It Don't Mean A Thing (*If It Ain't Got That Swing*)

Bateson's Epistemology and the Rhythms of Life

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2007

> It doesn't matter if it's sweet or hot,
> Just give that rhythm everything you've got.
> It don't mean a thing (if it ain't got that swing)
> Doo-wat doo-wat, doo-wat doo-wat, doo-wat …
> – Duke Ellington & Bubber Miley[1]

1. Music is not a thing

"So," Gregory Bateson rumbled at me one evening after a concert I'd played, "what you're really researching with that violin is experimental epistemology." It was not a coincidence that I was Bateson's student when I morphed from an academic into an improvisational violinist. Improvising provides ready access to the kind of thinking which Bateson urges upon us – communicating from an awareness of relationship, pattern, and self-organizing systems, unlike our customary way of talking about "things" and "forces" that act on the "things," and our customary way of using words to pin down, define, and discipline aspects of a world which is in interactive flux.

It was extraordinarily refreshing for me as a young man to find a way of expressing myself nonverbally, in a crystal-clear but ever-changing pattern-language of instrumental music which arises from the present mind and the present moment.

Half a century later, I'm still at it. When I started doing free improvisation on bowed strings, coming out of a classical background, very few people were doing it outside the world of jazz. Today, a great many people are doing it. During the years before and after 2000, the artistic climate has shifted so that improvising has finally come to be accepted as a significant mode of music-making. Many music publications now feature articles on improvisation. But strangely, many of these articles are filled with music notation – a transcription of a piece of improvised music, or a pattern or template to imitate. Somehow this practice is supposed to make

improvisation easier for the reader, or more acceptable to the powers that be – legitimizing it by representing it in symbols. But improvisation and notation are like matter and antimatter – transcribe a Leroy Jenkins improvisation and that is supposed to make it tangible and study-able, but in the process, the improvisation winks out of existence.

Music represented symbolically is regarded as more acceptable than music happening in real time as sound. We have fallen under the sway of a strange inversion in which symbols are regarded as more real than the realities they represent. Music (or art, literature, theater, science, technology) is often treated as a collection of works arranged on an historical timeline. The scores are regarded as having not only an independent existence, but a higher existence than the performances. Stick a word, mathematical symbol, or other label on a process and you have nailed it down; it seems more real than an un-label-able activity. In reality, improvisation and notation are two parallel paths to musical pleasure; neither is higher nor lower than the other.

Even improvisation, when it is the object of either academic study or commercial marketing, is too easily turned into a *thing*. The real-time activity of *improvising*, rather than the abstract noun *improvisation*,[2] is an antidote to this one-sided view. Improvising is the pleasure of art-making that is all process, all action in the present moment. It is also the normal mode of functioning in daily life. Think over your last few conversations. You probably did not write down what you were going to say before you said it.

2. Epistemology

One of Bateson's accomplishments was to bring epistemology to the forefront of our understanding of life. Traditionally, epistemology has been an activity of philosophers – the study of how and what human beings know. But among all of us living organisms, and our aggregate systems and communities, what we perceive and how we know are colored, textured and filtered by patterns of mental organization. Even a rat in a learning experiment, or exploring a cellar, "has" an epistemology, a way of sorting out what is and is not knowledge, what is and is not important, what is and is not real.

Bateson said that "all art is concerned with epistemology, about the how of knowing"[3]. For the player, the violin and bow provide a context for exploring how hands know. For the listener, music provides a context for exploring how ears know, mind knows, dancing body knows, and for experiencing connections between emotional states and formal patterns.

> I was laying down very elementary ideas about *epistemology*, that is, about *how we can know anything*. In the pronoun *we,* I of course included the starfish and the redwood forest, the segmenting egg, and the Senate of the United States.
>
> And in the *anything* which these creatures variously know, I included "how to grow into five-way symmetry," "how to survive a forest fire," "how to grow and still stay the same shape," "how to learn," "how to write a constitution," "how to invent and drive a car," "how to count to seven," and so on. Marvelous creatures with almost miraculous knowledges and skills.[4]

Our retinas have five layers of nerve cells that filter and transform visual information before it even gets to the brain. They respond to edges and contours. As we look at this page of print, we bring forward the edges or differences between the black ink and the white paper; we seldom pay attention to the solid areas in between. There is a famous paper called "What the frog's eye tells the frog's brain"[5]. The retinal cells of a frog's eye fire most strongly in response to small moving objects, because frogs eat flies. This selective response *is* epistemology: an internal calibration defining, for each organism, what is or is not information. Vision is the creative activity of filters that predispose us to see edges, change, and movement, then on to engage more layers of brain function, classifying differences as important or not important, interesting or not interesting, information or redundancy. We do an enormous amount of creative work on our images before they ever come to conscious awareness. All perception, no matter how simple, is creative. Remember the anomalous card experiments by Bruner and Postman[6] in which the experimenter flashes, for example, a red ace of clubs, but the participant sees an ace of hearts or diamonds? Our frogs-eye filtering, usually unconscious, is a process that can sometimes be brought to vivid awareness through musical and artistic creativity.[7]

Epistemology is a system of algorithms operating at lightning speed, through which we sort information as relevant or irrelevant, memorable or not, perception or illusion, knowing or imagining, good or dangerous, serious business or play. In the arts, religion and other fields, we enjoy, for some reason, to classify things as "high" or "low." Our worship of the printed score is related to the idea of "high art."

In particular, we are organisms with hands, and thus have a predilection for seeing *things*, discrete objects that can be picked up and separated from their environment. Christopher Small[8] suggested that people fundamentally distort music by treating it as a thing; it is better to get rid of the noun *music* and replace it with the verb *to music*, or *musicking*:

> When we are musicking, as when we are taking part in a ritual act (ritualling?), we model the relationships of our world – physical, social, religious – as we feel they ought to be. We do not just learn about these ideal relationships, that ideal society if you like, but actually bring them, and it, into existence for as long as the performance lasts. That, I believe, is the reason why musicking arouses such strong, positive emotions in us, why it makes us feel good.[9]

Meaning, then, is a function of epistemologies operating "within you without you"[10] – across the supposed boundaries of self and things. Each personality has a different texturing of its perceptual set, and the kinds of information it is predisposed to absorb and understand. Bateson points out that anybody who thinks he or she doesn't have an epistemology simply has a bad epistemology. Thus Blake's[11] question and answer: "Where is existence out of mind or thought? Where is it but in the mind of a fool?"

3. It don't mean a thing …

> A monk asked Yun-Men, "When it's not the present intellect and it's not the present phenomena, what is it?" Yun-Men said, "An upside-down statement."
>
> - The Blue Cliff Record, #15

Many concepts don't mean a thing, but seem to.

1. Molière's last play, *The Imaginary Invalid* (1673), contains an epilog in dog Latin in which a group of doctors ask a medical student an exam question: "Why does opium put people to sleep?" The student answers, "Because it contains a dormitive principle." They congratulate him on his brilliance and admit him to the profession. A dormitive principle is a made-to-order concept that has no reality other than to encapsulate an observation, but which we then regard as though it were a thing in itself.[*] Dormitive principles also have the property of putting our critical faculties to sleep.[12] It is hard to think of any field of study that is not rife with dormitive principles. And dare we add the abstract noun "music"? Or "creativity"? Theories of "ultimate reality" are particularly prone to dormitive explanations. Once established, they are researched with seriousness, classified, investigated, fractionated into further entities. Soon whole fields of serious study spring up to explain the explanations, much like the epicycles circling around epicycles in mediaeval astronomy.

2. "The map is not the territory." This statement by Korzybski[13] was seized upon by Bateson as a key to understanding the communicational matrix of the living world, in a series of seminal works from his theory of play and fantasy (1954) to his double bind theory (1956) to the great 1970 integrative essay, "Form, Substance and Difference."[14] The name is not the thing named. Our symbols and concepts are not to be confused with the realities they map. These differences seem obvious when so

[*] Nietzsche (in *Beyond Good and Evil*, 1886) used Molière's dormitive principle to make fun of the empty explanatory concepts of science and scholarship in just the same way as Bateson. While I am not aware of Bateson ever reading Nietzsche, the idea may have come to him via Ruth Benedict, who was a formative inspiration for both Bateson and Margaret Mead. Benedict extended Nietzsche's insights about Apollonian and Dionysian styles of culture into anthropology, and sent the manuscript of her *Patterns of Culture* to Bateson and Mead in New Guinea in 1932.

stated, but in our daily and professional lives we frequently ignore them, like a person at a restaurant eating the cardboard menu instead of the meal.[15]

Many people think that musicians play notes, but that is impossible: a note is not a tone. A note is a culturally defined symbol representing a range of frequencies. A tone is a perceptible sound. Even 'tone' is an oversimplification because the simplest musical gesture sets in play a complex profusion of vibrations.

3. In Bateson's 1968 conference recorded in *Our Own Metaphor*,[16] Anatol Holt stated that he wanted to have a bumper sticker that said *Help Stamp Out Nouns*. It is difficult not to fall into reifying our world, mistaking symbols for reality, turning experiences and dynamic patterns of relationship into the illusion of things which can be separated and defined independent of context. Even if we never think about these fancy concepts consciously, they affect each of us in the real world, sometimes disastrously.

Bateson said, "Language is a wonderful servant, but a terrible master."[17]

Stamp out nouns? We are not going to stop talking about dogs or violins, rain or our friends. Philosophers have always been aware of the trap of reification, but it is almost impossible to stop doing it because we do like to talk. "Partly the unconscious *is* unconscious because language destroys its structure. Language has the epistemology of *things*."[18]

Bateson presented compelling arguments for how our epistemologies limit our ability to survive on the earth. We need better methods of thinking that reflect interdependence and relationship rather than illusions of a discrete you, me, and it, and the dualistic illusion that people can "control" their environment. One response is to learn multiple descriptions of reality, verbal or otherwise, each with its own perspective; to begin to get the idea that there *are* perspectives on reality, none of which *is* reality. The trick is to use language without being confined by it.

Bateson spoke of *story* as a way we already have of grasping relationships, patterns, and dynamic systems, rather than things. For me improvising has become a practice for sweeping away obscurations. In ordinary speech we would be hard-pressed to leave nouns behind. Improvising is motion and flow, constant redefinition of what we take for granted, all process and relationship, impermanence and interdependence – not as mere ideas but as raw materials of daily practice. Improvising is play, an activity not a thing, and yet the most precise of pattern languages. It has no name – after decades of improvising, I am still flummoxed when people ask me what kind of music I play. It is all freshly born and freshly dying.

I have no name
I am but two days old
sweet joy befall thee

- Blake[19]

4. If I could say it I wouldn't have to play it

"To analyze the boogie-woogie style adds little to understanding its magic."[20] How many statements like this have been made about how many art forms? It is a central fact of art, a cliché universally acknowledged, yet we often need a nudge to remember it.

"It don't mean a thing if it ain't got that swing" is an epistemological affirmation. We feel that information is false when one level, the verbal or denotative, conflicts with another level, the level of body and kinesics.[21] When we communicate with whole body, with whole (rhythmic) bloodstream, whole (rhythmic) nervous system, then people sense truth – or perhaps more accurately, authenticity – in our communication.

Bateson often quoted Isadora Duncan's statement: "If I could say it, I wouldn't have to dance it." This is one of those famous statements that can't be quite traced and that have made the rounds. (Louis Armstrong is likewise supposed to have said, "If I could say it, I wouldn't have to blow it.") Such statements circulate because they express a fundamental truth: that communication which can be transcribed in text can be partial, one-sided, from a limited and limiting epistemology arising from conscious purpose; while communication which comes from body or breath, or other carriers of the vast systemic inclusiveness of unconscious mind, are likely to reflect more complete and nourishing varieties of meaning. Or as Bateson explains,[22] the dancing of Duncan, the blowing of Armstrong, and the multimedia art of Blake come from neither consciousness nor unconsciousness but from the complex interface between them.

5. Swing as vitality

> No notes represent swing. You can't write swing because swing is the emotional element in the audience and there is no swing until you hear the note.
>
> – Duke Ellington[23]

What did Ellington and his cohorts "mean" by "It don't mean a thing if it ain't got that swing"? They were promoting their style of music, which was and still is a lot of fun, danceable, full of life, full of activity, great music. But beyond that, art that has a high content of liveliness, vitality, activity, sets your body moving, sets your blood flowing – music of many styles, not just jazz – has *swing* in a universal sense. Gunther Schuller: "Swing occurs when a listener inadvertently starts tapping his feet, snapping his fingers, moving his body or head to the beat of the music."[24] "It don't mean a thing …" identifies meaning and information with our total functioning as biological organisms. Thoreau wrote,

> A man thinks as well through his legs and arms as his brain. We exaggerate the importance and exclusiveness of the headquarters.[25]

If it don't mean a thing if it ain't got that swing, then knowing is embodied. Many authors have written about embodied knowledge, their writing flavored with the assumption that this is news to educators.[26] Ever since Freud, psychologists have talked about the importance of body and systemic integration in the act of knowing, yet we still never quite take it seriously. But is there any other kind of knowing? The millions of symbols in the stacks of Widener Library are not knowledge; each one is part of a cybernetic loop of interactivity, and like a musical score, depends on being interpreted by an immense variety of individual performers. Just as I am now learning to say *improvising* instead of improvisation, we can say knowing instead of knowledge. Knowledge is treated as a noun, a thing, but it is a process of interrelationship involving far more than the functions normally ascribed to the cerebral cortex.

Descartes (1641) famously wrote: "My mind, by which I am what I am, is entirely and truly distinct from my body, and may exist without it." This idea that body and mind are entirely separate has been profoundly influential, and has encouraged the view that knowledge is something that is "in" the mind, and therefore, if Descartes is right, cannot be "in" the body. But from everything we now know about living systems, Descartes was quite wrong.

Education from kindergarten up is still modeled on the premise that there is such a thing as disembodied knowledge, perhaps an insubstantial substance like ether or phlogiston, with which we can be stuffed, which we can stockpile, and of which we can measure the quantity on standardized tests. The notion of disembodied knowledge is sometimes blamed on Descartes and his dualism, but actually stretches back to the twin roots of Western civilization, Athenian philosophy and Middle Eastern monotheism. This disembodied thinking is the *Logos*, or the Word with a capital W, which is somehow separate from flesh and comes before flesh. The splits keep reverberating, for example in the idea that "head" and "heart" (both dormitive principles) are separable entities, opposed to each other. Thus culture continues to see-saw between romantic or new age epistemologies (heart valued more than head) and academic abstraction (head valued more than heart).

There are other ways to look at knowing. Compare *logos* to the Japanese notion of *hara* – that knowledge, wisdom, and ability come not from having a "store" of knowledge, but through being centered, balanced, flexible, and present. *Hara* is the body's physical center of gravity in the lower belly, the focal point from which *ki* (Chinese *chi)* develops. The disciplines of the martial arts, of shakuhachi, tea ceremony, and so forth are seen to be a matter of learning to act from *hara*.[27] The epistemology that gives us *hara* also gives us the word *shin*, which means heart/mind (none of our words quite work as a translation because the split is so engrained in our native language). Instead of operating from a pair of contrary poles which must

always be reconciled, we can operate from a center of dynamic balance. *Hara* is epitomized in those little Bodhidharma dolls – push them around any which way and they keep popping upright. Constantly wiggling around, yet the whole organism always poised – that is *swing*.

Swing, vitality, vigor, all these metaphors refer to a characteristic of life – *negentropy*, where the output of energy, information, patterning, is greater than the input, or more organized than the input. "Just give that rhythm everything you've got" is central to this story, expressing one's completeness as an organism, playing at the interface of mind/body, conscious/unconscious, whole self/whole world. "Everything you've got" is more than any of us can know, but something we can manifest.

If we swing, broadly defined, then every gesture and sound we make bears the imprint of our intelligent body; nothing is mechanically reproduced.

6. Swing rhythm

> Perhaps I like Louis Armstrong because he's made poetry out of being invisible. … Invisibility, let me explain, gives one a slightly different sense of time, you're never quite on the beat. Sometimes you're ahead and sometimes behind. Instead of the swift and imperceptible flowing of time, you are aware of its nodes, those points where time stands still or from which it leaps ahead. And you slip into the breaks and look around.
>
> – Ralph Ellison, *Invisible Man*[28]

Jazz is a set of musical languages which are sometimes all improvised, sometimes all notated, but usually halfway between. A marker of most of these languages is the rhythmic pulse called swing. Swing is described as playing slightly ahead of or behind the beat or shifting the beat toward a very slightly dotted feel (we are all familiar with dotted rhythms from our heartbeat). It is like walking with a regular gait but irregular at the same time, with emphasis that shifts and changes. Various theories exist on how to describe swing or teach it to students. When people write out jazz transcriptions (which is always a bit dicey), they write a string of regular eighth notes. Instead of being played in a metronomic way, however, they are played in this irregular way. It is expected that musicians will swing of their own accord, playing in this driving pattern of regular-but-irregular-but-regular-but-irregular.

Louis Armstrong, when asked what swing meant, replied, "If you have to ask, you'll never know." But he could also be more specific: "The boys are 'swinging' around, and away from, the regular beat and melody you are used to, following the scoring very loosely and improvising as they go, by ear and free musical feeling."[29]

Researchers have been able to document the microtiming of swinging pulse,[30] but each musician's swing, slowed down and measured, is entirely individual, different from moment to moment, and from one musician to another. Antonio Garcia[31] points out that attempts to quantify swing, either to study or teach it, simply don't

get us very far; it is a matter of activity and experience. Swing, like play, defies definition, but we recognize it when we hear or feel it. Each swing (or any other rhythmic style) is like a fingerprint, an expression of each person's unique character. Hence the paradox that no one can characterize the patterning of Bill Evans' swing, yet everyone can recognize his style.

Joost Van Praag, a music critic of the 1930s, came up with a striking formulation: "Swing is the psychic tension that comes from the rhythm being attracted by the meter."[32] Two patterns pull at each other: a metric sense of time and a felt sense of time. When right in the middle of that tension we feel the liveliness of swing. Schuller[33] connects swing with the mutual overlaying of polymetric and polyrhythmic African music with monometric and monorhythmic Western music. In theater, film, or fiction, when we are so tugged by two patterns at once, we feel comic tension, tragic tension, intellectual-emotional tension; then the aliveness of the work holds us. For instance, Van Praag's statement was published in 1936 by an institution called *Fédération internationale des hot clubs*. The name is hilarious to our modern ears because it beautifully mangles our dichotomy of high culture and low culture.

Great performers have a marvelously intuitive sense of just where on that continuum each sound can be placed for maximum forward-moving effect. There are constant changes in both microtiming and microtuning, connecting a pattern peculiar to each individual and to each cultural style – always a little off balance, always moving ahead.

You don't need to be a great performer to swing. There is a certain kind of walk which anyone can do, and which perfectly captures the spirit of classic swing. You can see it in the Pink Elephants On Parade sequence of Disney's *Dumbo*.

We digitize musical time by describing a 4-beat measure with x beats per minute, but that belies the reality of rhythm. Watch two healthy people walking down the street at the same tempo; they are both playing the same 1-2-1-2 rhythm, but the quality of those rhythms is different. Walk in that 1-2-1-2 but play with different combinations of strengths and resistances in your foot, leg and hip muscles as your toes push off the ground – an infinite variety of expressions can be generated. Within the steady pulse, we can become conscious of separate sub-rhythms played by the knees, by each of the toes, by each of many leg muscles, by hips, torso, shoulders and head. In this most ordinary activity, we get a small taste of the many-stranded polyrhythms woven together by a master African drummer. Western musicians tend to play with regular alternation of strong beats and weak beats, like the marching **1**-2-*3*-4. The influence of African cross-rhythms layering over each other gives swing a more complex feel, which Schuller[34] describes as the "democratization of rhythmic values."

In Baroque music it was common practice to play with *notes inégales* (unequal notes), which was very close to swing. Baroque scores were written in a similar pattern to jazz transcriptions, with long strings of regular eighth or sixteenth notes. When such notation is taken literally it generates a rigid, clocklike meter. Playing

with *notes inégales*, however, the up-beats are not quite the same as the downbeats, and there is a quality of drive and freedom. Swing, again, is irregularity within regularity, asymmetry within symmetry – a root characteristic of life. Poets play with the swinging rhythm of trochee. Musicians who compose trance-dance world-beat music are doing something similar using the computer as a musical instrument, creating a personal brew of shifting algorithms, tweaking them to taste.

Conductor Larry Livingston expands the idea of swing beyond jazz:

> When jazz players look at notation, they inflect according to stylistic norms and traditions that come down orally. While that is true, every musician does that. There is no notation that can be played without inflecting it. Mozart, Mahler have to swing. It is a different set of operations required to make them swing. The idea that jazz people look at eighth notes but don't play straight eighth notes, but classical people play straight eighth notes, is a mistake. All notation has to be passed through the enlightening prism of your mind and the traditions of how it's done, which largely come down from your teacher's teacher, etc. The one thing a score can never tell you about a piece is *how it goes*. You can try to specify some of these orally transmitted guidelines, but it's ineffable and elusive. You can't say any more for a classical player what he or she is doing to inflect than you can do with a jazz player. But it's crystal clear that inflection is the name of the game. And much of that inflection in my opinion is traceable back to basic body rhythms, dance, and vocal impulse.[35]

One of the most important themes in Bateson's work is metacommunication. Bateson sensitized us to the multiple layers of communication, the social matrix of all our activities. The way in which an activity or message is played out – what in music we would call the inflection – is at least as important as the "content," if not more so. Metacommunication is carried on the gestures, the timing, the tone of voice, the facial expressions, which color our communication with humor, sarcasm, irony, anger, desperation, fear, boredom. An actor (or any person) can say the same set of words, a musician can play the same set of notes, inflected as "this is play," "this is spiritual," "this is sexy," "this is torture," and a host of other contexts and mixtures of contexts, some of which can be named and many of which cannot.

Inflection is the name of the game. Many educators mistake inflection, swing, expression, and so forth, for something extra, a spice added to the essentials or basics of music. As soon as we think we are adding something extra to the basics, we have missed the boat entirely. This attitude implies that one can fractionate the practice of music or other arts into the essentials, which are systematic and theoretical, and the extras (extra credit, elective, nonessential), which are the practices of the real world. A note is not a tone; a name is not the thing named, but these distinctions are easy to forget.

Swing and many other forms of inflection are described as playing ahead of the beat, behind the beat, in relation to the beat, implying an objective temporal framework within which the musician plays. But the musician is playing *with* time.

Westerners (Northern Europeans and Americans in particular) carry deeply embedded epistemological assumptions about time, which are not shared by all other cultures. Specifically, we feel that clock time (the 60-second minute, the 24-hour day) is an ultimate reality, and as such we cannot *play with* it as one plays with a toy. To play with time itself seems to break this epistemology – yet people do it constantly.

Back to what the frog's eye tells the frog's brain, it is our nature as living organisms to bend and shape what we perceive and how we react. What do the frog's eye and brain do in response to light waves? They attend to disparity, enhancing contrasts. They bend and shape their perception of reality, their interactivity with reality. "Things as they are," as Bateson loved to quote Wallace Stevens, "are changed upon the blue guitar."[36] We swing and inflect both the input and the output. We like bending the beat. Creative people love to bend patterns that have been handed them – circuit bending, gender bending, going beyond the information given. In each generation and cultural style we find our meta-rhythms, our diverse ways of bending time: so music swings, grooves, rocks on.

7. Nature swings

> What immortal hand or eye
> Dare frame thy fearful symmetry?
>
> – Blake[37]

The gist of this story is that we are organisms. The patterning of meaning and reality as we live it is colored by and expressed through our biology. When we look at ourselves in the mirror, like all vertebrates we each have a bilaterally symmetrical face and body. But if I look closely at my face, I see that it is not exactly symmetrical; my right half is a bit different from my left. This skew is the individuality and character of each person. Thus painting or photographing a face is not like doing something mechanical, but seeing and transmitting a pattern which is unique and irreproducible, like fingerprints or voiceprints. Biology is full of symmetry-within-complementarity and complementarity-within-symmetry, i.e., it is full of spatial and developmental swing.

Epigenesis is the music of how the genetic code plays out in a growing organism. A crab has a bilaterally symmetrical pair of claws, but one claw is much bigger than the other. Our two eyes are not exactly the same, nor our ears. The viscera have deep asymmetries, with the heart on one side, the liver on another, and so on. The left and right sides of the cerebral cortex, while structurally similar, are functionally complementary. Each of the symmetrical and repeating parts, as it develops, has encountered a slightly different environment and context, thus has become more individual, less like the generic template.

Bateson liked to compare the serially repeating series of our vertebrae with Bach's *Goldberg Variations* – a meta-pattern playing out in progressive alteration from head to tail.[38]

Most organic molecules, and some inorganic molecules in crystals, are chiral – they come in left-handed and right-handed versions that are otherwise identical. A chiral molecule is not superimposable on its mirror image. Many molecules that occur in biology occur as one of the isomers but not the other. Life uses only right-handed sugars and left-handed amino acids. One member of the chiral pair will be biologically active and the other completely inactive, or one will be a remedy for something and the other will be a poison. Advil or ibuprofen is such a molecule: only one of its structures is effective as a pain-reducing and anti-inflammatory agent.

Bateson always posed a question to his classes – how do we know an object (remains of an organism, remains of an artistic process) is a sign of life? Here is one answer: living beings are marked by interweaving levels of symmetry and complementarity. The object is a symptom of life because it has swing – a rhythm or symmetry with a twist.

Even in the nonliving world of the solar system, everything is shifting and catching up. The existence of leap years indicates that the earth's rotation around its axis, compared with its revolution around the sun, is playing a bit "behind the beat." Classical astronomy, as it evolved from Mediaeval times through Galileo, Copernicus, Kepler and Newton, was a journey away from man-made (and false) ideas of perfection. It was once felt that the heavenly bodies simply had to move in circles because they are so perfect. Even after the sun replaced the earth at the center of humanity's idea of the solar system, people stuck with the idea of perfect circles (and imaginary epicycles to explain away why the data did not match the idea). Kepler figured out that the orbit of the earth around the sun is an ellipse, with the sun at one focus of the ellipse and the other one empty. As the earth revolves, sometimes it is closer to the sun and moving faster, sometimes it is farther from the sun and moving slower – complementarity-within-symmetry. Earth swings.

Plant a stick upright in a stream and the waves passing around it fractionate into right-handed and left-handed curlicues. The asymmetrical discontinuities in flow are like the tails in time of swing beats. The stream keeps flowing steadily, but the components of its flow keep jumping from side to side.

8. Guido and Tom

Guido of Arezzo invented music notation in 1025. He also invented the solfeggio system for naming notes, a method of digitizing pitch information – mapping it onto a grid with discrete steps. Rhythmic values are also mapped onto a grid of discrete values, like half notes, quarter notes, and dotted notes. Guido applied

metaphors that have become second nature to us: a lineal grid, representing the flow of time; dots placed higher on the grid for smaller wavelengths, lower for larger wavelengths. He anticipated Descartes' (1637) invention of the graph with rectangular coordinates, a way of mapping complex realities onto simple frameworks, sparking a huge evolutionary leap in the sciences.

Digital coding has the extraordinary value of compactness and portability. Hours of speech (minus the inflection and expression) can be recorded in a relatively small number of printed pages, or in a small alphabetic file in a computer memory, like the one on which I am now writing. Such coding has all the advantages and disadvantages of shorthand. Guido's notation was a mnemonic device to make it quicker and easier to teach his students a chant. Singing was the primary event, and the digital representation was a secondary, helper function that enabled communication and teaching. These graphs are beautiful, a kind of visual or synesthetic music, but they carry the danger of switching the territory for the map, and more specifically of valuing or exalting the map above the territory. As Western musical epistemology evolved, we came to regard the representation or text as primary and performance as the helper function – the inversion referred to at the beginning of this article.

Thomas Edison invented sound recording in 1877. The phonograph stored analog information, coded in continuously varying quantities. If I say ***pumpkin*** louder than *pumpkin* when talking about a big pumpkin rather than a small one, that information is analog. Analog information requires far more storage capacity than digital. A 10 minute piece of music (continuously wiggling air waves) was coded as 10 minutes of a continuously wiggling groove in spinning wax or vinyl. To store 10 minutes of stereo sound into a computer with the quality of audio CDs requires more than double the amount of storage needed for the text of the entire Bible. Analog coding is rich in content, fat in size. Digital coding is lean and efficient, easy to transport, but loses the particular voice and expression.

As regards pitch selection, the cello is an analog instrument, because the finger can slide up and down the string; whereas the piano is a digital instrument, because it plays either a C or a C# but none of the tones in the crack between them.

The name is not the thing named. The crack between C and C# contains innumerable intermediate pitches to which no name is assigned but which are used very precisely in the musicking of other cultures, or in the past of our own culture. The "blue third" of jazz is a 7/6 ratio of tones (from C to a tone located in the crack between D and E flat).

When swing is described as being "behind" or "ahead" of "the beat," *beat* refers to a digitized grid, not to an objective phenomenon. *Notes inégales*, or pitch relationships like the blue third, are divergent or discrepant from the standard, but "the standard" is a made-up shorthand to enable easy communication. It is equally true to say that the notated values are inaccurate descriptions of real musical sounds.

Thus, in a musical context, we return to the epistemological theme of stamping out nouns. Guido invented the nouns, or notes, as a mnemonic device to teach

chants to his acolytes. A thousand years later, practitioners and students are stuck with the notes as the history and substance of music.

As an improviser, I often wonder how differently music might have developed if recording had preceded notation. Indeed, the flowering of jazz took place right after recording became available thanks to Edison.

A human body playing a rhythm is very complex. With today's equipment it is possible to measure – just barely – the patterns and variations of rhythm that may characterize a particular performer's swing or inflection at a particular place and time. Another element of musical expression, timbre, is far more complex. Making sense of timbre, even on a single bow stroke on a violin, or breath in a shakuhachi or in a pair of vocal cords, boggles the mind. On a computer we can visualize a multicolored spectrum of the relative strengths of some 30 harmonics that make up a single violin tone. A musical gesture of one second duration will play through innumerable micro-variations in timbre, dynamics and coloration, a constantly varying mixture of harmonics. A piece of a few minutes duration and ranging through a few emotional colors overwhelms any conscious understanding. This inherent complexity explains why evaluations of the tone of violins and other instruments are so profoundly subjective, so full of metaphorical words like rich, spicy, nasal, throaty, glassy, warm, fat, and so on. We actually have no idea of what we're talking about, yet when we are in the room with real sound, we manage to understand each other quite well.

Just as swing is a mutual attraction-tension of meter and rhythm, we experience a mutual attraction-repulsion of digital and analog. Our minds like to latch onto the clear distinctions of digital information (frog's eye, frog's brain) and flow with the richness of analog information. We like to have it both ways: double description brings us a more complete experience.

9. Wabi-sabi

> I shall argue that the problem of grace is fundamentally a problem of integration and that what is to be integrated is the diverse parts of the mind – especially those multiple levels of which one extreme is called "consciousness" and the other "unconscious." For the attainment of grace, the reasons of the heart must be integrated with the reasons of the reason.
>
> – Gregory Bateson[39]

This exploration brings us to the natural in art and the artistic in nature, as in the Japanese concept of *wabi-sabi*. Wabi-sabi is an esthetic of beauty that is "imperfect, impermanent, and incomplete."[40] Among the national treasures in Japan are beautiful clay pots, which are asymmetrical and slumping, looking old and even dilapidated. The ideal of wabi-sabi is to make artwork that looks as though it were a

product of natural forces, as though it might have been sitting in the woods for hundreds of years, merging with its environment.

Wabi-sabi and rhythmic musical improv come from opposite ends of the earth – two esthetics that could not seem further apart. Nevertheless they both provide certain qualities: allowing unconscious material and patterns to leak into our work, balancing of natural and bodily patterns with manmade patterns, and finally, allowing the accidental and unexpected to take root and color our work.

Wabi-sabi is an esthetic with a sense of cool spaciousness and slowness that is quite different in effect from the heat of swing, yet both esthetics involve the beauty of irregularity – off-beat and natural rather than mechanical or perfected. One can see a bit of wabi-sabi in Michelangelo's late masterpiece the *Two Slaves*, half-made figures barely emerging from the raw marble, or in some of the violins of Guarneri del Gesù.

Musicians work hard in their performances and recordings to correct and polish off mistakes. It is satisfying to see the high sheen of relative perfection. All too often, though, they sand away the marks of the personality who wanted to become a musician in the first place. Improvising can be a musical or theatrical wabi-sabi. Our gestures cannot be erased or edited; they are a symptom of each person's liveliness and style.

In Indian music there is a kind of glissando called *meend*, which involves bending a pitch, grazing through adjacent tones, sliding into base, and is particularly exquisite in the *alap* or slow improvisations. Within the one second or so of a *meend*, surprising surges may occur in the dynamics or volume. Aficionados of raga playing see a performer's *meend* as a symptom of his or her spiritual accomplishment in music, this feature amounting to a supreme value, much as aficionados of jazz see a performer's swing. *Meend* is ineffable, yet it is always possible to spot the real thing. This wave of expression or inflection interacts with the waves of pitch and pulse, creating new, unforeseen patterns. *Meend* and other subtle and supple vehicles of expression are symptoms of the complex, analogic, biological system that shows through as personality.

Meend is like vibrato, swing, and other ways of bending time and space in music, in that too little of it can make a piece boring, too much can be positively sickening, while just the right amount in the right places sends the performer-listener off into spiritual ecstasies. A proper balance is at most semi-teachable by example and experience. Play is unpredictable, too complex to describe, but never random.

Nature swings, and people make their wabi-sabi. All I have to do is walk outside my studio into the woods, and all things rectilinear and circular disappear. Everything is lopsided as the members of the forest community continuously adapt to each other's influence and patterning, inflecting each other.

Tonight I hope to make some music like a Japanese cup, rough or smooth according to the proclivities and character of the material and the air and the earth's gravity and for as long as I want to hold it between my hands, in the space between

violin and bow. Improvisation, like a wabi-sabi cup, is not random, not "just anything."[41] Its irregularity needs to be tested against the complexity and evolutionary wisdom of my human organism. Then we can follow Henry Miller's advice, which has nothing to do with meaning or ultimate reality, but which carries a nurturing wisdom: "Paint as you like, and die happy."[42]

10. Time

> Every Time less than a pulsation of the artery
> Is equal in its period & value to Six Thousand Years.
> For in this Period the Poets Work is Done: and all the Great
> Events of Time start forth & are conceived in such a Period
> Within a Moment: a Pulsation of the Artery.
>
> – Blake[43]

In the static logic Western civilization inherited from Aristotle, something is either *x* or not *x*, but not both. In the parallel tradition of mystical thinking, the main theme was the union of opposites. Take, for example, Jung's mandala diagrams of opposites and their interweaving and reconciliation. Such is Blake's "fearful symmetry" as he asks the tiger, "Did he who made the lamb make thee?"[44] Such thinkers were concerned with the contradictions of reconciling ideals and the messy way they play out in reality.

Bateson offers a cybernetic view that includes time, and which thereby changes the terms of all these contradictions. He takes[45] the lowly model of an ordinary electric buzzer: the electromagnet pulls the clapper to the bell, which breaks the circuit, which cuts off the electromagnet, which makes the clapper drop back, which connects the circuit and turns on the magnet, and so on. On means off, which means on, which means off. In classical logic this is a contradiction, in real life it's a vibration.

Vibrating between opposite states or directions is normal life. When we drive a car we constantly jiggle the steering wheel according the feedback of our surroundings and kinesthetics, and do not worry about the "contradiction" between left and right. Sitting or standing right now, our muscles are constantly making micro-adjustments left and right, front and back, to keep us comfortably upright. Our blood temperature is constantly wiggling up and down as a million small vessels change their conformation.

This fundamental life process, homeostasis, is expressed by rhythm, vibration, music. It is not a mechanical regularity, but swings.

11. Sweet or hot

"It doesn't matter if it's sweet or hot," goes the song, a string of swinging iambs. But what did sweet and hot mean to African-American musicians in the Twenties? Louis Armstrong wrote:

> A musician who plays in 'sweet' orchestras must be like a writer who writes stories for some popular magazines. He has to follow along the same kind of line all the time, and write what he thinks the readers want just because they're used to it. That keeps him writing the same kind of thing year after year.
>
> And right here I want to explain that 'hot,' as swing musicians use the word, does not necessarily mean loud or even fast. It is used when a swing player gets warmed up and 'feels' the music taking hold of him so strong that he can break through the set rhythms and the melody and toss them around as he wants without losing his way. That creates new effects and is done whether the music is soft or fast or slow.[46]

In real life, these forms come in mixtures. Armstrong's hot music, as traditional jazz, was based on known tunes and patterns. Within these (deductive) frames, artists kept finding new ways to break out into something new.

We may speak of two sides of the musical palette, deductive music and inductive music. Among improv practices, deductive music is *improvising on* and inductive music is *improvising*. Similarly, we may dance a named dance with defined steps, or we may simply dance. We may play a game or we may *play*.

The game of deductive music is: given a theme, or some rules for manipulating tones and their combinations, to produce a valid piece. Either composing or improvising can work this way. In some forms of theater improv, the audience shouts out suggestions and the performers work out the consequences. The pianist "improvising on" Debussy or Bach produces a set of original variations on the piece. The challenge of deductive improv is to take a chord structure, a ballad form, a raga, and make it one's own.

Inductive music starts from no *a priori* rule or agreement; we begin with a sound or gesture, or some quality of the time and place of playing. That sound/gesture leads to another sound/gesture, and so on. When playing together with other people, or in any environment, the practice of total listening is *the* discipline. The continuous feedback of listening brings the piece to clarity and form. Inductive music is a stochastic and recursive process, like learning or evolution.[47] The consequences of each gesture feed back into the next gesture, and eventually a complex system gets built up. On one afternoon when I played a piece for Bateson, he said, "This is a process of painting yourself into a corner" – meaning that while can I begin with any gesture at all, any piece of information; the following gestures build on and add into the results of the earlier ones, becoming more structured, until by the end of the piece there is a sense of inevitability and closure. It is the reverse of theme and variations.

An internalized sense of structure pulls us without having to be consciously invoked. Every piece of music we have ever played or heard, ones we have like and disliked, leaves memory traces that cumulatively give us our personal idea of what is music, what is good or bad, interesting or boring. Our epistemology of music builds up through experience.

Bateson was dissatisfied with both the purely inductive and the purely deductive epistemologies. For him, the fun of science comes when we find big patterns that reappear across examples, and across fields and disciplines. These patterns can then feed back into our inductive operations. That is why we can play a free improvisation and find immanent structure and pattern as the piece evolves, without even trying.

12. Connecting the patterns

To live outside the law you must be honest.

– Bob Dylan[48]

The overtone series and the flow of time seem to be universals, in that they can be observed at the subatomic level and the galactic level, which are presumably not susceptible to human monkeying. But it is we who are observing these regularities. Some truths are what St. Augustine called Eternal Verities, such as "3 + 7 = 10." But in fact, Bateson reminds us, "3 + 7 = 10" is true "*if* 'quantities' are appropriately defined *and if* 'addition' is appropriately defined."[49] Even the most objective statements are inextricable from our subjective epistemologies.

As with metronomic clock time, the 12 tone scale of Equal Temperament is treated like a Platonic absolute. Pianos and synthesizers are tuned to this scale; guitar frets and flute holes are placed on its divisions. It is the acknowledged standard for reckoning "in" and "out of" tune. Yet this scale did not even exist before about 1750; it is an artifact of the Industrial Revolution. E.T. was invented as a mathematical compromise. The intervals are all out of tune compared with the perfect-whole-number scales of Pythagoras, which can be observed in nature and the overtone series. The new tuning system was constructed to fit the named notes, A, A#, B and so forth, which are arbitrary symbols of convenience. We set standards and then decide that other ways of tuning or timing are divergences or discrepancies. Swing, groove, and so forth may be seen as "participatory discrepancies"[50], but discrepancies from what? With many systems of measuring time, pitch and other qualities, who decides which is relative and which is absolute? Just as art is secreted by living organisms, so are Platonic ideas and mathematical-musical forms.

Light and darkness are a pair,
Like the foot before and the foot behind in walking.
Ordinary life fits the absolute as a box and its lid.
The absolute works together with the relative

Like two arrows meeting in mid-air. (The Sandokai*, c. 750)*

The beauty of the wabi-sabi cup comes not only from the fact that it is slouching off to one side and looks charmingly bumpy, but also from the essential tension between the slouch and the imaginary (Platonic) circle or cylinder that is implied. It is hard to say which one is a deviation from the other, but the tension between the two is essential to our appreciation.

Bateson's favored epistemology of science was a kind of pincers movement – of knowledge proceeding simultaneously from the data of never-to-be-repeated experience (inductively) and from universal patterns and shapes (deductively) – and meeting in the middle as a mutual fitting-together.

This mutual fitting-together is exactly what music is – metapattern. Wabi-sabi, swing, inflection, imperfection, rub against the mathematical patterns and regularities that are implied or intrinsic. The patterns of regular beats and just intonation, *tala* and *raga*, chord changes and strides, 12-bar blues and fugue, are empty – they are no-thing. If musicians could play them exactly, which they cannot do (even computer-controlled digital instruments have grain, finite resolution, glitches and irregularities), then the result would be boring. Randomness or capriciousness for its own sake is also boring. In the same way, it would be visually boring to draw a perfect Platonic circle. Those rough, blotchy, roundish *ensos* famous in Zen ink-painting are far more interesting. I submit that they are interesting because they are halfway between entropy (nonexistent) and a perfect circle (also nonexistent), both of which are called up by our minds as we look, think and feel our way around them.

Sprinkle some glitter or tea leaves on a thin plate or membrane of wood (like a violin belly or back) and send sound waves through the plate: you will see the famous Chladni patterns revealing the shapes of standing waves. As the glitter wiggles around and congregates along the nodes of vibration, they seem to want to form into a perfect mathematical shape, at the same time revealing the irregularity and variation that comes from the complex texture of inertias, resistances, and imbalances of force characteristic of real objects wiggling against each other. They look like a cross between a mathematical diagram and a fingerprint – or in other words, a little wabi-sabi swing.

We *like* forms; we tend toward them. The finger sliding up a violin or cello string seeks those Pythagorean perfect whole-number ratios of vibrations that tickle our ears just so. As the finger slides up, we get the *meend*, the pleasure of sliding into base. What is less pleasurable is having that order imposed by the dictates of high culture, Beethoven's father smacking him on the knuckles with his stick. In the same way, a luthier can make a violin that flows from ancient geometric patterns, yet is tugged on in a thousand microscopic but very specific ways, by the history of the tree, by the pattern of densities, by the gestural caprices of the tools.

Musicologists write of how the vital drive of swing resists analysis, yet they feel tempted to analyze it anyway. They are perhaps pulled by the same essential tension

between free play and reaching for the metapatterns which exert such a magnetic effect on musicians and other artists.

Bateson found nothing more beautiful in the biological world than to see geometric pattern. The bones of a human arm, forearm, wrist, hand, and fingers stand in a certain relationship to the homologous bones in a dog's limb, and that comparison can be further matched up with a comparison of the crab's limb and the lobster's limb to reveal metapatterns of epigenesis and evolution. These comparisons and metapatterns and matching-up of relations between parts are exactly the stuff of music. One of Neil Stephenson's characters opens his mind like this:

> It was as if the math teacher had suddenly played the good part of Bach's Fantasia and Fugue in G Minor on a pipe organ the size of the Spiral Nebula in Andromeda – the part where Uncle Johann dissects the architecture of the Universe in one merciless descending ever-mutating chord, as if his foot is thrusting through skidding layers of garbage until it finally strikes bedrock. … like a falcon's dive through layer after layer of pretense and illusion … [51]

Musicking, particularly improvisation, is an exploratory process. I enjoy digging into the music theory of various cultures and times, thinking about abstractions and relations, and playing games with scales and the overtone series. However, the instant I pick up my instrument, all theories and ideas are forgotten; I just play with the physical instrument. I am conscious only of the inductive elements of music, just listening to what is going on, and I have learned to leave the deductive elements to unconscious process. Another improviser might take the opposite approach, operating from a consciousness of deductive elements like formal patterns and harmonic structures, and leaving the inductive elements to work themselves out in the natural flow of activity. Both artistic types manage to get to the middle ground, which is the territory where music happens.

When I teach improv, people come in wondering if they will have to learn theory or chords first, and the answer is no. They also come in wondering if they need to be specially creative or clever, and the answer is no. All they need to do is listen to their partners, listen to the noise of the air conditioner or the traffic outside, and make sound together. Seemingly miraculously, the sounds begin to spontaneously evolve into coherent pieces of collaborative music. The structure and collaboration get stronger and stronger by a self-organizing process of learning and evolution. I might say, for example, "Play a 60-second piece which is 20% more musical than the last one, however you personally choose to understand that term." Then we apply that direction, recursively, over several successive pieces. At the end, when some really interesting and even profound pieces have been played, I might reflect back that this came from a process of 100% listening, and nothing else. But that is not quite true; the real figure is more like 50%, because each person comes in with myriad patterns and templates derived from experience, both conscious and

unconscious; a deep sense of rhythm coming from heartbeat and walking and dancing, and from having encountered music in many forms; a sense of pitch relations and the overtone series which are intrinsic to the universe, even if they are not consciously formalized. None of this patterning needs to be mentioned in the music-making process, because it is always there.

13. The trouble with words

"It don't mean a thing if it ain't got that swing." This is such a compact, expressive package of words that it too can be a dormitive principle if we don't pay attention.

14. Nature and imagination

Swing or inflection may be experienced as discrepancies from some Platonic mathematical form such as metronomic time – a form which is abstract, imaginary, and nonexistent. However much these forms are imaginary, everyone talks about them as reference points. Jazz musicians who swing talk about being ahead of or behind the beat – fooling around with time – so there is "in" their minds a beat to alter. Bateson urged us to stamp out nouns, but he used nouns like the rest of us, and had a particular love for formal ideas. Bateson loved mathematics, and felt akin to the Pythagoreans, who were enamored of abstract numerical or geometric patterns, and saw such patterns as templates for the real events around them. Blake says,

> Nature has no Outline: but Imagination has. Nature has no Tune: but Imagination has! Nature has no Supernatural & dissolves: Imagination is Eternity[52]

We swing in the tension between the ever-fluctuating world of the real and the imaginary construction, particular to one's culture and practice, of time. Real-world sound is not a sine wave or nameable pitch – many waveforms and frequencies coincide and sum up into a pattern which is more than the components, and cannot be adequately described. This is why a violin's tone pleases us, because it is complex and multidimensional.

Romantic ideals of spontaneous expression, personal and artistic freedom, and so forth are wonderful, but they are wonderful in relationship to the forms from which they diverge. Life vibrates form/structure, Apollonian/Dionysian, imagination/nature, and all those lovely pairings. Mozart diverges from certain imaginary timings, as does Coltrane. The pleasure of the divergence presupposes some pattern from which it diverges. Bach sounds great on steel drums or synthesizers not only

because Bach is infinitely malleable, but because he is still the master of metapattern, even when hammered into all sorts of playful and exotic forms.

What did Bateson mean, then, when he spoke to me that night equating improvisational violin with experimental epistemology? Improvisation is a language for working out the dynamics of being alive, being within and comprehending a world of infinitely intricate pattern and relationship, a world in constant flux, responsive to subtle chance variations of environment. It means allowing body-mind to function instantly, rather than waiting for the slow mechanisms of conscious awareness.

We come back to the problem of words. They conjure illusions of solidity that need to be cracked open by an awareness that everything changes and is empty of inherent existence. It's great to stamp out nouns, but with clarity and the right spicing, some words transmit the flux of life quite nicely. "It *DON'T* mean a **THING** if it **AIN'T** got that *SWING*." It is difficult to sing or even to say that sentence aloud without understanding it. It is also difficult to sing the sentence without understanding its bigger circles of meaning. So Blake observes, "Inspiration needs no one to prove it; it is as evident as the Sun & Moon." When Eliot[53] laments at how inadequate words are, how they slip, slide, perish, crack, decay with imprecision, his words are perfect, in tune with the flux or swing of life. Such perfect spontaneity is the art of poetry – a field far beyond form and emptiness – and beyond that, the poetry of music and of all the life forms around us.

To be alive: not just the carcass
But the spark.
That's crudely put, but …

If we're not supposed to dance,
Why all this music?
– Gregory Orr[54]

This article was first published in the journal *Ultimate Reality And Meaning*, 30:1, 2009.

Thanks to Leslie Blackhall, Larry Livingston, and Patricia Bianconi for enlightening conversations.

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Stephen Nachmanovitch is a musician, author, computer artist, and educator. Born in 1950, he studied at Harvard and the University of California, where he earned a Ph.D. in the History of Consciousness for an exploration of William Blake. His mentor was the anthropologist and philosopher Gregory Bateson. He has taught and lectured widely in the United States and abroad on creativity and the spiritual underpinnings of art. Since the 1970's he has been a pioneer in free improvisation on violin, viola and electric violin. He has had numerous appearances on radio, television, and at music and theater festivals. He has collaborated with other artists in media including music, dance, theater, and film, and has developed programs melding art, music, literature, and computer technology. He created computer software including *The World Music Menu* and *Visual Music Tone Painter*. He has published articles in a variety of fields since 1966, and is the author of *Free Play* (1990) and *The Art of Is* (2019). He is currently working on new musical and literary projects. He lives with his family in Virginia.

www.freeplay.com www.dharmaviolin.com

Notes:

[1] Ellington and Mills 1932
[2] Nachmanovitch 2007a
[3] Bateson 1979b
[4] Bateson 1979, p. 4
[5] Lettvin, Maturana, McCullough and Pitts, 1959
[6] Bruner and Postman 1949
[7] Nachmanovitch 1997
[8] Christopher Small 1998
[9] Small 1995, p. 91
[10] George Harrison 1967
[11] Blake 1810, p. 94
[12] Bateson 1972, p. xxi
[13] Korzybski 1933, p. 58
[14] Bateson 1972, p. 177, p. 201, p. 454
[15] Bateson 1972, p. 280
[16] M.C. Bateson 1972, p. 63
[17] Nachmanovitch 1982
[18] Bateson 1979b
[19] Blake 1789
[20] Russell 1938, p. 10
[21] Birdwhistell 1970

[22] Bateson 1967
[23] Ellington, quoted by Hughes 1939
[24] Schuller 1989, p. 223
[25] Thoreau 1859, pp. 69-70
[26] Borgo 2007
[27] Dürkheim 1956
[28] Ellison 1952, p. 8
[29] Armstrong 1936, p. 33
[30] Prögler 1995
[31] Garcia 2006.
[32] Van Praag 1936
[33] Schuller 1968
[34] Schuller 1968, p. 6
[35] Larry Livingston conversation 2007
[36] Stevens 1937, p. 1
[37] Blake 1794
[38] Nachmanovitch 2007b, p. 1130
[39] Bateson 1967, p. 129
[40] Koren 1994
[41] Nachmanovitch 1990
[42] Miller 1973
[43] Blake 1804, pl. 28-9
[44] Blake 1794, pl. 42
[45] Bateson 1979, p. 58-59
[46] Armstrong 1936, p. 29, 31.
[47] Bateson 1979a
[48] Dylan 1966
[49] Bateson & Bateson 1987, p. 22
[50] Keil 1987
[51] Stephenson 1999, p. 7
[52] Blake 1822, pl. 1
[53] T.S. Eliot 1935
[54] Gregory Orr 2005, p. 74