

MUSIC-SPACE AND TIME

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Music is the most universal phenomenon. It is 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.” The concept “time” in Butler’s definition is the most essential in music. Time and its two variables open up us the breathtaking view into music, when we listen to it and when it is performed publicly at concert halls or privately at home for 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 metaphysical, philosophical, and physical problems, and it must be resolved in order to understand reality, which is 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, also sounds, 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 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 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 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.

Kant located time into the mind as a pure *form a priori* of sensible intuition. As such, time has no physical status. Whereas Euclidean space is the formal *a priori* condition of outer experiences, time is the formal *a priori* condition of appearances. If this subjective condition of sensibility were removed, time would be nothing at all. Thus, space and time are given *a priori*, whereas everything that is given in them is *a posteriori*.

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 Riemann’s 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*). The objectifiable *consciousness-spaces* of my-, your-, and their combination, our-space construct the objectifiable, physical aspect of reality: 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 ($t_1, t_2 \dots t_n$). 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* of I-, You-, and their combination, We-space construct the eternal aspect of reality: W-reality (*Werden*). It is the *absolute* “now”: *nunc aeternum*, that is, $W = 0$. 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 or 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. Or in other words, at its deeper level, reality is a sort of “super hologram,” in which the past, present, and future exist simultaneously, as for instance, David Bohm has proposed.

Even if spaces are limitless, there are boundaries within and between spaces. The *boundary of contents* prevails within a space. If the number of dimensions in a space is n , then the number of dimensions in the boundary of contents is $n-1$. Instead, the *dimensional boundary* is the constant *velocity of light* $= c$ between spaces of W- and G-realities. It means that within a black hole, from where light cannot escape, or within the singularity of Big bang, G-reality of physical time merges into W-reality of eternal time, and hence, $W + G = 0$.

Except the boundaries, there prevails also the *polarity*, that is, the *absolute simultaneity* between W- and G-realities and their spaces. The law of double polarity: $A \langle \rangle B \langle \rangle AB$ (indifference condition), as Schelling defined it, is neither a causal (cause-effect) nor logical (premise-conclusion) relationship but is obvious 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, *un-*

countable duration and the *countable* duration in physical time are always in the *polar* relationship: $(\oplus) 1 < \oplus > 2 < \oplus > 3 \dots < \oplus > n (\oplus) \geq 0$. 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-space 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 composer's mind becoming the sounding G-reality,*" that is, "*from eternity into temporality.*"

We usually experience reality as a three dimensional space, to where time somehow belongs. Einsteinian odd four-dimensional space-time is more difficult to understand. 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. 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 could say that what is invisible in reality is 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. With help of the eardrums and hear bones, those sound-waves transfer into the liquid of my internal ear, where they change electro-magnetic waves entering into my brain, and I can hear sounds and their composition, music. In other words, when the artist plays 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. The at least 350, 000 different kinds of tones of music-space open up me with many variations or not. Namely, the new space opens up always passively as a paradoxal gift, if it opens up at all. We cannot take it, only receive it. Schubert said in his last words: "Music in my name is not mine but received as a gift from eternity."

When music is performed, it is the transition from eternal W-reality of the composer into physical and temporal process of G-reality. 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 even famous 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 not able to metamorphose, that is, to become for example Beethoven, it would be better that s/he plays only his/her own compositions than rapping other's ones with peculiar and egoistic manner.

If music were only "artful arrangement of sounds across time," that is, only a phenomenon in G-reality, a robot could be technically the best virtuoso. Such kinds of robots are constructed in Japan, where there are already lots of so-called "artists," who play mechanically like robots. As a rhythm of two variables of time, music is, however, completely different: the harmony of W- and G-reality, that is, from eternity to temporality, and *vive versa*.

The *metamorphose*, that is, the most complete unification of the composer and artist, has been know in Buddhist thinking, especially in Zen, for thousands of years. The meeting of two Zen-masters lets to 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.

In the Western music world, only very few artists have drawn from the Eastern metaphysical wisdom. Menuhin was one of them, and from Finnish musicians only Ralf Góthoni. If the music heard in concerts were authentically the harmony and rhythm of two variables of time, and not only temporarily one-dimensional technical and mechanical performance, it could give the listeners much more broadening and unforgettable 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.