Primal Sound and Memory

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> "Proust finds a limitless space and an incredible throng of details, fragrances, considerations, sensations, reflections, re-elaborations, colors, objects, names, looks, emotions... all within the folds of the brain between the ears of Marcel. This is the flow of time familiar from our experience: it is inside there that it nestles, inside of us, in the utterly crucial presence of traces of the past in our neurons[1]." - Carlo Rovelli

As Apollo 10 passed the dark side of the moon following its launch on May 18, 1969, the three astronauts aboard—Thomas Stafford, John Young, and Eugene Cernan—heard a strange sound that resembled a whistle. They sensed this sound as if it were music coming from outer space and joked that no one would believe it if they mentioned it upon their return to Earth.

[1] Carlo Rovelli, *The Order of Time*, translated by Erica Segre and Simon Carnell, Riverhead Book, 2018, 112

Meanwhile, on board Apollo 11, launched on July 16 of the same year, astronaut Michael Collins was terrified to hear a strange sound of unknown origin. In 2003, on Shenzhou 5, China's first astronaut Yang Liwei heard a persistent series of noises as if something was pounding on the spacecraft.

Faced with these peculiar sounds, the minds of the astronauts were doubtless overcome with questions as to their origins. Nonetheless, there was no concrete information with which to satisfy their curiosity. Assumptions are made based on samples of similar results. Rather, only hypothetical speculations were possible, whether the phenomenon was attributed to natural sounds from space, signals from another planet, simple signal interference, or a collective auditory hallucination shared by the astronauts within the closed place of their spacecraft.

An unknown sound often strikes fear into those who hear it. Without hearing the sound in person, one might simply suspect that the astronauts misheard a mechanical noise emanating from the spacecraft itself. However, the astronauts of Apollo 10, as it orbited the Moon, recorded the sound that lasted for about an hour, and the recorded file was sent to the Johnson Space Center in Houston, U.S. Initially classified as an unexplained file by NASA, it wasn't until around 40 years later that this recording was declassified and made accessible to public in 2008. Later, Michael Collins wrote that radio communication experts assumed the sound had resulted from interference between the super-high radio frequencies used by the lunar lander and the command module. Planetary scientist Kevin Grazier describes on the documentary TV series *NASA's Unexplained Files* that a similar sound had been detected near Saturn, which could be generated by charged particles passing through the planet.

Human neural pathways are known to be detailed enough to accurately perceive the direction of a sound and to detect to some extent

the differences in volume, duration, and frequency of the sounds. However, just because humans can identify whether the sound is coming from the left or the right, as well as the direction to which the sound is moving and whether one sound is higher or lower in frequency than another, it is not to say that humans have the ability to pinpoint the source or origin of sound waves. Moreover, the frequencies of sounds audible by humans range from 20 Hz to 20 kHz, whereas frequencies outside this range cannot be perceived by human ears at all. The whistle-like sound that penetrated the inside of Apollo 10 and Apollo 11 and the pounding noise on Shenzhou 5 were all within the range of sounds perceivable through the neural pathways of the astronauts. In terms of their physical properties, these sounds are soundwaves that alternate between condensation and rarefaction; that is, oscillations of high- and low-pressure fields of air at a certain speed. As such, it goes without saying that there should be no sound whatsoever coming from outside a spacecraft that flies through the vacuum of space. Even if some kind of debris had struck Apollo 10, there would have been no air to transmit the soundwave outside of the spacecraft. The only waves that can travel through vacuum without any medium are light and electromagnetic waves. As for the sounds heard by the astronauts of Apollo 10 and 11, radio communication experts are likely correct in that the most probable speculation as to their source is interference in radio frequencies between the spacecrafts. If the noises were similar to those of charged particles passing through Saturn, whose magnetic field is incomparably stronger than Earth's, the first point of research should be the spacecraft's surroundings as it passed over the dark side of the moon during the period of severed contact with Earth.

I listened to the peculiar sounds recorded by the astronauts on YouTube. It was interesting to me that I, too, perceived the sounds as something akin to music, a strange tune with high and low

pitches. Even though the source of the sounds may remain as a mystery forever, our brain perceives these extraterrestrial noises as a piece of music based on what we know. This faint semblance of a melody—no matter its origin—reminds me that this unknown sound from outer space is, in essence, a matter of physics. Even if the sound was coming from Earth, it does not change the fact that sound itself is a physical phenomenon comprised of energy. Indeed, it becomes an example for the remembrance of this mysterious noise as musical vibrations, albeit quite unrelated to any known structure of music.

Hearing a sound consists of the following process: "In the moment that we hear a note, the previous note is 'retained,' then that one also becomes part of the retention and so on, running them together the present contains a continuous trace of the past, becoming gradually more blurred[2]." Theoretical physicist Carlo Rovelli explains that, through this process of retaining, phenomena "constitute time[3]", quoting Edmund Husserl. In the chapter "The Analysis of Time-Consciousness[4]", Husserl employs the process of perceiving a series of sounds as music to explain internal time-consciousness: According to Husserl, "That several successive tones yield a melody is possible only in this way, that the succession of psychical processes are united 'forthwith' in a common structure[5]." Husserl demonstrates the process of perceiving sound and its continuity, positing, "Every tone itself has a temporal extension: with the actual sounding I hear it as now. With its continued sounding,

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[2] Ibid., 191.

[3] Ibid., 191.

[4] Edmund Husserl, *The Phenomenology of Internal Time-Consciousness*, edited by Martin Heidegger, translated by James S. Churchill, Indiana University Press, 2019, 40-97.

[5] Ibid., 41.

however, it has an ever new now, and the tone actually preceding is changing into something past[6].” According to Husserl, retention constitutes the vitality of “now” and the consciousness of “what has just passed” is obtained through retention: “Therefore, it, the sound, is given here, let us say, as a sound perpetually unchanged in its duration. But this sound unchanged in its duration —regarding content—undergoes an alteration[7].”

Sound as a material relates to “the immanent time of the flow of consciousness”. The data consisting of sound, however, relate to random events happening in the outer world; the sound is perceived as blurred in the “equilibrium state of a macroscopic world”. Austrian physicist Ludwig Boltzmann has shown that “entropy exists because we describe the world in a blurred fashion[8]”. According to his research, “the difference between past and future is deeply linked to this blurring[9].” “If I observe the microscopic state of things, then the difference between past and future vanishes. There is no distinction between ‘cause’ and ‘effect[10],’” speculated Rovelli.

If there is an artistic medium that introduces the world of quantum mechanics where every photon is regarded as a wave, the gap between the world of imagination and reality would also vanish. Introducing a sound as an object of observation into the structured system of music as created by humans for auditory pleasure is, without doubt, an artistic act in itself. The objectified sound then contains the “nowness” of the past, while the data consisting of the already-

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6 Ibid., 43.

7 Ibid., 144.

8 Carlo Rovelli, *The Order of Time*, translated by Lee Jung Won, Sam & Parkers, 2019, 41.

9 Ibid., 42.

10 Ibid., 42.

past nowness interact with the physical phenomenon that reacts with a certain material at a certain place.

Is it possible for time to be constituted in an objective manner? Unlike the cosmic time we measure based on the direction and speed of Earth's rotation and revolution, there is no such thing as the present that exists as an objective phenomenon in the universe. The Planck time, which is the shortest unit of time representing the speed of a photon travelling at the speed of light, is so short that it can be hardly measured, while intervals of time are discontinuous, not uniform: "Just as a particle may be diffused in space, so, too, the differences between past and future may fluctuate: an event may be both before and after another one[11]."

Sound in a subjective domain only exists when we perceive soundwaves with our auditory system. However, sounds that occur outside of the hearing range of our "self" can nonetheless be heard by insects flying over the empty lots of the city or neighborhood dogs roaming the streets. What would happen if different properties of soundwaves could be perceived through memories, as opposed to a unified system known as music? If a sound is studied as an unseen movement—that is, purely as a physical phenomenon of transmitted frequencies meeting human neural pathways—it would open the door to a new world of noise that had been excluded from music. Friedrich Kittler regards the emergence of the concept of frequency, which finally started to develop in the 19th century with the invention of the gramophone, as an event that led to a divergence from the existing concepts of music. Notation based on frequency, which emerged in non-musical fields, opened an ontological domain that had been excluded by visual or linguistic representation theories, which

[11] Ibid., p95.

was explained by Kittler's remark: "The real takes the place of the symbolic[12]." On the other hand, Christoph Cox[13] mentions the completion of the antihumanist project through sonic materialism, or as Nietzsche puts it, "to translate humanity back into nature." "Sound art is best understood by way of a philosophical naturalism and materialism that rejects the ontological and epistemological oppositions between subject and object, mind and matter, culture and nature[14]," stressed Cox.

It has been not long since I first encountered the exhibitions and live performances of mixed artistic duo "GRAYCODE, jiiiiin". As such, there are many of their works that I have not seen in person, aside from *poetic canon* (2022), *25/signal minus noise* (2023), *+3x10^8m/s, beyond the light velocity* (2017-2018), *delta w, composition film* (2023), and *Δw* ("delta w," 2023), which I have witnessed myself. The expression "+3x10^8m/s" indicates the speed of light, the upper-case Greek letter Δ (delta) indicates a change of quantity, and W indicates work performed by a system, reminding us of the world of quantum mechanics that incorporates both the properties of particles and waves, or the natural phenomenon of increasing entropy and the direction of time according to the second law of thermodynamics. *Δw, composition film* is a 16-minute-40-second-long video recording (at the frequency of 1/1000Hz) of a performance act of changing input signals collected from the sea at Jeju Island into frequencies, which were then reverted to their place of origin as the output. Named *wave forecast* by GRAYCODE, jiiiiin, this performance constructs a kind of archive, preserving the time phenomenon accompanying the extent of physical

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[12] Friedrich A. Kittler, *Gramophone, Film, Typewriter*, translated by Geoffrey Winthrop-Young and Michael Wutz, Stanford University Press, 1986, 24.

[13] A philosopher, cultural critic, and curator of visual and sonic art, whose writings include *Sonic Flux: Sound, Art and Metaphysic*.

[14] Christoph Cox, *Sonic Flux: Sound, Art and Metaphysics*, The University of Chicago Press, 2018, 4.

variation. The collected data (including the frequency, the cycle, and the variation) are not used for the representation of past time; the data rather extract special properties contained in the conserved time and retract them into the isolated dimension of time at the length of 16 minutes and 40 seconds. Nature's homeostasis and circulation, which GRAYCODE and jiiiiin tried to model in their works, was represented in the form of the exhibition *Δw* at the underground venue of SongEun Art Space. In the exhibition, sounds of the past that move at intervals through the eight small directional speakers do not seek to convey or express certain messages; the indicators are set up in the venue only to facilitate the perception of the movement of primal power and energy contained in the sounds. The working process of extracting, organizing, overlapping, and adjusting the sound as a material isolates infinite time in a random time slot.

"If there are extra dimension, such fingerprints of extra dimension are sure to exist[15]", says American theoretical physicist Lisa Randall. "Such fingerprints are particles called Kaluza-Klein (KK) particles[16]. KK particles are the additional ingredients of an extra-dimensional universe. They are the four-dimensional imprint of the higher-dimensional world[17]." Randall explains this is "just as you can reproduce any sound a violin string could make by the

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[15] Lisa Randall, *Warped Passages*, Ecco, 2006, 351.

[16] German mathematician and mathematical physicist Theodor Kaluza conceived the possibility of a hidden, unseen dimension existing in the four-dimensional time and space. Kaluza presented a hypothesis in 1921 where he applied Einstein's general theory of relativity on the fifth dimension to integrate gravity and electromagnetic force of the fourth dimension into the fifth dimension. In 1926, Swedish theoretical physicist Oskar Klein developed Kaluza's classical physics theory into a quantum interpretation, finding a five-dimensional wave equation that resonates in the closed fifth dimension.

[17] Lisa Randall, *Warped Passages*, Ecco, 2006, 352.

superposition of many resonant modes[18].” Since I am incapable of understanding these theories of physics in the mathematical sense, I try to imagine of the process of creating sounds by overlapping multiple resonant modes, which makes me think of KK particles as ghost particles[19]. Would it be possible to find extra dimensions curled up in a higher-dimensional world by finding hidden objects (fingerprint) in the four-dimensional world? If someone studies a way to mathematically trace vibrations generated by friction when the four strings of a violin are touched by a bow, it would entail the task of confirming data that is recorded in the past. Simultaneously as the vibration occurs, the direction and continuity of many different waves allow us to perceive the flow of specific time with our internal consciousness. According to Husserl in relation to time, “the situation is not the same here as with a manifold of spatial fullness where visual and tactile fullness coincide. Rather, here we have separated, non-coincident materialities which endure and are still in the identical temporal interval[20].” The movement of internal consciousness with which the flow of time is perceived comprises the limit and pain of human consciousness. If the past, the present, and the future could happen simultaneously, just as space can be filled in a manifold manner, it would not be possible for such a thing as a causal relationship to exist. This would be a revolutionary revelation, like the realization of Dr. Louise Banks in Ted Chiang’s *Story of Your Life* as she begins to “remember” new memories while learning the alien language of Heptapod.

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[18] Ibid., 352-353

[19] I named the particle quite literally, focusing on the ghost-like nature of the particle in that its existence cannot be proved, and only later learned that the term “ghost particle” actually refers to neutrinos in English.

[20] Edmund Husserl, *The Phenomenology of Internal Time-Consciousness*, edited by Martin Heidegger, translated by James S. Churchill, Indiana University Press, 2019, 164.

> "Usually, Heptapod B affects just my memory: my consciousness crawls along as it did before, a glowing sliver crawling forward in time, the difference being that the ash of memory lies ahead as well as behind: there is no real combustion. But occasionally I have glimpses when Heptapod B truly reigns, and I experience past and future all at once[21]."

Unlike other works where familiar melodical oscillations are designed to induce narrative-based empathy, works of sound art focus on the physical power of sound itself and do not seek to represent reality. Instead, such works are more akin to a journey of searching for the traces of the past or the future that emanate from the origin, like KK particles. This is the route through which we can return to the point of origin for a sound, the beginning of a vibration, or a future point that we have not seen but has already happened nevertheless. These works explore the chasms of the microscopic world that break the subtle balance and symmetry of a certain point in time, position, or place.

In their exhibitions *Δw* and *+3x10^8m/s, beyond the light velocity*, GRAYCODE and jiiiiin do not use any rhetorical devices to induce immersion. Therefore, their works are naturally composed of a minimal structure with little embellishment. Imagine a temporary system such as a semagram[22], which is composed of physical data of individual sound waves as a way to intercept the signification of a sound. If there was a kind of extra-dimensional writing system that is similar to mathematic equations or musical notation, it would be possible to represent the

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[21] Ted Chiang, "Story of Your Life", *Stories of Your Life and Others*, translated by Kim Sang-hoon, Happy Reading, 2004, 208-209.

[22] In *Story of Your Life* by Ted Chiang, Louise defines the alien writing system of Heptapod as a semagram, whose linguistic structure differs in dimension from that of human languages, which use sequential tenses.

present containing both the memories of the past and the future in a two-dimensional model. Of course, the emergence of new languages or communication methods like a semagram used by alien creatures, where thinking occurs simultaneously without the divisions of tenses, would only be possible when humans of the present regain their lost memories of the future.

After the first phonograph invented by Thomas Edison in 1877 came into the spotlight, Rainer Maria Rilke described his childhood experiment of building a phonograph at school in his essay *Ur-Geräusch* ("Primal Sound", 1919)[23][24]. The material he used was a piece of pliable cardboard bent to the shape of a funnel, on the narrower orifice of which was stuck a piece of impermeable paper of the kind used to bottle fruit and a bristle from a coarse clothes brush that pointed at a right angle to its surface to record sound waves. About a decade later, Rilke spent many nights studying a bare skeleton that he saw in anatomy lectures at the École des Beaux-Arts, and was reminded of the unforgotten grooves, "which had been scratched in a little wax cylinder by the point of a bristle" from the coronal suture of the skeleton. "As will be seen, what impressed itself on my memory most deeply was not the sound from the funnel but the markings traced on the cylinder; these made a most definite impression[25]," says Rilke.

Sound is stored in the phonograph as the needle vibrates from sound waves and passes the wax cylinder to leave marks on the surface. When the markings are set to rotate, the recorded sounds are played. What Rilke calls "markings" are the traces imprinted by vibrations on the rotating wax cylinder. The sound comes back to life when the past traces left by the vibration are rotated again.

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[23] In 2015, Carsten Nicolai republished Rilke's Ur-Geräusch and held an exhibition of the same title.

[24] Friedrich A. Kittler, *Gramophone, Film, Typewriter*, translated by Geoffrey Winthrop-Young and Michael Wutz, Stanford University Press, 1986, 38-39.

[25] Ibid., 39.

The marks on the wax cylinder that resemble the line of a skeleton's coronal suture constitute the first visual representations naturally created by sounds of the past. Rilke imagined placing the phonograph's needle on the coronal suture of the skeleton. The noise that would sound from the coronal suture was described by Kittler as follows: "Thus a writer celebrates the very opposite of his own medium—the white noise no writing can store[26]." Sparked by the "primal sound" of Rilke, this noise that cannot be stored in writing develops through experiments that utilize technical methods. Kittler considered László Moholy-Nagy's record etchings to touch upon the same point as Rilke's notion of "extracting sound from a skull[27]". The noise converted from primal markings that cannot be converted into writing elevates the relationship between image and sound to another level.

GRAYCODE and jiiiiin place visualized traces such as musical scores or frequency data inside a space where a sound structure is being played. The abstractness of the physical traces that are recreated in the present within the space is different from that of graphic images in abstract films. In the installation videos of *poetic canon* or *+3x10^8m/s, beyond the light velocity*, the movement of images becomes the metaphor for sound, while the data drawings of *Δw* are captured images of the process in which naturally generated energy is converted into physical signals.

Many of the works of the artists, which consist of graphic videos where music is combined with continuous abstract images, are reminiscent of films by Hans Richter or Viking Eggeling, who led the abstract film scene in the 1920s. As such, it is necessary to investigate the

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[26] Ibid., 45.

[27] Ibid., 47.
In 1923, Moholy-Nagy suggested to engrave a series of characters on a record disc which does not contain music to cause a sound phenomenon itself, which was called "making a gramophone as a representing tool into a producing one.".

internal phenomena caused by abstract films on our perception through the continuous movement of abstract images—that is, a way to store instances captured in our memories. When we look at abstract paintings, the overall composition and elements of the pictures are easily engraved in our memories in an instant; with videos comprised of abstract forms such as geometrical shapes, moving lines, or dispersions of light and colors, however, it feels as if the memories of the forms are ephemeral beyond the overall impression. Comparing abstract films to those whose narratives are composed of coherent images of characters or landscapes, the difference in the clarity of our memories or "obligation of containing and being contained"[28] becomes clearer, which is perhaps a learned behavior of memory acquired from narratives. On the other hand, abstract images are more likely to be perceived as a flow of the whole that integrates the movement of colors, light and darkness, and rhythm, rather than the actual forms within. Due to this overall impression, the details of such images may not be remembered at once but could be stored deep in the subconscious in the form of potential imagery.

The overall impression created by successive abstract images usually contains the pictorial elements of the image. However, if this abstract image is not the representation of a certain object but the recorded trace of a specific signal from the past, this image transcends beyond the pictorial compositions that are familiar to us. If the abstract images of Richter's *Rhythmus 21* (1921) are the symbolic world, the image of the coronal suture of a skull takes form both in the abstract and real world. Likewise, the records of frequencies collected by GRAYCODE,

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[28] Henri Bergson, *Matter and Memory*, translated by Park Jong-won, Acanet, 2005, 256.
"The difficulty that we have in conceiving it comes simply from the fact that we extend to the series of memories, in time, that obligation of containing and being contained which applies only to the collection of bodies instantaneously perceived in space," remarked Bergson.

jiiiiin are also abstract forms but belong to the real world. Therefore, to delve into and analyze these records like traces of an extra dimension hidden in a higher-dimensional world, one must undergo the training process to accept this new sensory dimension.

When the frequencies of GRAYCODE, jiiiiin's *Δw* are transmitted within the underground space, the audio signals are converted into data drawings. The graphic images or diagrams replicate the data (or rules) of soundwaves that constitute the process of persistence, division, and continuation that comprise "time-image".

The sound art of GRAYCODE, jiiiiin's, including *Δw,* does not deceive our ears; rather, they demand the visitors' attention. These are sounds that must be carefully listened to and parsed. Inviting visitors to a point in time where the original energy of natural sounds was generated without artificial processing; this is the mission that GRAYCODE, jiiiiin seek to achieve in their work. Though it is no easy feat to identify the points of distinction in the flow of changes, the power of attentive listening allows us to feel in our bodies the lapping of the ripples and the fury of the waves.

The endeavor to return to the point of origin for a physical event through sound, GRAYCODE, jiiiiin's works are reminders of a strange artistic landscape that I only recalled through vague imagination.

There stand indicators of sound at intervals. Walking along these indicators, we can sense the very direction of the frequencies. As the sounds of the unknown create fissures, they break down the amorphous balance of the macroscopic world. It is there that we might finally restore our lost memories of the future.

> "The beauty of sounds is by the nature; their effect is purely physical. It is the result of the coming together of

different particles of air put in motion by the sounding body and by all of its aliquots, perhaps to infinity[29].”
- Jean-Jacques Rousseau

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ΔW(delta W)
2023
GRAYCODE, jiiiiin

[29] Jean-Jacques Rousseau, Essai sur l’origine des langues, GF-Flammarion, 1993, 108.