

Music as primordial change

Tariq Khan
Omaha, NE USA

A short and informal essay considering the significance of music or musical melodies. Music is considered as being equivalent to a fundamental encoding of change in a digital universe. Consciousness is also proposed as being what it feels like to have dopamine levels change in an organic brain. Consciousness is considered as emergent from an agent with sufficient memory and context or a threshold of a vast number of associations in memory. Memory is, thus, noted as existentially primordial and required for any change or consciousness.

"So where does music come from?" ... "No one knows. A platonic theory of music just muddies the water. Music is made out of nothing but some fairly simple rules. Yet it's true that no one made them up. The rules. The notes themselves amount to almost nothing. But why some particular arrangement of these notes should have such a profound effect on our emotions is a mystery beyond even the hope of comprehension. Music is not a language. It has no reference to anything other than itself. You can name the notes with the letters of the alphabet if you like but it doesn't change anything. Oddly, they are not abstractions. Is music as we know it complete? In what sense? Are there classes such as major and minor we've yet to discover? It seems unlikely, doesn't it? Still, lots of things are unlikely until they appear. And what do these categories signify? Where did they come from? What does it mean that they are two shades of blue? In my eyes. If music was here before we were, for whom was it here? Schopenhauer says somewhere that if the entire universe should vanish the only thing left would be music."

-- Cormac McCarthy -- *Stella Maris* [1]

"Time is but memory in the making."

-- Vladimir Nabokov [2]

"Music ... stands quite apart from all the [other arts]. In it we do not recognize the copy, the repetition, of any Idea of the inner nature of the world. Yet it is such a great and exceedingly fine art, its effect on man's innermost nature is so powerful, and it is so completely and profoundly understood by him in his innermost being as an entirely universal language, whose distinctness surpasses even that of the world of perception itself, ... We must attribute to music a far more serious and profound significance that refers to the innermost being of the world and of our own self."

-- Arthur Schopenhauer -- *The World As Will and Representation* [3]

A question for the ages has been why humans love music? In his final fiction book before passing away, famous American author Cormac McCarthy suggests that only music is eternal [1]. In this essay, note that "music" refers to musical melodies versus musical lyrics or musical styles. So, might it be the case that our love for music is more profound than generally considered? Might melodies or music actually be a core or primordial aspect of reality? Could our brains be attracted to, or focused on, music as a fundamental aspect of reality? Consider how recent work on artificial intelligence shows A.I. machines coalescing on general rules:

They fed in sentences such as "The key is in the treasure chest" followed by "You take the key." Using a probe, they found that the networks encoded within themselves variables corresponding to "chest" and "you" each with the property of possessing a key or not and updated these variables sentence by sentence. The system had no independent way of knowing what a box or key is, yet it picked up the concepts it needed for this task. "there is some presentation of the state hidden inside the model."

-- Belinda Li - MIT [4]

The famous line from mathematician Leopold Kronecker that “God made the integers; all else is the work of man,” is likely a misnomer for, in actual physical reality, there is no singular object. University of California Irvine cognitive scientist Donald Hoffman has noted that his FBT (Fitness beats Truth) theories tell us that what we observe or believe is not the true nature of reality.

The central lesson of quantum physics is clear: There are no public objects sitting out there in some preexisting space. As the physicist John Wheeler put it, “Useful as it is under ordinary circumstances to say that the world exists ‘out there’ independent of us, that view can no longer be upheld.” ... According to evolution by natural selection, an organism that sees reality as it is will never be more fit than an organism of equal complexity that sees none of reality but is just tuned to fitness. Never. ... Physics tells us that there are no public physical objects. “Look, quantum mechanics is telling us that we have to question the very notions of ‘physical things’ sitting in ‘space.’” I’m emphasizing the larger lesson of quantum mechanics: Neurons, brains, space ... these are just symbols we use, they’re not real. It’s not that there’s a classical brain that does some quantum magic. It’s that there’s no brain! Quantum mechanics says that classical objects - including brains - don’t exist. [5]

Note that the number “1” represents a *distance* from the number zero. Thus, there is no singular entity of “1” as we need, at minimum, a single unit of memory to store, observe, or compare the entity “0” and another for the number “1.” We know from the classic number line that the quantity of numbers between 0 and 1 is technically infinite. In essence, there is no static object nor is there a static moment in our reality. The only location in our Universe with a truly isolated object was the Big Bang singularity from which every event and object derives and perhaps Black Holes where time is believed to stop. Our minds, in order to survive on planet earth, create moments as “NOWs” to store in memory and to use to create models or simulations to plan for the future in order to survive. Our minds create sequences of events akin to the ordering of integers. But we don’t live in a world of isolated objects but, rather, one of eternal motion or change. The number 1 is only relative to 0, the musical note of A is only relative to B or C notes.

Music exists in a framework i.e., a musical scale with a maximum and minimum. The same can be said of all experiences. Human mood is fundamentally relative to levels dopamine in the brain. Note how so many great musicians had issues with depression and addiction (synonymous with excessively low dopamine). We see a relationship between their music genius and them having an ability to feel deeper or more feeling (depression or passion) than the average person i.e., they live on a larger “scale” of experience and can thus create more appealing art or can see or feel or communicate better these aspects of fundamental change.

It is also interesting that most songs in human experience are between three to five minutes in length. Here we likely face a limitation driven by biology, and thus chemistry and physics, where our short-term memory reaches a limit of its ability to track every note, in a given song, relative to every other sequence in the same song. As noted by computer scientist Jeff Hawkins, the entire song is stored in our brain with the song stored based on its changes. The song is recognized and is pitch and tempo invariant:

This means that your memory of the song must be in a form that ignores pitch. The memory must store the important relationships in the song, not the actual notes. In this case, the important relationships are the relative pitch of the notes or intervals. ...your ability to easily recognize the song in any key indicates that your brain has stored it in this pitch-invariant form. ... Neurons recognize and memorize not only patterns or “sequences” (gaps in time) but sequences of sequences like a song. It is this recognition that allows the brain to recall an entire “song” from the first few notes; auto-associative memory. [6]

Note too how the Holographic Principle and the field of Digital Physics describe a Universe that can be encoded and where our three-dimensional Universe is represented entirely as two-dimensional code i.e., bits, and with time. As Donald Hoffman notes in his book *The Case Against Reality*:

This is exactly what Bekenstein and Hawking discovered about spacetime. It is redundant. Two dimensions contains all the information in any 3D space. This is the well-established holographic principle of Susskind and 't Hooft... [7]

So, in the context of change as a fundamental entity, might consciousness merely be what it feels like to experience changes in dopamine levels? Perhaps creating consciousness is, thus, not that difficult? Recent work in A.I. appears to show that after a certain amount of data has been learned the tool of compression is “discovered” i.e., we likely approach an emergence of intelligence or even consciousness:

...the system seeks the underlying logic of its training data... the wider the range of the data, the more general the rules the system will discover. "Maybe we're seeing such a huge jump because we have reached a diversity of data, which is large enough that the only underlying principle to all of it is that intelligent beings produced them and so the only way to explain all of the data is for the model to become intelligent."

-- Sebastien Bubeck -- Microsoft Research [4]

Consciousness, at its core, is based on a threshold of memory and overall exposure. Consider this versus the development of the brain in any animal embryo.

Just as a block of marble may contain every variation of a masterpiece by Michelangelo, perhaps the mathematical relationships we discover are also not inventions but rather patterns already present in our Universe or in one universe in a multiverse of them? Thus, perhaps every song is eternal. Every song could be a primordial maximally compressed form of change that, in the context of universes that are encoded, could be a slice or portion of code of a given universe:

In the case of AI, the probe showed that its “neural activity” matched the representation of an Othello board game, albeit in a convoluted form. To confirm this, the researchers ran the probe in reverse to implant information into the network – for instance, flipping one of the game’s black marker pieces to a white one. “Basically we hack into the brain of these language models,” Kenneth Li says. The network adjusted its moves accordingly. The researchers concluded that it was playing Othello roughly like a human: by keeping a game board in its “mind’s eye” and using this model to evaluate moves. Li says he thinks the system learns this skill because it is the most parsimonious description of its training data. “if you are given a whole lot of game scripts, trying to figure out the rule behind it is the best way to compress,” he adds. [4]

Humans consider music beautiful. Perhaps the cause of this is best explained by deep Learning computer scientist Juergen Schmidhuber where he notes that:

...data becomes temporarily interesting by itself to some self-improving, but computationally limited, subjective observer once he learns to predict or compress the data in a better way, thus making it subjectively simpler and more beautiful. Curiosity is the desire to create or discover more non-random, non-arbitrary, regular data that is novel and surprising not in the traditional sense of Boltzmann and Shannon but in the sense that it allows for compression progress because its regularity was not yet known. This drive maximizes interestingness, the first derivative of subjective beauty or compressibility, that is, the steepness of the learning curve. It motivates exploring infants, pure mathematicians, composers, artists, dancers, comedians, yourself, and (since 1990) artificial systems. [8]

In this context, the movement of continents, the history of a forest, a human life, the life and death of stars, and the dance of galaxies all could be “songs” in their own sense with simply larger scales and larger memory. We may in fact exist in a reality with a logical hierarchy of change represented by songs, then brains

with dopamine states, then lives, then civilizations, etc. up to a universe or multiverse. Each song itself may be, or represent, a slice of our universe or perhaps even each song is a slice of its own universe? Perhaps via our hierarchy we can see an analogy with every universe, in essence, being the same as a song except requiring a memory exponentially larger in scale.

References

- [1] - McCarthy, C. (2022). *Stella Maris*. Alfred A. Knopf.
- [2] - Nabokov, V. V. (2015). *Ada or ardor: A family chronicle*. Penguin Books.
- [3] - Schopenhauer, A., J., P. E. F., & Schopenhauer, A. (n.d.). *The world as will and representation*. Falcon's Wing Press.
- [4] - Musser, G. (2023, September). An ai mystery. *Scientific American*, 58–61.
- [5] - Gefter, A. (2019, July 8). *The Evolutionary Argument Against Reality*. Quanta Magazine.
<https://www.quantamagazine.org/the-evolutionary-argument-against-reality-20160421/#0>
- [6] - Hawkins, J., & Blakeslee, S. (2008). *On intelligence: How a new understanding of the brain will lead to the creation of truly intelligent machines*. Times Books/Henry Holt.
- [7] - Hoffman, D. D. (2020). *The case against reality: How evolution hid the truth from our eyes*. Penguin Books.
- [8] - Schmidhuber, J. (2008). *Driven by Compression Progress: A Simple Principle Explains Essential Aspects of Subjective Beauty, Novelty, Surprise, Interestingness, Attention, Curiosity, Creativity, Art, Science, Music, Jokes*. ABiALS