

Why We Love Music

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A speculative essay on the nature of song lyrics and song melodies answering the question of “why humans love music.” A proposed shared human subconscious mind can understand language but, while it can communicate with the sleeping mind via images in dreams, it can only communicate to an individual’s awake mind via what appear to the individual as a random recall of a musical song in working memory. Remarkable lyrics of a given song can thus be used by the subconscious as a means to communicate to an awake mind. A theory of subconscious communication, from Cormac McCarthy’s essay *The Kekulé Problem* and the research of Jeff Hawkins showing the human brain storing sequences of patterns including songs, is used to support the proposal. Music is considered as “primordial change” or as being equivalent to a fundamental encoding of change in a quantum or digital universe. Music is proposed as possibly being the *boot code* for any experience.

The Nature of Lyrics

“Foremost among them, the fact that the very recent and “uniquely” human capability of near infinite expressive power arising through a combinatorial grammar is built on the foundations of a far more ancient animal brain.”

-- David Krakauer, President and William H. Miller Professor of Complex Systems, Santa Fe Institute ¹

In 2017, Cormac McCarthy wrote his famous essay on the subconscious mind in the online magazine Nautilus called “The Kekulé Problem: Where did language come from?” In the story, a chemist cannot figure out the shape or structure of the benzene molecule and only in a dream while sleeping was the shape of a ring revealed to him and, thus, did the chemist discover the structure of the benzene molecule. Formally, the French chemist Friedrich August Kekulé said that he had discovered the ring shape of the benzene molecule after a dream of a snake seizing its own tail (akin to the ancient symbol known as the ouroboros) ².

We must note the significance of this event. The event implies that our subconscious is aware of the conscious mind's problems and likely even able to understand language. The question that Cormac McCarthy considered was: why is the reply from the subconscious thus in the form of images or symbols and not spoken language? Cormac McCarthy’s claim was that the subconscious mind does not respond to the awake mind with spoken language as it prefers not to: “why is the unconscious so loathe to speak to us? Why the images, metaphors, pictures? Why the dreams... The unconscious is just not used to giving verbal instructions and is not happy doing so. Habits of two million years duration are hard to break (pg. 4).”

In his essay, Cormac McCarthy describes in length his theories of the subconscious including its capabilities and its ability to communicate:

The unconscious is a biological system before it is anything else. To put it as pithily as possibly - and as accurately - the unconscious is a machine for operating an animal. ... But the duties of the unconscious are beyond counting. Everything from scratching an itch to solving math problems. ... Did language meet some need? No. The other five thousand plus mammals among us do fine without it (pg. 1).

How the unconscious goes about its work is not so much poorly understood as not understood at all (pg. 2).

It’s hard to escape the conclusion that the unconscious is laboring under a moral compulsion to educate us.... But the fact that the unconscious prefers avoiding verbal instructions pretty much altogether - even where they would appear to be quite useful - suggests rather strongly that it doesn’t much like language and even that it doesn’t trust it. And why is that? How about for the good and sufficient reason that it has been getting along quite well without it for a couple of million years? (pg. 3).

The unconscious is concerned with rules but these rules will require your cooperation. The unconscious wants to give guidance to your life in general, but it doesn't care what toothpaste you use. And while the path which it suggests for you may be broad it doesn't include going over a cliff. We can see this in dreams. Those disturbing dreams which wake us from sleep are purely graphic. No one speaks (pg. 4).¹

"The neocortex stores sequences of patterns."
-- Jeff Hawkins -- *On Intelligence*³

In a different research path related to understanding the human mind, Jeff Hawkins and his team of computational neuroscientists at Numenta Corporation believe that the mind stores entries as sequences. In his book *On Intelligence*, Jeff Hawkins states:

The brain treats abstract and concrete objects in the same way. They are both just sequences of patterns that occur together over time in a predictable fashion. The fact that certain input patterns repeat time and again is what lets a cortical region know that those experiences are caused by a real object in the world (pg. 128).

An auto associate memory can be designed to store sequences of patterns or temporal patterns. This feature is accomplished by adding a time delay to the feedback. With this delay you can present an auto associative memory with a sequence of patterns, similar to a melody, and it can remember the sequence. I might feed in the first few notes of "twinkle twinkle little star" and the memory returns the whole song. When presented with part of the sequence, the memory can recall the rest. As we will see later, this is how people learn practically everything, as a sequence of patterns (pg. 30).

We can think of these inputs to layer 1 as the name of a song (input from above) and where we are in a song (delayed activity from active columns in the same region) (pg. 146).³

If we consider both theories in tandem, we can then theorize that our subconscious mind, while it may not be able to send images to the awake conscious mind as it does in dreams to the sleeping mind, might be able to send themes or even short bits of language to the awake mind via the lyrics of songs. Those random times an old song "pops in your head" (not triggered by a radio tune or TV commercial reminder) may not be random at all but, rather, a message of encouragement or a description of state or even a warning from our primordial subconscious mind. In essence, music may be the "language" our subconscious uses to "speak back" to our conscious self and, thus, we have a cause for our human love of music.

"Sad songs say so much."
-- Elton John⁴

Our subconscious mind cannot speak to us (or reply to us) in language directly, at least outside of a dream state. Our subconscious thus communicates via entities stored in the brain i.e., images and perhaps sequences including music. Since music is also stored as a sequence, as previously noted by the research of Jeff Hawkins and team, our subconscious can send a reply to the awake mind via the sequence of an entire musical song. But our subconscious mind is doing so to drive awareness to specific lyrics as a reply or update message from one's subconscious. Thus, only via replies using sequences of music can our subconscious message back to the awake mind. Specific songs can become "stuck" in an individual's mind with lyrics representing a recommendation or confirmation of the current behavioral or emotional state of a person. Note the human affinity to music during times like emotional crisis or heartbreak.

Some example scenarios of possible emotional states with associated lyrics from famous songs as replies from a subconscious mind include:

An individual that is socially isolated: *"You can check-out any time you like, but you can never leave!"*⁵

An individual that is depressed: *"Turn 'em on, turn 'em on, Turn on those sad songs, When all hope is gone, Why don't you tune in and turn them on?"*⁴

An individual that is exhausted or over-worked: *"What I wouldn't give for only one night, A little relief in sight, Or someday when times weren't so tight."*⁶ or *"I'm empty and aching and I don't know why."*⁷

An individual who has come to the end of a long project or is at an end of an era: *"And the three men I admire most, The Father, Son and the Holy Ghost, They caught the last train for the coast, The day the music died."*⁸

An individual who has completed a long project or can return to social activity: *"finished my dinner, now I can go outside."*⁹

An individual that is hyperactive or planning a night out: *"The atmosphere on the streets tonight, Is the driving beat of the world, So take your share of the gifts that are there, They all belong to you, And come what may at the break of each day, We all begin anew once more, we all begin anew, Baby, baby, baby, let's investigate, The other side of life tonight, The lovers and the fighters and the risks they take, Are on the other side of life tonight, Let's lose our way, go completely astray."*¹⁰

An individual in a state of difficulty or crisis: *"Nothing gonna stop me now... Nothing gonna stop me now."*¹¹

In summary, there is the possibility of the subconscious human mind, especially in intervals of extreme emotion, communicating in replies to the awake mind via song lyrics - that had been stored as full songs as sequences in the brain. This behavior may be the cause of human affinity to music.

Note that there may be an additional reason for human's love of music. Let's consider the question of why so many top musicians have issues with addiction. It is not so easy to write this association off as caused by the "rockstar culture," lifestyle, image, or community.

Over time, as aggregate human intelligence increased, we see a correlation with intelligence and empathy. Qingke Guo et al. found in their 2019 research that "highly intelligent people are more likely to behave in ways that contribute to the welfare of others due to higher levels of empathy and developed moral identity."¹² Dr. Heidi Moawad notes in her 2017 paper how "researchers from Boston University School of Medicine used cross sectional data obtained from 590 medical students" and using "the Jefferson (JSPE) scale of physician empathy and the results of objective structured clinical examination (OSCE) scores, researchers found a positive correlation between the students' JSPE scores and their OSCE scores."¹³

But there is also a correlation with empathy, or higher empathy, and addiction. As Brittany Oliver noted in her 2019 post:

Because empathaths absorb the energy of those around them, they can be predisposed to higher rates of stress and become easily overwhelmed, exhausted, and overstimulated. The stress and anxiety they absorb from others can leave them predisposed to developing depression, anxiety, emotional burnout, and an increased risk for developing an addiction (pg. 1).¹⁴

We can imagine the human gene pool needing a mechanism to prevent minds with higher empathy from being damaged or helpless. At the risk of excess anthropomorphizing of nature, we still must acknowledge that nature is an expert at copying, stealing, and utilizing whatever tools it can find. Thus, we can further imagine the gene pool needing to ensure critical even lifesaving lessons or information - especially regarding the present state of an environment - is communicated to these high empathy minds, or all minds in a given family, tribe, or population. Epigenetic messaging in DNA is much too slow in this situation. Thus, if sequences are the grammar of our subconscious, we can imagine the evolutionary fitness or survival benefit of our minds using music for this purpose. In essence, music becomes a fundamental meme.

For example, to avoid heartbreak related devastation like suicide, that a person with excess empathy will endure, the communication of the gene pool's historical knowledge (that "life will get better," that life

moves on, and that others have shared and survived the same painful emotional experience) must be rapidly sent or distributed and also easily available and recallable. As noted in 2020 on ScienceDirect.com, "distinct empathic profiles are associated with suicidal behavior, and some suggest that people who attempt suicide may have higher levels of empathy."¹⁵ Thus, we see the secondary use of music: subconscious minds using music to communicate to other subconscious minds now and even into the near and far future; music stored as a sequence, the fundamental grammar of our subconscious. Huang in 2020 describes how music reinforces empathy, "empathy is built through processes like those involved in music playing, including sharing feelings, imitation, and collaborating."¹⁶ Thus, we realize a plausible explanation for addictive minds being drawn to music or, equivalently, many musicians fighting issues with addiction.

In summary, the reason *we love music* is because our subconscious loves music. Why does it love music, because the subconscious is a singular entity in the Platonic realm that is timeless. We assume here that there exists a shared subconscious similar to that proposed by Carl Jung.^{17 18} Because music is a viral meme over large populations (space) and years or eras (time), it becomes the perfect mechanism to influence people. The communication channel or path and the theme or symbolic meaning of a given song, already exists in millions of minds in a near identical format.

This is why the subconscious mind "uses" music. Time and energy efficiency are supreme in our reality including memory space and channel bandwidth. Thus if a subconscious can trigger or invoke a concept in a mind from an already stored memory (musical lyrics that symbolize themes), there is no need for language and its extensive dialog messaging. The theme is local and just needs to be retrieved into working memory i.e., recalled and "heard." While songs may mean different things to different people, the interpretation of the lyrics is generally similar if not identical (Figure 1).

Note that the proposed shared subconscious "wants" fidelity of communication as well as the least amount of bandwidth and number of messages (that is excessive with language). Thus music (a song) stores a near identical copy of a language-based lyrical messages in brains. The symbolism tends to be universal amongst the population, or nearly so, thus with the least amount of messaging and memory, and the best cost of fidelity or accuracy of a symbolic message and the optimal amount of fecundity or quantity of brains with the same message (akin to partial differential equation like optimization of these factors), our subconscious can utilize lyrics tied to, and replicated by, meme-like song melodies into the maximum amount of human brains.

The Nature of Melodies

"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*¹⁹

A question for the ages has been why humans love music or melodies? In his final fiction book before passing away, famous American author Cormac McCarthy suggested that only music is eternal¹⁹. In this section, note that "music" refers to musical melodies versus song lyrics. 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 melodies 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 ²⁰

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. ²¹

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.

"Time is but memory in the making."
-- Vladimir Nabokov ²²

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.³

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.²³

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 Research²⁰

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.²⁰

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.²⁴

The remark about artificial intelligence “trying to figure out the rule behind it is the best way to compress” ²⁴, thus, becomes synonymous with the appreciation of human beings for music and with music as a primordial form of compression in a reality of change. Also 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.

“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* ²⁵

But perhaps there is an even more dramatic cause for our love of music. Is it possible that a newborn mind, that has never heard music, cannot become conscious? In essence, note how many physical and non-physical mediums humans create to fulfill a music addiction, and that also happen to propagate the meme of a song melody: radio, TV, records, CDs, tapes, mp3 players, iPods, elevator music, concerts, musical plays, films, sheet music, funerals, church services, finger tapping, humming, singing, car radios, etc. At first glance, one might consider music as an optimal form of compression of “emotional states” or, literally, of experiences e.g., the vast number of songs representing or encapsulating the theme of “heartbreak.” But, what if this interpretation is backwards? What if music is actually the “boot code” of experience or of the categories of experience that must be heard first e.g., slow and sad music creates a subroutine in a mind that enables the experiencing of heartbreak. As a “boot code” of experience, music may in a sense create reality. Perhaps we don't recall the earliest years of our lives as we have yet to develop enough subroutines (have yet to be exposed to enough musical rhythms) to enable those events to be “formally” experienced - and properly categorized and clocked (timestamped) in our minds?

Music by its very nature involves the “pattern recognition” of the relationships of repeating mathematical structure over an interval of time. We believe we are born to feel sad, happy, energetic, heartbroken, in love, angry, relaxed, awe inspired, mellow, content, exhausted, etc., but, perhaps, a newborn mind is exposed to the “boot code” (music) of these emotional and experiential subroutines and only then does that human brain develop the ability to experience the given emotion. We love music and we desire new music and a wide variety of music as it creates, enhances, and reinforces mind subroutines required to experience various emotional states and thus more of reality. Melodies of great songs are likely optimized (compressed, efficient, accurate) representations of emotional subroutines and perhaps even social concepts like justice, cruelty, compassion, teamwork, etc. Music, as such, may be the bedrock of all human emotion, culture, and experience.

Figures

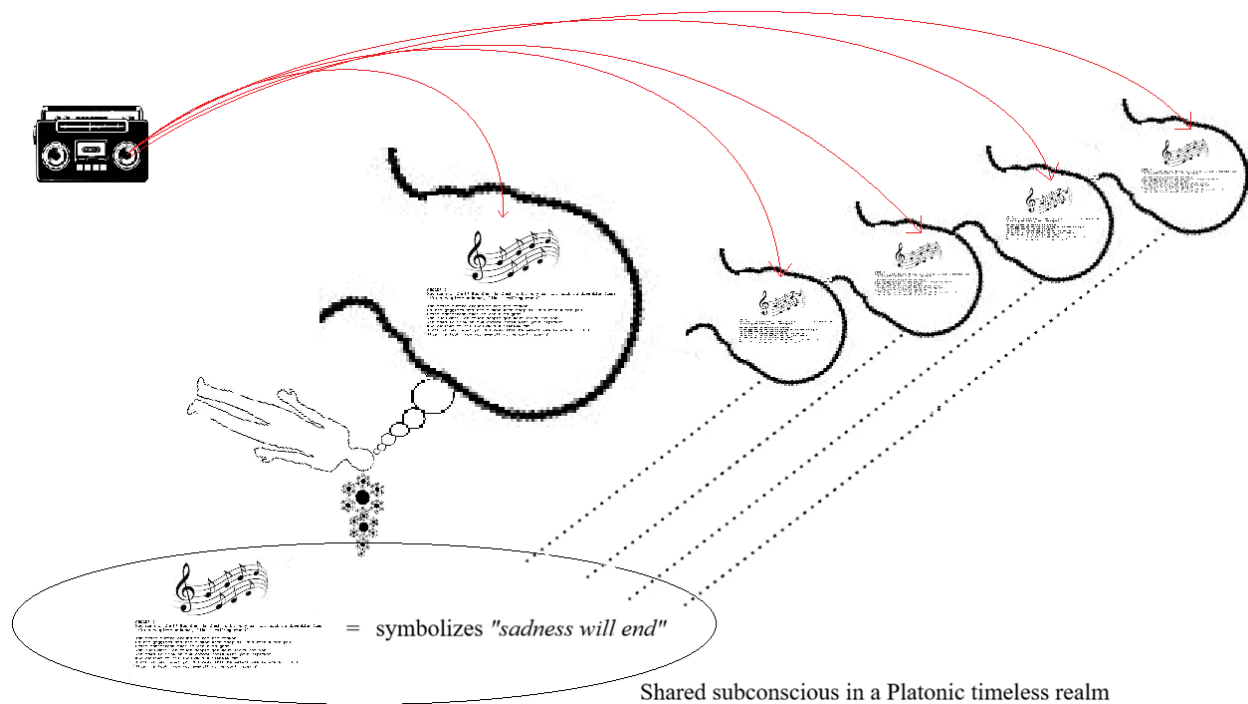


Figure 1.

Nearly identical memories of songs are stored in millions of human brains. The symbolic aspect of the song lyrics thus make a near universal standard or common theme that the subconscious can use to warn or message an awake human mind by recall of the song and thus those lyrics.

References

- ¹ McCarthy, C. (2017, April 17). The Kekulé Problem: Where did language come from? *Nautilus*. Retrieved from: <https://nautil.us/cormac-mccarthy-returns-to-the-kekul-problem-236896/>
- ² Read, John (1957). *From Alchemy to Chemistry*. Courier Corporation. pp. 179–180. ISBN 978-0-486-28690-7.
- ³ Hawkins, J., & Blakeslee, S. (2005). *On intelligence*. Henry Holt And Co.
- ⁴ John, E. (1984). Sad Songs (Say So Much)[Song]. On *Breaking Hearts*. Geffen. Retrieved from: <https://genius.com/Elton-john-sad-songs-say-so-much-lyrics>
- ⁵ The Eagles (1977). *Hotel California* [Song]. On *Hotel California*. Asylum Records. Retrieved from: <https://www.azlyrics.com/lyrics/eagles/hotelcalifornia.html>
- ⁶ Hornsby, B. (1986). Every Little Kiss [Song]. On *The Way It Is*. RCA Records. Retrieved from: <https://genius.com/Bruce-hornsby-and-the-range-every-little-kiss-lyrics>
- ⁷ Simon, P. (1968). *America* [Song]. On *Bookends*. Columbia Records. Retrieved from: <https://songmeanings.com/songs/view/32487/>

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- ⁸ McLean, D. (1971). American Pie [Song]. On American Pie. United Artists Records. Retrieved from: <https://genius.com/Don-mclean-american-pie-lyrics>
- ⁹ Awolnation. (2018). Handyman [Song]. On Here Come the Runts. Red Bull Records. Retrieved from: <https://genius.com/Awolnation-handyman-lyrics>
- ¹⁰ Hayward, J. (1986). The Other Side of Life [Song]. On The Other Side of Life. Polydor Records. Retrieved from: <https://www.azlyrics.com/lyrics/moodyblues/theothersideoflife.html>
- ¹¹ Monkey Safari (2012). Hi Life (Cheeky Bold Cover) [Song]. Monaberry. Retrieved from: <https://genius.com/Monkey-safari-hi-life-cheeky-bold-cover-lyrics>
- ¹² Qingke G., Peng S., Minghang C., Xiling Z., & Kexin S. (2019). Why are smarter individuals more prosocial? A study on the mediating roles of empathy and moral identity. *Intelligence*. Volume 75. Pgs 1-8. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0160289618301466>
- ¹³ Moawad, H. (2017, April 3). Are Empathy and Intellect Incompatible?. *Neurologylive*. Retrieved from <https://www.neurologylive.com/view/are-empathy-and-intellect-incompatible>
- ¹⁴ Oliver, B. (2019, February 27). A Link Between Empathetic People and Addiction. *Nexus Recovery Services*. Retrieved from <https://nexusrecoveryservices.com/blog/empathetic-people-addiction/#:~:text=Empaths%20are%20highly%20susceptible%20to,outlets%20through%20substances%20or%20behaviors>
- ¹⁵ Scocco, P., Aliverti, E., Toffol, E., Andretta, G., Capizzi, G. (2020). Empathy profiles differ by gender in people who have and have not attempted suicide, *Journal of Affective Disorders Reports*, Volume 2. Retrieved from <https://www.sciencedirect.com/science/article/pii/S266691532030024X>
- ¹⁶ Huang H., Liu Y., Su Y. (2020). What is the relationship between empathy and mental health in preschool teachers: The role of teaching experience, *Frontiers in Psychology*, 11, p. 1366. Retrieved May 15, 2024 from <https://www.psychologytoday.com/us/blog/science-of-choice/202303/the-role-of-music-in-promoting-our-empathic-reactions#:~:text=Even%20listening%20to%20music%20could,person%20with%20whom%20to%20empathize>
- ¹⁷ Jung, Collected Works vol. 9.I (1959), "The Concept of the Collective Unconscious" (1936), p. 42. Editors' note: "Originally given as a lecture to the Abernethian Society at St. Bartholomew's Hospital, London, on October 19, 1936, and published in the *Hospital's Journal*, XLIV (1936/37), 46–49, 64–66.
- ¹⁸ Jung, C. G., & Hull, R. F. C. (2014). *The archetypes and the collective unconscious*. Routledge.
- ¹⁹ McCarthy, C. (2022). *Stella Maris*. Alfred A. Knopf.
- ²⁰ Musser, G. (2023, September). An ai mystery. *Scientific American*, 58–61.
- ²¹ Gefter, A. (2019, July 8). *The Evolutionary Argument Against Reality*. Quanta Magazine. <https://www.quantamagazine.org/the-evolutionary-argument-against-reality-20160421/#0>
- ²² Nabokov, V. V. (2015). *Ada or ardor: A family chronicle*. Penguin Books.
- ²³ Hoffman, D. D. (2020). *The case against reality: How evolution hid the truth from our eyes*. Penguin Books.

²⁴ 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

²⁵ Schopenhauer, A., J., P. E. F., & Schopenhauer, A. (n.d.). *The world as will and representation*. Falcon's Wing Press.