



JMM 3, Fall 2004/Winter 2005, section 2

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ON PRIMITIVE ELEMENTS OF MUSICAL MEANING

2.1. Introduction

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I have been asked to give some insights on how elements of possible meanings of sounds and perhaps music could be found in my studies on the sound dimension of Palaeolithic painted caves. To describe in brief the main discovery, let us say that in the painted caves, the density of pictures in a location of a cave is proportional to the quality of the resonance of this location: the pictures are found mostly in resonant areas. It can be shown that this is not merely by chance, and we can therefore gain some understanding on how the Palaeolithic people utilized resonance. The sounds needed to test the resonance are vocal, simple but closely related to the 'answer' of the cave in order to make it sound the best. Because of the resonance, the whole body is implicated, sometimes in a subtle way. The approach is essentially physical; in this respect, we may say that the sounds and the whole situation are *primitive*. It is indeed a very strong experience to hear in almost complete darkness the cave answer to a sound produced just in front or just under a picture of an animal, a bison or a mammoth. Since both the body and the cave vibrate we can speak of an earth or *mineral* meaning of sound, but also, because of the relationship with the pictures, of an *animal* meaning of sound: we are thus naturally introduced to very deep elements of sound meaning. And a reflection on possible meanings which sound and music could have for the Palaeolithic tribes who adorned these caves with pictures is without doubt a very interesting subject.[1] But when reflecting more on this subject it appeared increasingly that for a deeper understanding and clearer results, some ground material taken from studies in elementary sound perception, in sound therapy based on sound / body and sound / consciousness relationship, and more generally in what I call *sound anthropology*, should be introduced. Some considerations taken from ethnomusicology or from music in Antiquity will be mentioned as well.



Figure 1 Arcy-sur-Cure (Burgundy, France). An ibex in the most resonant location of the main cave. (Collection La Varenne, photograph M. Girard).

It is recommended to the reader unfamiliar with the sound studies in the prehistoric caves to look at Reznikoff (1987a, in French, or, in English, 1995, 2002, this last reference being the most complete) or at Reznikoff & Dauvois (1988, in French).

Concerning sound therapy most of the material of my studies since 1980 remains unpublished (see however Reznikoff 1994). In this field I have taught, given lectures and led many workshops in several institutions in many European countries, including – to acknowledge the Danish school – at the Department of Music Therapy in Aalborg, whose remarkable Director was at that time (in 1995) Prof. Inge Nygaard. For prenatal perception, a good reference is Herbinet & Busnel (1991, in French), or Krasnegor *et al.* (1987, in English), or Klaus & Klaus (1998), or recently, Granier-Deferre (2004, in French) and Kisilevsky *et al.* (2004, in English). Other references in various fields are given further on.

In order to better introduce our subject we may first reflect on the impulse we have to speak of *meaning* in music and why expressing this meaning remains essentially impossible.

2.2. The Unspeakable Meaning

It is indeed interesting to ask why we feel so strongly the need to speak of meaning in music and at the same time, in trying to express it cannot give except in a few obvious cases any clear meaning at all, nor even express this need in words. The reason is that *the level of sound is much more primitive in our consciousness than the level of speech*. As we will show further on, sound is related to our deepest, that is to say, to the *very first* levels of consciousness: those appearing already in the period before birth.

The level of speech and language, however, is a very specialized one acquired by the child only from about the age of three years old: the brain areas mainly concerned with sound perception and those concerned with speech are not the same. Listening to a sequence of sounds is more primitive in our consciousness than listening to a sequence of words. As we will see, astonishingly enough, singing a well known song by heart is more primitive than speaking, in spite of the fact that the song contains words. Consequently, it is the same concerning an important part of music. Much deeper than, and prior to the speech level, the sound level therefore cannot be expressed in words. The exception is that of the simplest physical properties of sound related to the external body perception: we say that a sound is strong or gentle (intensity), high or low (frequency), near or faraway (space location). The notion of timbre however, belonging to the deeper levels of perception, can hardly be expressed properly. Of course we have also difficulties in expressing tastes and smells, but very often music, be it a simple melody or a complex moment in a symphony, *speaks* much more to us. Such a musical *conversation* or *speech* may last for a long time, whereas for odours, we would rather say that it *reminds* us of something and this reminiscence disappears quickly after the source is no longer there. The strength of the impression of meaning in the case of sound is due to the importance of sound perception which is for the human being much more important than the perception of taste and smell; actually the sound perception is the main one (see below). Moreover this perception gives the basis for phonetics of words and spoken language, while conversely by hearing sounds of speech the child discovers the very basic sounds; although their levels of consciousness (or areas in brain) are not the same, clearly sounds and speech are intermingled and a sequence of sounds often desires to tell us something yet unspeakable. We try to put words on it, unsuccessfully, and have to find other ways of expressing it: more or less conventional analogies or commentaries, be it in terms of poetry, literature, musical analysis or, nowadays, some forms of musical semiotics. We shall try here, however, to point out the most *elementary* notions involved in possible meanings of sound and music, notions that we can gather from the various fields of study mentioned above. But speaking (as we say) of sounds, what about a definition of music?

2.3. On a Definition of Music

Progressing through the tunnel of a cave, sometimes crawling on the ground, making sounds to discover the resonance given by the tunnel's response is a *functional* use of sounds.



Figure 2 Arcy-sur-Cure (Burgundy, France). The 'Diamond incrustated' mammoth in the most resonant location of the main cave. (Collection La Varende, photograph M. Girard).

And in ancient traditions, as it is still in a few oral ones, music was mostly functional: there was a precise purpose for which it was to be performed. Be it a song to the child in its mother's womb, sounds made by the woman during the moment of birth, the song to lull the child to sleep, working songs at home or in the fields, music for dance, war songs, trumpet voluntaries for retreat or those for victory, laments for departure or death, healing songs, chants of prayer or praise addressed to the Spirits and to the Invisible World, all these demonstrate that the *power* of sound and also music are used functionally with a precise intention in order to obtain a specific effect. It is possible to demonstrate that for an important part of these songs and music, the functional aspect has objective – in the scientific meaning of the word – bases. These bases are built essentially on the notion of *modality*: it is clear that e.g. the tone of a lament – the singer may indeed cry with tears – or the sounds of 'joyful' dance music or those of trumpets of victory, actually impress in different ways and, to a great extent, as intended to.[2]

However, in the learned traditions of Antiquity, especially the learned spiritual traditions, music progressively gains its autonomy, although, through modality, it remains in close relationship with its modal functional aspects. It is therefore very interesting to have a definition of music belonging to one of these traditions of Antiquity. St Augustine (fourth century A.D.) gives the following famous definition of Music in his *De Musica* (I, 3, 4): '*Musica est ars bene movendi*', which we can translate as 'Music is the art of good movement'. 'Good' here is understood in its Platonic sense: the *good* is what leads to the divine.

Contrary to a common opinion amongst musicologists stating that

Augustine confuses music and dance, this definition is certainly one of the deepest concerning music. It refers indeed 1) to the *movement of the sound in the body*, and essentially, 2) to the relation between the *movement of the soul* and sounds, particularly the sounds of the voice.

Concerning the *movement of sound in the body*, it is easy to understand and to experience this twofold movement. First, the higher sounds of the voice vibrate in the higher parts of the body (throat and lower part of the head) while lower ones vibrate in the lower part of the body (chest and back). It is a very simple and convincing experience to put one's ear on the upper middle part of the back of a person and listen to the sound this person produces, the sound moving, let us say, in the range of a fifth: it goes up and down along the spine and the back of the singer. And hence it is not purely conventional when we say that sounds are *high* or *low*: on the contrary, it is a reality based on the body perception of sound. Moreover, because of its movement the sound structures the spine and therefore the body; this structuring can be shown to be precise. This was about the movement of sound related to pitch. But there is a second movement, independent of pitch: the movement of the vibrations of different vowels and consonants in the body. A simple experiment makes this evident: put your left hand on your chest and your right hand on the top of your head, and simply say or, even better, sing (on the same pitch), alternatively, A and M; you feel the vibration going from the chest to the head and back again. Singing A O U M you may feel the vibration raising up, respectively from the chest (A) to the throat (O), to the lower part of the face (U) and finally to the upper part of the head (M).

This simple experience shows the relationship between vowels or consonants and locations in the body.[3] It brings to our outer consciousness the importance of the *perception of sound*, actually vibrations *in the body*; and this relationship, which we use in sound therapy, is relevant also to the approach of modality and meaning. It opens also some new perspectives in linguistics. Clearly, the remarkable C.Grund's Aurelians lack this body consciousness of sound (Grund, 1995).

The *movement of the soul*, is not a notion familiar to us nowadays, but it is an essential one in Antiquity and is implicit in St Augustine's definition. It refers to the permanent changes in our consciousness which goes through states, for instance, of happiness, joy, exultation, sorrow, tears, anxiousness, wrath, fear, courage, peace, and so on: emotions which correspond to different psycho-physiological inner states and different expressions of the voice. These expressions by tone, timbre, pitch or intonation are characteristic of the corresponding psycho-physiological inner states, and give a musical elementary characteristic of each state.

This defines the core notion of *modality* (see Reznikoff 1987b). For each *mode* in music, its *core* is given by some timbre and one or two intervals slightly higher or lower that characterize the *ethos*, the inner state, which the mode is supposed to express. Thus the *movement of the sound* reflects the change or movement of consciousness and this gives the notion of *movement of the soul* so important in Pythagorean and Platonic vision of the World, since its ultimate meaning is the *becoming of the soul*. The *good* movements Augustine speaks about are those of consciousness that lead the soul eventually into the everlasting light of the divine One. Of course, here *Music* is understood in its higher meaning: given by the Muses i.e. from the Divine.

This ideal modal approach of music, which belongs also to a deep spiritual tradition, is still very current in the seventeenth century, as we read in Mersenne's *Harmonie Universelle* or e.g. in Descartes (see the lively paper on the meaning in Baroque music by Christensen, 1995). These main concepts of modal meaning are still understood by Rousseau or d'Alembert in the eighteenth-century *Encyclopédie*. Beethoven is probably the last great musician coming out of this tradition and, we could safely say, he represents one of its achievements, although his music belongs, of course, also to another culture where this kind of meaning, the modal one, is quickly disappearing. In the twentieth century, it was only through the discovery of learned spiritual oral traditions e.g. of India, Iran or Turkey, still practising in their antique musical spirit, that the precise notion of modality could be rediscovered as a living reality.

What is important for us to understand here is the notion of *movement* related to music, be it the simple movement of sound in the body which is an inner version of the movement of the sound in space, or the far-reaching notion of movement of the soul, which music did and may reflect and which focuses also on elements of meaning in music. Such elements are given by the expression of certain fundamental psycho-physiological states. It is interesting to investigate how the most primitive of them can be apprehended through sound.

2.4. Our Deepest Consciousness is Structured by Sound

By deep levels of consciousness we mean the very first levels acquired in early childhood and even before birth. With the exception of the sense of sight, the means of perception, particularly the auditory system, of the child in its mother's womb are already formed at the sixth month of pregnancy. Let us now consider the phenomenon of the prenatal perceptions of the child.

The sense of sight is very limited since the child remains in darkness; of course there can be visual impressions but no real

sight, which remains a marvel appearing with birth and daylight. The sense of smell and the sense of taste are both limited since the placenta and the amniotic fluid – although slightly pervious to some variations carried by the blood – protect the child from too much external change. More active is the sense of touch; indeed, the child may touch its own body and its immediate surroundings; moreover the child feels not only with hands but also with the entire body, as it is also with the perception of sound. The perception of movement is very rich, be it passive – with the mother’s activities, standing up, walking, lying down etc., movement which give some elementary notion of rhythm and dance - or active, the child’s moving of arms, legs and body, head up or head down.

But the richest and most structured perception is the perception of sound and noise: aural perception by way of the ears – in a liquid milieu the vibrations are very well perceived – but also, as we have seen, perception by way of the entire body. The child of course doesn’t hear as we do, due to its isolated environment but due also to the fact that our listening is very cultural and that for us sounds are already full of meaning, while it is not yet the case with a child. The perception of sounds is manifold:

1. First are the permanent noises of the child’s body (e.g. heart beating) and
2. the various noises of the mother’s body. Since these noises and rhythms do not vary very much except in the case of particular emotions (see below), they quickly reduce down to an unnoticed level of the developing consciousness of the child.
3. Varying much more is the sound of the mother’s voice with all its changes and inflexions which the child perceives – it has been shown, for instance, that the child notices a possible change of language (e.g. from English to French). Of course the child does not understand the words but can perceive some of the intentional content in the vocal intonation and tone, for instance the joyful, anxious or crying voice of the mother. The sound of her voice comes through her mouth and the air but also from direct vibration in her body (see above), so that the child has elementary but deep information on what is happening. The child gets this information from the ‘auscultation’ of all the sounds and noises related to a given state of consciousness. And hence the first notion of meaning, *the first semantic dimension appears through sound*, much earlier than any visual ability. The relationship between the sound of the voice and the inner state of the mother which the child perceives shows how deeply rooted in our consciousness the elements of sound modality are, at least for the most primitive of these sounds. With the mother’s voice and

speech appears also the *verbal rhythm* and elements of the prosodic structure (that the child perceives them is proved by the experiment with the change of language). The consciousness of verbal rhythm and prosody are necessary for speech, poetry, rhythm and music.

4. Finally is the level of perception of noises and sounds *external* to the mother's body: male and other voices, cello or piano playing etc., the barking of a dog or per chance – in our urbanized world – the mooing of a cow. It is remarkable that *almost all of what is new* for the child is *discovered through sound perception*. Interestingly, there is also a relationship with an *invisible world* – for the child – through sound.

It is also important to notice that *the first consciousness of space is given by sound*. The child doesn't see but hears the voice of the mother high or low in her body (see above) and the sounds or noises in various locations coming from internal or external surroundings. This sense of space is important for the child to position itself in the right way, head down, in preparation for the moment of birth. It has been shown that children whose mothers sing are in general better positioned for this major event. The consciousness of space is of course also given by the consciousness of movement, but when the mother moves, the physical space surrounding the child doesn't change, and it is only sound itself that can give a clear consciousness of high or low, in front or behind, far or near, before any sight perception could do. However, to give a counterexample, the distinction between right and left does not belong to deep consciousness; on the contrary, it is closely linked with external and some cultural awareness.

The relationship of the consciousness of space with sound perception is demonstrated also by the fact that people who are born deaf have difficulties in comprehending space. To conclude, in early levels of consciousness, space and sound, and therefore movement and change of sounds, are deeply related, and hence, in our consciousness music and rhythm are inseparable from movement and space. *One of the strongest elementary meanings of music is movement*. This perception of movement is naturally related to perception of time; it is interesting to remark that in case of a very deep level of perception of sounds, for example in a strong natural resonance, the perception of time is shortened.[4] We shall come back to the aspect of movement, one of the main aspects of music, but let us first reconsider the corporal perception of sound and vibrations.

The body perception of sound by sensing vibrations belongs of course to the deep levels of consciousness and we are usually unaware of it, for instance when we speak or even sing. When practising the simple exercise on A O U M mentioned above,

people are astonished to discover the movement of the vibrations in their bodies. This elementary perception, which appears already before birth in a passive way, becomes active when the child is born since the first thing the child has to do, just born, is to breathe, as he/she usually does with a strong and awaited cry: the active relation with the sound begins. It is important to notice that the passive perception of sounds preserves continuity with the period in the womb. But now the child discovers aerial hearing with all its marvels, while the perception in the body is also new since the child starts to *produce* different sounds. Moreover the body of the baby vibrates much more than ours since for small bodies, the surface is proportionally larger than the volume (the ratio surface / volume decreases when the length increases): small children, during the short while they remain concentrated, feel their vibrations very well.

Of the two perceptions of sound we have, either in the body or auditory, the first one is actually the most important. Indeed, those born deaf do perceive sound vibrations in their body, and they can learn to speak and even to sing when trained properly in this corporal perception, without any auditory apparatus; whereas, not to perceive any sound vibration in the body is a sign of mental backwardness. This proves that our perception of sound is founded on the corporal perception of vibrations. Also, clearly, the whole body is involved in the process of perception and / or production of sound, e.g. the vibrations of M reach also the lower parts of the body. This shows that *our twofold perception of sound is completely different from other perceptions*: we see only with our eyes, smell only with our nose, taste only with our tongue; the sense of touch, however, involves also the whole body. But the sound perception is far more structured and elaborate than the sense of touch. The human being is above all a sound (sonorous) being and the dimension of sound is for us the essential one; it includes the deepest levels of consciousness, deeper than those of the sight, it implicates the entire body and is exceptionally subtle, especially, of course, in its auditory hearing ability.

When the child is born he / she discovers all the new sounds and particularly the many different timbres characterized by different harmonic overtones. Very soon the child gets the potential ability to perceive distinctly all the phonemes of all the languages, and the ability to identify them with his / her own production of sounds. The main harmonics were already heard in the womb as transmitted by the mother's bone structure down to the lower part of her back and the pelvis, so that the child is surrounded by them and its *early consciousness is impregnated by the fundamental harmonic consonances*. But of course it is in the air that this subtle hearing of harmonics will develop all its potential capacities. This discovery of harmonic sounds in the air which is necessary for speech, begins in the first weeks of life and continues for a long

while before the child really speaks.

We can now measure how rich and structured the perception of sound is in very early childhood, before the child speaks - before, let us say, the age of three. This belongs to what we call the deepest levels of consciousness. To summarize this, we can say that particularly in its levels acquired before birth, *deep consciousness is structured by sound*.

That consciousness – *psyche*, the soul – *is musical* is a major theme in Antiquity, and Plato, in his Pythagorean treatise *Timaeus*, explains carefully how the soul is founded on musical proportions (*Timaeus*, 35-36). ‘Musical’ is here understood as being founded on pure intervals given by harmonic consonances. This statement is often considered as a mere Pythagorean speculation: why indeed should consciousness be musical rather than pictorial? But as we have seen, there are strong grounds for that, and Antiquity was aware of the prenatal perception of sound. A famous example of this awareness is recorded in the Biblical account of the Visitation of the Blessed pregnant Virgin Mary to the already six months pregnant St Elisabeth: the child (St John the Baptist) jumped in Elisabeth’s womb when he heard the voice of Mary (Luke, 26-36 and 39-44).

Starting from the age of two, all the discoveries of sounds the child acquired since the mother’s womb are progressively integrated in what become deeper levels of consciousness. These levels do not belong to the levels of speech, although of course, the spoken language is based on these acquisitions. We have seen that because the ground level of sound is acquired before speech it is impossible to express this level properly in words, as it is for memory related to experience in the earliest childhood before the ability to speak has developed.

The deep primitive sound level is *always* present in our consciousness (in the corresponding areas of the brain) and because of its primitiveness it remains unaffected even when other, more superficial levels of consciousness are damaged or destroyed, by accident, illness, stressful situations or age. On this remarkable fact is based the practice of sound therapy which I myself initiated 25 years ago. To give some examples, a person in a coma, who has lost the functions of outer levels of consciousness, can recover these levels and full consciousness when hearing long vocal sounds of a live singing voice, particularly a song the person heard in early childhood. The activity of deep levels of consciousness started by sounds progressively brings blood and activity to other levels of the brain, if they are not destroyed or damaged too much. As a rule a person who suffers from loss of speech, be it by accident or age, can sing. A typical case in point is that of an old grandmother who speaks no more, sits prostrated, and is left

forgotten somewhere in a corner. To this old lady comes a visiting niece who starts to sing a song the old lady knew in her childhood or youth: *immediately* the old lady awakes, sings with the niece and, momentarily no longer prostrated, can perhaps even talk for a little while. This has been observed since ancient times, for example in cases of old monks who don't speak anymore but sing in the liturgy (for recent studies, see Yamadori, 1977 and Warren *et al.*, 2003).

Concerning the deep unconscious memory of high overtones heard in early childhood, the sound therapy gives the following evidence. Certain persons hearing some reinforced, isolated and sustained specific overtone produced by a human voice, can experience suddenly pain in one ear (or both ears), and even though the sound is not particularly strong it becomes unbearable to the person, who may even cry or even roll down on the floor because of the intensity of the pain. This comes usually from a quarrel or from shrieks the person heard in his / her early childhood, the characteristic timbre of which is brought back strongly to his / her mind by the overtone. The situation the child was faced with reappears carrying with it frightfulness or terror; the overtone becomes unbearable: one has to stop it. The therapy is well on the way as soon as the person has identified precisely the trauma that was at the origin of this apparently peculiar pain. This shows an important educational principle: except in an emergency, never shout at a child!

For a person who suffers from loss of speech, the best way to recover speech is through singing. *It is more elementary to sing words on a known melody than to say them.* Why is it? Because the singing level remains in the more primitive sound level of consciousness. This shows that in our consciousness not only sound but also *an important part of music is more primitive than speech.* While at the same time speech is intermingled with music because sounds and rhythms are the grounds of speech.

All these primitive elements of sound perception and their primitive semantics, belonging to the deepest levels of consciousness, will appear - as we may expect - in the attempt to formulate the basics of musical meaning. In view of its importance, we return to the concept of consciousness of space related with sound.

2.5. Space and Movement of Sound

In a prehistoric cave, one of the most impressive experiences is to discover the cave, walking in complete or almost complete darkness, and all while making sounds (preferably vocal ones) and to listen to the answer of the cave. In order to figure out where the sounds come from - from far away or from nearby - and whether

there is somewhere a strong resonance or not: all this in order to ascertain the direction in which one may proceed further on. Because our vision is limited by darkness, resonance is the only way to know how long or deep the space ahead is. This represents one use of the voice and of the hearing as a sonar device, and there is no doubt that Palaeolithic tribes who visited and decorated the caves proceeded in this way; indeed, in irregular shaped galleries or tunnels, neither oil lamps nor even torches light further than a few meters. This sonar method works: in many cases, proceeding into the direction of the strongest answer of the cave will lead to the locations of paintings.

This way of moving around in darkness demonstrates the main importance of sound in discovering space and in proceeding through it; to be sure, it reminds one of the first perception of space the child has in the world of the mother's womb.



Figure 3 Arcy-sur-Cure (Burgundy, France). A salmon in the most resonant location of the main cave. (Collection La Varenne, photograph D. Baffier).

As we have noticed above, those born deaf have some difficulties in mastering the notion of space (e.g. in space geometry), while for those with unimpaired hearing the space / sound relationship is so deeply rooted in consciousness that they are usually not aware of it; the same is true, as we have seen, for the sound / body relationship. But because of this deep and primitive perception of sound in the surrounding space and in the body, we have a spatial representation of sound: very close, near or far away, approaching or moving away, high or low, ascending or descending: even for a fixed source of sounds. We speak too of an *ascending* or *descending* scale of sounds. As we have emphasised above, this is not only a way of speaking, for the sound of the voice actually vibrates higher or lower in the body, in a precise relationship with

the body, and then through resonance and through an identification process each non vocal sound as well will be related to a part of the body (see below).

Now, with this notion of movement of sound appears the fundamental notion of *repetition*, for example, of a short motif on two or three notes, which combined with a decrease of intensity, gives the impression of motion away or vanishing. It is a wonderful experience, particularly with relation to painted rocks in open air, to listen to echoes answering to a short motif (depending on the quality of the echo) and then per chance to hear echoes of echoes moving around through the landscape and finally disappearing in an always surprising silence. This impression of movement away associated with decreasing intensity is of course also a very primitive element in our consciousness: a noise that moves away diminishes progressively in intensity, and, conversely, a *diminuendo* gives the impression of motion away.

The notion of *repetition* is combined with that of one's capacity to identify octaves: we immediately recognize as the same melody a melody performed one or more octaves higher than the initial one. This is yet another of our very primitive perceptions of sound, necessary for speech, since we must identify the same words pronounced by a male, female or child's voice. It must certainly be the case when the words are transposed at another pitch of spoken sounds – for example a fifth or fourth higher –but the clearest case of this is that of the octave in which the correspondence of sound waves is the best and the equivalence of sounds the clearest. This is indeed an extraordinary capacity: I recall when one of my daughters at the age of three repeated with her tiny voice the words “*jardin du Luxembourg*”, that I pronounced with my deep voice, and the last word of which she heard for the very the first time. The ability to identify sounds, words and melodies, higher or lower, is related to the subtle perception of harmonic structure we acquire progressively in early childhood. It seems that some animals partially have this ability: for example, a dog recognizes its name pronounced by different voices.

A melody repeated one octave higher sounds actually the same, like an echo or an answer *far away*. The phenomenon of echo is deeply rooted in our physiology and consciousness since a sound is partially reproduced – as an echo called *oto-acoustic* emission – by the internal ear before it is transmitted to the auditory nerve (Kemp 1978, Pujol 1988 and 1990). In music, the impression of movement in space is strengthened even more with the change of instruments and the play of various instrumental sonorities. Thus, we are brought to the notion of *sound space*, or space of sounds, *independent* of the ordinary space we see around us. Since in our deepest consciousness space and sound are intimately related, in particular because our first apprehension of space is through sound

and because of our corporal perception, we have a spatial representation of sounds and it is possible to speak of the space of sound we perceive, what we call the *sound space*.

2.6. The Sound Space

Apart from the obvious properties we mentioned earlier - *height or depth, proximity or remoteness*, which are common properties of space and apart from the obvious property of *intensity* - the other properties appear very difficult to speak about. And the question: *how many different dimensions does the sound space have?* is a particularly hard question. If, as we do for colours, we abstract sound from the precise notion of location (as it is in real space), there remains the dimension of *height*, while the dimension of *remoteness* can be identified with that of *intensity* if we agree that *strong* is like near and *gentle* like far away, which is only in part acceptable. Even if we assume the source of the sound to be unique and fixed, we may however preserve the notion of remoteness, because as we have seen, it is also related to the notion of repetition, one or more octaves higher and because movement of chords give obviously an impression of volume. Thus, we have already three dimensions: height, remoteness, intensity. Now comes the most complicated notion, that of *timbre*. Physically, a timbre is characterized by its harmonic components, each component being measurable in intensity; hence if we consider that the first 16 harmonics (necessary to include all the seven sounds of the diatonic scale) are sufficient to characterize a timbre, the subspace of timbres needs 16 dimensions. Together with the previous ones, it goes as high as 19 dimensions. It can be argued, of course, that the study of a phenomenological space has to be reduced to phenomenological data, but concerning timbre it is doubtful that such an approach would simplify or clarify the matter; here, we come to the very heart of the problem of *significance* of sound: the meaning of various timbres. Meanwhile, the number of dimensions has to be increased due to the fact that there are sounds which are not yet characterized by the previous analysis, e.g. the sounds and noises we feel in the body and which are at the very foundations of our sound and speech perception.

Moreover, contrary to the ordinary visual space the sound space has internal cycles because of the octave relationships; it is also a bounded space, in an intricate way because the timbres of very high sounds are reduced to one sound – perceived as a high sound *ii* (or *ee* – in English) – and the same happens in the case of very low timbres perceived as a growl or a rumble. Also our hearing capacity is finest in hearing the wide range of ‘normal’ male and especially female voices. Having collected all these aspects, we come to a global representation of sound as a multidimensional sphere or globe centred in our body, the higher extremity directed towards the sky and the lower down towards the earth. There is, of

course, some analogy with the mother's womb, which has been mentioned many times in this study. This space is *dense* and even *continuous*, in a geometrical meaning: it is possible to move continuously in pitch or intensity, from the point of view of both physics and perception.

This representation is half phenomenological and half physical, but indeed it has to be so: inasmuch as it is based on perception and body consciousness, it cannot be expressed in physics only. Now, concerning timbre, rather than coding it by harmonic components, we could, in a pure phenomenological way, introduce some elementary basic timbres (in terms of instruments, vocal sounds, noises, etc.), and then subjectively appreciate which of these basic timbres are to be found in a given sound. This is as it is done in wine tasting or with perfumes (the objectivity of this practical analysis is attained by the *consensus* of several professional tasters or experts). But the problem with tasting wines and appreciating perfumes is that there are still no natural *measurable* components in analysing taste or smell, as we have with measuring the intensity of harmonics in analysing timbre. In any case, it is doubtful that the subjective approach of timbres would simplify the sound analysis, but it could make it possibly more *meaningful*.^[5]

2.7. Timbre and Modality

The extraordinary ability we have to perceive the different harmonic structures of sounds, necessary to recognize timbre, belongs to the most elementary levels of our sound perception. The two first indications we need for sound are 1) *what* sound it is and 2) *where* it comes from. For instance we spontaneously say: 'a dog is barking in the yard', or 'a flute is playing in the apartment above', and, secondarily, we would add 'loudly' or, for the flute, 'a C sharp' or 'Mozart'. This subtle capacity of perceiving timbres and locations is clearly needed for survival, as it is necessary for a child in order to recognize his / her mother's voice and where she is. Animals nurturing offspring, as well as birds, share this capacity, particularly penguins.

As for humans, this capacity gives the remarkable possibility to feel the mood or inner state of persons through the tone and timbre of their voice. As we have seen above (*On a definition of music*) the different intonations and timbres of a voice, which can be characterized in an objective and precise way, give what is at the core of the notion of *modality*. A mode is thus objectively defined if it expresses the harmonic characteristics of a voice of a person in a given inner state or mood (the words *mood* and *mode* seem to have a common linguistic root). So, the *meaning* of a given mode and the basic elements of modal music should be clear, as far as elementary emotions or affects are concerned: this music expresses *sorrow, anxiousness, peace, joy or exultation* etc. or may even

express the main character of a person! This is the case in Baroque music, such as we find in the *Portraits* by Forqueray, Couperin or Rameau. One has no difficulty in expressing a timbre related to a given emotion, at least with voices and instruments tuned in the appropriate modal just intonation, as it was done before the mid-eighteenth century; whereas this is no longer possible with modern equal fixed temperament, which is, in fact, false in view of the harmonic natural structure. Tuning an instrument or the voice in order to express a particular emotion seems quite natural and one wonders why this tradition disappeared in the West: we also see it disappearing nowadays in many traditions of non-western music but under its modern influence. The loss of this tradition is related certainly with our urban civilization and destruction of rural life and nature, but also with the nineteenth-century *éducation bourgeoise* where expression of emotions is not the accepted thing to do and where the piano, the typical *bourgeois* instrument, belonged to the obligatory minimal musical education. The artificial tuning of the piano and music came with or even preceded the artificial development of our whole civilization. So we can speak of the notion of *ecology of sound* (see Reznikoff, 1981).

Studying the interpretation of chants of Christian Antiquity in the just intonation of scales of Antiquity – insofar as it is possible to understand this repertory from ancient treatises, from living learned spiritual traditions and from the neumatic notation of manuscripts of these chants – one discovers the *tense, sweet or deep, peaceful or heroic, clear, joyful or dark, devotional or bright* qualities of certain intervals revealed particularly in their dialectic relationship to high or low vowels and to words, for the main meaning of which the mode has been chosen and treated. An obvious *meaning* of certain intervals – and therefore of modes – appears, especially when comparing intervals among themselves. For example, compare the character of the large Pythagorean third ($81/64$ for its ratio) with the character of the sweet natural one ($5/4$ for its ratio): the former sounds like a call, an awakening, while the latter has a sweet devotional character, or even a character full of contrition. But to hear these qualities one needs an attentive ear, and usually a more subtle sense of hearing than is commonly required (just as it is necessary for taste: in order to discover the rich qualities of certain wines, one needs a bit of palatal education). A modern ear is no longer trained to sense the fine differences in ancient intervals or those of oral traditions; while the comparative *meaning* of these intervals, at least for some of them, is clear and has an objective base. Mastering these intervals, one shares with certain musicians of learned spiritual non-European oral traditions the ability of making people cry or go into deep states of interiority (it is much easier to make them joyful: usually a lively rhythm would do).

Here is a list of elementary meanings of some intervals sung in their precise intonation in relationship to a given drone tone:

- *Octave*: bright unity, joyful, high.
- *Pure fifth* (3/2): bright, contemplative, full of light, heavenly or divine (when gentle).
- *Harmonic fourth* (11/8): characteristic of laments, sometimes 'beyond lament', extraordinary (when gentle).
- *Pure fourth* (4/3): peace, peaceful strength (whereas the little higher tempered fourth is a bit aggressive).
- *Pythagorean (large) third* (81/64): call, awakening, brightness.
- *Natural harmonic (small) third* (5/4): sweet, devotional or full of contrition (one may cry).
- *Neutral (large minor) third* (around 11/9): heroic, a call to a difficult resolution, transition or passing through.
- *Natural minor third* (6/5): awaiting, acceptance, yearning.
- *Pythagorean (small) minor third* (around 32/27): awaiting, in pain or sorrow.
- *Pure second* (9/8): verticality, strength, call, uprightness, giving, openness.
- *Natural (large) semitone* (around 11/10): tension, unclear hope, mystery.
- *Unison*: unity, peace, contemplation in unity.

These intervals appear in the ancient Western tradition. Of course for all intervals a great part of the 'meaning' *remains unspeakable*. It is beyond the scope of this paper to discuss the connection of this account with those given by various schools of various traditions e.g. the classical tradition of North India. The given meaning of an interval is also relative to the way the interval is approached - i.e. of the musical content - so that a long discussion with several examples would be needed. However, just as in the case of the subjectivity of the sense of taste, in appreciating these intervals, objectivity or, at least, a comparative objectivity can be attained by a well-trained ear and by a fine sense of perception, including the body perception of sound.

What is most interesting is to understand how classical music - which progressively lost the natural and living temperament and eventually came to the fixed one (and somewhat false, except for octaves) - compensated for the loss of modal possibilities in expressing the 'meanings' that ancient music, in principle, was indeed capable of expressing. First it must be said that this capacity of ancient music for functionality and for expressing meaning disappeared progressively: music increasingly became *l'art pour l'art*, abstract and, probably, more and more *intellectually* meaningful. However, the need to *express* even unspeakable feeling had to come out: indeed, it is mostly by the use of larger and larger chords that this aim was attained. It is as if

what was lost in the more direct intonation of harmonics by varying slightly intervals and timbre, was recovered by including higher harmonic tones in the chords and in the music. One might say that the harmonics that were no longer heard as such had to be introduced as *notes* integrated into chords. Similarly the use of larger orchestras with expanded wind and brass sections, and ultimately the whole musical *complexity*, be it harmonic, orchestral or structural, contributed to the recovery of what music should always express: that is to say, some simple, yet unspeakable, meaning. Of course, as we well know, the great adventure of western Classical Music has indeed given rise to many a masterpiece; notwithstanding, Mozart once declared that he would have given all his masses for the chant of the liturgical Eucharistic canon, built on simple modal formulas, and which, at that time, was still chanted (in just intonation).

2.8. Imitating Noises and Sounds

A remarkable discovery in the study of ornate caves is the relationship between painted red dots in narrow galleries, where one has to crawl, and the maxima of resonance of these galleries. While progressing in the dark gallery, crawling and making vocal sounds, suddenly the whole gallery resonates: you put the light of your torch on, and a red dot is there on the wall of the gallery. A simple low *hm* at the right pitch is sufficient because of the strong resonance. Then, it may be like a play; owing to the pleasure to have twenty meters or more of the cave that strongly resonate, one repeats the sound: the whole body vibrates or rather co-vibrates with the gallery, it is like an identification, a deep communion with earth, stone and the mineral elements of Creation. It is what in the introduction of this paper I called the *earth or mineral meaning* of sound, the meaning which is discovered also when the whole face of a cliff or a mountain answers and resounds in echoes.



Figure 4 Niaux (Ariège, France). A bison in the *Salon Noir* which sounds like Romanesque chapel.

But often, still in caves, small recesses or narrow hollows in the ground resonate strongly with low sounds that transform themselves into growls, mooing, bison-like lows, stag-like bells or lion's roars, sounding in a whole gallery or part of the cave, the quality of growls depending on the shape of the recess. And taken by the power of these animal sounds and imitating them, you cannot help identifying with the corresponding animal, for instance a bison. It is sometimes frightening, due to the power of the identification; this reminds us strongly of shamanic possessions or trances. The Siberian shaman indeed, in his shamanic process, imitates animal and bird cries in order to identify himself with the corresponding species, reaching, by these means, deep states of consciousness needed for his seer's quest and vision. Because of their primitiveness, such sounds are indeed very powerful. This is what I call the *animal level* for the meaning of sound. Let us remember here that the ornate caves have paintings of these animals on the walls, paintings that clearly relate to the Invisible, and even more so through sounds and sound communion with these animals. This is also an ultimate level of musical meaning, which links us the closest with the Invisible world.

It is very remarkable that almost all sounds and noises can be imitated by the voice or more generally by our phonatory system (including whistles). This ability is related to our deepest levels of sound consciousness including the level of corporal perception and the subtle level of perception of harmonic structures needed to hear all the various timbres. No musical education is necessary for this ability. Because our most primitive perception is related to vocal sounds and to their vibrations in the body, we hear or perceive all sounds in terms of vocal sounds and corporal vibrations. Even if we cannot imitate all of them with our voice or body, for example because the sound we hear is too low, although we hear it as an *o*, or too high, although we hear it as an *ii* (*ee*), or even more so because this sound has too many components like the sound of the full orchestra. But most of these components can be imitated or at least expressed with the human voice and the human body.

Since all sounds can be, potentially, related to vocal or corporal sounds and since, as we have seen, vocal sounds, namely vowels and consonants are related to different parts of the body, we see that *all sounds are related to our body*. The evidence of this major fact demanded a clear demonstration. It sheds a new light on the question of the meaning of music.

For example high sounds are related with the high parts of the body and low sounds with the lower parts of the body. A sound like an *mm* is related to – and often can be felt in – the head and

the bone structure; a sound like an *aa* is related to the chest but also to the upper part of the head because of high overtones usually included in this sound; the sound *ii* (*ee*) is felt at the level of ears, etc. It is an extraordinary experience to sit and listen to all sounds and noises, connecting them with different parts of the body. Of course, this cannot be done in a too noisy place, and should take place in nature rather than in a city; in good conditions it yields a contemplative inner state and conducts the subject into deep meditation. Similarly, a piece of music based on, and performed in, just intonation of natural intervals induces deep meditation. This is contrast to so many pieces of tempered music, which are preferably not to be listened to in the manner indicated above.

More familiar is the practice of imitation of various noises and non-vocal sounds with the voice. Indeed, machines are reputed for their hard consonants *mm*, *rrr* or *tktk*, waters for *shsh* or soft *aa*, flies for *zzz* or very high *nn*, while nature is rich in vowels: there one often hears soft *aa*, *oooo*, high *iii* but also high *sss* which give whistles as does the blown out *uu* (German *ü* or French *u*) etc. The imitation of voices is known to procure also a lot of fun; for those who remember him, the famous American cartoon-child Gerald McBoing Boing could even sing, alone, the whole Dvorak's cello concerto.[6]

2.9. Music Revisited in Terms of Elementary Meanings

Collecting the various elements of meaning we have encountered, we shall endeavour to give an account of the possible use of these elements in a supposed analysis of music, trying as much as possible to remain on an anthropological and objective basis which was one of the aims of this study. The following elements can appear simultaneously.

- i. Immediately, with the first notes of a piece of music, we have a *space* (this space is unidentified, but some people may associate it with a real one whatever it may be) and *higher* or *lower* parts of this space, as well as *near* or *remote* parts of it. In this space we have
- ii. *movement* and, actually, many different movements: *ascending*, *descending*, *crossing*, *appearing*, *disappearing* or *returning*. The notion of *return*, as we have seen, is an important one. It may be a *repetition*, *nearby* or *far away*, like an *echo* or an *answer*. The connection with the real space is sometimes straightforward; thus an *earth* or *landscape* or, what we called *mineral* impression may appear e.g. in strong echo effects of brass instruments, reminding us of ancient hunting or military marches.
- iii. With these movements associated with certain rhythms, there often appear impressions of horse riding or of various *footsteps*, light or heavy, walking or jumping, which

introduce straightforwardly into the dimension of *dance*. It can be a solo dance (for instance the beginning of the G-minor Mozart's Symphony) or of a whole troupe, or even a dance of a multitude (for instance in the final movement of Beethoven's 7th Symphony, which Romain Rolland qualified as the *apotheosis of dance*). These dances spread all over the space and, possibly, in all directions, while the *music space* becomes increasingly apprehensible.

- iv. A whole class of rhythms is related to elementary *verbal rhythms* i.e. rhythms of words, sequences of words, sentences, which give patterns for poetry. With such verbal rhythms, a little melody may suggest words and, therefore, a song; the higher or, respectively, lower tones suggesting high vowels, (e.g. [æ], [e], [ɛ], [i], [i:]) or low ones ([a], [o], [u], [u:]). This relationship showing why words may fit well or not to a given melody. A melody, therefore, *speaks*, and one yearns for its meaning to be more clearly expressed.
- v. Resulting from these verbal rhythms, from various timbres of instruments and from the power of chords, which reproduce, as we have seen, certain elements of different timbres by integrating higher harmonics into their structure, the impression of meaning becomes even stronger. The melody may speak of *departure, expectation, waiting, request*, it may appear *regretting, beseeching, lamenting*, or possibly *peaceful, hopeful* or *joyful*, in the case of appropriate dance rhythms. Obviously, this brings us back to the *modal* elementary meanings we have studied above, and which the ancient modal approach of music, or later tonal approaches using larger chords and orchestration, may express. It is impossible to develop here an analysis of the structure of chords, and of the stressing of certain of their harmonic components in order to get a particular effect,. However, as we have seen, classical music stems from ancient modal music, and even a large part of the nineteenth-century music will elaborate extraordinary means of expression of 'modal meanings', that we may discover. Eventually, the melody speaks 'for itself': one is compelled to sing, to whistle or, at least, to hum the melody, joining deeply in the music and feeling it more directly in the body.
- vi. A very special meaning is what we called the *animal* level of meaning. Apart from known and announced imitations of animal cries like in *Le Mariage force* by Charpentier or bird's singing like in Beethoven's Sixth Symphony or more intricate and controversial imitations in Messiaen, there are some remarkable moments of what it is possible to call a *wild* musical expression. This can be found mostly in twentieth-century music as in Stravinsky or Varèse, but also in Baroque operas, for instance, storms such as those

in the *Alcyone* of Marin Marais or in Rameau. It also occurs in classical music as, for instance, in the *Vivace* of the first movement of Beethoven's Seventh Symphony, with the extraordinary use of violas, cellos and contrabasses playing for twenty measures (from m. 401 to m. 421) the same chromatic continuous formula (D, C#, B#, B#, C#) in very low octaves; it sounds indeed very strange and wild and may remind us of the *growls* we mentioned above. Listening to a piece of music and to sounds may appear like moving around in a deep prehistoric cave.

It would be interesting to analyse a real piece of music in terms of the analyses i) – vi) above, for instance, the beginning of Beethoven's Ninth Symphony. However, in this introductory study

- vii. the last aspect one has to speak of is the relationship with the invisible. We mentioned such a relationship when reflecting on a child's first perceptions: the child has a link with an active invisible world for him or her – our world which is external to the mother's body – through sound. And we also mentioned this aspect concerning sound and the invisible when we spoke of ornate caves with various animals painted on the walls. Of course, we could say that all music is in close relationship with the invisible. It is what my mother, who was not a musician, told me when, being a teenager, I was questioning her about what true link music has with the *sacred*. What does *sacred music* mean, if we take *sacred* in the strong meaning of the word, that is to say *related* to the Invisible world, to the Spirits or, to put it strongly, to God? Usually sacred is said of music that has a religious programme and religious words, whether it be in the title or the words that are sung, for instance a requiem, a mass, a cantata; but what about the case when nothing is said or written? Clearly, one has to make a distinction between *religious* and *sacred*. A piece of art or music can be religious due to its programme, title or words, but remain profane otherwise, in its purely artistic or musical means and effects as, for instance, are the masses of Mozart of which the musical technique is the same, let us say as in his symphonies. On the contrary: a piece of music can be sacred but not religious i.e. not referring to any religious words or titles. *Sacred*, in the strong sense of the word has a functional meaning: it acts on precise locations of the body (see the effect of the vibrations of the syllable AOUM), on the subtle perception and on deep consciousness, in order to help in concentration and then, to introduce those who listen or contemplate, into a deeper state of consciousness, eventually into the inner chapel where the divine Mystery may visit the soul. This effect is closely related to natural just intonation and resonance of

the body.

Concerning the relationship with the Invisible through sound and paintings, as in Palaeolithic ornate caves, the following it is worth telling. Some years ago, I gave a concert in the *Basilica Superiore* in Assisi, which is decorated with the famous frescos by Giotto, Cimabue and others; I was singing some grand solo chants of Christian Antiquity. In the middle of a chant, I couldn't stop contemplating one of these frescos, and suddenly I was seized by the great impression that came from the paintings and the painted glasses, by the architecture, by the fact that under my feet, in the *Basilica Inferiore*, is the grave of St Francesco, and by the marvel of the resonance of the church. It was as if the frescos were animated, the whole church was singing. The emotion given by this extraordinary relation with the Invisible was so strong that, for a short while, I had to stop singing. Truly this was sacred art. At the end of the concert, there was a crowd of weeping Italian women and men gathering around me to share their tears and thanksgiving. A woman said: this was my second greatest musical impression; while my previous one was when I heard *Parsifal* in the Scala of Milan, the very place where it had been created for the first time, with Wagner himself. As in Palaeolithic ornate caves, paintings, sounds, resonance and the whole space of the Basilica were linked together in high praise to the Invisible.



Figure 5 Niaux (Ariège, France). An ibex (bouquetin) in the *Salon Noir*.

We shall at present leave this deep subject of sacred art and meaning of sacred music (Reznikoff, 1987c). Of course the

question of meaning is greatly influenced by our cultural and educational environment. We have tried here to elucidate, on an anthropological basis, the less cultural meanings, that is to say the more elementary or primitive ones, those that come from our most profound consciousness and that structure all our musical comprehension and humanity. In this quest of the deep unspeakable meaning of sound, I wish to the reader light and joy in the intimate discovery of the divine melody of the Invisible.

To refer to this article: click in the target section

JMM: The Journal of Music and Meaning ISSN: 1603-7170 © JMM and the contributing authors

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