

Philosophical and computational thoughts why we love music.

Tariq Khan
Department of Computer Science
University of Nebraska at Omaha,
Omaha, Nebraska, USA

"Music is a moral law. It gives soul to the universe, wings to the mind, flight to the imagination, and charm and gaiety to life and to everything".

--Plato

"Next to the Word of God, the noble art of music is the greatest treasure in the world."

--Martin Luther

Let me share some ideas, my speculative thoughts, on "why we love music." Authors of many recent physics papers and books are (as I agreed with a few years ago) believing that, at root, the Universe is made not of particles and forces but of relationships (interactions) only. But this, at its core, is also what music is. Consider: music is the structured ("nice sounding" and repeating-over-time) changes in notes and pitch (chord) rate and volume. But all of this is, fundamentally, just "change." Change, by definition, is an adjustment of relationships or interactions. Our ear hears an A note then a B note etc... over a period of time. The notes themselves change, but also what we hear has changed and what we remember or associate to the aggregate song has changed.

Again, the change itself is the key concept and subtly the problem of "something vs nothing" again glimmers out of our intellectual cupboards as "something" becomes defined as the structure that underlies (over time) the changes. Music is "beautiful" as it is an almost identical overlay or representation of "structure" from changes over time. The entire song is a tapestry or skeleton-like structure and unique with a start and finish.

I think again we find ourselves logically at a spot where conscious minds are needed both to observe/experience and record (the music or the change is "over time" in mental short-term memory a la "to compare notes") to instantiate a song and thus I am back at previous papers of mine noting the programmatic drive in Nature to preserve structure and John Wheeler's "observer dependent Universe" and Plato and Roger Penrose's dualist "world of forms," separate from our discrete and non-infinite reality. My previous paper pointed out the inherent desire to maintain or promulgate structure and thus why we might believe structure is "beautiful."

Perhaps, akin to the famous debate, about mathematical laws, where many argue if mathematical laws are discovered or created, we can ask "are songs created or perhaps are their "beautiful" structural forms of change actually discovered from amongst so many possible structures out of the nearly but NOT infinite combinations possible in a large-scale universe?"

Here, let us propose that what if the actual "foundation of reality" is not "nothing vs something"? Consider again a song. The song is NOT just change over time. The song is a whole as well as its parts and thus it can only truly EXIST with an observer/listener that can remember and contextualize the entire the song (heard once and heard second time) and thus "experience" the song. The analog is a listener of music compared to the physicist's quantum mechanical observer. The listener or, equivalently the musician playing the song, who "understands" and experiences the song as a structure completed (in aggregate in the past and/or present and future if listening to it a second time) is required to instantiate the song. Without the listener, the song is akin to code that has not been "run" a la a computer program.

Now ADHD patients will demonstrate behaviors that are considered OCD-like, listening to the same song repeatedly. This is often considered to be an activity done to help the brain "clock" vis a vis seasonal affective disorder like circadian rhythm "drift." However, this might not be the case. Perhaps this activity is a major hint at something more universal. Perhaps the desire or addiction to "do this" is related to the actual fundamental algorithm of the mind, if not reality itself, which is, again, "to instantiate"!

Thus, if the fundamental "drive" of consciousness is to preserve structure, we can observe how an ADHD individual is, what we may consider, "stuck" or reinforcing, like insurance, that a "wonderful" structure

is solidified in the brain's memory and/or a Platonic Universe of forms. The "addiction" is neither to music or a physical activity but rather to "the fundamental goal of consciousness" which is to "instantiate structure."

So if we generalize "intelligence," at least in these specific examples, then, as a typical sample scenario, we can note that the listener/observer is experiencing (comprehending the change from note to note, contextualizing or correlating the note changes in terms of location within the entire known song and also predicting the next notes in the song based on previously heard and remembered (stored) listening, and again reinforcing a "record" of the aggregate structure to preserve it (as best as possible) for accuracy. The assumed evolution of meme or structural storage to imply that minds, or better yet many minds, (if not Platonic worlds of conscious minds) is the best possible location to store anything (i.e. a codified idea of structure), to a degree, brings us full-circle from code to instantiation (song cannot exist without a listener) back to stored experience of song in brain memory, a la code.

Now obviously if we extrapolate this mechanism we can see that there is an "axis of fidelity and scale" of the song (how precise are delineations between notes in scale and in time) as well as how large is the length or size of the song (i.e. memory). What is perhaps amazing here is that we perhaps have a high-level roadmap for a skeleton for "general intelligence." It could be comprised of: existing in a material or physical Universe, having the ability to input and recognize changes in observations, the ability to comprehend/correlate/entangle those changes and to compare or contextualize them to the specific whole song or sequence in question (part of song versus whole song and current run of song versus past plays of song) and to have enough quality (processing speed) of inputs to input and store at high-fidelity, and enough memory to hold the entire song as well past renditions or runs or plays of the song, or song parts, to compare against.

Here again we have the analog to computer parlance with "processing speed" and memory and input, comparison, and storage all Computer Science terms. But, as we attempt to scale each of these areas, (note that this claimed intelligence process "exists before" the creation of computing as computer engineering works to improve and optimize each of these functions to save time for human competitive advantage - be it cost or profit or winning a race against an enemy - we hit a proverbial "wall" at the bottom of quantum mechanical laws that limit our fidelity and defines a minimum sampling size or discreteness (vis a vis Planck time and Planck size and Heisenberg uncertainty intrinsic "fuzziness" impacting accuracy or limiting precision or minute-ness of change) as well as thermodynamic and gravitational laws that limit again sampling rate and song size as the fastest possible processor would be so hot and CPU so large or dense that at maximum it becomes a black hole (see Seth Lloyd), and cosmological or general relativistic laws as the size of the Universe and its rate of expansion (heat death) provide literal maximum values for a length of a song in time and quantity of notes (changes = # of interactions or particles and correlations = entanglements etc...) that we are literally constrained even if we started listening at the start of the Universe.

Thus, I propose that as we evaluate all "songs" or perhaps all "sequences with structure" (change) that we approach the definition of a Universal Computational "God" (UCG) that we can define as a computational system large enough to: input all observed changes in a system, identify all correlations == entanglements (recent research hints this might be infinite however), store them all - as well as past song occurrences for correlation and comparison analysis - at a fidelity with sampling rate of at least Planck space (vis a vis bytes) over Planck Time (vis a vis ms), and with enough storage/memory to do this.

For, logically, if a song (vis a vis a Universe), by definition, requires a listener to instantiate (we thus approach metaphysical and theological boundaries) then a Universe might require a UCG to instantiate.

Now, philosophical musings aside, in the above when I speak of a song, I am more closely speaking of a melody. But songs are both lyrics and melody. Now, again, we all love music, but at its core, what is it? So consider that melody and lyrics are separate. But we break down all lyrics into categories, they fall into subsets akin to various human emotional experiences. But what is emotional experience really? It is best compared to a record akin to a "lessons learned." For example, our hearts get broken and we cry. We wax and moan how "nothing compares to you" and how we hurt losing someone to make "the music of the night."

So, what is the optimal way to tell your "future self" about this painful lesson in life or love or human relationships? Outside of a tattoo, how do you originally make sure you "survive" a similar situation in the future and thus avoid the next "trap"? What mechanism can help sink and store this "lesson" in our minds? Well what about the vehicle of a meme? In this case the meme (shared in community minds or brains nearly holographically amongst a human population) as a song melody. The melody (quite literally "the hook") is a catchy and easy to remember and enjoyable (likely helps our brain "clock" and contains inherent mathematical beauty or logical structure) mechanism. There, thus, can be no better mechanism.

Over time, however, we can tie these "lessons" into other "tools" like stories (vis a vis musical theater) or imagery (music videos) or even cultures (lifestyle, clothing, language) like "heavy metal," punk, country, "gangsta rap," etc...

The point here is that our human organism, in order to ensure, or rather "guarantee," the lesson and "memory" of the emotional trauma or pain - or even joy or energy - "hijacks" whatever mechanisms or tools are available to ensure the wide-spread distribution and lesson survival and communication of this lesson "into the future" to help with survival of the individual organism and of the aggregate gene pool. What young lady would literally ever forget to consider "but will you love me tomorrow" or what male might avoid that girl as she is a "maneater?" All the rest of human music, on top of this foundation, is optimization, art, and genius.