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An Ontology of Music

Even though the Greek word *ontologia* had not yet emerged, Aristotle prescribed what an ontology should accomplish in his Metaphysics: “There is a science which investigates being as being and the attributes which belong to this in virtue of its own nature.”¹ He is anticipating a broad spectrum of topics in what will come to be called *metaphysics* and knows that he must take a first step, make a reasonable beginning. He does this by establishing being as the most reasonable point of departure; *to on he on*, he writes, *being qua being*. I am proceeding with the decision that the concept of sound should be an analogous beginning for our examination of music, sound being the “raw material” of music. It is here that we can identify whatever first principles or features in music present themselves. In trying to identify music as such, one has to notice that *music*, itself, so multifaceted, tends to elude even the diligent observer/analyst. Are all of the following really music? If they are, are some instances better, or ‘higher’ in some way than others? But if they are not all music, what distinctions are appropriate? Consider these examples:

Musicians playing Bach’s Brandenburg Concerto No.5 for an attentive audience.

A seven year old child playing her latest piano lesson for her patient family

A CD of Bach’s Fifth Brandenburg on a music shop shelf

A series of pitched sounds in correct ratios, as defined by the Pythagoreans

A melody that has the purpose of putting an infant to sleep. Or instilling patriotic feelings. Or encouraging socializing. Or applying for a job playing piano in a bar. Or engaging in religious worship. Or providing a soothing atmosphere in a surgical theater.

The phenomenon *sound*, whether actual or potential, whether pleasing or not, must come to mind. The word *sound* is required in defining music, but this one element is not adequate or helpful on its own. We may have one feature of music but little else, so many are its permutations. Thunder is sound; squawking seagulls make sounds; a burping baby is making

¹ Metaphysics IV.1; 1003a 21-32. The Latin term itself, *ontologia*, is attributed to Jacob Lorhard (ca. 1606); its popularization is attributed to Christian Wolff (1730).

sounds; but none of these constitutes music. Composers have imitated the sounds of nature, as did Vivaldi, suggesting thunder in the third movement of *Summer* in his Four Seasons.

Nonetheless no one would be tempted to say that real thunder is music; so too with squawking seagulls and burping babies. Aristotle might have said that, with the word 'sound', we have the genus of the definition of music but need far more, i.e. the 'difference'. He might have said so, but he didn't. The present task, then, is to treat the word *sound* in pursuing an ontology of music in a way that is similar to the way in which the word *being* is traditionally used to inaugurate traditional metaphysics as a whole. Aristotle's words indicate an approach, viz. "investigates...the attributes which belong to this in virtue of its own nature." Music presents the attributes of sound, pitch, melody, harmony, and rhythm.

The foremost attribute of music is sound, and sound in music is pitched. All sound is constituted of vibrations/oscillations moving as waves through a medium such as air or liquid, a wave being a disturbance in the medium.² Vibrations given by a vibrating body, e.g. human voice, musical instrument, move in cycles per second, each cycle repeating its identifying values at regular intervals. Musical instruments can produce sound by such means as vibrating columns of air, or vibrating or plucking taut strings, or vibrating membranes. The frequency of the vibrations in each cycle is described by the term hertz (Hz), named in honor of the achievements of Heinrich Hertz.³ If, for example, one hundred cycles are completed in one second, the frequency is described as one hundred Hz.

² Physics provides more detail: Sound is defined as "Oscillation in pressure, stress, particle displacement, particle velocity, etc. propagated in a medium with internal forces (e.g. elastic or viscous), or the superposition of such propagated oscillation." American National Standards Institute/American National Standard on Acoustical Terminology. Retrieved from <https://webstore.ansi.org>

³ Heinrich Hertz (1857-1894) discovered radio waves and proved that James Clerk Maxwell's theory of electromagnetism is correct. He produced electromagnetic waves in his laboratory, establishing without any doubt that light and heat are electromagnetic radiations.

Anglo-Irish philosopher George Berkeley raised a taunting question about sound as part of his immaterialist philosophy: *If a tree falls in the quad (i.e. university quadrangle) and there's no one about to hear it, does it make any sound?* His negative answer has not satisfied many people, and physics is in clear opposition to immaterialism: sound is an auditory sensation evoked by vibrations travelling through a medium. Sound waves can reach the ears of humans and animals, entering the outer ear, then moving through the middle ear into the inner ear where the waves are converted into neural signals to be interpreted by the brain. What has come to be called acousmatic music experience moves more deliberately still into emphasizing music as the experience of a person; one enjoys the music for itself alone without knowing or caring about its origin, significance, or physical causes. British philosopher Roger Scruton argued thus: "Because sounds are pure events we can detach them, in thought and experience, from their causes, and impose upon them an order that is quite independent of any physical order in the world."⁴ The preeminence of sound as auditory, and thus too music, is a current research interest of Michael Trimble, professor of neurology and neuropsychiatry at University College, London. The human brain, he writes, "likes the rules of music," classical music especially. Generally referred to as providing the "Mozart Effect," classical music has a robust connection to mathematics, a connection that the human brain responds to and appreciates.⁵

Pitch, then, requires a human listener to the music. Each note corresponds to a particular frequency or number of vibrations, and humans perceive the level of this frequency as a specific pitch. Pitch is determined by the number of vibrations of the vibrating body. The higher the number of vibrations, the higher the pitch that we hear; the lower the number of vibrations, the lower the pitch we hear. That pitch is a perceived feature means that pitch is subjective to some extent. *Higher* and *lower* are the traditional designations of how the neural signals are interpreted by the brain.

Melody, our third attribute of music that deserves attention, got off to a late start, principally because of the influence of Pythagoras throughout the classical period. Modelling

⁴ Scruton, *Understanding Music*, page 5

⁵ *The Epoch Times*, June 4, 2024, B8. Mozart's Sonata for Two Pianos in D (K448) has proved helpful in treating epilepsy and Parkinson's.

his speculation on the importance of numbers governing the cosmos, Pythagoras taught that intervals were ratios of numbers placed as fourths, fifths, and octaves.⁶ Quantification was admittedly challenging, and Plato remarks that "...the sciences of astronomy and harmonics are closely akin."⁷ One should not be interested in the sounds of the notes but should "...seek out the numbers that are to be found in these audible consonances..."⁸ In dealing with harmony, the numbers are important, the sounds less so. Musicologist Andrew Barker, however, wrote of this: "The use of ratio may have been a reference to the place on a string where the sounds were 'stopped' as by finger or bridge...this method is irrelevant...it does not describe what we perceive as we perceive it. Only that which is accessible to our hearing is relevant."⁹

When we hear a melody, we hear many individual tones, each replacing another tone and then being replaced in its turn by still another. Tones within the melody vary greatly both in their pitch and their duration. Further, they move in both ascending and descending patterns, tension being the 'spirit' of ascent, and gravity, that of descent. Surprisingly, humans hear all these as a unity, a unity which, expanding over time, creates a figurative kind of 'space'. These many tones, though presenting themselves individually, and consisting of successive notes of varying pitch, do not escape our human ability of organizing them as a unity in time. And so, from all these individuals, our minds perceive a unity that we call a melody. This musical perception has an explanation in Immanuel Kant. "...neither coexistence nor succession would ever come within our perception, if the representation of time were not presupposed as underlying them *a priori*."¹⁰ Time is a "pure" intuition, i.e. one that does not involve any sense

⁶ In defining harmony, two schools of thought were accepted in the Graeco-Roman period. The earliest was that of Pythagoras, viz. that harmonic analysis had to be expressed in numerical terms, specifically as ratios of numbers. The alternative view held that intervals between notes should be based on distances or intervals chosen by the composer and/or performer. The Pythagorean approach is described as *mathematical harmonics*; the other, as *empirical harmonics*

⁷ Republic VII, 530c-d

⁸ Republic VII, 531c. Further, in Laws Bk.2, 665, he describes rhythm briefly as "order in movement."

⁹ Barker, pp.30-40.

¹⁰ Critique of Pure Reason, Transcendental Aesthetic, Section Two, page 74.

perception of time. Though we have no sensation of time in itself, we cannot remove time from whatever appears to us.

Defining the word *melody* gives one pause. In contemporary terms, melody is: **a.** the rational progression of single tones in one part, by contrast with harmony; or **b.** the leading part, usually the soprano; or **c.** and any air or tune. (Webster's New World Dictionary of Music) But for much of our Graeco-Roman beginnings, the meaning was more elusive. The noun *mousike* sometimes carried the meaning of 'melody,' despite the chance of ambiguity, *mousike* referring to all the activities and productions inspired by the Muses. Aristotle uses *mousike* when he clearly means music at Pol.VIII 1340b, 30-39; so context must have been crucial. Individual words for melody are already established by the first century A.D., when we find that historians Diodorus Siculus and Plutarch have used *eumeleia* and *elegos* for *melody* specifically.

Melody is perceived by the listener as moving horizontally, carried along by the flow of time succeeding other units of time. Harmony is vertical, either with chords composed of three or four notes sounding simultaneously, or with such notes moving in succession to produce chordal progressions.

Harmony is the combining of notes simultaneously to produce chords and chord progressions. Polyphony may also qualify as harmony, where the component parts are not tones but rather melodies. Such simultaneous but independent melodies, as in a canon or fugue, achieve a pleasing consonance in the whole piece or region; and even when there is dissonance, it is controlled and resolved. Different peoples in different ages have disagreed about which combinations of notes are acceptable, and so a wide range of what constitutes harmony is the case. Even dissonance has been acceptable. Harmony, in music at least, was a late arrival. The Greek noun *armonia* (plural: *armoniai*) was a joint, a suture, a framework, a covenant, or any means of joining and fastening. Pythagoreans established the ratios of fourth, fifth, and eighth as appropriate for intervals of notes, and melodies that observed these ratios were appropriately joined or harmonious. Heraclitus agreed: "What opposes unites, and the finest attunement stems from things bearing in opposite directions, and all things come about by strife." (DK B8) Harmony remained homophonic for centuries, the plainsong of the Church

accustoming generations to the two ways of ordering a scale, i.e. major mode and minor mode. As harmonized music developed, modal types diminished.

Within a melody, it may be possible for each note to have the same value or duration, but such a possibility would be so monotonous as to border on the inconceivable. What we do have in musical composition to help guarantee artistry is rhythm. Melody and rhythm are inextricably joined.

The Greek origin of the word *rhythm* is *to rheithron*, a noun that means “that which flows” or “river” or “stream.” Plato describes the word as “an order of movement,” while Encyclopedia Britannica is more expansive: “Rhythm is music’s pattern in time.”¹¹ Musicologist Grosvenor Cooper provides more details: “Rhythm may be defined as the way in which one or more unaccented beats are grouped in relation to an accented one.”¹² A composer has grouped separate sounds into structured patterns, and an audience can perceive that pattern. Not to be confused with beat, rhythm refers to the movement that can be heard in the pattern defined by beat. Rhythmic organization is free to incorporate different arrangements of accent, stress and grouping. Established by the composer or even the performer, rhythm organizes both the pitched sounds and the silences between the sounds, both of these being assigned a duration. Emphasis is important. Some sounds are accented and some are not; and accented notes may be strongly or weakly pulsed. There is nothing mechanical or habitual about rhythm; rather it is a deliberate organic planning and execution: sounds, silence, duration, emphasis. There is everything creative about rhythm, since one-and-the-same melody can be heard in many guises. A reader of Heraclitus has to wonder if his reflecting on this seeming paradox could have influenced his most famous dictum: *You cannot step twice into the same river*. He may have stepped into what was then the Cayster River in Ephesus many times, and yet, as he is implying, the actual water that he is touching is different each time. A melody has its identity and yet can have many appearances; the Greek origin of the word *rhythm* is suggestive of this irony.

¹¹ Retrieved from Encyclopedia Britannica: <https://www.britannica.com/art/rhythm-music>

¹² [The Rhythmic Structure of Music](#), page 6.

Writing of western civilization, Roger Scruton makes the broad point that “Our civilization is bound up with music as no other that the world has known.”¹³ In all manner of gatherings and circumstances, music may be present as one exceptional expression of human existence, thus holding a mirror to our understanding of this existence. Musical expression pervades the sacred and the secular, the popular and the classical, all nations and tribes. Even the very word music challenges us. The Oxford English Dictionary lists twenty-three English meanings for this word. It then presents over twelve thousands entries presenting musical subjects of all kinds, e.g. composers, performers, orchestras, individual works, terminology, et al.¹⁴ The Oxford Dictionary of Music presents 10,000 entries offering broad coverage of musical categories.¹⁵ Given the scope, diversity, changeability, complexity, and universality of music, we would be wise, and possibly more humane, if we take up the study of music as a grand challenge to enter this world where many other persons exist, a world of feeling that is nonetheless ordered and free.

¹³ The Aesthetics of Music, p.500.

¹⁴ <https://www.oed.com/dictionary/music>

¹⁵ <https://www.oxfordmusiconline.com>

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