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EMOTIONS IN MUSIC. AN OVERVIEW OF MUSICAL EXPRESSIVE QUALITIES

abstract

What does it mean to say that a particular melody is cheerful *rather than* melancholic, *or that a musical rhythm is* anxious *and* nervous *rather than* peaceful *and* calm? *Which kind of qualities are these? In this paper we will give an overview of musical expressive qualities, trying on the one hand to describe them as* tertiary *or* value-qualities *and, on the other, to understand their expressiveness by means of a phenomenological analysis of rhythm and rhythm perception.*

keywords

Musical expressive qualities, emotions, rhythm, Piana, Plessner

EMOTIONS IN MUSIC. AN OVERVIEW OF MUSICAL EXPRESSIVE QUALITIES

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Introduction

In a paper published on *Current Biology* in 2009, Thomas Fritz and colleagues presented two cross-cultural experiments about music perception. The aim of these studies was to investigate which aspects of music perception could be universal and to differentiate them from those which are developed only after exposure to a specific musical culture. In order to achieve this goal, the authors chose two groups of subjects who were completely naïve to each other's music – in particular, a group of a native African population (Mafa) which had never been exposed to Western music, and a group of western people (German participants) which had never listened to Mafa music.
In the first experiment, the authors aimed at investigating the ability to recognize three basic emotions (happy, sad, scared/fearful) expressed in Western music. The Mafa and German participants listened to short computer-generated piano music excerpts and had to decide which of three faces from the Ekman archive – depicting emotional expressions corresponding to those in the music – fitted best with the perceived music stimulus. Results show that both Mafas and Western people recognized happy, sad, and scared/fearful Western music excerpts above chance, even though Mafa listeners show more variability in their performance (Fritz et al. 2009, 573-574). According to the authors, therefore, these data seem to corroborate the idea that the expression of some basic emotions in Western music can be recognized even without being used to that kind of music.
The second experiment, instead, investigated how the manipulation of an original piece of music could affect its perceived pleasantness in Western and Mafa listeners. Among other aspects, the manipulation modified the consonant character of the excerpts, leading them to increasing dissonance. The results show that both Western and Mafa people prefer original Mafa and Western music over the manipulated versions. According to the authors, the dissonances produced by the spectral manipulation can be at least partly responsible for this "unpleasantness" effect.
Overall, this unique experiment suggests that consonance and permanent sensory dissonance universally influence the perceived pleasantness of music and, crucially, that the expression of emotions in Western music excerpts can be recognized universally. This is similar to the largely universal recognition of human emotional *facial* expression (Ekman et al., 1969) and emotional prosody (Scherer, 1997). The universal capacity to identify emotional expressions in particular in nonverbal patterns of

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emotional expressiveness, such as emotional prosody and music, supports a shared neural system underlining such processes.
It is easy to notice that both the experiments of the presented paper, as well as many other empirical works (Peretz et al. 1998, Koelsch et al. 2006, Blood et al. 1999), try to investigate some particular *qualities* that characterize music, such as its *pleasantness* or *unpleasantness* and, even more importantly, its *happy*, *sad*, or *fearful* character. But if it is quite simple to grasp what we mean when we speak of a *pleasant* or *unpleasant* piece of music, what does it really mean to say that a particular melody is *cheerful* rather than *melancholic*, or that a musical rhythm is *anxious* and *nervous* rather than *peaceful* and *calm*? Which kind of qualities are these? How do they emerge? How can we be affected by them?

The aim of this paper is two-fold. On the one hand, we will briefly try to describe these *expressive qualities* of music as *tertiary qualities* or *value-qualities* – qualities that emerge from the structure of the musical objects and that are capable of *affecting* us emotionally. On the other, even though entirely persuaded of the fact that such expressive qualities can emerge only from the structural organization of *many* musical aspects, we will focus on one of them to understand how it can contribute to the expressive character of a piece of music. In particular, we will focus on *rhythm*. Firstly, because it is one of the aspects that are mostly underlined in many empirical studies on the expressive qualities of music (Fritz et al. 2009, Peretz et al. 1998, Hevner 1937). Secondly, because, we would like to propose some ideas about the conditions of possibility of its expressive power. In this way we will also be able to underline some peculiar aspects of music perception.
We will try to do so, in particular, starting from the phenomenological reflections on music and on the relationship between music, expressive qualities, rhythm, and movement of two well-known phenomenologists: Giovanni Piana and Helmuth Plessner (Piana 1991, Plessner 1951, 2007), who, though independently from each other, have come to highly compatible descriptions of the phenomenon of music and music perception.

1. The Power of Expressiveness. Music and Affective Qualities

Let us go back to the questions we asked in the introduction. What do we really mean when we say that a melody is *cheerful* or that a particular rhythm is *anxious* and *nervous* rather than *peaceful* and *calm*? In our everyday life we often use such adjectives to define music and its properties. But how can we better describe this class of qualities?
First of all, we can surely underline their *expressive* character. As the adjectives we have used can easily show, in fact, music seems to have

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qualities that are able to express feelings or to recall the dynamical aspects of particular movements – the psychologist Daniel Stern has referred to these features as *vitality affects* (Stern 2000, 53-60). This fact leads us to describe musical pieces through the typical attributes that we use for *living creatures* and to recognize them as *expressing* a particular affective state. We will recall and deeply analyze this aspect of music's *vitality* in the next paragraph of this paper. For now, however, we want to underline another fundamental property of the *expressive qualities* of music that can help us to better understand their nature.

Especially within that particular current of the phenomenological thought which is known as *experimental phenomenology* and that finds in Carl Stumpf one of its pioneers, the expressive qualities of music – and of all other things – have been labelled *tertiary qualities* (Bozzi 1990, 88-117). Paolo Bozzi has given many examples of these properties. Colours, for example, have tertiary qualities: black is *gloomy*, red on the contrary is *joyous*. A diminished seventh chord is *screeching*, *harsh* and *clashing*. Ascending and slow gestures and movements are *solemn* (Bozzi 1990, 100). We can disagree about which *specific* tertiary quality we have to recognize in a particular thing and we can discuss about that. But we acknowledge that such things <<magnetize>>, as Paolo Bozzi would say, the *kind* of adjectives we have used to describe them (Bozzi 1990, 100). And we could easily continue our list with all the objects of our everyday life that have these properties – from landscapes to human faces, from artworks to apparently vague things such as *atmospheres*.

Now, the properties we are dealing with have been called "*tertiary* qualities" to recall the classical distinction between primary and secondary qualities that, as it is widely known, has characterized philosophical thought from the beginning and has been stressed by many authors – from Democritus to Galileo to John Locke[1]. The idea is to underline the fact that, far from being characterized only by properties such as weight and size – traditionally *primary* qualities – or as colours and fragrances – traditionally *secondary* qualities, the things of the world we live in are full of another wide range of qualities that we can then define *tertiary* and that are grasped by the different attributes we have used in our examples. But, which specific feature characterizes all these qualities, from the cheerful character of a melody to the anxious and nervous development of a rhythm, from the gloominess of a colour to the solemnity of a gesture? What we want to propose, according to a well-established idea in the phenomenological tradition, is the fact that all these qualities, despite their differences but *precisely in virtue of their power of expressiveness*, are able to *affect* us, that is –

1 See on this point Bozzi (1990), pp. 88-92.

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to involve us *emotionally*[2], and can then be defined as *affective qualities*. They express in fact the sense, the meaning, the inviting or repulsive features, the positive or negative values that the things in the world offer us. Due to their inviting or repulsive character, then, grasping these qualities means, for instance, being scared or disgusted, as well as amused or made happy by them – that is, in general, being affected in a pleasant or unpleasant way. In this sense, such qualities are not just perceived through the five senses; they are instead *affectively* perceived. Our affective responses, of course, can be very different from each other and also not necessarily akin to the expressive and affective quality that we recognize in the object. Recalling an example of Paolo Bozzi's, in fact, if I am sad and not well-disposed and I go to a cheerful and joyful party, I can be perfectly able to recognize the happy atmosphere of the party without being affected by it in any way; on the contrary, I could be much more bothered and annoyed *because of* it (Bozzi 1990, 103-104). In the same way, the melancholic tone of a melody can be perceived as terribly boring by some listeners and instead totally consuming by others. But the melancholic character of the melody or the cheerful and happy atmosphere of the party still remain; they just evoke different *affective* responses in different people[3].

Being one of the most well-known phenomena of our everyday life, the *affective* power of music and of its *expressive qualities* is today also one of the most studied aspects of music in cognitive neuroscience. Functional neuroimaging and lesion studies have shown for example that the emotional responses to music can modulate activity in *limbic* and *paralimbic* areas of the brain. As Stefan Koelsch declares, "limbic" (e.g. amygdala and hippocampus) and "paralimbic" structures (e.g. orbitofrontal cortex, insula, anterior cingulate cortex, parahippocampal gyrus, temporal poles) are considered as fundamental areas for emotional processing. As he said, in fact:

> These structures are crucially involved in the initiation, generation, detection, maintenance, regulation and termination of emotions that have survival value for the individual and the species. (Koelsch 2010, 131)

Therefore, at least some emotional responses to music seem to involve the *very core structures* of the neuroaffective mechanisms. Blood and Zatorre (2001), for example, have shown activity changes in the amygdala in a positron emission tomography (PET) experiment with music perception. In

2 On this topic see in particular Dufrenne (1953). For a contemporary approach to the expressive qualities of the aesthetic objects and to the phenomenology of the affective acts see for example De Monticelli (2008) and De Monticelli, Conni (2008).

3 For a deeper analysis of this point see for example Pinotti (1997) and Griffero (2010).

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the experiment, the participants listened to one of their favourite pieces of music to which they usually had a "chill experience" – chills are defined as the intense emotional experience involving sensations such as goose bumps or shivers down the spine (Koelsch 2010, 131). Measuring changes in regional cerebral blood flow (rCBF) during chills, the authors found that an increasing chill intensity correlated, on the one hand, with rCBF decrease in the amygdala and in the anterior hippocampal formation, on the other, with rCBF increase in the ventral striatum, the midbrain, the anterior insula, the anterior cingulate cortex and the orbitofrontal cortex. Moreover, in an fMRI experiment, Koelsch and colleagues (2006) compared brain responses to two groups of musical pieces that the subjects had previously defined as "pleasant" or "unpleasant". Data show that, during the presentation of pleasant music, increases in blood-oxygen level dependent (BOLD) signals can be observed, for example, in the ventral striatum and the anterior insula. On the contrary, the presentation of unpleasant music correlates with increases in BOLD signals in the amygdala, the hippocampus, the parahippocampal gyrus and the temporal poles. These same structures, on the contrary, show decreases of BOLD signals during the perception of pleasant music. Both the experiments, therefore, clearly show how many of those limbic and paralimbic structures that are considered as fundamental areas for the emotional processing are involved in the *affective* responses to music as well. More interestingly, the same research group (Salimpoor et al., 2011), using molecular PET imaging, showed that music, an abstract stimulus, can arouse feelings of euphoria and craving, similar to tangible rewards that involve the striatal dopaminergic system. They found a consistent functional involvement of the nucleus accumbens during the experience of peak emotional responses to music, indicating that intense pleasure in response to music can lead to dopamine release in the striatal reward system. The authors highlight the role of these biological findings in explaining why music is of such high value across all human societies. Another interesting aspect was the functional dissociation found. Namely, the caudate was more involved during the anticipation and the nucleus accumbens was more involved during the experience of peak emotional responses to music. Thus, more dorsal striatal regions are also involved interconnected with sensory, motor and associative regions of the brain. We have stated, then, that *a parte subjecti* what characterizes the *tertiary* or *value qualities* of aesthetic objects like pieces of music is the fact that they are *affectively* perceived and *emotionally* involving. *A parte objecti*, instead, we have described those properties as *expressive* qualities. We want to better analyse this side of the issue in order to clarify the way in which

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these particular qualities appear but also in order to shed new light on the involved perceptual processes.

2. The Emergence of Expressiveness. Music and Vitality Affects

In *La Phénoménologie de l'expérience esthétique* (1953), Mikel Dufrenne underlines the fact that, phenomenologically, the expressiveness of an aesthetic object is grasped as an *indivisible unity* – that is, as the *general* atmosphere that appears to be conveyed by the object itself (Dufrenne 1953, 439-444). As such, it is perceived *before* – sometimes even *without* – the recognition of the elements that contribute to its emergence. As Max Scheler says, in fact:

> I can tell from the expressive "look" of a person whether he is well or ill disposed towards me, long before I can tell what colour or size his eyes may be (Scheler 1923, 244).

The expressive and affective qualities, therefore, are what is primarily given to us and, after having been perceived, according to Dufrenne, they are what can guide us to the analysis of the structural elements from which they emerge. The analysis of the elements that contribute to expressiveness, in fact, can actually be done only *after* the expressive quality itself has been perceptually grasped. Now, how can the elements of an object contribute to the emergence of a particular expressive trait? According to Dufrenne, there are some particular structures that have been revealed to be interestingly suitable for expressing a particular atmosphere. As he says, for example, the *vigor* of César Franck's *Prelude, Chorale and Fugue* clearly depends on its rhythm and on the modulation from the minor to the major scale, as well as the *mysterious grace* of Debussy's *The Girl with the Flaxen Hair* depends on the uncertainty of rhythm and tonality (Dufrenne 1953, 441). Nonetheless, Dufrenne is also perfectly aware of the fact that it is only the *overall structural organization* of many and different aspects that can actually convey the expressiveness of an object. We can in fact modulate from the minor to the major scale without achieving the effects of Franck's *Prelude, Chorale and Fugue* as we can maintain an uncertain tonality without producing the dreamlike atmosphere of Debussy's music (Dufrenne 1953, 442). Therefore, even though particularly suitable for conveying some specific expressive effects on their own, the different components of a musical piece can be actually expressive only if their structural organization, their coherency and their reciprocal relationships are such that they can allow the emergence of that particular expressive trait.
Now, even if totally persuaded of Dufrenne's thesis, from this point on we

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will focus our attention on the expressive resources of one single musical aspect – that is, *rhythm*. We will do so, as we said in the introduction, on the one hand because rhythm is easily recognized – from a naïve perspective too – as one of the "core contributors" to music expressivity. On the other, because when it comes to rhythm we can try to propose a hypothesis about the conditions of possibility of its expressivity, trying also to shed some light on the phenomenology of music and music perception.

2.1 Rhythm and its Expressiveness. Time and Movement

Experimental data show that when subjects are asked to define the expressive traits of some music excerpts, they mostly rely on temporal and rhythmic cues, among others (Fritz et al. 2009, 573-574; Peretz et al. 1998, 117-119). And maybe most of us, when wanting to listen to a cheerful piece of music rather than a melancholic one, have found ourselves relying on the piece's rhythm to make a good choice. Rhythm seems to be responsible, in particular, for the *dynamical* aspect of music – to its appearance of *vitality*, as Daniel Stern would say.

Let us think for example of the *solemn walking* of Beethoven's *Funeral March* of the Piano Sonata op.26 n.12 or the *graceful and cheerful dancing* of Chopin's *Grande valse brillante*. The circumlocutions used here to describe the expressive character of these pieces have not just a strong evocative and metaphorical power; or, better, they can appear *so* strongly evocative and appropriate because they grasp a relevant aspect of music and specifically of rhythm – that is, their strong connection to *movement*. Rhythm, in fact, can give expressivity – and *vitality* in particular – to music because it can convey the appearance of *movement*, which, of course, turns out to be one of the peculiar features of living creatures as human and non-human animals. This is not so very surprising, of course. The connection with movement, in fact, is a very well-known feature of music as well as the fundamental basis for a wide group of phenomena, from the simplest foot-tapping to the most elaborate kind of dancing. It is also today one of the most studied aspects in music cognitive neuroscience[4]. One of the striking results of this kind of study, in particular, is the fact that the coupling between music perception and movement is so strong that motor and premotor regions of the brain seem to be involved not only during "motor" tasks like tapping to rhythms, but also during "purely passive" tasks – that is, tasks which do not require overt movement. Recruitment of the supplementary motor area (SMA) and premotor areas is reported, for example, when musicians are asked just to *imagine* performing (Meister et al., 2004), but also when pianists just have to *listen to* familiar pieces, making no movements and without any specific

4 For a review on the topic, see for example Zatorre et al. (2007).

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imaginative tasks (Bangert et al., 2005). More impressively, maybe, the same areas are recruited in *non-musician* subjects during "passive" tasks. Chen and colleagues (2008), for example, compared the fMRI data of two studies with non-musicians involving rhythm perception. In the first, subjects had to listen to different rhythms knowing they would later tap along with them, then tapped. In the second, instead, subjects listened to rhythms *without* foreknowledge that they would later be asked to tap along with them. Interestingly, recruitment of the SMA, mid-premotor cortex and cerebellum was observed in both the experiments.

As we have seen, the strong coupling between rhythm and movement that turns out to be a familiar trait of our everyday experience of music can be supported also by some empirical findings. But one question seems to remain unanswered. *Why* can musical rhythm convey an impression of movement? That is, more precisely, which conditions of possibility is this coupling based on?

We believe that the answer to these questions can only be provided by the analysis of the phenomenological structure of both music and movement: that can be the basis, in fact, to disclose which phenomenological traits they have in common and that turn out to be fundamental conditions for this kind of relationship. In this way we will then have a better and more satisfying account of the expressive power of rhythm. We want to conclude our paper, therefore, trying to address this point.

Let us start from the beginning, that is from the phenomenological constitution of the musical percept. Obviously, music is constituted through *time*. But, even though many other objects, such as all material things, exist *in* time and *through* time, music seems to show an entirely different relationship with the temporal dimension. As the Italian philosopher Giovanni Piana underlines in his *Filosofia della musica*, in fact, music appears as a *process* and its duration in time clearly reveals itself in its perceptual appearances: it is not just the case that music and sounds are in time – because all other material things are – but that their being in time experientially appears as *passing.* Now, it is worth noting that this *passing* appears as the sequence of the phases of *one single* phenomenon. The melody, in fact, is not just the static juxtaposition of sounds but it emerges from the *perceived relationship* between the notes. In this way, perceiving a melody means in some sense perceiving the sequence of notes as the *dynamic* passage – the *transition* – from one sound to another, or, as Piana says with an Italian expression that explicitly refers to the metaphor of movement and walking, as a kind of *avanzare sopravanzando* – that is, a kind of *moving forward* (Piana 1991, 155).

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Now, how can this *dynamic effect* emerge in a musical piece? Piana's answer is akin to the one we have proposed before. The dynamic effect emerges not just because music is extended in time (Piana 1991, 170) but, more precisely, because it can show a *rhythmic structure*. But why? Let us continue our analysis. When they are arranged according to a particular rhythmic organization, the notes of a melody *perceptually* appear not as *unrelated* sounds, but as perceptual unities that are organized according to the scheme of *beat and upbeat*. This is actually a widespread phenomenon. Even if we listen for a while to the perfectly *uniform* mechanism of a metronome, for example, we will come to perceive sequences of short rhythmic unities with downbeats and upbeats (Zhok 2012, 133).
Now, according to Piana, what we can observe in configurations like these is the fact that the relation between the sounds is perceived as that of *impulses* and *relaxations*, *openings* and *closures*, *questions* and *answers* (Piana 1991, 173). This means then that, far from being just a sequence of sounds in which there is no actual articulation in sequences but a mere juxtaposition of notes that we can arbitrarily choose to group as we prefer, the musical perceptual course appears on the contrary as an *organized* unity that requires a *closure* when something has been previously perceived as an *opening*. In other terms, as Helmuth Plessner says in his *Zur Anthropologie der Musik*, in a musical piece sounds appear as *impulses* for what comes next and therefore the peculiar character of having a *direction*, an open connection to something else, is motivated by the sounds themselves (Plessner 1951, 146-150). This peculiarity of sounds and music emerges in particular if we compare the auditory percepts with some *visual* ones, such as figures and colours. Also if presented one after the other in a temporal sequence, the colours that have come first do not have an *intrinsic tendency* to the ones that come next. This clearly appears comparing this case with the tendency of the seventh scale degree to the tonic note in a diatonic scale. As Dufrenne would say, colours and figures have a prominent *spatial* character, even though they can of course be arranged in a temporal sequence[5].
On the contrary, because of their prominent *temporal* character, music – and rhythm in particular for what concerns us – are constituted as sequences of organized unities, where what comes first shows a *teleological tendency* towards what comes next and it is only in this way that it achieves its complete meaning[6].

5 On the difference between spatial and temporal arts in Mikel Dufrenne, see Dufrenne (1953), pp. 331-341.
6 On the concept of teleological tendency and its interesting applications in a phenomenological account of perception, see Zhok (2012).

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Now, it is easy to notice that the same *opening-closure* structure we have described for music and rhythm has its equivalent in the structure of our movement. Like music, in fact, our actions are extended in time and are organized as complex unities: they are not just sequences of unrelated movements, but organized structures that show a particular *rhythm* and in which every single movement develops with a *teleological tendency* towards what comes next.
We have arrived then at our answer. Music can convey an appearance of movement, and can therefore be expressive of those dynamical properties that some living organisms have, because it has some phenomenological traits in common with movement itself – that is, as we have said, *rhythm*, with its *opening-closure* structures developing in time.
As we have said before, of course, rhythm is not the only feature responsible for music expressivity, but we can undoubtedly say that it is one of the main aspects which can contribute to its emergence.

What we have tried to do in this paper is to give an overview of the aesthetic qualities of music. We have proposed that the specific way in which we respond to this kind of qualities is an *affective* one. Following Dufrenne's thesis, in fact, we maintained that it is exactly because of its expressive qualities that music has the very well-known power to affect us, to involve us emotionally. But, clearly, our *affective* perception is based on our *sensory, auditory* perception and the strictly connected limbic systems. And it is also the peculiarity of this kind of perception – the temporal unfolding organized in *opening-closures* structures which resemble movement – that in some sense contributes to expressiveness itself, as we have seen in the case of rhythm. In particular, this opening-closure structure is made possible because of the fact that our perception is not reducible to instant and atomic sensations, but it is a more complex phenomenon, in which what is passed is *retained* and what is coming is *in some sense anticipated*[7] – as also some contemporary psychological and neurophysiologic models of perception are underlining in terms of "working memory" "learning" and "prediction" (Friston, 2005).
The analysis of what music is able to express because of its temporal unfolding, then, suggests that the specific way in which the objects of our perception are structured and given to us can, at least in some sense, contribute to the affective value they have. In this sense, *sensory* and *affective*

7 Here we refer to Husserl's theory of time-consciousness (Husserl, 1893–1917). We can not examine here this issue in an appropriate way; for a more detailed account of it and especially of the concept of *anticipation*, see Gallagher, Zahavi (2008), pp.69-87.

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perceptions seem to be strictly coupled and mutually involving. This is why we believe that investigating this relationship could be an interesting way to come to a more accurate description of the phenomenon of music expressiviness itself.

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