

MUSIC AND TIME

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Music is a most universal phenomenon sounding everywhere, but what is music?

David Butler defines it in Encarta Encyclopedia: “Music is artful arrangement of sounds across time.” On the one hand, this definition is obviously very broad, but not sufficiently broad. On the other hand, the narrower one would exclude too much essential, as caricaturist Kari Suomalainen’s definition concerning string music: “It is rubbing of pig’s intestine with horse tail hair.”

I think that “time” is fundamental in music. Time and its two variables open up us the breathtaking road into music, when we listen to it or when it is performed publicly at concert halls or privately at home for someone’s own pleasure.

One cannot progress very far in answering the questions concerning music without considering the riddle of time. Time may be the most enigmatic of all philosophical and physical problems, and it must be resolved in order to understand reality filled by music.

Time as metaphysical problem

Two opposite views of time have been clashing from the dawn of Western thinking. Heraclites (ca.540-480 B.C.) thought that the basic feature of reality is “becoming,” that is, time is a “flux” or perpetual change. As such, time is something *physical*: measurable, countable, and computable, that is, *a posteriori*.

Parmenides (ca. 515-445 B.C.), in turn, thought there is no change in the universe, because the permanent forms of reality are motionless and mathematical. The universe is timeless and hence, it is something *eternal*: immeasurable, uncountable, and incomputable, that is, *a priori*.

Western metaphysicians have mainly argued in favor of Heraclites. There have been three paradigmatic topics concerning time in philosophical enquiry: change, causation, and modality.

Time as change.

It is commonly accepted that only time, not space, is the variable of change. The genuine change involves temporal variation in the properties of things and also music, when time “passes.” Time is the changing process, where the future is becoming the present, and the present is changing into the past. It is just the change that goes on in the event while it is occurring.

The presentness of an event is its happening, as opposed to its having happened or being about to happen. The present is a factual point in the flux of time or a number of motions, which separates and unifies the past and the future, or earlier and later, as Aristotle (384-322 BC) thought.

From the ontological difference between the past and the future, it follows that the past expands in the flux of time: more facts are added to the totality of facts. Changing time can be very long or very short but never zero. In other words, time t is a duration, and as such always > 0 .

J.M.E. McTaggart showed in his famous paper concerning the unreality of time (in *Mind*, 17/1908:457-474) the movement of time consists in the fact that later and later terms pass into the present, or that the present passes to later and later terms. In other words, the so-called “B series” of time is sliding along a fixed “A series” of time, or A series of time is sliding along a fixed B series of time.

In the first case, time presents itself as a moment from the future to the past. In the second case, time presents itself as a moment from earlier to later. The events seem to come out of the future, while we ourselves move towards the future. B series of time runs backwards, whereas A series of time runs forwards, that is, the future has been, the present is, and the past will be, and *vice versa*.

Time as causal relation.

The main point in the causal theories of time is that time, as a temporal becoming, is asymmetric, deterministic, and continuous. If A causes or is among the causes of B, then B does not cause or is not among the causes of A, and A is sufficient cause for effect B. The asymmetry of time entails that time has a direction because causation has a direction. Asymmetric time is the variable of causality.

Yet within physical time, we cannot affect the past, because it is determined. The future, instead, is not yet determined. There is no present fact about whether A will exist tomorrow, so anything we do or happens now can make a difference for the future. If there is no ontological difference between the present and the future, then future-tense statements must have a determined truth-value. Hence, the rejection of temporal becoming means a rejection of indeterminism, that is, free will.

The flux of time seems to be continuous. The changing things in time exist continuously. Kant (1724-1804) proposed in his prin-

principle of contradiction that a thing cannot be itself and something else simultaneously. If one state exists, the other cannot exist simultaneously. One cannot be both existing and non-existing, or neither existing nor non-existing simultaneously. Reality is a continuity of the temporal states.

Time as modal relation.

Finally, time can be described in modal terms. “Necessarily p” means that p is true in all possible worlds, and “possibly p” means that p is true at least in some world. The future is just a set of possible worlds, so the flux of time is the passage from the possible to the necessary.

Time as physical problem

In classical mechanics (CM) of Newton (1642-1724), time is absolute, true, and mathematical, which of itself and from its own nature, flows without relation to anything external. Material bodies move through Euclidean space along predictable paths, subject to forces that accelerate them in accordance with strict mathematical laws. The universe is a gigantic clock-like mechanism, predictable in every detail by universal and absolute time. Time is simply there, and nothing can affect it. Newtonian time is absolute calculus: the precise and continuous succession of the present moments.

Newton’s conception of absolute time was rejected 150 years later by Einstein’s (1879-1955) flexible time. Time became Riemannian and non-Euclidean “metric” space or at least an inseparable part of it. Euclidean and “phenomenalistic” SR needs observers and their time depending on how they are moving, whereas non-Euclidean and “realistic” GR does not need any observers. Strictly speaking, Einstein’s GR does not describe time

but gravity, which has some important implications concerning time.

On the one hand, gravity is not a mysterious mechanical force operating at a distance but a warping of space-time by the mass and energy on it. On the other hand, it is an acceleration that depends on the curvature of space-time. So to say, mass tells space-time how to curve, and space-time tells mass how to move. In fact, Einstein's space-time as a Riemannian field is simply there, like Newtonian absolute time, but as relative, because it depends on motion of mass and energy on it.

At the quantum level of reality, there is, however, a basic limit that introduces an irreducible fuzziness to the notions of speed, rate, and time: Werner Heisenberg's (1901-1976) *uncertainty principle*. The size of the wave function at a point gives the probability that the particle will be found at that point, and the rate at which the wave function changes from point to point gives the probability of different velocities.

One can have a wave function that is sharply peaked at a point. This corresponds to a state in which there is a little uncertainty in the position of the particle. However, the wave function varies rapidly. It means that there is a lot of uncertainty in the velocity. Similarly, a long chain of waves has a large uncertainty in position, but a small uncertainty in velocity.

One can have a well defined position or a well defined velocity but not both at the same time. This would seem to make complete determinism impossible. If one cannot accurately define both the positions and the velocities of particles at one time, how can one predict what they will be in the future?

Even if time is absolute Newtonian clock-time in QM, there is no absolute clock in QM, because all physical clocks are subject to quantum uncertainty. Hence, also time itself may be subject to quantum effects.

What is now?

Einstein was seriously worried about the question: “What is now”? He concluded that the “now” has no physical status, and hence, it was a metaphysical question that lies beyond scientific physics.

Instead, Sir Arthur Stanley Eddington (1882-1944) thought (in *The Nature of the Physical World*, Cambridge: Cambridge University Press, 1929, p. 97) that our impression of “becoming” is so powerful and central to our experience that it must correspond to something in the objective world.

He thought: “If I grasp the notion of existence because I myself exist, I grasp the notion of becoming because I myself become. It is the innermost Ego of all which is and becomes. It seems that we experience time in two distinct ways: externally through the senses and internally within the mind.”

Although Plato (c. 428-347 BC) was obviously the first discoverer of “self” (soul, mind) in Western thinking, it was Aristotle who first put the mind into the center of changing reality. For him time was a measure of change, and as such, a number of motions in connection with earlier and later. There is no time without motion, and there is no present without the mind who realizes it. In this sense, Einstein’s SR is only a novel variation of Aristotle’s metaphysics.

But what is the now? Is it only something *physical*: changing, measurable, countable, and computable, as Heraclites thought or; only something *eternal*: unchanging, immeasurable, uncountable, and incomputable, as Parmenides thought; or something *physical and eternal* absolutely simultaneously?

Physical and eternal time

A German theologian Karl Heim (1874-1958), who's thinking I have researched in my dissertation *Time and Polarity* (Yliopistopaino: Helsinki 2000) and its expanded version *Two Dimensions of Time* (Peter Lang: Frankfurt a.m. 2003), defined time ontologically.

There are two variables of time inseparable from each other: physical and eternal or timeless.

In entire reality, there are limitless or infinite objectifiable spaces (*Räume*): my-, your-, and their combination, our-space. These consciousness-spaces construct the physical aspect of reality, the so-called "G-reality" (*Geworden*).

In other words, there is an objective reality constructed by "many worlds." This objective G-reality is relative, physical time. It is impossible to talk about time in general, but only time of individual observers: "my-time" of my-space, "your-time" of your-space or "our-time" of our-space depending on how we are moving through space-time.

Physical time as temporality is the variable of the measurable, countable, and computable change. It is an ever-changing *process*. The future of possibility and potentiality is becoming the present of actuality, and the presence is changing into the past of necessity. The relative flux of time as a "secondary becoming" or a process is an irreversible sequence of successive present moments ($t_1, t_2 \rightarrow t_n$).

Thus, physical time does not start at t_0 , but at t_1 , because physical time can be infinitely long or infinitely short but never zero, that is, $G > 0$. It means that we can observe only the past of time. The events we observe lie on what is called our "past light cone." Physical time is relative space or at least inseparable from Riemannian metric space and gravity in it.

The crucial difference between Einstein's and Heim's thinking was the question concerning the now. The "now" was, for Einstein, the mysterious question beyond physics. He was right, but because he did not want to answer this crucial question, his conception of time was like Schubert's "Unfinished symphony." According to Heim, this "mysterious something" is W-reality, which as non-objectifiable and *eternal* time is beyond science, as Einstein clearly understood.

Thus, there are also limitless or infinite non-objectifiable spaces, which are incomputable. The non-objectifiable mind-spaces: I-, You-, and their combination, We-space, construct the eternal aspect of reality, the so-called "W-reality" (*Werden*). It is the absolute "now": *nunc aeternum*, which means $W = 0$.

W-reality is the pure non-objectifiable, emerging, and energetic state within G-reality. Heim argued that W-reality does not include only human minds but also non-objectifiable "minds" of the whole biosphere and the material world. For example, the core of electron seems to be such a mental property. In other words, eternal W-reality is *panpsychic*.

Eternal time is the variable of the "primary becoming" or *transition*. It is a certain "imaginary zero-point," where the "secondary becoming" or process appears into existence. In other words, "not yet become" potential reality becomes "already become," that is, logically necessary actual reality. Entire reality is a dynamic interaction and an information exchange of physical and eternal time.

Eternal W-reality of the minds, which are knowing, willing and evaluating subjects (I-, You-, and We-space) is the perspectival and energetic center of physical G-reality (my-, your-, and our-space) of the objects.

Eternal time is *absolutely simultaneous* with all moments of physical time, as St. Thomas Aquinas (1225-1274) thought. In other

words, at its deeper level, reality is a sort of “super hologram,” in which the past, present, and future of physical time exist simultaneously, as for instance, David Bohm has proposed.

The absolute simultaneity between W- and G-realities and their spaces is in other words “polarity.” The law of double polarity: $A \leftrightarrow B \leftrightarrow AB$ (indifference condition), as Schelling defined it, is neither a causal (cause-effect) nor logical (premise-conclusion) relationship but is known immediately.

Since Aristotle, philosophers have concluded that if there is no entity that is purely “in itself” and “through itself” (AB), then there is no secondary and dependent thing imaginable, and all actuality as a whole dissolves into illusion.

The polarity implies that there is no physical time without eternal time, and no eternal time without physical time. The polarity holds physical and eternal time together. In other words, reality is not dualistic but monistic totality combined by objectifiable and non-objectifiable aspects of reality.

Practically, the polarity means, for instance, that “here” and “there” is absolutely simultaneous in eternal time of I-space but relative in physical time of my-space. I can be “here” and “there” absolutely simultaneously in the eternal now of I-space (the mind) but not in the physical now of my-space.

Thus, eternal time is bound in certain locations in physical time, which can be described by using Boolean algebra. Eternal time is like the Boolean duration between two measurable “clock-ticks” of clocks. The Boolean non-numerical, uncountable duration and the countable duration in physical time are always in the polar relationship: $(\oplus) 1 \leftrightarrow 2 \leftrightarrow 3 \dots \leftrightarrow n \ (\oplus) \geq 0$.

Because eternal time exists *within* physical time, time as a dynamical unity of physical and eternal must be a continuum. Thus, time is both physical and eternal simultaneously. In physical time,

all changes are successive, and in eternal time, all happens at once. Time is in eternity, and eternity is in time

Music and two variables of time

If Einstein's relativity theories are unfinished, also the definitions of music based on them are helplessly unfinished and insufficient. As a harmony of two variables of time, music cannot be only "artful arrangement of sounds across (physical) time." Music is not but "The W-reality of the eternal mind becoming the sounding physical G-reality," that is, "from eternity into temporality."

We usually experience reality as a three dimensional space, to which time somehow belongs. Einsteinian odd four-dimensional space-time is more difficult to understand. However, reality is more complicated.

According to the so-called "super-string theories," there are not only four dimensions but at least 11 or 12 in reality. Those seven or eight additional dimensions are completely invisible. Also music-space is physically at least 11-dimensional or better: there are 11 different kinds of variables.

In other words, the sound can be heard from somewhere (three dimensional places), as a time-duration, as some thickness (strong or weak), as some colorfulness, at some height of brightness and sonority, as some kind of tonality, fullness, and intimacy. We might say what in reality is invisible could be audible. The 11-12 dimensional reality is the vibration of strings in different frequencies. The entire universe is like music.

When I listen to music, the sounds come into my ears as waves of air. Within my ears, those sound-waves transit into the liquid of my internal ears. Then they change electro-magnetic waves, enter into my brain, and I can hear sounds and their music.

In other words, when the artist performs music, it transits from his/her W-reality into my G-reality, from my G-reality into my W-reality, and back into my G-reality as a permanent or soon forgetting memory.

At least 350, 000 different kinds of tones of music can open up me with many variations. Namely, the new space opens up always passively as a paradoxal gift, if it opens up at all. We cannot take this paradoxal gift, only receive it. Schubert had realized this paradox, when he said: "Music in my name is not mine but received as a gift from eternity."

When the artist performs music, s/he is transiting music from eternal W-reality of the *composer* into physical and temporal process of G-reality.

For example, when a pianist plays the Moon Light Sonata of Beethoven, s/he and Beethoven, who has gone long ago, exist in W-reality absolutely at the same time. The pianist must become Beethoven, if s/he likes to interpret what Beethoven aimed in his music.

Regrettably, only very few artists realize that the music they are playing is not their own but some one's else. If the artist do not want to change or is incapable to metamorphose, that is, to become, for example, Beethoven, it would be better that s/he plays only his/her own compositions than to rape with peculiar and egoistic manner music composed by the others.

If music were only "artful arrangement of sounds across time," that is, only a phenomenon in G-reality, a mechanical robot could be technically the best virtuoso. Such kind of robot can be created "emotional" zombie of the human being, but it belongs ever only to the physical variable of time.

As a rhythm of two variables of time, music is not any materialistic technology but completely different: the harmony or syn-

chronization of W- and G-reality, that is, from eternity to temporality, and *vice versa*.

The metamorphose, that is, the most complete unification of the composer and artist, has been known in Buddhist thinking, especially in Zen, for thousands of years. The meeting of two Zen-masters lets us suspect, what it is:

Kyōzan Ejaku asked Sanshō Enen: “What is your name?”

Sanshō said: “Ejaku!”

“Ejaku!” replied Kyōzan, “that’s my name.”

“Well then,” said Sanshō, “my name is Enen.”

Kyōzan roared with laughter.

In other words, two persons exist *absolutely simultaneously* and as the *same* person in eternal variable of time, but they are, however, *absolutely different* persons and relatively temporal in physical variable of time.

Regrettably, in the Western world, only very few musicians have drawn on the Eastern metaphysical wisdom. Menuhin was one of them, and from Finnish musicians only Ralf Gothóni.

If the music heard in concerts were authentically the harmony and rhythmical synchronization of two variables of time, and not only temporarily one-dimensional technical and mechanical play, it could provide deep and unforgettable emotional experiences for better life.

The metamorphose does not change the musicians chameleons whose original egoism gets dressed different kinds of cloths, but on the contrary, less egoistic, altruistic, humble, and really great artists.