces and laws rooted deeply in our psyches as permanent, inevitable, and impervious to our agency.

        Latour 1999, a book about whether reality is really real, exposes in granular detail how scientific reality is constructed and represented, without yielding to those who might argue that it is not really real after all. Latour has also been at pains to call the forces of social critique to arms, to see that the enterprise of deconstruction we have developed and passed to our students has run its course, and must be retooled to meet future challenges:

        The mistake would be to believe that we too have given a social explanation of scientific facts. No, even though it is true that at first we tried, like good critics trained in the good schools, to use the armaments handed to us by our betters and elders to crack open—one of their favorite expressions, meaning to destroy—religion, power, discourse, hegemony. But, fortunately (yes, fortunately!), one after the other, we witnessed that the black boxes of science remained closed and that it was rather the tools that lay in the dust of our workshop, disjointed and broken. Put simply, critique was useless against objects of some solidity (2004:242).

        This is already more than this curious, under-qualified ethnomusicologist should venture to say.

7. On objective morality see further, for example, Boehm 2012, or, for a synopsis of the issues, Pinker 2008.

8. Deutsch, like Dawkins, fails to distinguish meaningfully between hunter-gatherer, nomadic, agricultural, monarchic, or any other kinds of “traditional societies”, and for the purposes of this stage of my argument I will let this position stand. Later I will challenge it, but to proceed I think it is important to grant that post-Enlightenment science really is something different and new in the world.

9. Note that it is the appearance of design for a purpose, and not actual design for a purpose. Actual purpose would contradict the careful tenets of neo-Darwinism and give unwarranted credence to advocates of Intelligent Design.

10. Some flowering plants, like apples, tobacco and grain, also co-evolved with humans. But unlike them, flowers themselves serve no purpose for humans except to produce aesthetic pleasure.

11. “Je me suis trouvé envoyé sur la ligne Maginot a la frontière Belgo-luxembourgeoise, un endroit ou d’ailleurs il n’y avait aucune troupe anglaise a ce moment-la, mais ou en pensait qu’il pourrait y en avoir. Et j’étais la pour les accueillir mais je n’avais strictement rien a faire. Je crois bien que c’est, a ce moment-la, enfin un jour, ou j’étais étendu dans l’herbe et ou je regardais des fleurs et notamment une boule de pissenlit, que je suis devenu (par ce que je ne savais pas encore s’appeler) structuraliste: en pensant aux lois d’organisation qui devaient nécessairement présider a un agencement aussi complexe, harmonieux et subtil que celui que je contemplais et dont je n’arrivais pas a m’imaginer qu’il pût résulter d’une suite de hasards accumulées.” Spoken at 10:55 in the film « Claude Levi-Strauss » dir. Pierre Beuchot, collection *Permis de Penser*, France, 2004. See http://www.youtube.com/watch?v=2CcnLa2Ho0g.
12. Many will recognize a version of this epiphany in their own experience. A single instant like that, particularly during childhood, can be so transformative as to set one’s life on a permanent and different course, as it did for the adult Levi-Strauss (who may have had such epiphanies earlier in life). Some musicians reminiscing from the perspective of adulthood attest with conviction to a moment around the age of eight to twelve, when the encounter with a compelling music revealed to them its perfection in distinct structural terms, grasped within an instant and destined to remain accessible to the mind’s eye with undiminishing clarity.

13. Transcendent experiences of this sort have been an important theme in ethnomusicology, particularly as they relate to trance and so-called limit experiences. Savage 2009 presents a sustained philosophical critique of such experiences and their representations (or the impossibility thereof), with reference to a wide range of thinkers including ethnomusicologists (especially Blacking 1973) and hermeneuticians (especially Ricoeur 1984, 1985, 1988). Departing from Blacking’s endorsement of the universality of the transcendent limit experience, Savage considers the idea of music’s autonomy from perspectives that complement those of the present article.

14. See also Deliège (1986:255–272) for consideration of Popperian falsification with reference to modernist late 20th-century Western art music. She asks how we could tell if a work is perfect. Her argument never devolves to specific musical instances, but strategically eliminates several evaluating criteria (critical judgment of the society, originality, conformity to style), locates the medium for the “essence” of the music in the score, and posits that a test of “craft” (qualité artisanale, p. 269) would be preliminary but not conclusive.

15. How and whether the music might be perceived as coherent is a matter of acculturation. But the analysis to follow assumes the structure to have an independent reality, and will not be concerned with perception per se, except implicitly in the sense that an acculturated listener would need no help to follow the structure.

16. Hancock rendered his imitation of the music in a simple duple meter that precludes the possibility of virtually all of the structural features about to be described. Arom is well aware of Hancock’s mishearing (p.c. July 10, 2014).

17. In Feld 2000 and Arom and Taurelle 1966 the name is spelled “Hindewhu;” but in Arom 1998 the w is removed; I use the latter orthography.

18. If the pitches in the second segment are reversed (F, A, A instead of A, A, F), they form a transposition of the outer segments in a mod 3 pitch class space (see Tenzer 2000: 222), in which the highest note (A) is conceptually adjacent to the lowest (F) once the pitches are imagined as distributed around the surface of a cylinder.

19. A little algebra can easily show that any triangle containing two angles summing to 60, such as the 25+35 in triangle X, can be used to generate two further triangles with the same relationships as those shown between X, Y, and Z. (The 60 corresponds to 120 degrees on the circumference, or 12 pulsations in the music.) The 5:7 ratio between 25:35 degrees, however, is the only one that translates back to the special African imparity of the IOI sequence in “Hindehu.”

An interesting theoretical and compositional problem (for future research) might be to see how various kinds of polygon interrelations generalized from this type could be used to discover rhythms of special interest that could animate cyclic structures. See Pressing 1983 and Toussaint 2013 for other thinking in this genre.

20. There are of course many kinds of music that blur the sharp distinction made here (music with layers some of which are cyclic and some aren’t; music which concatenates or mixes cycles with other kinds of structures, and so on).

21. See the extensive discussion of the Crab Canon in Hofstadter 1979: 198–203 and passim.

22. See Grauer 2011 for arguments in favor of estimating the age of Pygmy musical traditions at 75,000 to 100,000 years.

23. During time spent in Bali I had many conversations with introspective gamelan musicians, young and old, who strive to puzzle out the intertwined compositional designs and aesthetic perfection they perceive in their music. I Wayan Loceng (d. 2006) and Dewa Ketut Alit (b. 1973) have been among the most wonderstruck. Marc Perlman (in preparation) describes many of his
Javanese teachers as "searching”—in the sense of contemplative thought—for answers to the structural conundrums their music embodies.

24. This should not be taken to mean that music is evolving always toward complexity, for clearly some old music is complex and some new music is simple. But complexity can be understood in many ways. All I mean here is that technologies of both time-measurement and musical production are evolving, to be sure, and creating greater possibilities for temporal organization.

References


