

# Chapter 3

## Interspecific Cultural Studies and Humanities: The Comparative Study of Animal Traditions Beyond the Separation Between Humanities and Life Sciences

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**Abstract** The introductory part of the chapter will display its whole purpose and topic. First of all, this section of the book aims to clarify the situation of both humanities and behavioural sciences after the discovery of animal thought and cultures. In other words, after the fundamental theoretical assumptions of these two scientific traditions were empirically refuted: the idea of man as the only thinking and cultural animal and other animals as mechanically explainable entities. From this the need for a critical and self-critical re-foundation of both humanities and behavioural sciences arises. A process which is in fact already underway but is still not reflecting enough on the level of theoretical elaboration and on the practical level of a reform of scientific training and research. This need for a new organization of university and post-university education, transversal to the bipartition between human and life sciences, and of meta-disciplinary forms of organization of the basic and applied research, on which the chapter aims to focus, is in various respects close to the goal of a radical self-reform of humanities proposed in Martinelli's *Manifesto of Humanities* (Martinelli 2016). In this specific case, the pivot or pillar of this "revolution" of humanities is identifiable in the attempt to reorganize the humanistic field as *Interspecific Cultural Studies*. That is, as a meta-disciplinary area able to assume a post-anthropocentric approach towards its topics and collaborate, each sector starting from its own specificity, on an enterprise that we are attempting in our age for the first time: to insert the study of past and present human cultures into the broader context of a comparative study of *all animal cultures, existing and existed*. This enterprise would imply, as its indissoluble condition, the commitment to protect the survival of these animal cultures and of the natural environments in which they have evolved. The following section presents, in extreme synthesis, the state of the art of cultural ethology. The third section introduces, in an equally concise way, the emerging etho-centric approach to the explanation of evolutionary processes in contrast to the geno-centric one, recognizing not genes, but explorative and cognitive behaviours, experiences and cultural traditions as the main driving forces of animal evolution. The fourth section illustrates the basic characteristics of the meta-disciplinary area indicated in the chapter as *Interspecific Cultural Studies*

(ICS) and their close affinities with the program of Numanities. The fifth section focuses, within the ICS framework, on a particular project and object of research: the study of the cases of *Interspecific Cultural Convergences* (ICC). These are cases in which a technique, an invention, a discovery, an expressive form or use have been independently developed not only by different populations of the same species, but also by *societies and traditions of different animal species*. The last part illustrates one of the best-known ICC cases: *singing*. A widespread expressive form in all human cultures and in primates genetically and phylogenetically quite distant from us such as Hylobatidae, Tarsius, Indri and Callicebus yet not among our sister species (chimpanzee, bonobo, gorilla). An expressive form developed by animal species as diverse and from a genetic, phylogenetic, morphological and ecological point of view as different as birds, mice and whales. The diffusion of singing in so different clades and environments obviously cannot be explained as a case of homology (similar characteristic inherited by common ancestor), because the ancestors common to birds and mammals did not sing, just as those common to insects and birds did not have wings. It is instead the result of mutually independent, but in some aspects similar, evolutionary processes and social or ecological selective pressures. It can be adequately understood only by identifying and comparing the *biological and social functions* that this kind of expression plays, and the *forms* it has assumed, in all these animal communities, just as is commonly done by comparing human singing traditions and performances. In the ICS perspective, this approach can be extended to the study of *all aspects of animal cultures* and of all cases of ICC found.

### 3.1 Introduction

From Aristotle's time to the first half of the twentieth century, studying past or existing cultures, reconstructing their history, analyzing and comparing their languages, productions and traditions signified dealing exclusively with *human* culture, as Man was considered the only "cultural animal".

Today, just over half a century since the beginning of that scientific revolution which, in the 1960s led to the discovery of different traditions in various species of primates, cetaceans and birds, cultural ethology is still a very young discipline, but we can affirm that the existence of non-human cultures is widely proven and the hypothesis that *all* existing species of mammals and social birds have, over millions of years, developed their own uses and dialects is highly probable.<sup>1</sup>

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<sup>1</sup>How are the concepts of "culture" and "tradition" in the ethological field defined today? Ethologists are in broad agreement on a trans-specific notion of "culture" that implies, as its necessary and sufficient conditions, the existence of systems of transmission of experiences and uses to other individuals and generations, through learning/teaching processes (de Waal 2001: 11; Martinelli 2011: 230). They "refer to as 'cultural traits' those behavior patterns shared by members of animal populations that are to some degree reliant on socially learned differences between individuals,

It is also demonstrated that this differentiation of uses and languages, handed down through social learning in different populations of the same species, is not an exclusive prerogative of mammals and birds. Research performed over the past forty years has highlighted the existence of intra-specific local traditions in various species of teleost fish, particularly among species that live in the coral reefs (Helfman and Schultz 1984; Bshary et al. 2002; Laland et al. 2011), and this fact reinforces the hypothesis that analogous phenomena can be found in all aquatic and terrestrial vertebrates that derive from bony fish.

Therefore, the world of animal cultures appears to us, today, as an immense, yet almost completely unknown universe, because so far, humanity has lived next to it without recognizing it as such. At the same time, it presents itself to our eyes as a world whose survival is increasingly threatened by anthropic impact, or rather by our models and processes of economic and social development.

In our age the greatest mass extinction of animal and plant species ever recorded is currently underway and consequently, almost all existing animal cultures are, in fact, *hunted cultures*, from which larger and larger portions of living environment are subtracted on a daily basis for purposes related to human profit.

In my opinion, it is exactly this interweaving of ethological, ecological, socio-cultural, philosophical and ethical problems, that anyone who studies animal cultures is used to facing, that today requires a full development in the field of research indicated in this essay as Interspecific Cultural Studies. An area to be understood not just as something completely new that the author of this paper would like to propose, but rather as the set of heterogeneous skills, transversal to traditional disciplinary blocks, necessary to investigate a new object of study, about which we began, to learn just sixty years ago, such as animal cultures. The problems inherent in their study, in fact, can be adequately addressed, *to a theoretical level*, only by attempting a critical overcoming of both the anthropocentrism and anthropo-denial rooted in the humanist tradition and mechanistic approaches to the study of the evolutionary processes and animal behaviour, rooted in the biology and behavioural sciences of the twentieth century. They can be adequately addressed, *on a practical level*, only through a radical reform of paths of scientific training and organization of basic and applied research. Reform that must aim at overcoming the bipartition between humanities and life sciences and educating generations of students, scholars, environmental, social and cultural operators to manage skills that are transversal to those offered by these two traditional disciplinary blocks. This overcoming undoubtedly implies a not easy, individual and collective effort of self-renewal and dialogue, a willingness of all the 'actors' involved to explore fields other than those of their traditional sector, to exercise a self-critical reflection on one's disciplinary, methodological, theoretical and conceptual traditions. It appears, however, indispensable for safeguarding and re-launching the critical vocation, the social relevance and reliability of the sciences and of their forms of application.

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observed within or between populations, that are to some degree attributable to differences in what they learned socially. We treat tradition' and 'culture' as synonyms" (Laland et al. 2009: 178, 179).

The objective of the ICS is to outline graduate and post-graduate training programs and research methods aimed at providing and applying the intertwining of ethological, ecological and socio-cultural competences that is today necessary to critically connect the comparative study of human cultures and the comparative study of the cultures of other animal species.

For humanities, first of all, this task requires the effort to insert, acknowledging the facts, the history of human cultures in the much older and broader history of animal cultures, the comparative study of human cultural productions and of their forms of diversification and contamination, within the immensely wider, but still debutant, field of the comparative study of animal cultures and of the processes that lead to their birth, differentiation, dissemination and contamination.

The project to overcome traditional didactic and scientific paths, from which these pages are inspired, presents evident points of convergence with that of Numanities, outlined by Dario Martinelli in the volume *Arts and Humanities in Progress. A manifesto of Numanities* (Martinelli 2016). The need to “defend and promote critical thinking” proposing a reflection on “the position of the humanities in modern society” and on their “crisis” (Martinelli 2016: 11) and the effort for “working on relocating and redefining the humanities” (Martinelli 2016: 9), which the author indicates as the global goals of Numanities, are also fundamental to the ICS program, as provisionally outlined in this chapter. The method focused on discussing “the current crisis of the humanities and its possible solutions, in a spirit that should be both critical and self-critical”, based on very “Multi/Inter/Cross/Trans-disciplinary dialogues between humanities and social and/or natural sciences”. The attention to “the context, dynamics and problems of current societies” (Martinelli 2016: 9), that the “Manifesto” proposes also characterizes the ICS approach.

The effort to promote a transition of humanities beyond the anthropocentric approach and rethink them as Interspecific Cultural Studies, or as a set of disciplines devoted to the comparative study of all existed and existing cultures (not only human), should be part of the programmatic objectives of Numanities and could constitute the specific contribution of the ICS to their development.

To give a pair of non-random examples, I think that today, in any university course and whatever its disciplinary field may be, it should not be considered tolerable that students can finish their studies without having taken courses and topics that allow them to develop an awareness of the current global environmental crisis and of the global and local ecological problems linked to their field of study, or of the environmental impact of the production and distribution cycles that concern them. In fact, it is unthinkable that there are now areas of knowledge that can be called out of the problems linked to the devastating effects of the anthropic impact on the environment, on millions of animal and plant species, on all the human beings. Social ecology, as Murray Bookchin called it (Bookchin 1980, 1990), represents, therefore, an area of study that our age must consider transversal, and necessary to all the forms of knowledge and formative paths.

Similarly, in my opinion, no disciplinary field should today endorse that traditional kind of human mythology according to which “man and culture originated simultaneously, by definition” (White 1959: 5), because it is now adequately demonstrated that this is not the case.

Contributing to the de-mythologizing of this atavistic anthropocentric arrogance, and to a transition of the humanistic culture beyond it, also means contributing to the search for models of society and forms of social and scientific development alternative to those in force (descendants of that haughtiness) and capable of reversing their course showing respect towards the environmental, social and cultural disasters they have provoked.

In fact, the ability of human and natural sciences to preserve their social relevance, exercise their critical role rise to the challenges that await them will also depend on the ability of the present generations of scholars and students to question themselves and to overcome secular prejudices and obsolete paradigms, trying to boost a collective critical and self-critical re-establishment of human knowledge.

### 3.2 From the Discovery of Animal Cultures to Contemporary Cultural Ethology

In the second half of the twentieth century developments in ethology led to one of the most revolutionary discoveries of contemporary science: the existence of animal cultures.

This falsified (in the Popperian sense), or empirically refuted one of the fundamental assumptions of our philosophical and scientific tradition, that of man as the only “cultural animal”. Therefore, it questioned the same *founding partition of western sciences: the division between humanities, conceived as sciences of culture, and natural sciences.*

Two field studies, introduced to the scientific community in the mid-1960s, allowed this amazing discovery. The first, directed by Junichiro Itani, Shoji Kawamura and Masao Kawai, disciples of the Japanese ethologist Kinji Imanishi, began in 1948 on the island of Koshima, where a community of macaques (*Macaca fuscata*) lived then and still does today. The second, promoted by Louis Leakey, the most authoritative anthropologist of the time, began in 1960 and was carried on by Jane Goodall, who was the first scholar to study the behaviour of chimpanzees in their natural environment, in the Gombe Stream Chimpanzee Reserve, in Tanzania.

In 1953, the observation of macaques made Satsue Mito, an inhabitant of Koshima aide to the three ethologists, the first human witness to the birth of a tradition within a community of non-human animals (de Waal 2001). Western scientific community became aware of this discovery in 1965, when Kawai published a paper about it in the scientific magazine *Primates* (Kawai 1965).

Meanwhile, in 1960, Jane Goodall had begun studying the chimpanzees at the Gombe Stream Chimpanzee Reserve, a site that, thanks to her efforts, would become

a protected area from 1968. She was the first scholar to discover several important aspects of the social, emotional and cognitive life and material culture of chimpanzees: their ability to build wooden tools and exploit them to obtain food, the techniques used to open coconuts by choosing, carrying and using different stones in the form of anvils and hammers, the existence of cultural differences between groups, the complexity of their social structures and the differences in sensitivity, intelligence, character and preferences in every single individual.

But, in the 1960s, also another sub-field of ethological research began to contribute to the birth of cultural ethology: the study of the communicative systems of singing birds. It led to the discovery of “dialects”, which are regional and macro-regional differentiations of songs within a species. In fact, Peter Marler and Miwako Tamura, pioneers in this development, had in the early 1960s already discussed “Song «Dialects»” (Marler and Tamura 1962) and “culturally transmitted patterns of vocal behavior” by sparrows (Marler and Tamura 1964).

The debate on the philosophical and scientific consequences of these discoveries began to develop in the 1970s and intertwined with the discussions on animal minds arisen by some comparative psychologists who studied the ability of “higher primates” to learn man-made languages as the ASL, or *American Sign Language* (Miles 1994; Fouts 1997; Patterson 1999), and other techniques of interactive use of human lemmas or symbols (Premack 1986; Savage Rumbaugh 1977), to recognize themselves in the mirror (Gallup 1970; Povinelli 1987) and solve several cognitive problems (de Waal 2016).

Despite their methodology, based on observations in captivity and initially set up assuming the anthropocentric presupposition of the Cartesian matrix which equated the intelligence of other animals to their ability to acquire and use human language or tools, these experiments opened up a window on an unpublished scenario: *the translation into human languages of the thoughts, moods and experiences of other animals like chimpanzees, bonobos, gorillas, orangutans and parrots, made by the animals themselves* (Warren et al. 1996; Patterson 1999; Pepperberg 2002).

Between the 1990s and the next decade, a new *philosophy of ethology* oriented both in a post-anthropocentric and post-genocentric direction began to emerge, intersecting with Animal Studies and the rising Critical Animal Studies. Books like *Visions of Caliban* (Peterson and Goodall 1993) and *Species of Mind* (Allen and Bekoff 1997) gave a first significant boost in this direction. Then, ethologists, philosophers of ethology and zoo-anthropologists such as Marchesini (Marchesini 1999), Lestel (2001), de Waal (2001), Despret (2004), Martinelli (2007), Best (2007) and Nocella et al. (2014)—to name but best known—contributed to set the comparative study of animal minds, cultures and societies on new both post-mechanistic and post-idealistic bases.<sup>2</sup>

Cultural ethology has since then gained increasing media attention to the extent that no adequately informed scholar now denies the existence of animal cultures.

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<sup>2</sup>Though it circulated mostly in Italy and Austria, I would include my *Etologia della conoscenza. Per una teoria critica del comportamento umano* (Celentano 2000) in the list of texts indicative of the birth of contemporary Philosophy of Ethology.

However, the legacy of anthropocentric traditions and ontological separatisms is still crawling in studies that defend the thesis according to which cultures of non-human animals lack relevant characteristics such as active teaching, cooperation, imitation in the strict sense of the word, syntactically organized languages, which would be exclusive to human cultures (Boyd and Richerson 1985; Heyes 1993; Tomasello 1994, 2014).

Other scholars, such as Laland, Kendal and Kendal, while contrasting these theses and highlighting data that suggest their fallacy, underline that it is very difficult to document on the field, in wild species, processes of active learning correction, forms of cooperation, or even more the birth of new traditions, and believe that, for now, only imitation can be considered fully proven (Laland et al. 2009). However, a conspicuous number of studies has provided empirical and experimental evidence of these characteristics in different animal cultures (for a first approach see: de Waal 2001, 2016).

We know, for example, that forms of active orientation of learning through discouragement or encouragement and even more complex educational processes are documented in many species of mammals. Each mother “cat (*Felis catus*), through a complex procedure that requires the succession of many different phases, teaches her cubs to hunt” (Mainardi 1992: 63),<sup>3</sup> and behaviours with similar instructive value have been studied in other felines as tigers, cheetahs, and desert lynxes. Chimpanzees and bonobos dissuade puppies from manipulating dangerous objects such as attractive but inedible fruits. Scenes in which chimpanzee mothers correct their offspring’s attempts to break coconuts with a wooden stick, taking the branch away from them and re-placing it in their hands in a functional position, were filmed by Christophe Boesch (AA.VV. 2006). Experiences of multi-decade studies on chimpanzees living in semi-captivity conditions have provided surprising evidence of their capacity for cooperation (Fouts 1997; de Waal 2016). If scholars like Tomasello still doubt that chimpanzees can spontaneously develop or adopt cooperative behaviours (Tomasello 2009, 2014), Roger Fouts, in his *Next of kin* (Fouts 1997), already over twenty years ago, described the attempted escape of a group of chimpanzees placed on an island surrounded by a fence, in terms that left little doubt about any cooperation. The observation of this event, gained by spying on the chimpanzees from a closed window, still represents a precious testimony for at least four good reasons: it documents a case of cooperation not induced by man; the chimpanzees *took turns* in carrying out the laborious task of twisting the final piece of the heavy net that surrounded the colony: when one got tired, another took its place; the cooperation concerned both the performance of this task and its *dissimulation*, or the immediate suspension of activities when the chimpanzees were observed by men; the attempt lasted for several days, making thus further clear its character as a planned and agreed action (Fouts 1997: 180–181).

More recently, several experiments have confirmed the remarkable cooperative capacity of our close relatives. In a study published in 2016 in *Proceedings of the*

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<sup>3</sup>This and all the other quotations from essays that have not been translated into English, contained in this chapter, are my translations.

*National Academy of Sciences*, Frans de Waal and his collaborators demonstrated both the cooperative abilities of chimpanzees and a series of social constraints or dynamics that reinforce them. They wrote on the subject:

Our species is routinely depicted as unique in its ability to achieve cooperation, whereas our closest relative, the chimpanzee (*Pan troglodytes*), is often characterized as overly competitive. Human cooperation is assisted by the cost attached to competitive tendencies through enforcement mechanisms, such as punishment and partner choice. To examine if chimpanzees possess the same ability to mitigate competition, we set up a cooperative task in the presence of the entire group of 11 adults, which required two or three individuals to pull jointly to receive rewards. This open-group set-up provided ample opportunity for competition (e.g., freeloading, displacements) and aggression. Despite this unique set-up and initial competitiveness, cooperation prevailed in the end, being at least five times as common as competition. The chimpanzees performed 3,565 cooperative acts while using a variety of enforcement mechanisms to overcome competition and freeloading, as measured by (attempted) thefts of rewards. These mechanisms included direct protest by the target, third-party punishment in which dominant individuals intervened against freeloaders, and partner choice. (Suchak et al. 2016: 10215)

Other studies have clarified that among chimpanzees cooperation is enacted not only between related individuals but that adults who have known each other for a short time also cooperate to obtain advantages or alleviate discomforts (Langergraber et al. 2007; de Waal 2016).

Moreover, sharing and cooperation have been documented, both in captivity and in nature, even among non-anthropomorphic monkeys: “Cooperation is common, for example, among capuchin monkeys. These monkeys are not only willing to help others obtain resources, but are more likely to share with individuals who help them” (Brosnan 2010: 11).

As for the birth and spread of new traditions in animal societies, if in the 1960s, the aforementioned birth of a new tradition among the macaques of the island of Koshima caused a sensation, further empirical evidence has been accumulated over the following decades. To limit ourselves just to a few examples, in 2007, in Côte d’Ivoire, a coconut crushing site that had been used by local chimpanzee populations for no less than 4300 years was discovered (Mercader et al. 2007). The use of stone tools has also been observed in some anthropoid monkeys and, in 2016, a site for crushing cashew nuts, used by local communities of striped cebi (*Sapajus libidinosus*) for over 700 years was found in Brazil, in the National Park of Serra da Capivara (Haslam et al. 2016). Moreover, in 2014, an article by Catherine Hobaiter and her collaborators, published in *PLoS Biology*, for the first time documented a phenomenon of transmission of a cultural innovation consisting in the invention of a sponge made with leaves and mosses among a group of wild chimpanzees (Hobaiter et al. 2014).

Regarding the structure of the languages used by different cultural species, and their differentiation through habits handed down for social learning, studies conducted on cetaceans, on hundreds of species of songbirds and on some singing primates show a tendency that is receiving continuous confirmation: the more our technical abilities to record and analyze these languages increase, the more they reveal a structural complexity, expressive variety, a network of relationships and local and



regional divergences comparable in various aspects to those of human verbal and singing languages (Campan and Scapini 2002; Naguib and Riebel 2014).

As for the capacity of social learning through imitation, its spread among not only so-called “higher animals” but also in different species of invertebrates is now established. As early as 1992, an essay published in *Science* by Graziano Fiorito and Pietro Scotto spread the discovery that octopuses are capable of learning by imitation (Fiorito and Scotto 1992). More recently, Lars Chittka and other researchers from the Queen Mary University in London have published, in the same scientific journal, a study in which they demonstrate that bees are able of solving complex problems by imitating and *improving* on the behaviour of others that they have observed (Alem et al. 2016).

### 3.3 Behaviour and Cultural Innovations as Driving Forces of Animal Evolution

As I tried to clarify in the previous chapters, the developments of cognitive and cultural ethology and those of evolutionary studies today seem to converge towards a both post-genocentric and post-anthropocentric interpretation of the behaviour and history of organisms.

In the perspective of contemporary ethology, behaviour is framed as *a self-regulative and cognitive interaction* of organisms with their inter- and intra-specific environment.

“Self-regulative activity and cognitive interaction” means that all organisms, of every species at any time need to maintain or restore internal processes and physiological states which allow them to stay alive and perform this function through *explorative and energy trading activities*, absorbing and transforming matter and energy present in the external environment and *modifying both the latter and themselves*.

What does “cognitive” mean here? In the perspective of contemporary ethology, we can call “cognitive” all activities through which organisms explore their survival chances and test their ability to actively change or regulate their physiological and/or perceptual states. Each “cognitive” activity is in this sense, *a production of behavioural forms*, or of *self-regulative internal and external interactions*, enabling the performance of an organism’s life cycle. In this perspective, cognitive activities are notable not only in animals, but in all organisms, because the simple fact that organisms are able to survive constitutes evidence of their ability *to make an object of knowledge out of their own living conditions* (Lorenz 1973; Riedl 1980; Celentano 2000, 2017).

These self-regulating and cognitive activities are obviously channeled and limited through constraints imposed by the anatomy and morphology of the species, intra-specific and interspecific context, individual characteristics and contingencies. However, all this allows us to understand both the history of each existed and existing

species and group, and the history of each body as an active and selective exploration of their environment, and an active construction of their ecological and social niche.

This post-mechanical conception of behaviour has since the 1990s assumed, a relevant role in both field and laboratory ethology, as well as in new models of evolutionary biology derived from the developments of epigenetics and the introduction of the evo-devo perspective.

In particular two notions, previously introduced by two eminent scholars of the twentieth century like Conrad Hal Waddington and Jean Piaget, began to find consensus and gain relevance through experimental findings such as “behavior as motor of evolution” (Piaget 1976), and the existence of *non-genetic hereditary systems* capable of producing phenotypic modifications much faster than genetic mutations (Waddington 1975; Piaget 1976), which we now call *Epigenetic Inheritance Systems* (Jablonka and Lamb 2005).

What does it mean, in this new context, that behaviour is a “motor of evolution”?

To conceive behaviour as a driving force of the differentiation of organisms means that when encountering environmental changes that endanger their survival or offer them new growth opportunities, individuals, populations and species do not passively wait for a favorable genetic mutation that will allow some of them to overcome those obstacles or exploit those resources. Organisms, in the face of any change, engage all the innate and/or learned cognitive and physiologic, social and (possibly) cultural resources they possess to take advantage of it. This means, in turn, that except for rare cases in which they derive from significant genetic mutations, evolutionary divergences start from the sphere of behaviours, from changes in ethological attitudes, which are active responses to changes in an environmental, social or individual context.

This approach to the comparative study of behaviors and evolutionary processes, which in contrast to the genocentric one could be defined as etho-centric, also allows us to recognize the role of input that cultural differentiations can play in the processes of animal speciation and phylogeny. Scholars such as Jablonka, Lamb, Whiten, van Schaik, Dugatkin, Beans have recently suggested that animal cultures, by passing on and differentiating behaviour, can influence the evolution of species in various ways: cultural innovations as tools or tactics to avoid predators and social processes that stimulate the ability to learn, preserve and transmit useful information can increase the chances of survival and reproduction of certain populations compared to others (Whiten and van Schaik 2007). The development of complex languages and social interactions can stimulate, as many scholars believe happened to our species, the evolution of higher dimensions and performance of the brain (Dugatkin, 2001).

I personally think that it is fully correct to hypothesize that cultural differentiations, modifying niches, diets and habits have also contributed to the differentiation of somatic and physiological characteristics, to the processes of speciation, to the differential reproduction. But, in my opinion, the possibility that this process will continue to occur *today* and in the future is drastically limited by the effects of *anthropic* impact. At least one million non-domesticated plant and animal species and, among these, most cultural animal species are currently at high risk of extinction

due to human intrusiveness, that is, the processes of destruction/anthropization of the environments in which they lived (Ceballos and Erlich 2018).

At the time being, we can therefore consider highly probable, and partially proven, that an incalculable number of animal traditions, such as many human cultures, has disappeared, is disappearing or is living in conditions of regression, dispersion and homologation, due to the human impact. Most existing animal cultures are now living a *hunted existence*, seeing their traditional habitats eroded day after day. Of course, this trend is not absolute. Some social species that manage to effectively parasitize humans, such as rats, are probably experiencing phases of increasing cultural differences and culturally transmitted information. But, from a global point of view, these few processes of differentiation are in no way comparable to the rhythms and vastness of the processes of destruction of animal societies and impoverishment of animal cultures induced by the anthropic impact in the last century, and currently underway. This is also attested by a study conducted over ten years on 144 groups of chimpanzees of central and southern Africa by a team of more than seventy primatologists whose results were then compared with those collected in other 100 communities of chimpanzees in the *Pan African Programme: The Cultured Chimpanzee*. The study, coordinated by primatologist Ammie Kalan, led to the cataloguing of 31 cultural behaviours and also showed that in groups of chimpanzees that live in closer contact with human settlements the probability of encountering cultural behaviour is 88% lower than in groups established in “low-impact areas” (Kühl et al. 2019: 1453). *Practically, the chimpanzee groups that live closer to our species have preserved 3 behavioural patterns handed down through social learning at most, while the communities located far from human settlements show between 15 and 20 cultural behaviours.*

### 3.4 Interspecific Cultural Studies (ICS) and Humanities

The discovery of animal thought and cultures has forced the humanities to begin a self-critical review of the anthropocentric assumptions on which their tradition has been based, for millennia (man as the only cultural, thinking, linguistic animal, the one capable of feelings, cooperation, inventions, innovations etc.). The goal of an adequate development of the comparative study of animal cultures, languages and forms of thought required however much more effort: a comprehensive reform of both scientific education and research organization oriented towards a full overcoming of the division between life sciences and humanities. This means towards the development of a meta-disciplinary area capable of combining biological, ethological and ecological skills with the cognitions and methods of modern anthropological, social, linguistic, aesthetic, and more generally humanistic studies in the contents of a comparative study, not only of the human uses and traditions, but of *all known and knowable animal cultures*. It is this meta-disciplinary which, as a first approximation, I indicate as being the field of *Interspecific Cultural Studies*. Its development is, in many ways, a process already underway. In fact, as I explained, the attempt to

develop this area should not be understood as the proposal of something completely new that the author of these pages intends to introduce to the scientific field. Rather, it is a project aimed at gathering, in both the fields of education and research, the set of heterogeneous skills, transversal to the traditional disciplinary blocks, required by a new and very complex subject of study which Western sciences began to address only sixty years ago: *animal minds and cultures, their history, their expressive forms and productions*.

For the humanities, a sector with which the study of cultural processes and phenomena has traditionally coincided, this change implies an extension of their field of study, a critical renewal of their theoretical and methodological tools and an integration of their formative methods. That is: a (self) critical re-founding of all their sectors aimed at inserting, in a coherent and competent way, the comparative study of human cultural activities in the virtually much bigger but from a scientific point of view, still nascent field of the comparative study of animal cultures.

In some areas of the human sciences this transition has now been underway for quite some time; in others, the resistances to these transformations and extensions are much wider. For example, not surprisingly, the post-anthropocentric turn we discussed is clearly perceptible in a branch of the human sciences that since the eighteenth century has been the closest to life sciences: anthropology. Today, in fact, by anthropology we no longer intend only the study of man, as it traditionally took place, because the anthropological field has increasingly merged with those of primatology and cultural ethology (Rodman 1999). One of the skills currently required for a good anthropologist is the ability to frame the comparative study of past and present human cultures within the broader horizon of the comparative study of the societies and cultures of our pre-human ancestors and of our sister species: the great apes traditionally referred to as "anthropomorphic". In turn, the comparative study of anthropomorphic cultures finds its historical and genealogical placement within the bigger horizon of a study of all the societies and cultures belonging to the great suborder of *Anthropoidea*. Finally, the latter goes into the wider horizon of a comparative study of all the animal cultures. Anthropology and human ethology are thus closely related to cognitive and cultural ethology and evolutionary studies. It is not by chance that, within the anthropological sector, the greatest resistance to these contaminations is recorded, albeit with some exceptions, in the specific sub-field of philosophical anthropology, particularly in the continental area and, within the latter, by the Italian tradition. That is, in the disciplinary areas and in places that have been cradles and emblems of the humanistic tradition.

Even the psychological sciences today include among their competences the ability to compare the human mind with that of other animals and, even between traditional resistance and cyclical counter-offensive, manifesting a tendency to overcome both the anthropocentric and deterministic-biologistic approaches, which are the two major paradigms that have competed in the past for the supremacy in this field.

A similar situation, which sees at the same time the development of openings to the interspecific sphere and the persistence of resistances and closures towards it, can also be recorded in the context of contemporary linguistic and semiotic studies, in which zoo-semiotics have gained their niche but only partially have managed to

trigger a collective work of re-foundation of the basic concepts and methods of the sector.

A third example of a humanistic discipline that has opened itself up, in recent decades, to fruitful though still insufficient contaminations with cultural ethology can be identified in the musicological field. In the last decades, with the birth of zoo-musicology, the comparative study of human musical traditions has begun to be rethought, re-elaborated and integrated by starting from a comparative study of the traditions and productions of all animal species that practice an “aesthetic use of communication sound” (Martinelli 2011). A study that implies the analysis of the social and biological functions that these expressive traditions perform in the animal societies that exhibit them, the reconstruction of the processes that lead to their genesis and the comparison of the structural and formal aspects of their products. This contamination, or rather integration, offers to ethno-musicology, understood as the comparative study of the human musical traditions, the possibility to develop solid zoo-musicological and ethological bases and, at the same time, allows cultural ethology and zoo-musicology to take advantage of the immense patrimony of research and reflection developed by ethno-musicology and other branches of musicological studies.

This integrative or contaminative approach can be extended to many disciplinary sectors that deal with cultural activities and productions, therefore, to many fields related to humanities.

From the comparative study of the learning processes, or of the techniques for finding, using and transforming raw materials and energy sources, to the analysis of languages, dances, songs, and processes of ritualization of behaviors, from the study of the phenomena of dissimulation, deceit and espionage between members of a group to that of the forms of resolution of social conflicts, or of dissemination of innovations, there is almost no sphere of social and cultural action in which the comparison between human societies and the community of other animal species is not revealing instructive and surprising discoveries.

This comparison, however, will be adequately developed only if our university systems are equipped to offer training courses and research structures capable of integrating biological, ethological and ecological skills with the knowledge and study methods developed by the humanistic tradition.

In other words, a research area such as the Interspecific Cultural Studies, and the training courses suitable for its implementation, can be adequately developed only when they become the object of a collective effort of the scientific community and a structural pivot of university organization. Its implementation requires profound and both practical and theoretical upheavals, which can be consolidated only through a reallocation of several sectors of humanities within an *interspecific comparative perspective and a meta-disciplinary operational context*. Moreover, they require, in the field of the behavioural sciences, the overcoming not only of the traditional dualistic Cartesian models, but also of the “psycho-hydraulic” and mechanistic model of classical and early cognitive ethology (Marchesini 2016), of the genocentric one of “classical sociobiology” (de Waal 2001), as well as of the substantially deterministic approach still today dominant in evolutionary psychology (Lieberman 2013).

Listed in an extremely synthetic way, the main goals of Interspecific Cultural Studies can be summarized in the following ten points:

- To promote a full overcoming of the division between life sciences and humanities in the organization of both scientific training and research, aimed at training generations of citizens and workers equipped with skills transversal to these two traditional blocks and useful to tackle some of the new important scientific and social challenges posed by our era;
- to revolutionize the traditional forms of human self-representation, paving the way for post-anthropocentric forms of self-understanding in which man is *just one* of the cultural animals, and to refound the methodologies, epistemological references and narrative background of the humanities with a post-anthropocentric and interspecific setting.
- to refocus ethology and behavioural science on a post-genocentric, post-deterministic and post-mechanist approach, which considers all organisms as selective agents capable of cognitive and explorative activities and cognitive and selective behaviour as one of the main driving forces of evolution.
- to learn to compare human and non-human cultures and societies without falling into the traditional opposition between anthropomorphism and anthropodenial;
- to collectively construct, through research, comparisons and debates, a meta-disciplinary lexicon capable of attributing to concepts such as “culture”, “traditions”, “invention”, or “singing”, “dance”, “ritual”, meanings usable in reference not only to humans, but also in non-human contexts;
- to critically insert the (chronologically) short history of human cultures into the greater history of animal experiences, traditions and cultures spanning hundreds of millions of years;
- to increasingly correlate research on animal cultures with a commitment to protect them and the natural environments in which they are rooted;
- to increasingly implement the extension in the fields of cognitive ethology and animal psychology of ethical rules that guarantee the non-invasiveness of study methods and respect for the freedom of the subjects studied as in in the fields of human ethology and psychology;
- to contribute to form new generations of teachers and scholars, students and socio-cultural or environmental operators equipped with theoretical and practical skills transversal to the traditional bipartition between humanities and life sciences and capable of using them to adequately understand the environmental and social impact of human activities;
- to contribute, as far as possible, starting each from their own specific field of study or work, to the search for models of social and scientific development that are alternative to those now dominant and capable of reversing the line promoted by them that led to the environmental and social disasters now underway.

The program outlined in these ten points to me seems to converge, on several points, with the intent of Humanities “to discuss the current crisis of the humanities and its possible solutions, in a spirit that should be both critical and self-critical”, through very “Multi/Inter/Cross/Trans-disciplinary dialogues between humanities and social

and/or natural sciences”, and “in the context, dynamics and problems of current societies” (Martinelli 2016: 9).

ICSs follow in the wake of the proposal of Numanities to enhance humanistic skills in new or broader research fields (in this case, the comparative study of animal cultures), and at the same time promote a radical renovation of their methods, theoretical assumptions and empirical contents.

The objective of contributing to the transition of humanities beyond anthropocentric prejudice (and related mechanistic way of seeing all other organisms), which characterizes ICS, in my opinion should in fact constitute the distinctive and characteristic factors of Numanities, to the extent that I believe it should be made even more explicit in a possible revision of their programmatic points, presented in the *Manifesto of Numanities* (Martinelli 2016: 11–83).

In favour of the idea that this orientation could aim to, imagining a under construction Numanities building of, the metaphor of a master wall on which to graft its various articulations would represent, in my opinion, the same intellectual and professional path of its main promoter. Indeed, the meta-disciplinary attitude that guided Martinelli’s studies led him to make important contributions to the development of areas such as zoo-semiotics (Martinelli 2007, 2010, 2017) and zoo-musicology (Martinelli 2009, 2011) and to an updated criticism of anthropocentrism. His anti-hierarchical sensibility very soon pushed him towards anti-speciesist ethics. In short, his whole intellectual path attests to the centrality that the father of Numanities recognizes to the anti-anthropocentric commitment, with all that it entails in terms of criticism of modern and contemporary human societies and their models of development.

Finally, although this aim is not particularly emphasized in the programmatic points, the centrality that the post-anthropocentric approach plays in the Numanities project is especially signaled by the fact that the case studies 2A and 2B, proposed in the second part of *Arts and Humanities in progress*, are focused precisely on it. They respectively regard the alleged “special specificity” of man, or human uniqueness (Martinelli 2016: 144–160), and the relationship between “language and interspecific communication” (Martinelli 2016: 161–201).

The ICS approach aims at overcoming the traditional man-animal dichotomies on the direction of a post-anthropocentric and at the same time post-genocentric approach to the study of animal (and therefore also human) behaviour and evolution. They represent an attempt to contribute to promoting forms of self-understanding of human beings and societies emancipated from developmental myths and based on a global ecological-ethological perspective that takes into account the interests of the community of living beings in which we are immersed and the repercussions that human activities have on it.

Indeed, contributing to the overcoming of the anthropocentric approach means, today, also contributing to a radical criticism of the goal of an ever more *total domination, and of an ever more indiscriminate exploitation, of all human and non-human natural resources* that the modern and contemporary societies continue to pursue, even though it has proved patently unsustainable. For the same reasons, to contribute to the research, testing and spreading of ethical parameters and models of social and scientific development in opposition to those that predominate today seems to me

the most important and ultimate objective which the attempt to promote a transition from Humanities to Numanities should aim for.

### 3.5 Interspecific Cultural Convergences (ICC): A New Object and Project of Study

Among the objects of Interspecific Cultural Studies, a particular group of them should occupy a privileged place for its relevance to both evolutionary and ethological perspectives: the cases of *cultural convergent evolution among different species*, or *Interspecific Cultural Convergences (ICC)*.

In ethology, as in morphology and in the anatomical area, cases in which, during phylogeny, different species have developed similar structural and/or functional traits that are not inherited from common ancestors are called *convergent evolutions*, *evolutionary convergences*, or simply *convergences* (Heymer 1977: 74; Mainardi 1992: 221–222). The wings in flying insects, bats and birds are a typical example.

I here suggest extending the concept of *evolutionary convergence* to the phenomena inherent in *cultural evolution*, defining:

- as *cultural convergences* or *Cultural Convergent Evolutions (CCE)* all (and exclusively) cases in which it is historically proven that a technique, an invention, a discovery, an expressive form or a use have been developed by different cultures and populations in reciprocal independence<sup>4</sup>;
- as *Interspecific Cultural Convergences (ICC)* all (and only) cases in which cultural convergences occur not only between populations of the same species, but also between *societies and traditions of different species*.

It should however be clarified that the concept of ICC so intended presents some differences from that of “convergent evolution” normally adopted in evolutionary studies: “Convergent evolution is typically defined as the repeated evolution of similar traits in independent evolutionary lineages inhabiting similar environments” (Harmon 2013). However, cases of ICC can also occur among species *living in very different environments*. The case of singing is emblematic in this regard: from a taxonomic point of view, singing is a phenomenon appearing in the animal world in a miscellaneous way. It appears in species that are genetically, phylogenetically and ecologically different from one another as cetaceans, monkeys as Hylobatidae, Tarsius, Indri and Callicebus, as all human cultures spread over the planet, as the mice and thousands of species of singing birds (Celentano 2016, 2018).

The fact that singing is developed in species so distant from each other means that this convergence cannot be explained on the basis of “homology”, intended as characteristics inherited through a common ancestor.

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<sup>4</sup>This concept of CCE should not be confused with that of “Convergence Culture”, recently introduced by H. Jenkins (2006), which refers to the effects of interactions between traditional and new digital media.



The diffusion of singing in so different clades and environments is therefore the result of mutually independent, but in some aspects similar, evolutionary processes and selective pressures. For this reason, it can be adequately understood only by identifying and comparing the *functions* that this kind of expression plays, and the *forms* it has assumed, in all these animal societies, just as is normally done in the comparison of human singing traditions and performances. This approach can be extended, in the perspective of ICS, to all the cases of ICC.

The cataloging of ICC cases and the research on the causes of these evolutionary convergences are still at their first steps. To become able to deepen our knowledge on these phenomena we will need to integrate the methodologies of the comparative study of uses and customs, communication systems and expressive forms, social regulation devices and material techniques, developed by the humanities, with the observation and intra- and interspecific comparison methods of contemporary ethology. We will also need to construct open databases to determine a methodical comparison between products, forms and intra-specific differentiations of all the animal cultures.

I would like to conclude this section by proposing, in the following figure, a first provisional mapping of the most common cases of ICC and of some of the factors that may have contributed to their genesis. It is of course only a first sketch that can be widened and further articulated with the contributions of other scholars.



### 3.6 ICC: The Case of Singing

In this final section I intend to illustrate the biological and social functions singing performs in different animal species and some converging aspects they present. I chose to proceed in a way that may seem strange: comparing the functions that ethologists have attributed to animal songs with those the traveler, ethnologist and writer Bruce Chatwin attributed to the “songs of the ancestors” of the Australian Aborigines (Chatwin 1987). The reasons for that are the following: the communities of Australian natives are those that longer than any other were preserved from exchanges with others (practically, until Cook’s expedition in 1770). Singing played a very important social role in their traditions. Finally, although some biologically and socially important features of the songs, such as courtship, are not reflected in his descriptions,<sup>5</sup> Chatwin’s analysis in a surprising way illuminates some of the features and uses of songs which can also be found in other animal communities.

Chatwin attributes three different functions to the songs of the ancestors:

- totemic memories of their clan and individual recognition documents. Indices of the familiar and mythical roots from which an individual comes, the songs allow the identification of each member of the group through his affiliation with his “totemic” ancestors (Chatwin 1987: 4, 12–13).<sup>6</sup>
- Melodic and vocal maps of a territory, travel guides for migration or occasional shifts, information vehicle about territorial features and boundaries that cannot be crossed without risk (Chatwin 1987: 13, 14, 69, 134–135).
- “Pass”: sound attestations that allow to recognize a person as “the owner of that path”; documents transmitted by cultural inheritance, in order to identify who has the right of transit in a given territory and the right to give or deny to others the transit permission on it (Chatwin 1987: 14, 70).

Is it possible to find equivalents of these three functions in the songs of other species? Here is a brief analysis of these three points.

**Songs as individual recognition ‘documents’, indices of the geographical and family roots from which an individual comes, allowing mutual recognition among members of a group or colony.**

At the end of the 1950s, Weeden and Falls interpreted some duets between male birds in neighbouring territories as exchanges destined to get to know each other (Weeden and Falls 1959), and Marler suggested that the melodies of birds could provide information for individual identification (Marler 1960). A decade later, two studies conducted in different areas (Thompson and O’Hara Rice 1970; Emlen 1971), documented this feature in the song of the male of the *Passerina Cyanea*: in case of a sound intrusion of new neighbors, males modified their singing adding to the specific

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<sup>5</sup>Chatwin’s notes privilege, within a rich set of local songs, only a few. He did not aim at an exhaustive cataloging of native songs, but the existence of courtship serenades in aboriginal traditions is attested by other authors (Lockwood 1962; Englaro 1998; Gioia 2015).

<sup>6</sup>Similar cases of anthroponymic functions of songs are reported by other scholars concerning Australian populations such as Warramunga (Bosi 1994: 116) and Aranda (*Ibidem*: 95–96).

sequence of their species some individually differentiated final parts. The songs of all the members of the group were so marked by a different end. Further studies have shown that there are intermediate layers between the songs of a species and its individual variations. According to Feekes (1977), the *Cacicus cela* emits colony-specific songs that have the function of a colony password and similar functions are found (Bailey and Baker 1982) in the Virginia quail (*Colinus virginianus*). Starting in the 1960s, Peter Marler and Miwako Tamura (1962, 1964), William Thorpe (1961, 1972), Wolfgang Wickler (1986) and many others contributed to the early stages of the study of local and regional dialects. The existence of “micro geographic (or local dialects) and macro geographic differences (regional dialects)” (Martinelli 2011: 238) was in the meantime discovered in the communicative systems of other animals, like cetaceans, and it is now regarded as a phenomenon widespread in mammals and birds. For example, studying the songs of the *Batis molitor* in nine different regions of East Africa, ethologists and zoo-musicologists found dialectal variations that concerned two aspects in each of them: the presence of a sequence of three descending sounds or of longer sequential sequences, and differences in the order of the three base sounds, in which the middle height may be in the second or third position (Wickler 1986: 76–77).

In many cases, the development of local song traditions is a prerequisite for the invention of personal songs and their use for identifying individuals and reinforcing parental or couple ties. We find an interesting example of this in the African *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 a 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).

These performances of the Ethiopian shrike revealed, in later studies, even more complex interactions which include a dozen of different pair duets and many duets between competing males and/or neighbors, both divisible, from a formal point of view, into two subgroups: unisons and antiphonal duets. The latter, in the case of male territorial duets, are, in turn, divided into exchanges of identical notes and varied exchanges. There are also cases in which an individual sings by issuing two different voices at the same time and cases where individuals who lost their companion, using this technique, alone run the sequence they used to perform as a couple (Harris 2000). Finally, there are songs that mix different dialects and cases of simultaneous running of two different types of duet, one of courting or strengthening the couple tie, the other as a sort of duet/duel with a rival (Wickler 1986).

**Songs like melodic and sung maps of the territory, guides for migrations and occasional or cyclical displacements, which transmit information about resources and dangers and on “borders” that cannot be overcome without risk.**

Well known in this category, are the cases of the Lira bird (*Menura novaehollandiae*), that includes in its own sounds environmental and animal sounds collected from the surrounding territory, thus offering an acoustic mapping of it (Dalziell and Magrath 2012), and that of the Australian magpie which exchanges information

on food sources and migratory routes with con-specifics through songs (Rogers and Kaplan 1998: 86). Also well-documented is the use of vocalizations with information and referential functions in birds such as the northern royal gull (*Larus argentatus*), or the *Indicator indicator* that use song to locate food resources.

With regard to whales, Roger Payne was the first to hypothesize, even if in a doubting form, that “the humpbacks use their songs a bit like Australian aborigines, whose songs contain descriptions of the road and the points where you are and tell about the characteristics of the scenery you are in” (Payne 1995: 165). Martinelli observed, in turn, that “migratory species of cetaceans use songs as geographic maps, in a way that cannot help but recall Chatwin’s songs” (Martinelli 2011: 163). Stimpert, Peavey, Friedlaender and Nowacek (Stimpert et al. 2012), conducting a study on ten male individuals of humpback whale to which they applied multi-sensors that allow deep recordings, have reinforced this hypothesis. Their research led them to conclude that the choir repertory of *Megaptera novaeangliae* males does not exclusively include courtship songs and does not only appear in the breeding season. In the vicinity of the migratory season, the individuals they watched were leaving for food, and using songs that were significantly different from those of courtship to communicate remotely.

**Songs as a “pass” that allow to recognize an individual as “path owner”: a person who has the “right” of transit on that path that may enjoy the resources that it offers and grant or deny to others transit.**

The words “right” and “owner” that Chatwin chooses to describe this use of songs, and the reference to the bargaining practices that take place through songs exchanges, at a first glance would seem to preclude a comparison with non-human cultures. However, we are here facing notions of “right” and “property” that are very different from those used by the Western traditions. In fact, they do not sanction the fixed property of a territory and do not permanently interrupt the other’s right of transit in it or of usufruct of its products. They only attest that someone has the privilege of crossing it, practicing hunting, gathering or exchanging without being attacked and receiving help when needed during this crossing. Looking at this profile, this type of use of songs presents remarkable analogies with the “territorial” delimitation function that ethologists have found in the song of the adult males of many of the singing birds.

But to determine whether we can detect analogies or convergences with this use of songs in other animal species, one should ascertain whether other animals can, through intense gradients or formal differentiations of their singing, *not only signal the presence of an x male in a y territory*, and also not only send a generic message of transit prohibition or allowance. We should check as well:

- whether the resident male responses depend or not on the ability/inability of the intruder to be individually recognized through their song;
- whether or not we can find any differences in the songs that the resident male performs in the presence of intruders depending on their being unknown individuals, new entries or long-term frequentations;

- whether adjustments and “bargaining” actually occur between these animals through singing or not.

Recent observations indicate that generally both the bird that enters the territory of another and the one already allocated in it may adopt various communication strategies that reduce or intensify aggressive reactions. These choices are manifested by variations in the form and intensity of the song, or through options which consist in overlapping or not on the other’s emissions. Recently, a study titled *The Social Interaction of Song in Song Sparrows* introduced the concept of “acoustic ownership marker” (Burt and Beecher 2008). The study shows that the songs of the resident males can perform the function of deterrent to many varying degrees of intensity, some of which seem to include the possibility of resolving small boundary controversies between neighbors without any physical clashes, only through the exchange of songs. According to the authors, these interactions appear like a continuous strategic game of escalation and/or de-escalation of aggressive elements, driven by executive stench and other parameters such as the overlapping or not of the songs and the repetition or variation of the verse performed on the other. Different dynamics reveal the exchange of songs between “first-year neighbors” and “neighbors of long time” (*Ibidem*). The authors suggest that the use of a certain kind of “conventional matching”, which arises an agreement on repertoires that can be paired or alternated (*Ibidem*, p. 89), can be attested between long time neighbors.

Territorial defense and recognition of the con-specifics that pass through the exchange of songs are closely linked to the last group of the biosocial functions of singing we have mentioned: those related to courtship, mating and strengthening of the couple’s bond. Two are the main groups of non-human protagonists of the studies about this kind of song: singing birds (for an introduction, Marler and Slabbekoorn 2004: 39–78; for an update, Naguib and Riebel 2014) on Mysticeti (for an introduction, Payne 1995; for an update, Suzuki et al. 2006). More recently, these model species have been added to others. For example, individual differences and local dialects have been identified in the male-female couple duets of the crested gibbon (Geissmann and Nijman 2006; Think et al. 2011). The courtship vocalization of mice, brought to frequencies which are audible and distinguishable by human ears, revealed melodic qualities comparable, for beauty and complexity, to those of the birds (Chabout et al. 2015).

Among Mysticeti, the species whose song has been most studied is *Megaptera novaeangliae*. Payne and McVay (1971) were the first to decode the structures and functions of their songs. Thanks to their efforts, it is today well-known that the male humpback whale produces melodies which are differentiated by geographical area and are renewed year after year or, more drastically, in multi-year cycles. They have complex structures, composed by different parts or “themes”, consisting of ascending and descending sounds, lasting between 20 and 30 min, and can be repeated several times. Recently Suzuki, Buck and Tyack (Suzuki et al. 2006), examining the songs of 16 male humpbacks and thanks to a specifically designed software, have analyzed their basic structures. The algorithm has mathematically confirmed the hypothesis of Payne and McVay which states that humpback whales have their own syntax and

that their song, like human speech, is based on a hierarchical language, consisting of lengthy sound blocks with increasing complexity, inserted into each other as in a system of Chinese boxes. A syntactic system, in many respects, analogous to human verbal language with its subdivisions in phonemes, phrases, words, propositions and periods is being found in an ever-increasing number of social mammals and birds. The same conclusions have led to the analysis of the vocal languages of cetaceans such as dolphins and “killer whales”, of mice and especially of sparrows and other birds, from which new confirmations come continuously. Among the latest, a study on the song of the *Parus minor* (Suzuki et al. 2016).

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