

**MIMESIS OF NATURAL SOUND IN MUSIC**

SPECIAL AREA EXAM

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## Musical Mimesis

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*Mimesis* may be defined as the imitation of the real world, by recreating instances of human action and events or portraying objects found in nature, and as the showing of a story through dialogue and enactment of events. Some of the earliest definitions of this practice date back, perhaps unsurprisingly, to the great philosophers of Ancient Greece.

For example, in *Poetics*, Aristotle discusses mimesis as it relates to poetry, music, and dance stating:

“Epic poetry and Tragedy, Comedy also and Dithyrambic poetry, and the music of the flute and of the lyre in most of their forms, are all in their general conception modes of imitation... [F]or as there are persons who, by conscious art or mere habit, imitate and represent various objects through the medium of color and form, or again by the voice; so in the arts above mentioned, taken as a whole, the imitation is produced by rhythm, language, or 'harmony,' either singly or combined. Thus in the music of the flute and of the lyre, 'harmony' and rhythm alone are employed; also in other arts, such as that of the shepherd's pipe, which are essentially similar to these. In dancing, rhythm alone is used without 'harmony'; for even dancing imitates character, emotion, and action, by rhythmical movement.”<sup>1</sup>

As such, “musical mimesis” may be viewed as the sonic manifestations of mimetic practices, referring to both the artistic medium by which mimesis is practiced, as well as the musical qualities of what may be termed the “mimetic subject,” or that which is mimetically represented.

Mimetic practice may be further separated into several typical sub-categories,<sup>2</sup> based on variations in awareness and function. It should also be noted that these divisions may be observed in both human and non-human species, and often an analysis of the biological functions of mimesis reveal insights into various aspects of mimetic music, in particular those concerned with the natural world.

1. *Imitation* – a mimetic practice that is intentional and voluntary, and partly created by the individual.
2. *Mimicry* – a mimetic practice that is innate or instinctive, and itself escapes control of the individual entirely, often fulfilling the function of a “decoy” or “bluff.”
  - *Decoy* – a function of mimicry which poses something false, often as an offensive tactic, such as the Lemurid or snake which rasps the grasshopper as a hunter drawing out his prey.

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<sup>1</sup> “Part I, I-II.” *Aristotle: Poetics*, by Aristotle, and Gerald Frank Else. Ann Arbor: University of Michigan, 1967, Pg. 1.

<sup>2</sup> “Zoomusicology.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 152-3.

- *Bluff* – a function of mimicry that poses something false, which is defensive by contrast, and results from individual talent rather than innate automatism.

Ornithologist David Sibley interprets the behavior of tits who, disturbed the hollow of a tree where they are nesting, whistle with an open beak while balancing laterally, like a *Batesian mimicry*, or an intimidating disguise, simulating the sound and movement of snakes, which occupy the same frequency of 8-10 kHz.

The threatening drone of the humble bee *Bombus hortorum* is imitated by the necrophore *Necrophorus investigator*, which lies down on its back, making as if to sting. This *bluff* would be here a *Mullerian mimicry*, or intimidating uniform, the necrophore being already protected, it seems, by its repellent smell. In this case it is very likely pure mimicry without imitation, though mimicry and imitation can coexist, complicating the interpretation of facts.

3. *Psittacism* – mechanical imitations, like those of certain species in which parents imitate their offspring, or the female its mate, in order to attract their attention.

These are signals of communication and apparently nothing else; they are related more to the chatter of some parrots (from which the term is etymologically derived) who possess the ability to speak human words without any knowledge of their meaning, than to creative practice, according to the criteria of behavior.

An analogous musical behavior would be the singing of nursery rhymes, in which children repeat set of vocal sounds, often completely unaware of their significance. A popular example of this is the song and game, *Ring Around the Rosie*, in which a group of children, while singing, form a ring, dance around in a circle, and stoop, fall or curtsy at the final line, “We all fall down!” – in this case, commonly understood to refer to the Black Plague. In some cases, this psittacism may even lead to alteration of the material itself, which of can further remove it from understanding, as in the rote learning the alphabet, where “L, M, N, O, P,” often becomes “e-le-me-no-pee.”

Given these distinctions of mimetic practice, imitation rather than mimicry or mere psittacism seems the most relevant in the discussion of musical mimesis, as a practice that is both intentional and voluntary, and partly created by the individual. That is to say, regardless of motivational origin, musical mimesis requires a conscious self-awareness of the practice, and creative input in the processes of interpretation and retransmission.

On the subject of motivational origin, it seems that the practice of imitation leads to two logical paths, or in the case of music, two different conceptual approaches related to the distinction between “absolute” or “non-mimetic” music, and “programmatic” or mimetic music, the first terms designating a semiotic system apparently autonomous and deprived of all reference, and the second a practice which acknowledges or re-vindicates its links with other phenomena:<sup>3</sup>

- *Play* – mimesis focused on the stylization of mimetic subject(s).

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<sup>3</sup> “The Universality of Sound Models.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 39-40, 46.

Often these take the form of games of imitation, one famous example being the Balinese *ketjak*, both a stylized imitation of monkey cries and a musical orchestration of these imitations.

- *Ritual* – mimesis which, rather than being oriented towards gratuitous game play, is keen to attain effectiveness by ‘sympathetic magic.’

Often these take the form of propitious rites, stemming from imitations realized by the calls of hunters. For example, the *Ngbakan* singer in Central Africa imitates the rain by onomatopoeia in order to invoke it.

The function of play-based mimesis is musical as it focuses on the stylization of a mechanical element, whereas ritual-based mimesis is more goal oriented in the sense that it seeks a particular relationship with the object of mimicry. However, mimetic practice may shift from one approach to the next as a propitiatory rite becomes elaborated linguistically over time and attains an aesthetic function or goal rather than that of phenomenal interaction.

This pattern may be observed in a variety of cultural instances, such as the metamorphosis of the *Suqa-Ikazuchi*, a traditional Japanese percussion work, which began as a propitiatory rain ceremony imitating a violent storm and later became adapted as a march for military use, today being a stylized concert piece of greater variety and virtuosity, by virtue of its secularization. The elaboration of the mimetic game and the secularism of the propitious rite converge to form the phenomenon of mimetic music.

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Mimesis writ large may be distinguished from mimesis of the natural world by the medium or perceptive sense by which a mimetic practice occurs or seeks to represent; that is to say, mimesis writ large may take form in any type of media, be it visual, sonic, or otherwise, may derive from any of the five senses, and may represent an infinite variety of mimetic subjects, whereas mimesis of the “natural world,” which may be broadly defined as those aspects of nature which are not made or caused by the human species,<sup>4</sup> focuses exclusively on nature as a mimetic subject.

As the subject of this research is the musical mimesis of natural sounds specifically, we will limit the scope of our discussion primarily to mimetic music that both focuses on the natural world and is concerned with the aural sense. This therefore necessitates the exclusion the following of forms of musical mimesis:

1. *Non-natural mimesis* – a form of mimesis writ large, in which imitation concerns aspects of nature made or caused by the human species, such as in Steve Reich’s *Different Trains* (1988) which imitates the mechanical sound of human-made machinery.
2. *Non-aural mimesis* – a form of mimesis of the natural world, in which imitation concerns another perceptive sense, such as the musical representations of star charts in John

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<sup>4</sup> A full discussion on the sonic components of the natural world which addresses the role of humanity in the global *natural soundscape* may be found in *Natural Sound and Musical Mimesis*.

Cage's *Atlas Eclipticalis* (1961) or the evocation of fire in *Magic Fire Music* from Richard Wagner's *Die Walküre* (1870), as sonic interpretations deriving from the sense of vision.

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“Must we suppose that man carries within him a language of forms which transcends civilizations, just as he carries within him the seeds of nightmares common to everyone? [...] Forms that we would call archetypal if this were not too ambiguous a description. Let us call them primordial forms. They derive, like a fear of the octopus, from a quasi-biological domain much deeper than collective forces: they are of the nature of destiny.” – André Malraux, *La métamorphose des dieux, tome 3: L'Intemporal (The Metamorphosis of the Gods, Volume 3: The Timeless)*, 1976

Malraux proposes that at the primal level, man is motivated by ‘primordial forms’, or underlying factors of biological origin, which transcend those socially contrived in civilization. From a Darwinian perspective, we can therefore theorize that as human biology has adaptively evolved to suit its environmental surroundings, our actions are all in some part related back to a primal relationship to our natural world. In this sense, artwork may be viewed as a manifestation of man's relationship to his environment. Though this is intentionally and explicitly done in many cases, such as in musical mimesis of the natural world, this argument would suggest that even the act of musical creation itself is derived from a biological underpinning.

That this primal relationship to the natural world would manifest itself musically is not only unsurprising, it may be as Malraux claims, ‘the nature of destiny,’ considering the sublime, intricate tapestry of natural sound that has flourished on our planet for millennia – a vast soundscape of mammals, birds, amphibians, reptiles, insects, fish, crustaceans, plants, fungi, wind, water, thunder, volcanic fire, glacial ice, and so on, singing on in infinite song.

As renowned sound ecologist, field recording artist, and musician Bernie Krause puts it:

“This is the tuning of the great animal orchestra, a revelation of the acoustic harmony of the wild, the planet's deeply connected expression of natural sounds and rhythm. It is the baseline for what we hear in today's remaining wild places, and it is likely that the origins of every piece of music we enjoy and word we speak come, at some point, from this collective voice. At one time there was no other acoustic inspiration.” – Bernie Krause, *The Great Animal Orchestra*, 2012; *Echoes of the Past*

Krause's musical diction in describing natural sound is not the result of reductive platitude or natural idealization. In fact, there are many observable scientific truths to substantiate this perspective and show why we are not only drawn to nature for its musical qualities as they relate to our own practices, but that the technical foundations of those practices are likely abstracted forms originating from a natural source.

The most abundant and salient examples of this musical similarity may be observed in birds – a favorite subject of musical mimesis throughout history. Indeed, of about 18,000 species of bird, 4000 to 5000 are songbirds.<sup>5</sup> Of these, 200 or 300 are of special interest to the

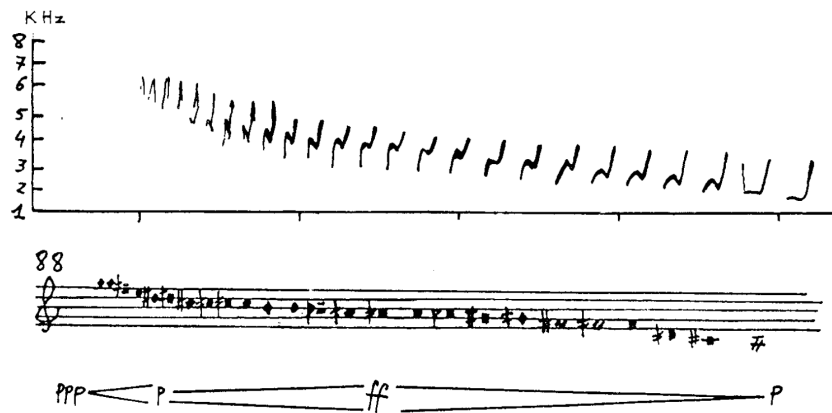
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<sup>5</sup> *How Many Kinds of Birds Are There and Why Does It Matter?*, by Barrowclough GF, Cracraft J, Klicka J, Zink RM. PLoS ONE 11(11): e0166307. <https://doi.org/10.1371/journal.pone.0166307>

musician through the variety of their signals,<sup>6</sup> many of which bear direct parallels to the following standard modes of musical organization:

1. *Scale* – linear structures, as in the traditional musical scale, which organize the parameters of duration, timbral quality, and pitch, etc.

A sonographic representation of the canon wren *Catherpes mexicanus*, which uses these three gradations simultaneously may be observed here:<sup>7</sup>



Mâche – Canon wren, *Catherpes mexicanus*

Furthermore, specific instantiations of codified musical scales may be observed with stunning similarity of several species, such as in the descending chromatic scales of the wood lark and the calandra lark *Lulla arborea* and *Melancorypha calandra*.<sup>8</sup>

2. *Development* – processes by which initial material is transformed and restated in the communication of an idea over time.

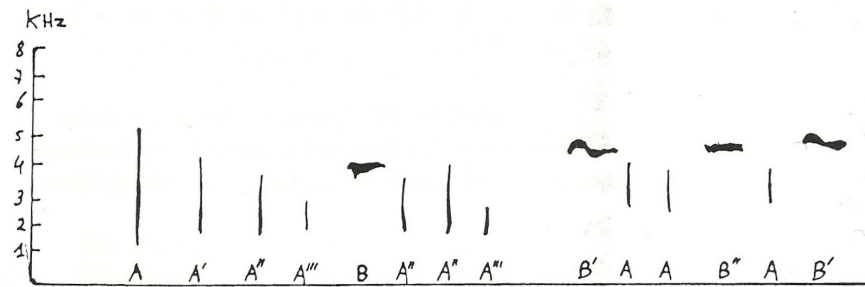
A spectral analysis of the sedge warbler, taken from J.-C. Roché's *The Bird as Musician No. 6*, reveals the syntactical procedure of elimination, which may be likened to recapitulation via essential reduction as may be heard in Beethoven.

<sup>6</sup> "Zoomusicology." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 96.

<sup>7</sup> "Zoomusicology." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 96.

<sup>8</sup> "Zoomusicology." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 135.

In this example, the warbler introduces a fully formed strophe and gradually reduces it to the individual units of which were originally multiple:<sup>9</sup>



Roché – Sedge warbler

As in the case of scale, there are clear musical counterparts to be found, such as in the imitative song of the Tretzel blackbird, which transposes learned melodies at a perfect fifth higher, ornamenting them with an appoggiatura before the first note and an ascending glissando on the second – perhaps a hint at fugal writing.

3. *Form* – organization concerning the scale of time, beyond the perceptive threshold of figuration or phrase.

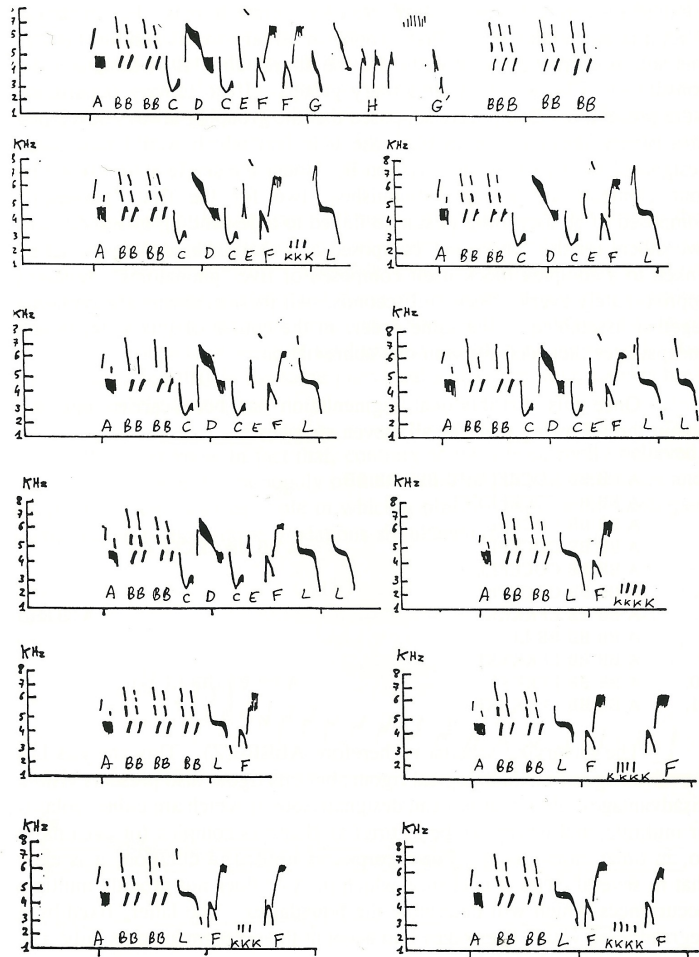
Certainly, we must admit that our perception of time varies from that of birds, and all animals. From a musical perspective, songs of such birds as the reed bunting *emberiza schoeniclus* are incredibly complex, but typically occur over a very compressed duration of time.

A spectral analysis of the aforementioned song, consisting of eleven strophes, may be viewed here:<sup>10</sup>

<sup>9</sup> “Zoomusicology.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 135.

<sup>10</sup> “Zoomusicology.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 100.





Mâche – Reed bunting, *Emberiza schoeniclus*

In our perception of time, this appears somewhere in the liminal space between melody and texture – being too compressed to be perceived as form. However, if we are to regard birdsong within the musical domain of *tempo*, as opposed to simply duration, we find that even among iterations, enough information is contained to develop larger formal schemes.

Birdsong seems so elusively musical to our ears because it appeals to us in two perceptive realms: on the one hand, its internal dimensions reflect elegant formal structures which we are unable to perceive without the aid of technology, and are only able to begin unraveling through repeated listens, which birds both kindly provide, while remaining ever elusive; their songs are constantly evolving within a subtly changing framework of reprised figures and fragments, while on the other being contained in what we may perceive as short bursts interspersed with silence, or strophes. Furthermore, these strophes are repeated in semi-regular utterances, which certainly appear to our ears to suggest form.

Finally, larger patterns such as the consistent tendency to vocalize during the dawn chorus and at sunset provide a further macro-dimension. The elasticity of perception is essential to grasping a full picture of the complex fractal structure in which birdsong can be understood, and in this sense certainly mirrors the level of detail available to composers through proportional use of local detail, large scale forms, or even a composer's *oeuvre*.

4. *Ensemble* – the group of individuals constituting a “musical” performance.

Over twenty percent of oscines are known to perform in duet – some one thousand or so species. Thanks to the research of ornithologist F. Dowsett-Lemaire, we know that marsh warblers sing not only in duets, but trios, quartets, and even quintets between males of neighboring territories.<sup>11</sup>

These duets often contain sophisticated musical equivalents, such as the use *hocketing*, in which a pair of birds rapidly alternate complementary pitches to create a very precise figure. This is a particularly subtle, and ingenious measure which bears the effect of an acoustic illusion, designed to conceal the size of a vocalizing group by avoiding rhythmic overlap.

Though researchers often argue this is motivated by sexuality and mate attraction, this tactic may serve a more general defensive application – as in the bluff function of mimicry; that by rhythmic hocketing, a large group may appear much smaller than it is, and vice versa, a duo or even a single individual may project a much more formidable target, thereby warding off predation.

The sense of form and dialectic aesthetic of these duets emerge as a result of relational interaction between groups. For example, as duets often manifest as sound duels between two members of a species, two different species, or even two members of vastly different beings of the animal world (such as between birds and amphibians), the individual(s) in which the most enduring or inventive song occurs defeats the other to silence – a primal “*to quia*”<sup>12</sup> that recalls Hegelian dialectics.

5. *Social* – extra-musical aspects relating to group participation and musical experience.

Birds frequently engage in a practice called “social singing,” which may be outwardly compared to the human practices of chamber music, and even concert experience on the whole. Social singing may be defined by the following criteria:<sup>13</sup>

- *Ensemble* – involving at least one *ensemble*, or group of birds – this includes any number of individuals or groups, ranging from the duet to entire flocks.
- *Venue* – occurring at a generally neutral zone on the boundaries of several territories, typically in sunny and still weather. Some birds may travel more than 200 meters from their own territory to participate.
- *Duration* – lasting about five to ten minutes, as an isolated experience.
- *Conclusion* – concluding when then number of participants becomes insufficient, as singers (generally male) gradually leave to relieve females guarding the nest.

As of yet, zoologists have found no biological explanation for this social phenomenon. Therefore, we must assume that social singing serves no purpose other than aesthetic expression through sound – music.

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<sup>11</sup> “Zoomusicology.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 145, 147.

<sup>12</sup> As in the oratorical contest of the Middle Ages, when the victor put the loser “to quia,” when he failed to find the ultimate elusive reply.

<sup>13</sup> “Zoomusicology.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 147.

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The question of whether music derives from a biological predisposition towards musical syntax based on patterns in natural sound, or the recognition of similarities between our musical imagination and natural sound, is very much a question of the chicken and the egg – likely the answer is that music is the product of both; that it originates from a natural source and is enriched by its complexity.

Whatever the case may be, it is clear that human beings have recognized the aesthetic beauty and power of natural sound, and have sought to wield it through musical mimesis.

“After about half an hour, the wind began to funnel down from the high southern pass, gaining more force with each passing moment. A *Venturi effect*<sup>14</sup> caused the gusts passing upstream through the narrow gorge to compress into a vigorous breeze that swept past our crouched bodies, the combined temperature and windchill now making us decidedly uncomfortable. Then it happened. Sounds that seemed to come from a giant pipe organ suddenly engulfed us. The effect wasn’t a chord exactly, but rather a combination of tones, sighs, and midrange groans that played off each other, sometimes setting strange beats into resonance as they nearly matched on another in pitch. At the same time they created complex harmonic overtones, augmented by reverberations coming off the lake and the surrounding mountains. At those moments the tone clusters, becoming quite loud, grew strangely dissonant and overwhelmed every other sensation[...]

Before us stood a cluster of different-length reeds that had broken off by the force of the wind and weather over the course of seasons. As the air flowed past the reeds, those with open holes at the top were excited into oscillation, which created a great sound – a cross between a church organ and a colossal pan flute[...]

Seeing recognition in our faces, Angus then took a knife from the sheath at his belt and walked into the shallows, boots and all. He selected and cut a length of reed from the patch, bored some holes and a notch into it, and began to play. After performing a short melody – one that we did manage to capture on tape despite the freezing temperatures – he turned to us and, in a slow measured voice, said: “Now you know here we got our music. And that’s where you got yours too.” –Bernie Krause, *The Great Animal Orchestra*, 2012; *Voices from the Land*

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At the heart of mimetic effect is the concept of “*myth*,” which must be understood in a temporal sense as the presentation of an image, which imposes itself more as a hallucination than as a meaning<sup>15</sup>. While the evocation of myth involves the telling of a story, this may be viewed as a secondary aspect necessary to the conveyance of mythic image, as meaning only arises in the first translation through the extraction of symbolic value.

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<sup>14</sup>The *Venturi effect* is the reduction in fluid pressure that results when a fluid flows through a constricted section (or choke) of a pipe. The Venturi effect is named after Giovanni Battista Venturi (1746–1822), an Italian physicist.

<sup>15</sup> “Music in Myth.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 9.

We may look to the mythology of Ancient Greece for an understanding of the aesthetic which produces such an effect, observing that often in the recounting of a story, a myth will seek to neither manage its own effects nor link them to causes. In the myth of Arion,<sup>16</sup> the appearance of Apollo contradicts all temporal linearity, causing the events to exist in a sort of “dream time.”

As such, myth may be considered a complex internal image or psychic vision, conjured by means of a non-temporal linearity, or as a story operating in a kind of “dream time” – an effect which may be likened to our musical practice, which necessitates the use of time to inspire and articulate what are often primal or timeless senses of the human experience, such as emotion or spiritual yearning.

In musical mimesis, myth manifests itself as the image of a mimetic subject imposed on the mind, which expresses a type of “*synonymy*,” or immobilization of the psychic area where the self and the non-self are still confused.<sup>17</sup> Suspended in the ecstasy of this eternal present, mythic images are drawn to the psyche through the doors of perception, during which the distinction between the dreamed and the perceived blurred.

In imitation of animal sounds, the primitive hunter seeks not only to pressurize his prey by appropriating its “spirit,” but also to become certain of possessing it by allowing himself to be possessed by its voice – in propitious ritual, the hunter humbles himself before his prey.

In the case of primal imitation, the success of the chase confirms the efficacy of this practice, but it is not the basis for it. That is to say, the just as in the case of myth, the deepest desire of musical mimesis may be considered the ability of spiritual transformation into a mimetic subject via the synonymy presented in mythical presentation.

The idea of myth helps to further define the essential qualities of mimetic effect – for without the evocation of myth, or the musical replication of a mimetic subject, mimesis cannot occur. That is to say, the source of the data is only mimetically relevant if it serves a *mythic* function, and music does not necessarily qualify as mimesis from its origins alone.

For this reason, we can disqualify certain forms of music, which despite being derived from mimetic data or inspiration, do not function mythically:

1. *Non-mythic, literal representation* – music involving the interpretation and/or representation of subjective data (or characteristics relating to a potential mimetic subject), which is not represented as a form of audible imitation.

A perfect example of this type of non-mythic representative music is Schumann’s *Carnaval*, Op. 9 (1834-35), subtitled *Scènes mignonnes sur quatre notes*, which is based on a symbolic motive, or “cipher,” referring to the town of Asch, the birthplace of Ernestine von Fricken. One form of this cipher, A–Eb–C–B (a–es–c–h in German notation), dominates the first half of the cycle, and another form, Ab–C–B (as–c–h in German), dominates the second.<sup>18</sup>

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<sup>16</sup> In reference to the Ancient Greek myth of Arion, a musician who eluded execution from pirates by escaping on the backs of dolphins (the friends of Apollo), who were drawn to him by the funeral dirge he sang on the prow of the ship before casting himself into the sea.

<sup>17</sup> “The Universality of Sound Models.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 33.

<sup>18</sup> “Poetic Music.” *Nineteenth-Century Music*, by Carl Dahlhaus. pg. 145.

In this example, it is important to note that Schumann chooses to appropriate a literal aspect which is not fundamentally parallel to the musical dimension in which he applies it – this explains the inaudibility of the source, which perhaps reveals a design that seeks to remain in the abstract realm, while at the same time recognizing a certain expressive or affective “power” of that source. In this sense, Schumann’s appropriation may be seen as a divining of perceived inherent value concealed in a communicable realm, uniquely positioned to convey affect.

From a certain perspective, the would-be mimetic subject is arbitrary as it does not seek to imitate, but rather serves as an inspirational pathway for the composer, which may or may not be conveyed to the listener. Furthermore, the characteristic aspect of which Schumann seeks to exploit is not fundamentally based in sound, but rather in a more laterally or tangentially related detail. The literal dimension is transcribed and reduced to an abstract dimension, rather than the abstract dimension being shaped towards a reflection of the source.

2. *Non-mythic, Non-literal representation* – music involving the interpretation and/or representation of subjective data, which does not imitate both the sonic identity, or “stereotype,” and the behavioral attributes of a subject.

A further example of this type of non-mythic use of subjective data, relating specifically to the natural world, might be the sonification of numerical data showing the magnitude and frequency of earthquakes. This may be mimetic only if the material mapped onto it resembles the sonic characteristics of subject itself – otherwise it does not recall the subject and does not function mythically.

It is important to note that this criticism lies in the pairing of behavioral attributes with a sonic stereotype, not with the technique of sonification itself – one may easily imagine a scenario in which the field recordings of violently shifting earth were mapped onto that same data, which would certainly serve a mythical function and thus qualify as a type of mimesis.

Furthermore, the singular utilization of sonic stereotype does not guarantee mythic effect. This practice may be viewed as a type of superficial invocation, which while possibly succeeding to reference an extra-musical entity will not achieve a mythic quality due to a lack of behavioral context.

Finally, if one were to map recordings of birds onto that same data, it would not qualify as musical mimesis of earthquakes, or a dawn chorus for that matter; it is necessary to represent both the behavioral attributes and the sonic stereotype of that which you seek to evoke, otherwise a mythic quality is not fully achieved. The pairing of behavioral and sonic elements is in direct reference to mythic on non-linear temporality, and the necessity of story to bring to life a mimetic subject.

3. *Abstract response* – in which no imitation occurs, and the composer instead offers purely abstract responses to natural phenomena.

Often these abstract responses are derived from symbolic cultural models rather than bearing direct, transliterate relationships to the patterns of natural phenomena, such as the general association of the emotion happiness with Major tonalities during the common practice period, and the use of this symbolic model to convey feelings of joy or contentment inspired by a natural subject.

A perfect example of this may be found in the first movement to Beethoven's *Symphony No. 6 in F major*, Op. 68; I. *Erwachen heiterer Empfindungen bei der Ankunft auf dem Lande* [Awakening of cheerful feelings on arrival in the countryside], which remains wholly in the key of F Major, until the first and only inflection of the minor mode occurs in measure 257<sup>19</sup>. As the movement's title explicitly states, this tonal aesthetic is designed to express feelings of cheer in direct response to a natural subject. This is certainly an exceptional case, considering both the duration of the movement<sup>20</sup> and the use of sonata form. This may be contrasted with the final measures of the second movement, II. *Szene am Bach*, which very clearly shows musical *mimesis* of the birdsongs of the nightingale, quail, and cuckoo, amid a setting of flowing water.



Ludwig Van Beethoven, *Symphony No. 6 in F Major*, Op. 68;  
II. *Szene am Bach* [Scene by the brook]

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It seems that in the discussion of the mimetic and non-mimetic, rather rushing to a debate on the supremacy of value, we must first consider that each may provide a distinct type of experience or influence, touching on different aspects of aesthetic appreciation, while at the same time relying on similar modes of expression. The value of mimetic practice, versus the pure expressionism of the abstract, is certainly up for debate – and indeed, has been debated in circles since the advent of both practices. Yet it is in the understanding of the essential effects of each approach that we may learn how they are able to coexist in ways that enrich the other.

To begin, in *Phantasien über die Kunst* (1799), German poet, writer, translator, and critic Ludwig Tieck praised music as the “supreme poetic language,” which “strikes out on its own path in disregard of the text and underlying verse, composing and explicating its own poetry.” From this perspective, through purely abstract music, art may liberate itself of mythic responsibility and reach into realms not limited by our understanding of the outer world.

However, as our grasp of the outer world is certainly limited, engagement with the mimetic allows an active engagement with an infinite source of subjective inspiration – one which is universally experienced and explored by our collective consciousness, and therefore

<sup>19</sup> *Sonata Form in Beethoven's Sixth Symphony*, by Michele Kishlansky. CUNY Academic Works, 2014, Pg. 23.  
[http://academicworks.cuny.edu/cc\\_etds\\_theses/330](http://academicworks.cuny.edu/cc_etds_theses/330).

<sup>20</sup> A typical performance lasting approximately 10-13 minutes.

may be discussed internally once a lexicon of sound models is developed and absorbed into common practice.

We may consider abstract instrumentalism as fundamentally separate from mimetic representation, that is, until the void created by a lack of programmatic material invites the notion of “poetry in music,” which often appeared in the music of Beethoven, who as Schindler points out, “frequently used” the expression “poetic idea,” and mentions the “underlying idea.”<sup>21</sup>

The paradox suggested in the development of poetic self-awareness resulting from the liberation of mimetic responsibility may be viewed as a consequence of the perpetual metamorphosis to-and-fro between ritual-based mimesis and play-based mimesis; in this sense abstract instrumentalism is the natural end to the ornamentation of play, originating from propitious rite. The argument that abstract music exists without reference to the natural world is primarily based in ignorance of this transformation; while the abstract may be held as an ideal, one must acknowledge its primitive roots in order to fully engage with its potentiality.

In these terms, we might consider the “poetic” to reference the idea of artistic mediation. That is to say, mediation provides a pathway to the human experience of aesthetic engagement, understanding, and appreciation. If we are to separate the abstract from the mimetic, the poetic provides an abstract perspective on the mimetic subject, which allows for deeper meditation on the subject beyond simple recognition.

As such, non-mimetic music may be intended for use independent of mimetic music, or created either for and by contrast. We may observe an example of this coexistence in the introduction of Gustav Mahler’s *Symphony No. 1 in D Major, I. Langsam, schleppend – Immer sehr gemächlich* (1887-1888), when a wistful horn tune, “*neir weisch gesungen*” (softly sung) confronts the ethereal music preceding, which Mahler specifies should be played “*Wie ein naturlaut*,” or “like a natural sound.”



Gustav Mahler – *Symphony No. 1 in D Major, I. Langsam, schleppend – Immer sehr gemächlich* (1887-1888) – four measures before figure 2

As Dahlhaus points out in an analysis of this moment, “the ‘song’ acquires the character of the natural phenomenon because Mahler creates a context which allows it to appear in that light.”<sup>22</sup> Musical kitsch may be dismissed as such, since the relationship between mimetic representation and abstract form, though folk-like in character, is clear. In other words, the lineage from propitious meaning or understanding allows abstract forms to tap into a primitive power, therefore deriving from a profound *synonymy*.

<sup>21</sup> “Poetic Music.” *Nineteenth-Century Music*, by Carl Dahlhaus. pg. 144.

<sup>22</sup> “The natural world and ‘folklike tune.’” *Realism in Nineteenth-Century Music*, by Carl Dahlhaus. Cambridge University Press, pg. 107.

Furthermore, “it is precisely by the act of forcing heterogeneous material to coexist, without glossing over the inconsistencies, that Mahler creates a panorama which truly fulfills the claim he made for the symphony: it stands as a metaphor in sound for a world which contains within itself high and low, the sophistication of fine art and artless vulgarity, which complete impartiality and with a sense of reality which is rooted in a sense of justice.”

The sense of universalism that this act implies recalls the metaphysical embrace of total-reality that while musically may be related to the aesthetic philosophy of Wagner’s *gesamtkunstwerk*, is perhaps more spiritually akin to the transcendentalist poetry of Walt Whitman or Schopenhauer’s philosophy on will.

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## Natural Sound and Musical Mimesis

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Over the centuries, perhaps as a social manifestation of the metamorphosis between ritual and play, civilization has evolved as part of its metaphysical discourse various perspectives on the relationship between nature and culture, often regarding contact with nature as an inadmissible past – except when, as a diversion, society permits itself to be moved by idealizing it.<sup>1</sup>

The historical differences in this relationship may be viewed symptomatic of developmental progress, or civilization's then relevant relationship to nature. From the perspective of emergent civilization, which by comparison to our modern standard of living does not normalize separation from the natural world, a direct alignment with nature is seen as a status to strive against for the sake of cultural growth. A disdain for the natural world is in this sense thus normal within a society that finds itself limited by its environment.

This may particularly noted in the case of the feast of Trimalcion in Petronius' *Satyricon*, which uses economic class as its prime means for determining the pinnacle of societal development away from nature – the guests indulge in imitation of animal sounds because they, as the cultural elite, regard themselves as superior to the natural world from which they purport to transcend.

The satire of such a perspective reveals a modern, or in the case of *Satyricon*, enlightened vantage point, which may be summarized, as it is by comedian George Carlin, as such:

“We’re barely out of the jungle folks. What we are, is semi-civilized beasts, with baseball caps and automatic weapons.”<sup>2</sup>

Of course, our relationship to the natural world has changed significantly from the first century A.D. As society moves towards increased industrialization, separation from the natural world becomes its own type of trap analogous to the inescapability of primitive societies from the elements. Idealization of the natural world may therefore arise as a form of non-ironic expression if the modern world becomes ill suited to our survival.

Often, this expresses itself as the identification of the natural world with the divine. For example, elders in the Native American Wy-am tribe<sup>3</sup> of the Columbia River in Northwestern Oregon tell of a period spanning thousands of when they fished all year long at Celilo Falls, just west of the Columbia River's midway point. So central were the falls to the tribe that the Celilo was considered a sacred voice through which divine messages were conveyed.”<sup>4</sup>

Certainly, Olivier Messiaen's countless hours in the field from the 1950's until the end of his life, during which he amassed some 200 manuscript notebooks filled with

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<sup>1</sup> “The Universality of Sound Models.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 50.

<sup>2</sup> *Life is Worth Losing*, by George Carlin. HBO, 2006.

<sup>3</sup> Wy-am means “echo of falling water.”

<sup>4</sup> “Voices from the Land.” *The Great Animal Orchestra*, by Bernie Krause. New York, Little, Brown and Company, 2012.

transcribed birdsong interspersed with musical sketches,<sup>5</sup> indicate a perception of nature as a spiritual expression of divine presence.

As a musical expression of this view, we may take the second movement of Béla Bartók's *Piano Concerto No. 3*. Marked *Adagio religioso*, this music may be seen as an summoning of the divine through the musical mimesis of natural sounds – in particular we may note the sonic stereotypes of both bird and insect calls, distinguished from one another by essential differences in instrumentation, playing technique, rhythm, dynamics, etc., which are reinforced through self-reference and developmental variation. Analyzed in these terms, it is clear that the winds and piano imitate birdsong, while the strings represent the singing of insects.

34 58

poco più mosso

Ob. I

Clar. I in A

Tbn. I in C

Pf.

Viol. I

Viol. II

Ve.

con sord.

pp

p

pp

p

Béla Bartók – *Piano Concerto No. 3; Adagio Religioso*

However, as periods of idealization<sup>6</sup> are generally ephemeral, it appears that reverence of nature has been regarded as a permissible only within a larger norm of general scorn. In a broad sense of musical history, the Romantic Period – which featured many such examples of musical mimesis of the natural world – may represent one of these periods. As the end of the romanticism in music was accompanied by the industrial revolution, this unique era occupies a complex place in the context of this argument as a historically unprecedented interpolation representing a new paradigm of cultural extremism. In this sense, historical context overshadows or disturbs what may be seen as a cyclic trend moving

<sup>5</sup> Program Note: National Symphony Orchestra: Oliver Knussen, Conductor / Peter Serkin, Piano, Plays Messiaen & Benjamin, by Thomas May, 2011. [http://www.kennedycenter.org/calendar/?fuseaction=composition&composition\\_id=4864](http://www.kennedycenter.org/calendar/?fuseaction=composition&composition_id=4864).

<sup>6</sup> Such as the in the *Idylls* of Theocritus under the Alexandrinians, or the *Pastorales* and *Solitudes* from Spanish Baroque lyric poet Luis de Góngora.

between disdain and idealization, through what was, up until that period in time, a comparatively slower pace of in civilized growth.

In our modern era, the marginalization of the natural world may be observed to have two effects in the context of this argument. First, it may be assumed that with growing urbanization, risks of over-population, and the dangers of climate change, we would expect to see an increased idealization of the natural world. While certain pieces may be observed within the contemporary repertoire, musical society remains on the whole obsessed with technology, either as a hero or as a villain; yet not necessarily in relation to the natural world. This can perhaps be explained as another byproduct of urbanization; that is to say, the normal push and pull between disdain and idealization of our primitive past is disrupted when the natural world, which reminds us of our primal origin is removed as a factor of our everyday lives. Without this impetus, we lose the ability to react – and perhaps, unless afforded the opportunity by rare chance, this primitive past becomes inaccessible.

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“The word 'natural' is completely meaningless! *Everything* is natural! Nature includes everything! It's not just trees and flowers and the Northern Spotted Owl; it's everything in the universe. Untreated sewage, polyester, toxic chemical waste, used bandages, monkey shit; it's all perfectly natural... it's just not real good food.” – George Carlin, *When Will Jesus Bring the Pork Chops* (2004)

A true definition of the natural world, beyond the broad description provided earlier<sup>7</sup> must challenge the presupposition that the human species is in fact separate from nature according to these terms. Indeed, interaction with the divine through musical mimesis of the natural world may be viewed as an attempt to locate oneself within the natural context, as a type of spiritual transformation inherent in the *synonymous* effect of the propitious rite; that is to say, as the psychic area which concerns the sense of self is immobilized, one may step outside the bounds of “anthropocentric perspective” towards a more universal understanding.

This “universal perspective,” directly related to our discussion surrounding the aesthetic combination of mimetic and non-mimetic materials in Mahler’s first symphony, is essential to understanding humanity as a part of nature, rather than *apart* from nature. For within the purely anthropocentric realm, we must necessarily view man as separate. Universal consideration provides a lens that allows for the distinction between the innate and cultural qualities of human behavior, and therefore enables us to distinguish which aspects of human sound may be regarded as part of the natural world and which belong exclusively to civilization.

For example, the ability to distinguish between innate and cultural sounds explains why music written for children tends to be primarily focused on mythic qualities, as cultural understanding emerges later in life with more education and experience in society.

Camille Saint-Saëns’ *Carnaval des Animaux* [Carnival of Animals] (1886) is a perfect illustration of this point. As a musical piece intended for young audiences, Saint-Saëns’ approach is hedged on his ability to tap into a child’s innate understanding of animal sounds, while references to the human being are limited to the generally expressive or gestural. Any sense of culture is limited to the naïve as it may address the societal experience

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<sup>7</sup> “those aspects of nature which are not made or caused by the human species.”

assumed of youth, such as in the mimetic representation of pianists practicing in the eleventh movement, *Pianistes* [pianists], or that of comical character in the eighth, *Personnages à longues oreilles* [Characters with Long Ears]. References that occur at the level of the music itself assume a certain degree of fundamental musical experience, or else perhaps seek to educate the young audience through the introduction of musical themes from a repertoire of common knowledge,<sup>8</sup> as in the twelfth movement, *Fossiles* [Fossils].

Like Mahler, by presenting innate and cultural materials in common space, Saint-Saëns is able to draw comparisons between the two and imbue otherwise abstract music with a sense of mythic life, and vice versa. The decoupling of innate and cultural forms enables the direction of myth towards a particular audience.

Despite being oriented towards the innate rather than the cultural, it is significant to note that an audience of any cultural level may appreciate music of this type, as with cultural education we do not lose access to innate understanding. Rather, the universal perspective is nested within an anthropocentric focus, which after being awakened, may be summoned forth by the call of nature.

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While listening in the universal perspective, we may observe a taxonomy of musical mimesis as defined by the sonic components of the global “soundscape” – a term credited to composer, writer, and environmentalist R. Murray Schafer, referring to all of the sound that reaches our ears in a given moment.<sup>9</sup> These categories derive from the three essential forms of natural sound we may hear in wild habitats, inclusive of human sound:<sup>10</sup>

1. *Geophonic mimesis* – imitation of *geophony*, or non-biological natural sounds. Examples of geophony include the sounds of wind, thunder, water, and even the shifting of tectonic plates.

One particularly effective use of this form of natural mimesis may be found in Richard Strauss’ *Eine Alpensinfonie* (1915), in the movement *Am Wasserfall* [At the Waterfall], which imitates the sound of a waterfall with stunning realism.

As may be seen on the following page, Strauss’s depictive strategy is one of virtuosic complexity, using such novel effects as the combination scaled timbre in the woodwinds, with that of descending arpeggiated figures, played “*mit springen dem bogen*,” or “with a leaping bow,” by the strings. As an orchestral effect, this imposes the dazzling myth of rushing water, complete with leaping flecks and droplets.

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<sup>8</sup> *Ab! vous dirai-je, Maman* (better known in the English-speaking world as *Twinkle Twinkle, Little Star*), French nursery rhymes *Au clair de la lune* and *J’ai du bon tabac*, the popular anthem *Partant pour la Syrie*, the aria *Una voce poco fa* from Rossini’s *The Barber of Seville*, and a self-quotation from *Danse Macabre*.

<sup>9</sup> “Sound as My Mentor.” *The Great Animal Orchestra*, by Bernie Krause. New York, Little, Brown and Company, 2012.

<sup>10</sup> “The Organized Sound of Life Itself.” *The Great Animal Orchestra*, by Bernie Krause. New York, Little, Brown and Company, 2012.

Eine Alpensinfonie 43

Richard Strauss – *Eine Alpensinfonie* [An Alpine Symphony], Op. 64 (1915); *Am Wasserfall*

2. *Biophonic mimesis* – imitation of *biophony*, or sounds originating from non-human, non-biological sources. Examples of biophony include birdsong, the dulcet purr of the wolf spider,<sup>11</sup> or even the territorial chest beating of mountain gorillas.

<sup>11</sup> In which the spider creates a purring sound by striking surrounding leaves, causing them to vibrate.

Because of the sheer variety and musical quality that characterizes much biophonic sound – in particular, birdsong – biophonic mimesis is the most richly explored of the three types listed here.

As such, there are many examples, yet some that serve a clear demonstrative point are Carlo Farina's mimesis of cat vocalization in his *Capriccio Stravagante* (1627), which may be noted in particular for its stereotypical accuracy as compared to the highly stylized approach which typifies music of the Early Baroque era, Olivier Messiaen's colorful mimesis of an impressive eighteen "exotic" birds<sup>12</sup> in *Oiseaux Exotiques* (1956-57), and George Crumb's mimesis of insects in *Threnody I: Night of the Electric Insects* from his string quartet, *Black Angels: Thirteen Images from the Dark Land* (1971), which through numerically determined bursts of *sul ponticello* tremoli and the electrification of strings, evokes a wild swarm of insects.

I. DEPARTURE

1. Threnody I: Night of the Electric Insects [Tutti] 13 times 7 and 7 times 13

Vibrant, intense! ♩ = 60  
sempre sul pont. e glissando

Electric Violin I.  
Electric Violin II.  
Electric Viola  
Electric Cello

\*) Make a continuous glissando, without dwelling on given pitches. The tremolo should be extremely rapid.  
\*\*) The numbers under brackets indicate duration in seconds; and since quintuplet = 1 second, play 7 quintuplet groups in first bracket, 3 groups in second bracket, etc.

George Crumb – *Black Angels: Thirteen Images from the Dark Land* (1971);  
*Threnody I: Night of the Electric Insects*

3. *Anthrophonic mimesis* – imitation of *anthrophony*, or human-generated sound. Examples of anthrophony include mechanical noises, such as the sound of looming airplanes, vocalization, including linguistic and non-linguistic expressions (such as in human speech or laughter, respectively).

From an anthropocentric perspective, anthrophony may be considered deictic noise in relation to the natural world, competing or otherwise obscuring the perceptibility of natural sound. It should also be noted that this frequently extends beyond the perceptive realm, as animal behavior is often adapted to changes in acoustic environments, thus altering the biophony. For example, tree frogs will often

<sup>12</sup> Messiaen imitates the following species: Indian minah (*Acridotherestrictis*), lesser green leafbird (*Chloropsis aurifrons*), Baltimore oriole (*Icterus galbula*), cardinal (*Richmondia cardinalis*), prairie chicken (*Tympanuchus cupido*), mocking-bird (*Mimus polyglottus*), cat-bird (*Dumetella carolinensis*), bobolink (*Dolichonyx oryzivorus*), shama or white-rumped shama (*Kittacinclamalabarica*), white-crested laughing thrush, (*Garrulax leucolophus*), American robin (*Turdus migratorius*), olive-backed thrush (*Hylocichla ustulata*), hermit thrush (*Hylocichla guttata*), red-whiskered bulbul (*Pycnonotus jocosus*), wood-thrush (*Hylocichla mustelina*), red-billed mesia (*Leiothrix lutea*), indigo bunting (*Passerina cyanea*), scarlet tanager (*Piranga olivacea*)

stay their song in the presence of an acoustically perceived threat – such as the mechanical rush of a passing train or car.

In the few cases where anthrophony blends with natural sound, it likely derives from an innate source, such as Walt Whitman’s “barbaric yawp.” Cultural derivation usually implies a linguistic dimension, which by virtue of syntax must be considered from an anthropocentric perspective, and therefore belongs to the index of noise. Observation of linguistics from the universal perspective is incompatible as the removal of syntax renders the form functionless.

“Anthropomorphism,” being a form mimesis of concerning anthrophony, may be defined as the imitation of human *behavior*. Being a sub-category of mimesis, anthropomorphic writing is typically concerned with a more nuanced band of behavioral attributes, extending into the subtleties of civilized behavioral patterns, such as linguistics, social interactions, and other self-aware actions from the human anthropocentric perspective.

Therefore, to discuss the nuances of subjective behaviors is to enter into the interpretation of intent, which is therefore unnecessary in the recreation of something that is simply *human*, rather than *Jewish-American Comedian from New York City in the 1990’s*.

In conclusion, musical mimesis that subjectifies anthrophony as included in the natural world, must be viewed from the universal perspective and must derive from an innate source.

It must be admitted that in the repertoire, examples of this particular brand of anthrophony are few and far between, as linguistics are more often the subject of inquiry – this trend is perhaps explainable from the “general scorn” referred to in the case of *Satyricon*.<sup>13</sup> However, a few salient examples from composers who favor the primal may be found, such as in Salvatore Sciarrino’s *Morte Borromini*, which uses the innate sound of human breath to mythologize the perspective of Francesco Borromini, the architect of the *Baldacchino di San Pietro*, who fell upon his own sword.

The shroud of string harmonics that color this pulsing breath as it is passes through the alto flute, as well as the deep, penetrating low frequencies of the rolling bass drum, engage the body of the listener, allowing them to empathetically link these sounds to their own familiar corporeal experience and sink further into the first-person perspective. This effect is continuously reinforced and deepened through non-literal repetition over long spans of time.

The image shows a musical score for Salvatore Sciarrino's *Morte di Borromini* (1988). It consists of two staves: Fl. I (Flute I) and Gr. C. (Grand Cymbal). The Fl. I staff is in G major (one sharp) and 5/4 time. It contains a melodic line with various dynamics (mp, mf) and articulations (accusare, ispirare). The Gr. C. staff is in G major and 4/4 time, featuring a sustained harmonic background with a 'più p. poss. (sempre)' instruction.

Salvatore Sciarrino – *Morte di Borromini* (1988)

<sup>13</sup> “The Universality of Sound Models.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 50.



4. *Soundscape mimesis* – imitation of an entire soundscape, or an integral simultaneity of biophony, geophony, and anthrophony.

Simultaneous use, or lack thereof, reflects the degree of realism to which a composer aspires in creating a perceptive totality. The mimetic presentation of a soundscape must include the use of all three types of natural sound simultaneously, if it is to qualify – assuming all three are present in a given soundscape.

The use of multiple mimetic subjects consisting of the same type of natural source, as in the case of the *Adagio religioso* from Bartók's *Piano Concerto No. 3*,<sup>14</sup> does not qualify as mimesis of a soundscape by virtue of its multiplicity. Furthermore, non-linear sequential presentation of mimetic subjects in the manner of Modest Mussorgsky's *Pictures at an Exhibition* (1874), while representative of the full spectrum of natural sound, do not succeed at evoking the myth of the totality of an eternal present, in which all forms of natural sound exist in natural counterpoint.

Indeed, very few composers have sought this undertaking, outside the pure documentation of field recording. Of the small number of pieces that attempt the endeavor, it must be noted that, despite an otherwise overwhelming focus on biophony, soundscape mimesis is more often manifested in the realm of the geophonic – likely due to the fact that in extremes of geophonic behavior, such as in that of a thunderstorm, the geophony is so forceful that it masks any perceptible presence of biophony or anthrophony, and thus does not require their inclusion. Furthermore, the sheer complexity of biophonic counterpoint alone, such as in the dawn chorus of birds, is so sublimely complex that any attempt to replicate its internal mechanism likely ends in artistic mediation and a discussion of the divine.

The clearest musical examples of these may be found in the music of Beethoven and Strauss, in particular the *Gewitter, Sturm* [Thunder, Storm]<sup>15</sup> of the sixth symphony, and *Stille vor dem Sturm* [Calm before the Storm] – *Gewitter und Sturm. Abstieg* [Thunder and Tempest. Descent] of *Eine Alpensinfonie*, which both aim to recreate the geophonic soundscape characteristics of thunderstorms, inclusive of such mimetic subjects as thunder, lightning (translated from the visual sense), rain and perhaps more importantly, a sense of form which recognizes the inherent rhythm of natural sound – Beethoven even includes an implicit emergence of the sun after the passing of the storm. Strauss goes so far as to include biophonic sounds of birds in *Stille vor dem sturm*, which are noticeably absent in the *Gewitter und Sturm. Abstieg* itself (likely due to the aforementioned phenomenon of geophonic masking), and it should be noted that, as touched upon in earlier discussion of the *Szene am Bach* of Beethoven's sixth, both geophony and biophony are represented simultaneously in the form of flowing water and birdsong.

Furthermore, we may note that in addition to the form of soundscape mimesis shown in the *Gewitter, Sturm*, all three forms of natural sound are present in the piece – with the abstract emotional responses of the *Erwachen heiterer Empfindungen bei der Ankunft auf dem Lande* and *Lustiges Zusammensein der Landleute*<sup>16</sup> [Merry Gathering of Country folk] representing anthrophony, the *Szene am Bach* representing both geophony and biophony, the *Gewitter, Sturm* representing geophony as

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<sup>14</sup> For example, the example provided features the mimetic use only of separate forms of biophony.

<sup>15</sup> Fourth movement.

<sup>16</sup> First and third movements, respectively.



discussed, and the final movement, *Hirtengesang. Frohe und dankbare Gefühle nach dem Sturm* [Shepherd's Song. Cheerful and thankful Feelings after the Storm] serving as a profound statement on the unification nature and man, which pays respect to all its fundamental elements, including the music of humanity.

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## History of Mimesis of Natural Sound in Western Music

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From the cave paintings of Lascaux, which feature nearly 6,000 figures of animals, humans, and abstract signs,<sup>1</sup> to the musical mimesis of Romanticism, as discussed in the works of Beethoven, Mahler, and Strauss, and through to the artwork of our modern epoch, such as in the scientific realism of Messiaen's transcription of birdsong and the psycho-acoustic mimetic-labyrinths of Sciarrino, mimesis of the natural world has remained as eternally present as nature itself.

As shown earlier via Aristotle's definition of mimesis, we may find the some of the earliest examples of aesthetic discourse on the imitation of natural sound during the 4<sup>th</sup> century BC, in the writings of Classical Antiquity. Predating even Aristotle, the dialogues of Plato's *Ion* and the *The Republic*<sup>2</sup> discuss many of the concerns that remain definitive of our modern discourse, in particular those surrounding the virtues of natural world, the advent of modern technology, and the unification of mythic and perceived images. Later, the fifth book of *De rerum Natura* [On the nature of the universe], by the Roman poet Lucretius, discusses the theory proposed by Chamaeleon of Pontos that birdsong is the origin of all music.<sup>3</sup>

As classicism in music deals with a resurgence of the ideals of Greek and Roman Antiquity, such as "formal discipline" and "model of excellence,"<sup>4</sup> it is unsurprising that the concept of mimesis, which played a large role in the artistic philosophy of antiquity would become an important guiding principle and compositional device during the Classical Period in music, and therefore extend in some fashion through the mimetic music of the Romantic Period, and beyond. Stravinsky's own neoclassical period, characterized by such works as the *Octet* (1923), *Concerto for Piano and Winds* (1924), *Serenade for Winds* (1925), *Apollon musagète* (1928), *Symphony of Psalms* (1930), *Perséphone* (1933), *Orpheus* (1947), and *The Rake's Progress* (1951), represents yet another rebirth of the aesthetic ideals of antiquity.

As we have observed in the metamorphosis between ritual and play, primal idealism may shift towards ornamented culturalism over time. This metamorphosis is complete once stylistic ornamentation reaches a point of saturation that alienates the primal self, which in response, seeks to reassert itself.

Considering the apparent inevitability of this cycle, it is therefore logical that works such as *L'oiseau de feu* [The Firebird] (1910) and *Le sacre du printemps* (1913) [The Rite of Spring], as examples of both the cultural saturation of post-romanticism and a desire to reinvigorate the primal self, immediately precede Stravinsky's neoclassical period, which may be regarded as an expression of the formal discipline of antiquity, which seeks to harness the raw power awakened in the aptly named *Sacre*, or Rite. That Stravinsky's neoclassical period would be followed by a period of serialism is similarly logical, as the rational processes of that style indicate both further elevation towards the cultural ideal and alienation from the primal.

Similarly, the apparently short-lived developments of serialism, which may in fact be

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<sup>1</sup> *Immersion Into Noise*, by Joseph Nechvatal. Ann Arbor: Open Humanities Press, 2011, pg. 74–76.

<sup>2</sup> Books II, III, and X in particular are concerned with mimesis.

<sup>3</sup> "The Universality of Sound Models." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 47-48.

<sup>4</sup> "Classical." *The New Grove Dictionary of Music and Musicians*, by George Grove, and Stanley Sadie. London: Macmillan, 1992.

more broadly viewed as an extension of lingering cultural extremism derived from the initial fracture between the Baroque and Classical periods, gave rise to the primal ostinati of American Minimalism,<sup>5</sup> which was perhaps anticipated by Stravinsky in his earlier ballets, but later rejected or otherwise developed logically in rapid alignment with the already continuing line of Schoenberg. In this sense, Stravinsky may be likened to J.S. Bach, who was regarded as *passé* in the context of the emerging *galante* style of the 1720's.<sup>6</sup>

In the context of musical mimesis, we may observe that as the return to classical idealism is often accompanied by a return to the primal sensibility, mimesis of the natural world also becomes more prevalent surrounding periods of stylistic fracture – for as in the case of Stravinsky, once the primal self is stirred, it seeks to articulate the mythic images made available in renewed universal perception.

We may therefore view the reassertion of classical idealism in the Classical Period as a response to the dense ornamental style of the Baroque Period, and similarly, neoclassicism in the 20<sup>th</sup> Century as resulting from the breakdown of the tonal system. Between these two points of fracture lies a continuous stretch of stylistic development originating from a primal source.

In a brief survey of mimetic history, it becomes clear that the most abundant examples of natural imitation occur around this time, as exemplified in pieces such as those mentioned by Beethoven, Saint-Saëns, Mahler, and Strauss and others such as Wagner's *Forest Murmurs* from Act II of *Siegfried* (1872), Bedrich Smetana's *Má Vlast, Z českých luhů a hájů* [From Bohemian Woods and Fields] (1874-79), and Claude Debussy's *La Mer* (1903-5), indeed and correspond with the notion that musical mimesis of the natural world both expresses celebration at the enlightenment of universal perspective and a yearning for its return.

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It is clear that in the historical consideration of mimetic strategy, there are some stylistic, technical, and expressive features of musical mimesis that have remained constant throughout usage, and others which conversely, have evolved over time.

Invariance in musical mimesis is likely due to a timelessness borne of cultural irrelevance, therefore belonging to the realm of the innate. For example, the mimesis of birdsong has remained a constant in musical practice because birds remain a constant in our environment. As these works are fundamentally irrelevant to the anthropocentric perspective, they themselves take on a supremely universal relevance, determined by the cultural predispositions of the time, which as discussed is likely in direct correlation to the relevant zeitgeist, both as a consequence of the historical shift in aesthetic priority from ritual to play and the developmental status of civilization (which are certainly not mutually exclusive).

Indeed, there are certain species of birds that appear in a practically unbroken line throughout the history of mimetic practice, such as the cuckoo, which may be observed in

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<sup>5</sup> "The Universality of Sound Models." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 37.

<sup>6</sup> Bach was regarded as "passé even in his own lifetime." *Beethoven: the universal composer*, by Morris, Edmund. Harper Collins; 1st edition, 2005, pg. 2.

notably early use in the Medieval British canon *Sumer is icumen in* [Summer is come in] of the 13<sup>th</sup> century, and can be similarly found in Clemente Janequin's *Le chant des oyseaux* (1509), the ninth movement of Saint-Saens' *Carnaval des Animaux* (1886); *Le coucou au fond des bois* [The Cuckoo in the Depths of the Woods], and the second movement of Beethoven's sixth symphony, *Szene am Bach*.<sup>7</sup> Other such species include the nightingale, cat, donkey, frog, cockerel, hen, etc.<sup>8</sup>



*Sumer is icumen in*

There are further sound models that have remained invariant in mimetic practice over time. One of the most abundant is the figuration of the horse, which has been universally used in a variety of cultures in very much the same manner. It should be noted that it is nearly always the gallop that is the rhythmic model retained by the composer, thus serving as the mimetic subject, though three principal variants of gait are used, the simplest form being the alternation between 1/4 note and 1/8 note.<sup>9</sup>

Musical examples illustrating the historical use of this universal model may be observed as follows:

1. Claudio Monteverdi – Second book of *Madrigals*; *S'andassa Amor a caccia* [Hunting for Love] and *Combattimento di Tancredi e Clorinda* [Fight of Tancredi and Clorinda]<sup>10</sup> (1590)
2. Clemente Janequin – *Bataille de Marignan* (1690)
3. Claudio Monteverdi – Eighth Book of *Madrigals*; *Altri Canti di Mare* [Other songs of the Sea] (1638, or before)
4. Jean-Phillipe Rameau' – *Hippolyte et Aricie* (Act IV) (1733)
5. Hector Berlioz – *Symphonie Fantastique*; V. *Songe d'une nuit du sabbat* [Dream of a Sabbath Night] (1830)
6. Ludwig Van Beethoven – *Symphony No. 7 in A major*, Op. 92; *Poco sostenuto – vivace* (1811-12)
7. Richard Wagner – *Walkürenritt* [Ride of the Valkyries] from *Die Walküre* (1854)  
Robert Schumann – *Reiterstück*, Op. 68, No. 23 (1848)

<sup>7</sup> An excerpt of the score showing this usage may be found on pg. 12.

<sup>8</sup> "The Universality of Sound Models." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 49.

<sup>9</sup> "The Universality of Sound Models." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 43-44.

<sup>10</sup> Presenting a more agitated version of the same cell.

What determines this similarity of use among cultures are not associative properties derived from social construct, but rather faithfulness to the evocation of myth through accuracy. Just as the quodlibet, fricassee, coq à l'âne, or medley, is no different from what in antiquity was called a cento, and in the 20<sup>th</sup> century a collage.<sup>11</sup>

Exactness of mimicry brings forth new capacities for complexity in musical detail, which may transcend the stylistic musical trends of the time. For this reason, works that evolve a linguistic syntax by virtue of their mimetic subjects may be seen as technical expansions from a stylistic norm that may help distinguish those works within a given era in terms of future reception.

Notably, this may also be true of works that are abstract or non-mimetic but remain fundamentally aware of their link to a primal sense. The absolute music of Beethoven, as distinguished by the overtly programmatic, comes in mind for entering into this musical space – it retains primal urge and a relationship to the natural while continually allowing for its own expansion to and fro between the mythic and the abstract, both within the composers *oeuvre* and within individual pieces on a variety of perceptive levels.

As such, there are certain strategies that have emerged independent of style that we may view as most congenial to mimetic endeavors, defining congeniality as supporting the efficacy of myth. One such example is the doubling of sound motif, which echoes the musical practice of reprise<sup>12</sup> and may be viewed as essential in the process of creating a perceptively traceable sonic stereotype.

Conversely, we may consider the strategies of non-mimetic music and its lack of ability or desire to mythologize. As non-mimetic music does not need seek to accurately portray a sonic stereotype or adhere to an observable behavioral pattern through self-reference, many of its strategic tenets invert the principles of mimesis, and may therefore allow us insight into strategies that may be regarded as essential, or else contradictory to mimetic practice.

A perfect example of non-mimetic music that defines its effect through parametric opposition of mimetic principles can be found in Pierre Boulez's *Structures 1a* (1951), which features the use of total-serialism, controlling the parameters of pitch, duration, attack, and dynamics are serialized.

Boulez himself has stated about the work:

"I wanted to eradicate from my vocabulary absolutely every trace of the conventional, whether it concerned figures and phrases, or development and form; I then wanted gradually, element after element, to win back the various stages of the compositional process, in such a manner that a perfectly new synthesis might arise, a synthesis that would not be corrupted from the very outset by foreign bodies—stylistic reminiscences in particular."<sup>13</sup>

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<sup>11</sup> "The Universality of Sound Models." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 49.

<sup>12</sup> "Music in Myth." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 9.

<sup>13</sup> *Pierre Boulez: Conversations with Célestin Deliège*, by Pierre Boulez, and Célestin Deliège. London: Eulenburg, 1976, pg. 57.



Pierre Boulez – *Structures 1a*, Measure 36-38

In this excerpt above, you will note that the characteristics of motivic reinforcement found in mimetic music are either absent or directly contradicted. As the serial techniques used in this excerpt prevent its parameters from repeating in sequence, it is impossible for the material to be self-referential. By imposing this restriction on multiple parameters, Boulez is able to avoid any kind of repetition and self-reference that might have occurred unintentionally had he let the process play itself out with less control.

Paradoxically, in choosing to control as many parameters as possible, Boulez relinquishes a great degree of control over his intuitive inclinations. Despite this, *Structures 1a* is not entirely devoid of intuition, as he did in fact make decisions about how to control each of his parameters. Many of these decisions have to do with the extremes of each parameter. For example, each successive pitch is in a different register, and very often very far away from the pitch it is preceded by. In addition, the dynamic markings found range from *fff* to *quasi piano*, with not much else in between (*poco sforzando* and *quasi forte*). In this case, Boulez uses his intuitive decisions to exaggerate the effects of his serial techniques by choosing characteristics that avoid musical structures that give rise to mythic image.

Furthermore, the ideal of perpetual variation may be interpreted as the symbolic expression of adherence to the modern world of industrial development,<sup>14</sup> which while not as a form of mimesis may serve to support the claim that music is derived from nature – for in a world where civilization regards progress with a sort of manifest-destiny, it is likely that this obsession is absorbed into practice in place of the nature which it displaces.

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In musical mimesis, variance manifests itself in the development of mimetic strategy as it relates to the subject of realism – emergent technologies, as well as discoveries in compositional technique made possible by the advancement of musical style give rise to new

<sup>14</sup> “Music in Myth.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 9.

methods of playing, or new aesthetic approaches, and are able to address the degree of realism to which a composer may aspire, assuming a spectrum of possibility between near-scientific realism and a high degree of artistic mediation.

Historically, developments in compositional technique have allowed for the emergence of more natural systems of expression, as they are not reliant on culturally cooperative symbolic systems of musical association. The move away from tonality in particular disrupts a harmonic system that likely limited musical expression within the bounds of a highly developed cultural framework,<sup>15</sup> which affected the majority of composers of the common practice period.

Accepting this claim, we may view mimetic music of earlier musical periods as more reliant on cultural systems of association and therefore less literal or successful in a strictly stereotypical sense; that is to say, because the language is more crafted towards cultural models, universal associations are articulated only within that system, and as a result there are not often instances where a universal perspective is articulated in non-mediated language.

In his *Nineteenth-Century Music*, Dahlhaus discusses the importance of internal musical logic in poetic program music – the distinction being that “good” or “essential” poetic music must contain a certain type of internal aesthetic logic that is able to effectively communicate a programmatic image without the aid of supplemental literary material.<sup>16</sup> In a mimetic sense, this may be viewed as mythic “realism,” where internal logic is derived from the characteristics of the mimetic subject – the greater the degree of realism, the more effective, and indeed affective, in the conveyance of myth.

Furthermore, program music that relies on associative description rather than internal logic consistent with its purported subject uses language as a crutch to conceal a flawed or incomplete construction or conception. Such as in the case of Ralph Vaughan William’s *The Lark Ascending* (1914, 20), without true understanding or depth, a composer may retreat into a sort of pseudo-representation in which a subject is explored on the surface, or not at all, and slapped with a label which allows the audience to project onto it a desired interpretation rather than experiencing a truly mythic quality. This guise serves the purpose of providing a type of pseudo-logic, which takes the place of mediation; that is to say, a realistic musical representation is not shaped for affective experience, but rather a false correlation is drawn deceptively between abstract musical material and a programmatic image. In this regard, music of this sort fails on two fronts: first, it fails to convey the image which it claims to represent, and second, it cheaply contrives an evocation of myth through literary means, which only strikes at the surface of affect – if at all.

What then is the purpose of this music? Without an internal logic based in mediated realism, language itself is sufficient enough to evoke a type of two-dimensional image, though it fails to connect the affective quality of the music with that image. The most the music may provide is an atmosphere for the audience to contemplate the possible relationships between the abstract music and the literary image – if there are indeed are any beyond a simple recycling of associative cliché, which is possibly derived from truth in some distant way, or from a previous misguided attempt at representation.

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<sup>15</sup> Though naturally originating from Pythagorean models of tuning to rational values expressed in natural structures.

<sup>16</sup> “Program Music and the Art Work of Ideas.” *Nineteenth-Century Music*, by Carl Dahlhaus. University of California Press, 1989, pg. 362.

Furthermore, technological advances that allow for direct replication, such as the case in field recording and mimetic applications of sonification necessitate a reflection on the function of realism. This depends on the goals of the composer – from one perspective, realism may be viewed as a means of articulating myth, allowing for a deeper connection with the eternal present, yet from another, mediation may allow a more profound *synonymous* reverie on the mimetic subject, allowing for a reflection on the self that surpasses merely superficial recognition.

The paradox put forth in Ottorino Respighi's *Pini di Roma; I pini di Gianicolo* [The Pines of Janiculum] (1924), which features the first use of a field recording in music, is one that touches on the essence of mimesis itself. While previous composers may have viewed the goal of mimesis as the achievement of realism, their lack of technological access prevented them from truly literal representation. As such, artistic mediation provided a solution in which the achievement of *synonymy* may be viewed as a symptom of this practice, though it is in many regards the fundamental depth to which the practice of mimesis penetrates. In achieving the goal of true realism, we meet another kind of irony that is related to the paradox of *Pini di Roma*, in which technical development that allows for a more accurate representation of nature produces a desire to leave nature in favor of exploration of the tool.

The idea of the mediation as an essential function of *synonymy* is not incompatible with literal approaches; rather, it explains the aesthetic decisions put forth by composers such as Messiaen in pieces such as *Réveil des oiseaux* [Awakening of Birds] (1953), who opt for a mediated form of expression relative to a more literal form made accessible by technological developments, such as Respighi's earlier use of recorded birdsong. It is rather, the genius of the composer to notice a relationship between the sounds of the natural world and an expressive goal.<sup>17</sup>

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17 "The Universality of Sound Models." *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 48.



## Practical Summary: Analytic Techniques for Listening to Natural Sound and Mimetic Music

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The classic tri-partite division of semiologist Jean Molino<sup>1</sup> allows us to distinguish three levels in the analysis of mimetic practices as they relate to the qualities of natural sound, with particular regard to the interpretation of biophonic sound:

1. *Poietic* – referring to the developmental history (ontogenesis) and emission of signals; put more simply, the evolutionary history of a biological organism that has led to use of a particular vocalization(s) – animals develop vocalizations from biological necessity.
2. *Aesthetic* – refers to the reliability of sound signals to produce common responses (reactogenic values of signals).
3. *Neutral* – (sound sequences) may be viewed as a musical property, or characteristic detail that may be separated from either of the other levels.

Furthermore, Z. Harris's study of the syntax of animal signals, provides two simple principles inspired by structural linguistics:<sup>2</sup>

1. To define as a provisional corpus the studied recording, whatever its length, with the one condition that it has been made without interruption, and that it carries the traces of an individual singer.
2. To designate by the same abbreviation every sound or group of sounds, whatever its length, which appears at least twice in the corpus.

These are only perhaps provisional steps in the understanding of birdsong; as Bernie Krause points out, older methods of recording natural sound were largely “point and shoot” vignettes of individual members rather than an inclusive view of the species within its environment, revealing the reactionary context from which a song is devised and vocalized.

The poietic and reactogenic purposes which drive the development of birdsong therefore subscribe to this isolated analysis, as one dimensional pictures do not provide a complete understanding of behavior, only a syntactical understanding of sounds which may be combined poietically for a reactogenesis within a soundscape.

Furthermore, as a practical summary, we may list the terms defined in this research as measures by which a listener may approach the understanding of both mimetic music and natural sound, and judge them by their qualification as mimesis, degree of realism, and artistic value:

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<sup>1</sup> “Zoomusicology.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 97.

<sup>2</sup> “Zoomusicology.” *Music, Myth, and Nature: or, The Dolphins of Arion*, by François Bernard Mâche, Harwood Academic Publishers, 1992, pg. 97.

1. *Mimesis* may be defined as the imitation of the real world, by recreating instances of human action and events or portraying objects found in nature, and as the showing of a story through dialogue and enactment of events.
2. Musical mimesis may be viewed as the sonic manifestations of mimetic practices, referring to both the artistic medium by which mimesis is practiced, as well as the musical qualities of what may be termed the “mimetic subject,” or that which is mimetically represented.
3. *Imitation* – a mimetic practice that is intentional and voluntary, and partly created by the individual.
4. *Mimicry* – a mimetic practice that is innate or instinctive, and itself escapes control of the animal entirely, often fulfilling the function of a “decoy” or “bluff.”
  - *Decoy* – a function of mimicry which poses something false, often as an offensive tactic, such as the Lemurid or snake which rasps the grasshopper as a hunter drawing out his prey.
  - *Bluff* – a function of mimicry that poses something false, which is defensive by contrast, and results from individual talent rather than innate automatism.

Ornithologist David Sibley interprets the behavior of tits who, disturbed the hollow of a tree where they are nesting, whistle with an open beak while balancing laterally, like a *Batesian mimicry*, or an intimidating disguise, simulating the sound and movement of snakes, which occupy the same frequency of 8-10 kHz.

The threatening drone of the humble bee *Bombus hortorum* is imitated by the necrophore *Necrophorus investigator*, which lies down on its back, making as if to sting. This *bluff* would be here a *Mullerian mimicry*, or intimidating uniform, the necrophore being already protected, it seems, by its repellent smell. In this case it is very likely pure mimicry without imitation, though mimicry and imitation can coexist, complicating the interpretation of facts.

5. *Psittacism* – mechanical imitations, like those of certain species in which parents imitate their offspring, or the female its mate, in order to attract their attention.

These are signals of communication and apparently nothing else; they are related more to the chatter of some parrots (from which the term is etymologically derived) who possess the ability to speak human words without any knowledge of their meaning, than to creative practice, according to the criteria of behavior.

6. *Play* – mimesis focused on the stylization of mimetic subject(s).

Often these take the form of games of imitation, one famous example being the Balinese *ketjak*, both a stylized imitation of monkey cries and a musical orchestration of these imitations.

7. *Ritual* – mimesis which, rather than being oriented towards gratuitous game play, is keen to attain effectiveness by ‘sympathetic magic.’

Often these take the form of propitious rites, stemming from imitations realized by the calls of hunters. For example, the *Ngbakan* singer in Central Africa imitates the rain by onomatopoeia in order to invoke it.

8. *Non-natural mimesis* – a form of mimesis writ large, in which imitation concerns aspects of nature made or caused by the human species, such as in Steve Reich’s *Different Trains* (1988) which imitates the mechanical sound of human-made machinery.
9. *Non-aural mimesis* – a form of mimesis of the natural world, in which imitation concerns another perceptive sense, such as the musical representations of star charts in John Cage’s *Atlas Eclipticalis* (1961) or the evocation of fire in *Magic Fire Music* from Richard Wagner’s *Die Walküre* (1870), as sonic interpretations deriving from the sense of vision.
10. *Non-mythic, literal representation* – music involving the interpretation and/or representation of subjective data (or characteristics relating to a potential mimetic subject), which is not represented as a form of audible imitation.
11. *Non-mythic, Non-literal representation* – music involving the interpretation and/or representation of subjective data, which does not imitate both the sonic identity, or “stereotype,” and the behavioral attributes of a subject.
12. *Abstract response* – in which no imitation occurs, and the composer instead offers purely abstract responses to natural phenomena.
13. *Geophonic mimesis* – imitation of *geophony*, or non-biological natural sounds. Examples of geophony include the sounds of wind, thunder, water, and even the shifting of tectonic plates.
14. *Biophonic mimesis* – imitation of *biophony*, or sounds originating from non-human, non-biological sources. Examples of biophony include birdsong, the dulcet purr of the wolf spider,<sup>3</sup> or even the territorial chest beating of mountain gorillas.
15. *Anthrophonic mimesis* – imitation of *anthrophony*, or human-generated sound. Examples of anthrophony include mechanical noises, such as the sound of looming airplanes, vocalization, including linguistic and non-linguistic expressions (such as in human speech or laughter, respectively).
16. *Soundscape mimesis* – imitation of an entire soundscape, or an integral simultaneity of biophony, geophony, and anthrophony.

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<sup>3</sup> In which the spider creates a purring sound by striking surrounding leaves, causing them to vibrate.

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