How Spatial is a Whale?
Places and Processes in Zoomusicology

Dario Martinelli

The aim of this essay is to look at a specific portion of the enormous area of musical universals, from a zoosemiotic (and zoomusicological in particular) perspective, i.e., starting from the hypothesis that certain 'universal' musical features (which I call tran-specific traits) are shared within a zoological domain, rather than simply within the human one.[1] To a large, possibly cosmological, extent, the problem of musical universals deeply interested several philosophers of the past (see Athanasius Kircher's *Musurgia universalis*; Kircher 1650). In strictly scientific and systematic terms, however, and thus in its uniquely human dimension, the question arose again in the 1970s, mainly within the field of ethnomusicology. The urge to investigate the universal characteristics of music went hand in hand with an interest in 'other', non-western music. Wondering about the universality of music implies wondering about music itself:

> It seems to us that there are [many] reasons why ethnomusicology is concerned with the question of the universals of music: first of all, because this discipline … contains an essential comparative dimension; this being the case, ethnomusicologists do not seem yet to have encountered any civilisations without music and are thus led to pose the question: "What is music as a universal phenomenon?", which, in itself, could constitute a first universal feature of music. (Nattiez 1977: 92–93.)

Universals constitute a theoretical problem that has far more than one single solution. Various scholars discussed the possible existence of archetypical musical structures, and even whether such a question made sense or not. Indeed, most of the theoretical material that I illustrate from now on is under constant revision or discussion. Yet, it is crucial to draw a fair picture of this heterogeneous theoretical landscape. In itself, heterogeneity should not be considered a limit.

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[1] On what zoomusicology is and how the musical problem can be faced from a zoosemiotic perspective, I, of course, suggest Mâche 1992 and Martinelli 2002.

First of all, the search for universals in music poses a crucial philosophical question: What is required of a musical element in order to define it as universal? In principle, one can distinguish between two main possibilities:

1. An uncontradictable coherence of given musical traits across all communities;[2]
2. A continuity at the pragmatic level, i.e., in the way those musical traits work, or in the principles that motivate their appearance within certain (not necessarily all) communities.[3]

J. H. Kwabena Nketia tries to incorporate both hypotheses within the so-called *absolute universals* ('unrestricted, unconditional universals') and *universal consequents*. He quotes William Hutchinson: '…the tuning, tonal and metric systems, for example, developed in music through time and cross-culturally, are myriad, but that does not mean that the musical working-out of the consequences of such properties will also be myriad in number. Consequential relationships of a universal nature imply common tendencies in both the response to and development of musical materials, not a commonality in the choice of the material themselves.' (Nketia 1984: 15.) Ellen Koskoff has also drawn a possible list of categories concerned with 'absolute hard-edged' universals, and 'near-universals' (Koskoff 1984: 80) (see Table 1).

Universals A (absolute hard-edged)	Universals B (near-universals, easier to find)
- communicated and heard by human ears	- communication of human feelings
- aspect of form a. dynamic contour, or b. pitch contour, or c. repetition	- projection through physical human effort
- purposeful (i.e., organized/modulated) presentation	- story-telling
- stress and release	- rhythmic elements
- beginning and end	- beginning-middle-end

Table 1] Koskoff's classification of musical universals (1984).

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[2] 'For an element to qualify as universal, one must prove that it can clearly be found everywhere and that no contradictory examples are to be found. To the extent that such a demonstration had not been made, the elements should be considered as *hypothetically* universal, with a more or less strong coefficient of chance. In some ways, one can affirm that any element presented as universal is always hypothetically so, for the knowledge of the musical civilizations of the world is not exhaustive.' (Nattiez 1977: 98.)

[3] '…what we should ask about, when considering the problem of universals, is not whether the data

Further, Nketia observes that an artistic world-view of music is of a qualitative, rather than quantitative, type. The approach is empirical rather than general, and it proceeds from the general to the particular. Diversity is certainly inevitable in music, but 'it is accommodated in creative and conceptual terms through 1) the postulate of an archetypical source; 2) the concept of music as a world-wide art of which individual cultures are particular expressions; 3) the notion of complementarity and alternative modes of expression; and 4) the universality of aesthetic experience.' (Nketia 1984: 6.)

There seem to be good reasons to back this position. We can not call universal only those musical traits displayed by every single musical culture, otherwise the search for universality in music becomes quite a hopeless task. As François-Bernard Mâche has stated:

> It is all too easy to show that music is not a 'universal language', since the learning of its diverse dialects is always laborious: it involves passing from excessive ethnocentricity to an accepted and perpetuated anarchy. No one has ever imagined … that all musics are alike. It is not essential for data to match up in every detail, without exception, for them to be qualified as universal. It is enough that they should appear in independent contexts, and that their functioning presents analogies too precise to be put down to chance. (Mâche 1992: 42.)

Perhaps this is the right way to proceed. We cannot be 100% sure, but it is very likely that *homo sapiens* and, for instance, *Megaptera novaeangliae* constitute 'independent musical contexts'.[4] At the same time, it is not in principle problematic that a musical trait shared by humans and humpback whales is not also shared by, for example, nightingales.

In classifying universals, zoomusicology adopts the same basic tripartition proposed by ethnomusicologists:

1. *Structures*. The musical traits in themselves. Analysis of this level implies a large use of sound material, such as recordings and spectrograms, and aims to define the organisation of sounds in the species observed; e.g., range of

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itself is common to different cultures – any more than we decide whether there are scientific laws on the basis of particular physical events. What we should ask is whether, beneath the profusion of diverse and divergent particulars, there are any universal *principles of functioning*.' (Meyer 1971: 271.)

[4] According to Roger Payne, during the 53 million years separating pre-historical from modern cetaceans, there is no possibility for a significant acoustic contact to have occurred between humans and whales (Payne 1996: 177).

sounds covered, recurrent intervals, timbres, and so on. Mâche's *Music, Myth, Nature* proposes exactly this typology of research (Mâche 1992).

2. *Processes*. Acts and behavioural patterns related to the structures, in the fields of emission and reception. It is the realm of the para-musical, and it includes the whole cultural dimension of making music, with its rituals, social rules and so on. This level constitutes the best-known part of zoomusicological research, with many of its aspects having already been investigated by ethology. The same kind of analysis can be found in Thomas A. Sebeok's *The Play of Musement* (1981), in the chapter entitled 'Musical Signs'.
3. *Experience*. The level scholars, such as Gino Stefani, François Delalande, and Philip Tagg have provided propositions in their discussions about musical universals. Since musical experiences may be considered a general experiences that takes place between a subject (human or other animal) and an object (musical event), they advanced the idea that a universal feature in each experience is the restatement of particular conducts and competences. With similar presuppositions, this view may be used for zoomusicological purposes. If the first level was that of the objective, and the second of the cultural, this one is surely the level of subjectivity, the investigation of music as an experience lived by an individual (although it is clear that many of these experiences follow general rules).

This essay will focus on the musical processes, and particularly those that have to do with the management of space: the *where* of zoomusicology. Studying musical processes, firstly, implies that the subject of investigation is not only the sound object itself, for the latter becomes music only as it comes into relation with an animal. Processes constitute this relation, which is the ethological, behavioural aspect of musical activity. Hence, processes concern the use and function of music, its social character, the way it becomes an 'event', a cultural occasion, the way it is performed, the tools it is performed with, the role played by performers and listeners, the relation between such subjects, and so forth. Quite evidently, in many of these occasions, space plays a crucial role. Where does music happen? How important are body, posture and movement? Are there specific musical positions or spaces?

At least the following musical processes concern these matters:

1) the *social character of music*, i.e., music as a cultural, ritual and social occasion;
2) the crucial relation between music and bodily movement, notably *dance*;

3) the musical phenomenon as related to the *number of performers*, from soloists to duets to groups. In addition to purely structural issues (unisons, polyphony etc.), the topic carries interesting ethological implications, since its manifestations are strictly related to the function of each musical event;
4) the *cultural dimension of music*, i.e. what establishes conventions common to a whole community or species, in opposition to *individual nuances*, which result from different personalities, interests and sensibilities;
5) *imitation*, which is probably more a non-human than human musical issue, although it will soon become clear how basic this practice is for all musical activity, human or not.

Music as a social fact

Music and social life are very closely related. Before codifying music as a system of sounds and their organisation, humans and other animals must have codified their music as a system of social rules, starting from very basic ones, such as phatic coordination. That is to say, they establish, through music, certain roles and relations within the members of a community.

According to John Blacking, the emergence of such rules is not totally exclusive of each society, i.e. some universal patterns underlie the setting of those rules:

> Evidence of music-making in many different social and cultural contexts convinces me that patterns of music, and people's uses of them and responses to them, are *not* entirely arbitrary, that music's existence as a social fact is more than a result of purely contractual agreements in different societies, and that not only can human beings share feelings but this capacity is fundamental to human evolution…. (Blacking 1977: 17.)

Three main forms of the music-social life relationship can be distinguished:

1. *Music as a support of social facts*. Very often, music is chosen as a mere decoration or enhancement of social events. As Kenneth A. Gourlay puts it, music 'is inseparable from the occasion and purpose for which it is produced' (Gourlay 1984: 35). A large number of social occasions are supported by the use of music; from formal and informal ceremonies to commercial or ideological advertising. The best example, within the animal kingdom, is the celebratory usage of the howling that wolves perform after a successful hunt. In that case,

music, as a manifestation of joy, 'celebrates' and 'enhances' a social occasion, i.e., the pack, safe and warm, gathering after the hunt.

2. *Music as a causative factor for social facts*. Not only is music the 'result' of a social occasion, sometimes – quite often, in fact – it is also the *cause* of it.[5] Music can be used to establish certain social relations or social roles, thus playing an active role within a community, and interlocking with the more functional role illustrated in the previous point. There are many examples, but a good summary is provided by Frank Harrison, who classifies a typology of the uses and functions of music, emphasising five main categories: *reservation*, *communication heightening*, *invocation of the supernatural*, *multiple participation*, and message sending (Harrison 1977: 35). Among non-human animals, the obvious instance is mating-related songs, which are a distinctive sign for healthy and skilled males and – through the female's choice – establish a new social relationship between two specimens. Evidently, the same principle applies to group singing, when performed in order to improve communication or enhance group-feeling.
3. *Music as exteroceptively related to social facts*. Music, in itself, can be a sort of metaphor for social facts, i.e., it may portray – through structural elements – given social occasions or behaviours. As Alan Lomax puts it, '...the models of coordination and cooperation in singing, mirror and support the key patterns of everyday co-action, tradition by tradition, so that, in this way, art and social life are closely linked.' (Lomax 1977: 119.) In this case, the relationship between music and social facts is exteroceptive, i.e., musical structures reflect – mainly through certain *topoi* – the outer, non-musical world. The production of musical sense occurs also through models and processes achieved through social practices (see Stefani 1998: 17). In imitative practices among birds, for instance, the use of diverse musical sources as part of an individual composition, apart from displaying performers' skills, mirrors the variety and the events of the surrounding environment. Still, among birds, antiphonal and mostly 'alternating' duets are a metaphor of the relationship established between two mates.

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[5] 'The power of music is … due not only to its acoustical properties, but also to the social experience that its performance generates, in creating a quasi-ritual association and concentration of human bodies in time and space.' (Blacking 1977: 16.)

Kinaesthetic signs

As Bruno Nettl says, 'nowhere do we find dancing completely without musical accompaniment' (Nettl 1977: 5). Along with a few other traits, dancing is a really universal phenomenon, whose manifestations can be detected everywhere, in humans and in other animals.

Before any specific consideration of dance it is worth sketching a brief outline of the general use of the body in musical activities, and that involves posture, movements aimed to 'keep the rhythm', and so forth. Humpback whales, for instance, perform within 40–50 metres of the surface, with both flippers outstretched, and the whole body inclined forward at a 45-degree angle (see Payne 1982: 472). In wolves, the typical 'head up' howling position is very well known. And so on. According to some scholars, these musical positions are related to the global meaning that each species attributes to its own singing (e.g., courting and competition with other males). In other words, the musical positions could be a ritualised visual aspect, comparable to a peacock wheel. In this case, cultural-aesthetic interpretations, at least in the ethological sense, are possible.

According to Roger N. Payne, humpback whales adopt their position in order to allow blood to flow faster to their brains, helping them to recall their songs, which are notoriously long and complex (Paine 1996: 154). Thus, it would be interesting to verify whether certain positions belong to a more complex cultural dimension or a specifically musical one. We know that among many species, singing occurs not only in the mating period. We also know that every now and then, but not always, the male's exhibition is followed by a 'romantic encounter' with a female. In addition, the time between singing performance and mating can be so long that one might view the two activities as not necessarily being in a causal relation. If this is true, then the *musical position* is not necessarily part of the courting strategy – not exclusively, at least. Thus, why not think about specifically 'musical' positions? A human being, even when only an amateur musician, knows that certain postures help her to exploit her vocal resources, and knows even better that certain postures make her 'look' like a real singer (eyes closed, hand on heart, the gestures of rock stars, etc.). If whales are smart enough to help their blood flow to their brains, then why should they not be a little exhibitionistic as well?

Let us now focus on dance in the strict sense of the term. According to the many kinaesthetic manifestations of various civilisations, dancing often appears to be related to *spiritual* and/or *supernatural* issues. As Gertrude Prokosch Kurath reminds us:

> The prime function of dance is transfiguration, identification of the ego with other creatures of the visible and invisible world. Dancers effect transformation by mime of revered animals, of other human beings, of supernaturals. They reach for the spirit world in healing trance or euphoria.
>
> They accomplish their aims by means of the universal tool, the human body, moving according to basic physical principles, in space and time. Thus they manipulate the same tool for all techniques, for traditional, regional folkdances and for ubiquitous modern art dances. (Kurath 1977: 43.)

It is a widely-held opinion that such issues are a strongly species-specific characteristic of the humans species, and – despite remarks by Charles Darwin (1871 and 1872) and others – that can hardly be denied. Yet, vague forms of somehow spiritually-connoted aesthetic performances are detectable in other animals, as well. Perhaps not by chance, a convincing example comes from chimpanzees, the closest relatives of humans. Jane van Lawick-Goodall, during her very long and well-known experience with great apes in their habitat, describes what she calls a 'rain dance' (Lawick-Goodall 1971: 54). Of course, as Sebeok remarks, the meaning of this behavioural pattern is not at all clear (Sebeok 1981: 219). However, what seems to be certain is that chimps dislike rain, and thus their dance is possibly not a way – as it is with humans – to invoke water. Is it then to make it stop? We do not know, but a display of disappointment is probably the simplest option. But one cannot exclude a certain rough degree of spirituality (i.e., the claim that the very act of rain-dancing has some kind of influence on the weather conditions). In both cases, there should be no doubt that we are talking about an aesthetic behavioural pattern.

Another universal in dance is the *circle figure*. Kurath notices that:

> …the geometric ground plans of group progressions are variations on basic principles, the use of curves or straight lines. Circles are universal, be they closed or open, may the dancers face a central object or the direction of progression. Open circles are really lines that curve into arcs and can develop into meanders or spirals under the guidance of a leader. The direction of circling is important. (Kurath 1977: 47.)

A good instance of this universal kinaesthetic feature can be found in chimpanzees, who display a peculiar performance that Curt Sachs described as a 'genuine round dance':

> In mock fighting two of them drag each other about on the ground until they come near a post. Their frolicking and romping quiets down as they begin to circle about, using the post as a pivot. One after another the rest of the animals appear, join the

> circle, and finally the whole group, one behind another, is marching in orderly fashion around the post. Now their movements change quickly. They are no longer walking but trotting. Stamping with one foot and putting the other down lightly, they beat out what approaches a distinct rhythm, with each of them tending to keep step with the rest. When two posts or boxes stand close to each other, they like to use these as a centre, and in this case the ring dance around both takes the form of an ellipse. In these dances the chimpanzee likes to bedeck his body with all sorts of things, especially strings, vines, and rags that dangle and swing in the air as he moves about. (Sachs 1937: 10.)

Apart from the idea of the circle, this report recalls another aspect that is universal, culturally-related, and erroneously considered exclusively human: *body adornment*. This feature is displayed not only by apes, but by many bird species, too.

One of the main elements in dance, as in all other forms of art that involve groups rather than individuals, is *organisation*, in the sense of *coordination* and *cooperation* between members of a homogeneous group (see Kurath 1977: 48). Consider this description of the dancing performance of a group of cranes, as reported by Anya Peterson Royce:

> There were some hundreds of them, and their dance was in the manner of a quadrille, but in the matter of rhythm and grace excelling any quadrille that ever was. In groups of a score or more they advanced and retreated, lifting high their long legs and standing on their toes, now and then bowing gracefully to one another, now and then one pair encircling with prancing daintiness a group whose heads moved upwards and downwards and sideways in time to the stepping of the pair. At times they formed into one great prancing mass, with their long necks thrust upward; and the wide swaying of their backs was like unto the swaying of the sea. Then, suddenly, as in response to an imperative command, they would sway apart, some of them to rise in low, encircling flight, and some to stand as in little gossiping groups; and presently they would form in pairs or sets of pairs, and the prancing and bowing, and advancing and retreating would begin all over again. (Royce 1977: 3–4.)

The *presence of spectators*, standing before or around the performers, is characteristic not only of dance, but of music and theatre, too. Spectatorship is a very culturally-connoted aspect in artistic performance, and mostly a display of aesthetic pleasure and amusement.

> [A] group of some twenty mountain chickens of a brilliant orange-yellow colour, gathered together in a kind of dance characteristic of these beautiful birds. In the centre, one of the cocks executed the dance-like movements, as he hopped about the open place with wings extended and tail outspread. On the branches of the bushes

> round about, the others sat and expressed their admiration of the dancer with the strangest sounds. As soon as one cock was exhausted, he joined the spectators, uttering a peculiar cry, and another took his place. (Sebeok 1981: 218.)

Most interestingly, this example puts into evidence a few points:

1. The above-mentioned idea of *performers-spectators*: a culturally-crucial feature of the performing arts;
2. The *performer in the middle/spectators around* set-up: a sheer universal, found in many popular traditions, both in dance and music;
3. The idea of the 'event', *the show*: the birds actually 'gather' in that place in order to perform; whether or not the dance is for mating purposes, the point is that the twenty cocks and chickens group together in order for each one to exhibit himself/herself;
4. The idea of *applause*: as each bird would perform, the others 'expressed their admiration of the dancer with the strangest sounds' (Sebeok 1981: 218).

From these observations, the phatic dimension of dance emerges quite prominently. A most interesting case comes from the geese of the species *Anser anser*, and it is called the 'ceremony of triumph' (Mainardi 1992: 122–123). In its simplest form, the ceremony occurs as a couple of mates, with or without offspring, meet an unknown male of the same species, who may or may not be invading their territory, but surely may represent a threat to the female. The male of the couple then furiously attacks the intruder, arching his neck over him. Usually no fights occur, for the intruder does not have aggressive purposes. Yet even in the case of challenge, for the same reasons, he does not keep up the fight for long, and soon leaves. The aggressor soon turns towards his mate, then both start an apparently euphoric dance, by quickly moving their heads and necks up and down, and uttering their typical nasal sounds.

Insects, too, display an incredibly wide range of dancing performances, most of which are closely related to mating. Nymphalid butterflies are among the most creative dancers.

> First, [the male] flutters his wings in front of the female. Then he slightly raises his wings to show the beautiful white black-rimmed spots. He opens and closes his wings rhythmically, his antennae quivering. This lasts from several seconds to one minute. Then (and this is the most gallant posture) the nymphalid male raises his fore wings, opens them wide, and bows deeply. Next, still bowing, he folds his wings back, tenderly pressing the antennae of the female between them. This is a butterfly kiss! And

> it is not only a posture: on the male's wings, exactly where he is pressing the female's antennae, are scent glands – a sign of his masculine maturity. He opens his wings, turns around and starts a fast dance: he circles around the female with the air of a very successful suitor. (Akimushkin 1988: 106–107.)

Spiders, too, seem to be very well trained dancers. Igor Akimushkin compares some of their performances to classical ballet:

> The dance of the small spider Attulus (it is only 3.5 millimetres long) is reminiscent of classical ballet. Propped up by his three pairs of legs (spiders are endowed with long legs indeed) he extends his two front legs to the sky and, sweeping them gracefully, skips sideways to the right. Then he freezes for a second, skips to the left, swaying his 'arms' coquettishly. (Akimushkin 1988: 107–108.)

These latter performances, which reflect the ordinary movements of the everyday life of these insects, are related to another universal of dancing: very often, the movements of daily tasks or activities are 'aestheticised', then converted into some dance form (see Kurath 1977: 44).

Still, among insects, there is an interesting example in which dancing is not only the ideal aesthetic accompaniment to mating-related singing, but also a useful strategy for *continuing* courtship, *in place of* singing. This is the case with green grasshoppers (see Hart 1998: 48–49). Instead of attracting females, a male grasshopper who performs a mating song runs the risk of signalling his presence to a bat, one of his main predators. The typical thrilling staccato, composed of a wide range of frequencies, is an easily locatable signal. Male grasshoppers face the problem in two ways: first, they perform much higher or lower kinds of trills (thus reducing the range of frequencies); second, as soon as they locate a female, they stop singing and complete the mating ritual with a silent dance.

Another, curious, example comes from cichlid fishes:

> The mating ceremonies of cichlids, such as Tilapia and Haplochromis, begin by staking out a plot at the bottom. There the male lies flat, beats his tail against the water and spins on the spot to dig a small depression in the sand. Then he sets off in search of a female. As soon as he finds her, the male performs his dance. A Tilapia male slowly swims sideways in front of the female, bending his head at a 30° to 60° angle. If the female stops, he waits for her. And then again, in the same strange posture with his head down, he swims sideways towards his hollow, leading his mate. (Akimushkin 1988: 113–114.)

This performance – and, in fact, all the others – stresses the importance of the dancer's contact with space. 'He moves in certain directions, cuts lines in the air with his body and arms, and with these lines he creates decorative designs and evokes emotions.' (Kurath 1977: 47.)

What about whales? Do such enormous animals dance? The word *Megaptera* derives from ancient Greek, and means 'big wings'. The humpback whale's big wings are of course its pectoral flippers, quite a bit bigger than those of any other species of whale, and vaguely recalling bird wings. In 1979, Roger Payne, Sylvia Earle and Al Giddings (see Earle 1979) first, and Jacques-Yves Cousteau eventually (Cousteau, Paccalet 1987: 237), discovered a particular use of the 'big wings' when singing. '…Al [Giddings] located the singer some fifty or sixty feet down. As it sang, the whale lifted its great flippers forward, then back, in rhythm with phrases of the song.' (Earle 1979: 5.)

Zoomusicologically speaking, such a behavioural pattern can be interpreted in two ways (either separately or at the same time). On the one hand, there is a merely musical motivation. Humpback whales often deal with rhythmical elements within or in opposition to the strictly melodic parts of their songs (see Payne 1996: 155–156). Thus, the lifting of flippers may be a) a percussive element; b) an attempt to rhythmically frame the song; or c) an attempt to produce further sounds (such as splashes) to include as part of the song. On the other hand, this pattern can be interpreted as a mere game, i.e., quite simply, an attempt to make the whole thing more amusing and richer.

Duets and groups

The at-once subjective and social character of music is well demonstrated by the presence of individual and/or group performances. Animal species, to different extents, perform in both ways. Statistically, solo performances are the more numerous, which also applies to humans; group performances of music occur less often than all the diverse solo performances (from conservatory practicing to singing in the shower). On the other hand, sharing aesthetic experiences with various numbers of one's fellows is a typical characteristic of music and musicality, possibly more than of other art forms, such as painting or sculpturing.

In analysing group performances, a distinction needs to be made between duets and groups (i.e., from trios on). A separate treatment for duets is necessary since the characteristics of this type of group musical organisation are quite idiosyncratic and autonomous, as compared with the other ones. In birds, certainly the class best known for singing in pairs, several types of duets can be distinguished:

1. *Antiphonal*, i.e., when singers alternate during the performance. Antiphons may be performed on the same pitch or, more interestingly, at different pitch levels. In such a case, 'one of the partners, instead of completing the common phrase, repeats it by transposing it. Among these examples, which inevitably recall human musics, we can cite the duet of African wood-owls *Ciccabi woodfordi* …, in which the pair holds a peaceful dialogue by repeating the same melodic-rhythmic ritornello, but exactly an octave apart. The African scops-owl *Otus senegalensis* does the same, but at an interval which is slightly more than a tone [away].' (Mâche 1992: 145.) Further, an antiphon does not necessarily consist of the repetition of the same melodic part, but rather of each performer making its own sounds.
2. *Unison*. Sometimes the singers are perfectly coordinated and perform identical melodies so that it is very difficult to discern that the song is actually a duet and not a solo. This type of duet has gone unnoticed (and is considered a solo performances) exactly because of its perfect unisonic coordination. As Mâche emphasises, 'this is particularly the case with several duets in which the notes alternate and complement one another very rapidly [so as] to create a very precise figure. Whether or not they serve to eliminate adulterous suitors from the couple, the sound result is exactly that of the medieval hocket. Percussive duets have also been spotted among storks and some American woodpeckers.' (Mâche 1992: 147.)
3. *Countersinging*, finally, occurs when the singers perform at the same time, but with different rhythmic and/or melodic parts.

These distinctions do not imply the priority of one practice over another:

> The notes of the duet constitute polyphonic singing, such that the pitch, timing, and phrasing can, to a large extent, be controlled very exactly, but can also be varied by the singers. Either sex can start and the other finish, either bird can sing the whole pattern alone if the partner is absent, and, when the partner returns, the two birds can either duplicate in perfect time or resume antiphonal singing. (Sebeok 1981: 224.)

In terms of function, one can distinguish among five types of duets. In all of them, the spatial dimension (an especially interpersonal distance) plays a crucial role:

1. *Duels*. These occur between two different species or between two members of the same species or community. They consist of a musical challenge, in which the most enduring or inventive performer wins, by reducing the opponent to silence.[6] Duels should not be confused with territorial duets, which fulfil a different, more biological function. The plausible explanation for duels is pure amusement[7] and, probably, training for *serious* singing (i.e., territorial or mating songs). In fact, both functions should be considered as one: within the whole animal kingdom, thus including humans, having fun is also a way for children and adults to learn useful activities.
2. *Territorial duets* occur at the moment of territorial division, and basically consist of countersinging or antiphonal singing.[8] The communicative function is thus connative.
3. *Mating duets* take place during the process of courting and can involve either male and female, or two males competing for the same female.
4. *Phatic duets* have the explicit function of enhancing the feeling of union between a couple – a John Lennon and Yoko Ono kind of thing, one might say.
5. *Referential duets* occur especially in tropical areas, where dense vegetation prevents animals from seeing each other. In such a case, singing signals or synchronises each one's position, as in the following case of the platyrrhine monkey *Callicebus moloch*: 'When two or more individuals are within twenty or thirty feet of one another, their songs tend to be very closely synchronised, note by note; synchronisation usually breaks down as the distance between individuals increases. This sort of timing probably has one important advantage, to enable singing individuals to judge, with very great precision, their relative positions *vis-à-vis* one another.' (Sebeok 1981: 227.)

Even among amphibians, interesting forms of countersinging may occur. Mâche illustrates an interspecies duet between the Mexican smilisca *Hyla Baudini* and

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[6] '…as in the middle ages an oratorical contest put the loser 'to quia', when he failed to find the ultimate elusive reply' (Mâche 1992: 124).

[7] Often, the winning singer keeps on performing after the challenge.

[8] '…it is tempting to put this practice in parallel with a very old poetico-musical tradition of the agonistic type. The 'alternating' songs of shepherds from antiquity, transposed for example by Theocritus in Idylles 5, 8, 9 etc. and still practised today in Crete, or again the *sfide* from Sicily, consist of improvisations of sung distichs. The imagery is to a large extent traditional, and the rule of the game is that the theme, the metaphor, used by the adversary in the preceding distich, is taken up again, to outbid or contradict: a final arbitration determines the winner. Musical contests in India consist similarly of an assault of virtuosity and invention in embellishments, each of the two adversaries – the percussionist and the melodist – trying to make the other lose the sense of the melodic (raga) and rhythmic (tala) framework chosen as the battle zone, by multiplying the virtuoso embellishments and [by] complicated prolonged syncopations.' (Mâche 1992: 144.)

the burrowing tree frog *Pternohyla fodiens*. Their countersinging is organised like 'a short piece of music in which, after their successive entries, the two voices with their bassoon-like timbre become superimposed with a quasi-scholastic rigour' (Mâche 1992: 145).

Occasionally, among tree frogs, a third singer joins in to form an apparently well- coordinated trio. The technique is that of alternating the parts, not necessarily in a strict antiphonal fashion, i.e., not the identical repetition of melodic parts. From a human perspective, the result is hardly intelligible as music.[9]

The latter example opens the door to group performances. Insects, amphibians, canidae and cetaceans are probably the creatures most devoted to group singing, at least quantitatively speaking: humpback whales can sing as soloists, duets, trios, 'or even choruses of dozens of interweaving voices.' (Payne 1979: 19.) Birds, as mentioned, are more specialised in duets, but may often perform in larger groups. Marsh warblers are a good example, since they often gather in order to perform together:

> We know of duets, trios, quartets and even quintets between males of neighbouring territories. This activity, called 'social singing', evokes the human practices of chamber music. It only develops in sunny and still weather, for about five to ten minutes, perhaps ten times shorter than ordinary territorial song. As soon as it is the time for one of the participants to go to relieve his female guarding the nest, and he has returned, all the participants are silent. Some travel daily more than 200 metres from their positions to participate in this musical get-together. Others stay away; but many return to the venue of the 'concert', generally a neutral zone on the boundaries of several territories, to resume their part as soon as they have been replaced by the female on the nest. The daily concert is gradually abandoned, even if it is fine, when the number of participants becomes insufficient: absenteeism is rife in birds too, and compromises this activity for which zoologists have found no justification other than an aesthetic one. (Mâche 1992: 147.)

From duets to ensembles, animals manage their group performances more or less as humans do: countersinging, unison, antiphonal singing – between a duet and also between a soloist and a choir – and even group performances 'enriched by solo virtuosisms' (Cousteau, Paccalet 1987: 237).

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[9] 'But if we consider that in North Cameroon, a large musical festival is judged the more brilliant when several orchestras each play their own music simultaneously, we will not see here any negative criteria for the resemblance between animal and human musics.' (Mâche 1992: 150.)

Individuals, dialects and cultures

The presence of individual musical traits in certain non-human animals is not limited only to species that possess a wide collection of sounds and songs:

> Individuality is as common in birds with small repertoires as in those with large ones. It occurs, for example, in chirping sparrows that have only one song per individual … and in mistle thrushes and blackbirds, with large individual repertoires [---]. In view of the increasing attention being given to the use of song in classification of the taxonomically difficult tyrannid flycatchers, it is worth remark[ing] that each individual pewee sings his own kind of song every morning; his individual traits persist throughout the season. The individual traits concern every characteristic of the singing. Songs of individual ovenbirds differ in pitch, speed, and details of phrasing [---]. Oregon juncos show great individuality in the structure of the syllables from which the song is made up [---]. Two individuals rarely share identical songs. (Hamilton, Marler 1966: 447.)

The balance between individual traits and common features is not necessarily weighted in favour of the latter. In certain species, the diversity of singing patterns within a population is so great that only a few elementary properties of the singing pattern are shared by its members. In the brown towhee, whose main part of the song is a trill of repeated syllables, scholars have described an extraordinary range of syllable types within one population (see Hamilton, Marler 1966: 447). Within a basic framework of patterns that resemble each other in terms of structure and duration, a high degree of intra-population variability is displayed.

The cultural aspects detectable in animal singing are also interesting. It is widely known that birdsong is almost totally a learnt skill. Notorious experiments have demonstrated that, if a bird is raised outside contact with its own family or even species, it will learn the repertoire of its adoptive parents; and further, the new songs will be transmitted from generation to generation. Specimens that become deaf soon after birth develop very poor and incomplete songs (thus proving that singing is also partly innate). Finally, the existence of widespread practices such as imitation and vocal mimicry proves how crucial the learning element is among animals.

What is significant for the topic discussed in the present essay is the presence of dialects. Members of a given species from one community tend to resemble one another (usually quite closely) in certain traits of their singing; and those from a community located much further away tend to have a progressively different pattern of average singing traits. As noticed by William H. Thorpe:

> …sometimes such dialects often seem to serve no particular function, being no more than an accidental outcome of the way in which the song matures. Perhaps … they help to make the song signal more effective by reducing local variability. But in certain cases they must surely help in the early stages of genetic divergence. (Thorpe 1972: 160.)

Dialects also seem to be fundamental in terms of individual recognition:

> …within the local dialect the individual birds can develop their own peculiarities of song so that this can now serve the additional function of individual distinctiveness. An interesting case of this is shown by songs of the bou-bou shrike *Lanarius aethiopicus major*…. Here, the members of a pair learn to perform duets with one another and, while adopting certain phrases and rhythms which are characteristic of the locality, work out between themselves the duets which are sufficiently individualistic to enable the bird to distinguish and keep contact with its mate by singing duets with it – or, to be more exact, singing antiphonally with it – in the dense vegetation in which they usually live. (Thorpe 1972: 160–161.)

Examples of dialects occur among practically all mammals, but the paradigmatic case of cultural transmission of songs in humpback whales certainly allows us to make general observations about the whole issue. The extreme complexity and constant variability of whale singing is well known. Humpback whales' songs are far from monotonous, and each specimen provides them with several, progressive and individual changes. As soon as modifications occur, the innovations of a song are learnt by all males in the same mating area, so that, at some point, everyone is performing more or less the same version. Singers constantly change their songs to keep in step with the group. As males change areas, a common occurrence, songs and repertoires are exchanged in several zones, and specimens from the same ocean end up singing quite similar tunes (see Payne 1996: 161). The process of variation and geographical exchange in singing, thus, follows the same rules as the folk songs of oral tradition. Each community has its own repertoire, but it is flexible and mixable with others, including new songs, and providing more-or-less evident modifications of the old ones.

For the record: the geographical characterisation of musical dialects is so evident that it is nowadays more useful for population surveys than are traditional methods. In practice, instead of collecting data through the sighting of specimens, many scholars have started to base their information on each specimen according to the type of song it performs (see Payne 1982: 464).

Imitation

Sound imitation normally implies re-elaboration, abstraction, arrangement, ritualisation, and organisation, as well as playing and having fun with sounds. All of these activities are fundamental aspects of music-making. Music in itself *is* a form of imitation, when one considers the use of musical models, conventions and archetypes. The musician takes inspiration from the soundscape that surrounds her, and very often her musical attempts are conscious reproductions of it (Messiaen's use of birdsong in his compositions is a most revealing instance).

Birds are no doubt the class mostly devoted to imitation.

> [There are] species which mimic widely: the mocking bird (Mimus polyglottos) in the United States, the starling (Sturnus vulgaris) in Europe, and the racquet-tailed drongo (Dicrurus paradiseus) in India are good examples. These birds are something of a puzzle since it is not at all clear what biological advantage is achieved by imitating other species. The Indian mynah *Gracula religiosa*, however … shares with the parrots the peculiarity that, while supreme imitators in captivity, they have never been heard to imitate any other species in the wild. [---] It appears that these mynahs do, in fact, imitate, but only other mynahs: since mynah calls are of such a wide range of patterns and of such acoustic complexity, this imitation is undetectable by man's ear without long training and close study of neighbouring individuals. When, however, these birds are hand-reared, they seem to imprint very easily and thus they imitate all sorts of noises in their own environment, particularly the noises most closely associated with human beings. Hence their fame as mimics. (Thorpe 1972: 161–162.)

The notion of soundscape is here crucial. The case of the Superb lyrebird is emblematic. During the mating season, the male of this beautiful species embellishes his songs with all sorts of decorations, taken both from the extraspecies or inanimate soundscape – such as claxons, dogs' barking, even electric saws – and from other birds (such as cockatoos and kookaburras, which in turn produce quite varied and complex songs). Sounds are reproduced, re-arranged, or otherwise combined in an original fashion. Such a huge collection of sounds is exhibited to the female as if they were war medals.

Another interesting case is the marsh warbler, who can imitate about forty species, sometimes very faithfully, and sometimes through complex processes of re-arrangement, which lead the songs to very distant points from the original model. What the warbler actually does is assemble a very complex musical 'Frankenstein' of the sounds that surround it:

> It is not in doubt that practices like that … consisting of integrating into the song alarms and other cries of different species, and of reciprocally constructing alarms, i.e., purely functional signals, by integrating fragments of foreign songs, suppose a kind of faculty of typically musical abstraction. Instead of reacting instinctively to a stimulus, the bird pleases itself: it plays with this international S.O.S. that an alarm is (always understood as such by other species present), by reducing it to simple sound content, proper to its being reused as a kind of musical material. The relative neutralisation that this musical material has to undergo seems to prove, on the bird's part, both the capacity to classify it in a formal category and a musical imagination [capable of] finding for it another function within the song in which it is re-deployed. (Mâche 1992: 153–154.)

A curious case of imitation occurs between the rock thrush *Monticola saxatilis* and the black wheatear *Oenanthe leucura*. In this case, the two species imitate each other's songs as a display of neighbourliness, something like what happens among humans, as when one country hosting a diplomat from another country performs the visitor's national anthem.

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