Chapter 4
A Glossary of People, Paths and Ideas

Abduction

Ancient method of investigation and reasoning, stemming from **Aristotle**'s logic, which gained scientific legitimation thanks to Charles S. **Peirce**. A surprising phenomenon, X, is observed. Among hypotheses A, B, and C, A is capable of explaining X. Hence, there is a reason to pursue A. Peirce ascribes the origin of the term to Aristotle, precisely to the word ἀπάγωγη, *apagoge*, translated as *abduction* (erroneously, according to Peirce, who thought the right translation should be "retroduction"; in his writings he uses both terms). The usage and contents of "abduction" are in conflict with "deduction" and "induction". If deduction means to proceed from a rule and a case to a result, and if induction proceeds from a result and a case to a rule, then abduction proceeds from a rule and a result to a case. Abduction is thus a "logic of discovery", a kind of critical thinking which opens doors of opportunity for scientific research and which, in the end, confirms the classifications provided by inductive and deductive procedures. In practice, according to Peirce, scientific investigation should go through the following phases: (1) Observation of an anomaly; (2) Abduction of hypotheses that explain the anomaly; (3) Inductive testing of the hypotheses in experiments; (4) Deductive confirmation that the selected hypothesis predicts the original anomaly.

In **>zoosemiotics**, abduction is not only a useful method of reasoning, but quite often the only one available. Particularly, it is an essential part of the paradigm of **>critical anthropomorphism**, as it tends towards an empathic, **>emic** perspective.

Disclaimer:

[1] The entries included in this glossary refer to words, concepts and scholars, which are considered (a) important in the development and systematization of zoosemiotics; and/or (b) applicable, to some extent, to zoosemiotic research. The glossary, therefore, does *not* include semiotic terms, even fundamental ones, that are already defined in other, more general, semiotic contexts (handbooks, encyclopaedias, monographs), and on which zoosemiotics, and this companion particularly, have nothing *else* to say. In that sense, one may compare the presence of a crucial notion like "code", that was slightly "adapted" to the zoosemiotic context, with the absence of the other crucial notion "sign", on whose "traditional" definitions this companion has nothing to add, except in those specific applications, like "icon", "index", "kinaesthetic signs" and others, which have an entry of their own.

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Abstraction

Abstraction, or generalization, is the ability of representing an event/entity in terms of general qualities/characteristics, independently from concrete realities, specific instances or actual objects. In semiotic terms, to abstract means to be able to consider an object as a token of a given type, to mentally represent that type, and finally, on the basis of that representation, to recognize other tokens of the same type. For example, abstracting *Hard Times* as part of the type "Dickens' novels" allows us also to recognize *A Tale of Two Cities* within the same whole.

The process applies also to the capacity of spotting the type even when the second token is merely a sign of the first one, or is manifest through another medium. In the previous example, not only an actual hard copy of *Hard Times* can be recognized as Dickens' novel, but also an electronic file of it, or even a picture of the cover appearing in a magazine. Evidently, thus, abstraction closely relates to such concepts as **>mind**, **>mental representation**, and **>symbol**ic **>semiosis**.

In psychological studies, abstraction is defined as a "higher brain function", and therefore has been long considered a **>species-specific** human feature. Already in the first decades of the twentieth century, however, and even more effectively starting from the 1950s, an increasing number of ethological studies (Hsiao 1929, Wolfe 1936, Cowles 1937, Köhler 1943, 1949, 1952, **>Eibl-Eibsfeldt** 1951, Rensch and Dücker 1959, Rensch 1965, Lehr 1967, **>Goodall** 1968, among others), in both natural and experimental contexts, found out that abstract representations are extremely common among non human animals. Subjects of such studies included pigeons, toads, elephants, parrots, ravens, squirrels, rats, monkeys, cats, and of course great apes.

The difference between the first and the second type of abstraction is pretty marked. If the mere ability to attribute a token to a type can be easily inducted with a simple behavioristic stimulus-response technique (after all, the infamous Pavlov's experiments were producing in the dogs nothing else than a capacity to generalize), at the same time, from a semiotic point of view, more relevant are those

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[2] As it will be soon clear, most room in this glossary has been given to concepts and scholars that had no specific opportunity to be thoroughly discussed in the other parts of this companion, or for specific portions of general topics that *were* dealt with, which had to be overlooked despite their pertinence within the zoosemiotic discussion. The remaining entries, often shorter in length, are always provided with an indication of where, in the book, they were treated more in detail.

[3] A third reason for differences in the entries' length, or for presence/absence, are of course the personal scientific choices of the author. This companion, it shall be reminded, is "critical": it presents a view on zoosemiotics that is hopefully coherent in itself, but that is far from being complete, encyclopaedic and impartial. Priority was given to those concepts and scholars that were perceived to require more attention (because they were not previously given enough of it, or because they were given a *different* form of attention, that this companion claims was not fully appropriate).

[4] Omissions due to author's limitations in knowledge and competencies, finally, will certainly appear, and – regretfully – not only rarely. For these, the author can only apologize to the readers, and hope that his work will at least serve as a basis for a further, more accurate job.

instances that focus on the animals'capacity to recognize a given object via a completely different medium, with one only, or very few, characteristics in common with the first token (like the photograph of a person, related to the real person it portraits, only via a visual-iconic relation). Lehr (1967), who found that rhesus and capuchin monkeys were able to recognize pictures of insects and flowers, or the different instances of problem-solving in different species discussed by Köhler, and – in chimpanzees – by Goodall (1968), are among the most interesting studies on the topic.

Acoustic Channel

The sensory mode (**>channels**) connected with the production, emission and reception of sounds. Acoustic signs can be produced through the vocal apparatus, or by hitting parts of the body or the environment. The main pros of the acoustic channel are the broadcast transmission (i.e., the possibility of communicating in darkness, around corners, etc.), directional reception, rapid fading (which makes a fast continuation and response possible, thus increasing the communicative potential), immediate feedback, and a very high degree of specialization (as the example of language, developed first of all as a vocal-acoustic sign system, clearly demonstrates). The main limitation of the acoustic channel lies in the rapid fading, which – besides its aforementioned advantages – also implies that a message does not last in time, and must therefore be replaced by other means of communication (typically, the **>chemical channel**) in those cases where an enduring message is needed.

Adaptation

Adaptation can be defined as the result of a (normally gradual) process of phylogenetical and ontogenetical adjustment of an organism to its environment. Generally interpreted through the evolutionistic framework, adaptation is studied in zoosemiotics mostly using the interface of the **>Umwelt** theory.

In addition, as the concept of **>biosphere** is perceived as overlapping with that of **>semiosphere**, zoosemiotics is also interested in analysing how adaptation also involves the sign systems and repertoires of an organism, for example through processes of **>ritualization**.

Adoption

The process of raising one (or more) young specimen that is not offspring of the adoptive adult, or of any close member of the same community (a phenomenon known as "alloparental care"). Adopted and adoptive subject may belong to the same (**>intraspecific** adoption) or to different (**>interspecific** adoption) **>species**. From a zoosemiotic point of view, the phenomenon is interesting because it is based on a particular form of **>communication** (mostly visual) between the adult and the

young. The interaction is normally started by the latter, who signals his/her status (particularly the age) to the adult, who then responds by accepting (i.e., manifesting parental care patterns) or refusing (sometimes aggressively) the new role. The phenomenon of adoption is mostly observed in birds and mammals.

Aesthetics

Generally speaking, Aesthetics stands for the study of the values of senses, emotions and taste, but in the modern sense (i.e., since the establishment, commonly attributed to Alexander Gottlieb Baumgarten, of "Aesthetics" as a branch of Philosophy), it is mainly defined as a philosophical reflection on art, culture and nature.

The application of aesthetic values and actions to non-human animals has been a leit-motif in western philosophy since the presocratics, and was more systematically studied since >**Darwin** 1871 and 1872 (and particularly in the mid twentieth century, thanks to studies like >**Morris** 1963). Within zoosemiotics, a groundbreaking research appeared in >**Sebeok** 1981 (chapter "Prefigurements of Art"), where the problem of the tension between the commonsensical ideas of art as a non-utilitarian form of behavior and of non-human behavior as strictly utilitarian is addressed:

> Over and over, we keep encountering the same pivotal aesthetic paradox: this emerges from a profound confusion about purpose; it drives us to ferret out compulsively any semblance of utility, usually defined as adaptive value. We find it difficult to conceive of art as a coherent part of animal life and can scarcely imagine it as an adornment of the creatures' leisure. All researchers in this field are stamped by a tension between a deeply felt conviction on the part of many distinguished and sensitive biologists that artistic activity indeed exists in the animal world, and the inability to face its presumed lack of importance, even uselessness. [. . .] the position assigned to the aesthetic life in Western culture, from Plato onwards, is imbued by an uneasy fluctuation between these two attitudes, that art is at once useless and fraught with significance, purposeless and yet important. (Sebeok 1981: 232)

In this companion (Chapter 2, Section 2.4.3), (zoo)aesthetics has been defined according to five major points:

1) The biological, not only or not too directly utilitarian, nature of aesthetic phenomena (as for instance argued in Hartshorne 1973);
2) The connection – also an etymological one – between the word "aesthetic" and senses, perception, plus concepts like "pleasure", "perception", "taste", sense of "beauty", etc;
3) The formulation of aesthetic messages, as suggested in Jakobson 1963, as more concerned with signifiers rather than with signifieds;
4) The aristotelian idea of tragedy (and by extension of all aesthetic messages) as *parà tèn dóxan* (i.e., unexpected, contrary to common beliefs) and *katà tò eikòs* (i.e., likely, believable);
5) The formulation of aesthetic information decoding, as suggested in Eco 1968, as consequent of three factors: (a) contextual interaction; (b) relative arbitrariness of the "matter" of signifiers as regards the signifieds (as in the

case of onomatopoeic words); (c) the levels of reality involved in the message articulation (physical matter of the signifiers, denotation, connotation, and so on).

Alarm Call

A sign or signal emitted by an animal in order to warn others of a danger that s/he has spotted or perceived. Scholars have emphasized that alarm calls may use the **>visual** (through specific bodily displays), the **>acoustic** (through the emission of vocalizations) or the **>olfactory channel** (through the production of chemical substances).

In zoosemiotics, the study of alarm calls, particularly in the monkeys of the genus *Cercopithecus* (see the seminal Cheney-Seyfarth 1990), has produced revealing findings in terms of the symbolic and syntactic use of signs among non-human animals. Vervet Monkeys produce three or four different kinds of alarm calls, depending on the specific kind of predator in the vicinity. A loud barking call is given for leopards, a short, double syllable cough stands for eagles, and a "chutter" sound stands for snakes (an additional call type appears in certain communities when baboons or human beings are in the vicinity). The calls are not similar to the sounds that those predators utter or produce, they are therefore of symbolic type, and the response of other monkeys to a given call is appropriate for escaping the corresponding predator.

Moreover, recent studies on alarm calls in the Greater Spot-nosed Monkeys (like Arnold-Zuberbühler 2006), have shown evidences of the existance of syntactic structures. This species produces two main alarm sounds, designating respectively a leopard, and a bird of prey. In addition to these designations, the monkeys form sequences with these sounds, whose meaning is not the simple sum of the parts (e.g., "A leopard and an eagle"), but something entirely different (generally interpreted as a suggestion to the rest of the group to move somewhere else).

This question is discussed in Chapter 2, Section 2.2.2.

Alarm Response

See **Alarm call**

Alex (1976–2007)

Short for *A*vian *L*earning *EX*periment, Alex was a male African Grey Parrot *Psittacus erithacus* trained in a rather successful **>Interspecific Communication Experiment**, by animal psychologist Dr. Irene Pepperberg. The training started in 1977 and was conducted first in University of Arizona, then at Harvard University and finally at Brandeis University, in Massachusetts, where Alex died of unknown causes at age 41 (against a life expectancy for his species of about 50 years).

The experiment started in a period when it became clear that, despite psychic faculties that are possibly the closest to the human ones, chimpanzees and other great apes do not have adequate anatomic and physiological characteristics to learn *spoken* human language. While these species were therefore trained with alternative methods (such as **>American Sign Language** or **>Lexigrams**), Irene Pepperberg thought that the idea of teaching to speak could be slightly modified and applied to a species that, in fact and notoriously, does not have these expressive limitations (if anything, it might have cognitive handicaps, as it is not a great ape, and not even a mammal). That was the case with the parrot Alex. The experiment was also meant to disprove the stereotype that parrots are just able to repeat things mechanically.

Alex proved to be able to understand and pronounce correctly about 150 English words, including several with multi-layered semantic functions, like "bigger", "different", "same", "zero", "over", "under", "smaller", and others. He could master quantities of objects up to six items, and also, not long before his death, started to learn reading, in order to relate written and spoken words (at the time of his death, he had been able to learn reading sequences of two letters). He was also, similarly to **>Koko** and **>Washoe**, capable of inventing new words, when his vocabulary did not allow him to properly refer to a given object. The most often reported example is the word "Banerry", a combination of the known words "Banana" and "Cherry" for naming an apple (similar to the former in consistency, and to the latter in colour). All in all, he was estimated to possess the intelligence of a 5 year old human being.

Alex's daily training consisted of different types of interviews, in which the trainers would ask him to name, request and describe objects and actions. When the answer was correct, instead of directly receiving a treat, Alex had to explicitly ask for it (e.g., "Want a banana", "Want a nut"). In order to avoid the **>Clever Hans Effect**, the experiments were structured in the so-called double-blind way. One trainer would ask the questions to Alex, and another one, who was unaware of the questions and thus impossible to be biased in his/her interpretation, would detect and transcribe the parrot's answers. Alex had a score of correct answers of 80% of the questions he was asked (including rather specific ones), and his mistakes were basically due to two factors: (1) *misunderstanding*: sometimes Alex would react to words that are similar in sound to the ones actually pronounced, (cable/table, fork/cork etc.); (2) **>Umwelt** differences: for instance, Alex would classify a piece of paper and a piece of leather in the same way. Possibly his criteria for categorization had more to do with the bi-dimensional and squared shape of the two objects, rather than their matter. In that sense, the request had to be considered inadequate as it contained more than one variable, and was thus subject to different categorizations of pertinence.

Shortly before Alex's death, the new "sensation", in the field of speaking parrots, became N'Kisi, also a *Psittacus erithacus*. By January 2004, N'kisi was reported to possess a vocabulary of nearly 1,000 words, frequently combined in complete sentences, with appropriate verb formes and tense, and with a variety of applications that go far beyond the information collected during the training.

American Sign Language

Often shortened as ASL or Ameslan, American Sign Language is the main sign language of the Hearing-impaiered community of English-speaking of United States, Canada, and Mexico. *Ad hoc* prepared versions of ASL were employed in some of the most successful **>Interspecific Communication Experiments**, particularly with the orangutan **>Chantek**, the gorilla **>Koko**, and the chimpanzee **>Washoe**. The main characteristic of ASL is that its **>semantic** and **>syntactic** aspects are totally comparable to the *normal* verbal language.

Ameslan

Short for **>American Sign Language**.

Analogies-Homologies

In biology, two structures or patterns are considered (1) *analogous*, if they are similar in function or constitution, although resulting from different evolutionary paths, or (2) *homologous*, if they share a common origin and the basic structure, even if they may evolved into substantially different functions. Homologies can be *phyletic* or innate (i.e., transmitted via genes), and *by tradition* or acquired (i.e., transmitted via culture). In zoosemiotics, as in other animal studies, the question anlogy-homology often emerges in relation to behavioral patterns (in this case, *semiosic* patterns) that show a certain degree of similarity between human and other animals.

The question is discussed in Chapter 2, Section 2.3.2.

Analogy

See **Analogies-Homologies**

Animal

In the denotative sense, an animal is a living organism of the kingdom *Animalia* bearing the following characteristics: (a) being multicellular; (b) being **>heterotroph**; (c) developing from an embryo (that derives from gametes produced in specialized organs). In most cases, animals are motile (in one or more stages of their life cycle) and provided with one or more sensory apparatuses. Every living organism possessing these characteristics is a potential subject for zoosemiotics research.

From a cultural point of view, the concept "animal" presents several connotations, and in this sense becomes an important topic for **>Anthropological zoosemiotics**. Among these connotations, one should mention at least the following:

1) Animal as "any other animal except humans"
2) Animal as referring to exclusively human characteristics

3) Animal as referring to a particularly uncivilized human being
4) Animal as referring to aggressive and/or violent
5) Animal as referring to natural and/or instinctive attitudes
6) Animal as referring to remarkable physical (mostly sexual) performances
7) Animal as referring to the ability of a human being to adapt to a certain context
8) Animal as referring to a zoomorphic non existent creature

A lengthy discussion on this topic appears in this companion in Chapter 3, Section 3.2.

Animal Ontology

Or Ontology of non-human animals. Theory, grounded in phenomenology, proposed in San Martin and Pintos 2001 as a continuation and extenstion of earlier reflections by Edmund Husserl on humans and other animals as living beings sharing a similar bodily experience:

> If animality is what we most originally experience, the common background from which we start before any division between "human animals" and the "other" animals is made, we need an ontology of animal or animate life as such, and, to begin with, animality, as it can also be called, is not to be identified with the soul but with "the concrete unity of body and soul". The "animality" of our being is where we are all partners, and from that experience we may outline an animal ontology. All animals, both humans and non humans, are transcendental subjectivities. Even though there are differences in level for nonhumans between the very elementary and those higher and closer to humans, we will ignore these obvious details here. (San Martin and Pintos 2001: 355)

The ontology is articulated in 11 points, and, in this companion, became part of the thesis on **>zoosemiotic universals**:

1. Every animal (EA) is a *Körper-Leib*;
2. EA is an *Ichilich* that rules its own body;
3. EA experiences a mental life articulated in time units;
4. EA experiences its own body in a direct way;
5. EA lives in the environment because it lives in itself; by consequence
6. EA is in material relation with the world;
7. EA perceptually feels itself as the 0 point of the world;
8. EA perceives the world from one point of view;
9. EA experiences a common animal world, and a social horizon of its own community/group/species;
10. EA – when interacting – has a set of semiotic problems to solve;
11. EA interacts with others primarily on an affective and emotional basis.

A more detailed explanation of this list and its context is in Chapter 2, Section 2.3.2.

Anthropocentrism

The philosophical or commonsensical attitude of considering the human animal at the center of and above other species (or other elements of reality). Anthropocentrism interprets Nature as (a) an entity existing *apart from* and *for the benefit of* humans, so that (b) nothing in Nature can be considered in itself, autonomously from humans; and (c) it is ethically acceptable for humans and non-humans to be treated in different ways. Nature is seen as lacking an *intrinsic value*, and instead carrying an *instrumental value*, i.e., the values it has for and to humans. In this sense, an investigation on anthropocentrism is crucial in **>zoosemiotics** for both methodological and ethical reasons.

In this companion (Chapter 4, see "Anthropocentrism"), and for the purposes of the human-other animal relationship, anthropocentrsism is classified in the following terms:

1) *Default*: an unavoidable form of anthropocentrism, related to the fact that the subject who observes a given animal species is evidently a human being, with all its resources, limits and modes of categorization.
2) *Binary*: a biased form of anthropocentrism. Here, the fact of being a different entity from the object observed (human, rather than another animal) produces a dualistic interpretation of reality, based on criteria of *difference* (*qualitative anthropocentrism*) and/or a strongly *hierarchical identity* (*quantitative anthropocentrism*), which puts the observer, and the group s/he belongs to, in a superior position in relation to the group observed.

Anthropomorphism

The representation of the Deity, or of a polytheistic deity, under a human form, or with human attributes and affections; or (what is the case in **>zoosemiotics** and other animal-related studies) the ascription of human characteristics to things not human. In animal studies, anthropomorphism represents an extremely problematic issue. In general, it is considered a scientific mistake or bias, which, historically, might have damaged or delayed a fair interpretation of animal behavior (as for instance in the typical case of the so-called **>clever Hans effect**). However, in the last few decades, particularly within philosophical discussions (see also **>Critical anthropomorphism**), there has been a comprehensive revision of the perception of the pros and cons of this attitude, as part of which its positive aspects have been emphasized.

Fisher 1990 presents an interesting methodological classification of anthropomorphism. A first separation is made between *interpretive anthropomorphism* ("all of the usual cases of ascribing mentalistic predicates to animals on the basis of their behavior" – Fisher 1990: 100), and *imaginative anthropomorphism* ("the productive activity of representing imaginary or fictional animals as similar to us" – Fisher 1990: 100). Interpretive anthropomorphism is in turn divided into *categorical* ("ascribing mentalistic predicates to creatures to which the predicates don't ever in fact apply" – Fisher 1990: 101) and *situational* (an animal's behavior is

interpreted "in ways that could possibly apply to that animal in other circumstances, but which do not in the situation in question" – Fisher 1990: 101). Lastly, Fisher divides categorical anthropomorphism into *anthropomorphism by species* and *anthropomorphism by predicate*.

A lengthy discussion on anthropomorphism starts in this companion from Chapter 3, Section 3.3.2, and continues more or less until the end of the whole Chapter 3.

Anthropological Zoosemiotics

The branch of zoosemiotics that studies the semiotic interaction between human beings and other animals, including those of cultural and/or sociological type. Strongly anticipated by **>Sebeok** and by the zoo-biologist Heini **>Hediger**, this field is discussed at length in this companion in the entire Chapter 3.

One form of anthropological zoosemiotics, of a mostly biological orientation, is called *Communicational*, and regards areas of inquiry like applied zoosemiotics and interspecific communication. A second form is named *Significational/Representational*, and concerns the vast areas of myths, tales, allegories, ethics, and systematic classifications, in which non-human animals are for humans mostly a philosophical problem.

Anthroposemiotics

The field of semiotics that studies human **>species-specific >semiosis**. Though not problematic at all in its definition, the expression raises some questions when it comes to its "location" within the map of semiotic studies, particularly in relation with **>zoosemiotics**. Generally, there are two schools of thought: those who think that anthroposemiotics is part of zoosemiotics, exactly as the latter is part of biosemiotics (according to the logical scheme *human being* = *animal* = *living being*); and those who instead maintain that, because of the alleged species-specificness of such traits as **>language**, **>aesthetics** or **>culture**, the human beings deserve an entirely different niche within semiotic studies, *separated* from "natural" semiotics (zoosemiotics, **>biosemiotics**, **>ecosemiotics**, phytosemiotics, etc.), and autonomous from both the methodological and analytical point of view (musical semiotics, film semiotics, semiotics of marketing, etc.). A simplification of the situation might state that the first interpretation belongs to the semiotic tradition, while the second is more proper of the semiological one.

Curiously, the general tendency (at least in those environments that seem to have overcome the strictly anthropocentric semiological approach) is that of acknowledging the scientific and logical correctness of the first categorization (not only the human being *is* an animal, but also concepts like **>culture** and **>aesthetics**, and possibly **>language** too, are far from being inapplicable to non-human species), but *de facto* acting according to the second one (by, for instance, constantly keeping separate zoosemiotic from anthroposemiotic topics in congresses and

publications, relegating the former in the company of other biosemiotic contributions, with the consequence that animal-related topics share their space with plants and micro-organisms, rather than with the human animals).

Anthrozoology

Partly an umbrella term, and partly a discipline with a specific paradigm, anthrozoology is an interdisciplinary field of inquiry originating within social sciences, and that nowadays comprises studies in anthropology, art, education, ethology, history, literature, philosophy, psychology, sociology and veterinary medicine. It is defined quite simply as the scientific study of the relationship between human and nonhuman animals, with the goal of creating "theoretical and conceptual bridges that not only link together widely separated disciplines but also span the gulf between the world of humans and the life of the rest of the planet" (Podberscek-Paul-Serpell 2000: 2). Such bridges are mainly constructed by looking at the symbolic, economic, ecological, and social consequences of human-animal relationship, thus encompassing topics from both human and natural sciences. According to the literature available, such topics include most frequently: human-pet relationships and their link with physical and psychological health; animal assisted therapy; different forms of zoonosis; abuse and cruelty to animals; and companion animals as social facilitators. Institutionally, anthrozoology moved its first steps in 1987, with the first issue of the journal *Anthrozoos*, and in 1991, with the creation of the International Society for Anthrozoology (ISAZ) at Cambridge University.

Anthrozoology is predictably an extremely close "relative" of **>anthropological zoosemiotics**. The latter may be interpreted as *part* of the former (that is, the specific *semiotic* addition to the long list of disciplines contributing to the field), or a different area of inquiry altogether (when one emphasizes the mainly socio-psychological identity of anthrozoology, as opposed to a study of the human-animal relationship as a phenomenon mediated by signs and codes).

Among the foundational literature on anthrozoology: Arluke-Clinton 1996, Serpell 1996 and Wolch 1998.

Anthro-Zoosemiotics

See **Anthropological zoosemiotics**

Appeasement

Semiosic pattern/s, generally of submissive type, displayed by an animal to another in conflict situations, in order to reduce the aggression shown by the latter to the former. Appeasement is normally used for avoiding the need to escape from the aggressor.

Applied Zoosemiotics

The application and exploitation of >**zoosemiotics** for human benefit (breeding, agriculture, veterinary medicine, etc.).

Aquinas, Thomas (1221–1274)

Italian philosopher and theologist. Possibly the highest philosophical authority of Catholic Church, Thomas Aquinas takes the principal responsibility for the penetration of Aristotelian ideas in the western Christian world: his own work can be read as an attempt to conjugate Aristotle (whom he calls "the Philosopher") and Christian precepts. This implies, among other things, a a clean break from overly mystical and spiritual philosophical formulations (as those of Ugo of San Vittore, for instance), to be replaced by a firmly establishment of dogmatism, ratio and hierarchies.

Although very little concerned with non-human animals in general, Aquinas' precepts about the human-animal relationship set decisive ethical standards for the Christian Church, producing a perception of such relationships that, to many extents, is still observed nowadays by fervent believers. In his *Summa theologiae*, indeed, Thomas makes a clear point on the unbridgeable difference between humans and other animals. The human being is an intellectual creature, master of his actions; all other animals are subordinated creatures, *functional* to the intellectual one. The Aristotelian framework soon becomes clear: in the natural world, just like the political one, there are masters and slaves, subjects and objects. The latter are at the disposal of the former. Humans are the only ones who know and perceive God, and therefore they are the sole beings created for their own sake. All other animals are created for human sake. The general invitation to kindness and pity that can be found in the Scriptures, says Thomas, is not to be intended as a duty. Humans should just be careful not to exceed in violence to animals, since, in future, that could turn into violence to other humans. If anything, in such cases when an animal is owned by a person, to kill that animal is an offence to the owner, exactly as killing a slave is an offence to his/her master. Rational creatures like humans cannot be friendly with irrational ones. Charity towards animals is exercised by God only, but this happens only because they are useful to the privileged creatures.

Architectural Signs

Architectural signs are one of the four "prefigurements of art" emphasized in >**Sebeok** 1981, along with >**pictorial signs**, >**musical signs**, and >**kinaesthetic signs**. Of all possible forms of art, architecture is the one most frequently interpreted within strictly utilitarian frameworks. While pictorial, musical and kinaesthetic signs are often claimed to bear a sort of intrinsic value which, at least to some extent, transcends the purposes of traditional biological functions, architecture on the contrary seems to be much more connected with them. In the first place, constructions fulfill a fundamental need for shelter and warmth (and, also, they may serve as prey traps, potential mate attraction, etc.). Hence, it becomes crucual to

argue for the existence of aesthetic values in architectural signs (>**Aesthetics**). To Sebeok, this is a fundamental issue:

> [. . .] we must look for the artistic value that may be involved, although subordinated to the principal interest of the "survival machine" [. . .]. If there is such a subsidiary purpose, falling passively under the sway of "mere" biological advantage, or supplementing it, an effort must be made to ferret out this aesthetic component. Such a quest is far from trivial, for, in the end, it is tantamount to asking: what is art? (Sebeok 1981: 240)

The work of the Finnish architect Juhani Pallasmaa (1995) is extremely helpful in categorizing the functions of animals' constructions, which he orders as follows:

1. Protection from the physical environment (temperature control; water management; humidity control; gaseous exchange and ventilation; waste management);
2. Protection from predators (avoidance of detection or recognition; mechanical protection);
3. Food gathering (cultivation; feeding; leaf-rolling; prey capture; food storage);
4. Communication (structures which assist transmission; structures which are signals; male selection and reproduction);
5. Decoration

A so-called decorative function is thus included: "[. . .] some animal behavior related to nest construction looks like superfluous decoration, lacking [any] other obvious function in the structure" (Pallasmaa 1995: 55). In addition, within the so-called "communicative" function, one notices the presence of sexual selection, which related to aesthetic manifestations to many extents.

Frequently reported examples of animal architecture are the so-called >**Pergolates**, or bowers, built by the Satin Bowerbird *Ptilonorhynchus Violaceus*. The decoration of nests with diverse objects is a pattern displayed by numerous species, including the *Ploceus benghalensis* (who "plasters" its nest with mud, and then decorates it with bright-coloured flowers) and the *Ptiloris paradiseus* (who decorates its nest with snake skins).

Among insects, even the very "rational" bees show some sign of superfluous decorations. After building their cells in the traditional hexagonal shape, bees attach a small hexagonal decoration to the external surface of the queen's cell (which has a different shape from the other cells). Apparently, this small hexagon serves no purpose.

Worth considering are also those cases of architectural artifacts designed as a *support* to other artistic activities, as for instance music (> **Zoomusicology**):

> Animals have also invented devices to improve sound transmission. The male of the tree cricket cuts a hole in a leaf and, while singing, stands in the hole and presses its tegmen against the leaf, which acts as a resonator. The male mole cricket digs a double-mouthed burrow in the ground, which functions as a horn-like amplifier to amplify and direct sound; the invention looks something like an early gramophone. (Pallasmaa 1995: 51).

Architecture is however not solely a decorative activity. To speak of architecture in general, including that of humans, involves also (perhaps mostly) a number of

behavioral patterns related with fabrication and construction of artifacts. This aspect is discussed at length in the entry >**Tools**.

Aristotle (384–322 b.c.)

Greek philosopher. One of the most important and influential figures in Western thought. His centrality is extended also at the zoosemiotic level, in terms of empirical observations (he was a forerunner in several zoological and ethological studies) and ethical reflections (establishing the motives of a most enduring perception of the human-animal relationship). His contribution is rather ambivalent. Aristotle is at the same time an attentive observer of Nature, and a biased interpreter of these observations, when they are somewhat in contrast with his whole, internally coherent, philosophical system. Paradigmatic is his definition of *Scala Naturae*, which served as a model for all classifications before Linnaeus. Though based on a principle of finalistic continuity of species and of correlations between organs, the scale aprioristically refuses the proto-evolutionary principles postulated by Anassimandrus: in the Aristotelian classification one simply finds a hierarchical scale from the most to the least perfect being.

Aristotle's works on animals number five: *History of animals*, *Parts of animals*, *Generation of animals, Movements of animals* and *Progression of animals*. As already mentioned, these texts alternate brilliant intuitions with rather glamoruous mistakes: Aristotle seems incapable of understanding the function of muscles and the nervous system, of distinguishing between veins and arteries, and of fully comprehending the reproductive act (to mention one, semen is to Aristotle merely aimed at sexual excitement). Aristotle also rejects Alcmeon's opinion that the brain is the actual central organ of the body, maintaining that its sole function is to chill blood. To Aristotle, heart is the actual core of all organs.

Several other of his considerations are remarkable. The observations on the anatomy of octopus, cuttlefish, crustaceans, and many other marine invertebrates are detailed and accurate. Aristotle distinguishes cetaceans from fish, describes the embryological development of a chick, the chambered stomachs of ruminants and the social organization of bees. Most of his observations would only be confirmed many centuries later. Aristotle groups together animals with similar features into *genera* (although the term is used in a much broader sense than nowadays) and then distinguishes the >**species** within the genera. Animals are then divided into two types: those with blood, and those without blood (or at least without red blood): the distinction is closely correspondent to that between vertebrates and invertebrates. Blooded animals are organized into five genera: viviparous quadrupeds (mammals), birds, oviparous quadrupeds (reptiles and amphibians), fishes, and whales. Bloodless animals are cephalopods (such as the octopus), crustaceans, insects, shelled animals (such as most molluscs and echinoderms), and "zoophytes", or "plant-animals", supposedly resembling plants in their form, such as most cnidarians.

From the ethical point of view, as mentioned, the concept of *Scala Naturae* remains a crucial concept, particularly for its strong impact on Western philosophy.

To Aristotle, non-human animals, women and slaves are three categories subordinated to the free male human, as they are simply "useful" to the latter (Jowett 1885: 10). Aristotle's philosophical-political system demands for both natural and social hierarchies, the latter depending on the former. Of course, there is a difference between the human slave and the non-human animal: however, in terms of such a socio-natural setting, these differences are not really relevant. What matters is, instead, *utility*, and Nature seems to obey this principle ("the other animals exist for the sake of man, the tame for use and food, the wild, if not all at least the greater part of them, for food, and for the provision of clothing and various instruments" – Jowett 1885: 14)

In Aristotle's hierarchy, there is no real interaction between superior and inferior categories. The former act upon the latter, they impose an order and affect their nature and behavior, without being affected in any way.

ASL

Short for >**American Sign Language**.

Baer, Karl Ernst Von (1792–1876)

Estonian-German morphologist and embryologist. Possibly the founder of modern embriology, Von Baer courageously denied recapitulation theory (i.e., that the embryo of a more complex animals goes through a series of morphological stages similar to the adult forms of lower organisms), in a period in which everybody seemed to have accepted it, and instead formulated his own "laws of embriology":

1. The general characteristics shared within a large group of animals appear in the embryo earlier than specialized features.
2. The embryos' ontogeny develops from general to specialized characters.
3. A species' embryos do not go through other animals' definite, adult, forms, but rather separate themselves from the latter.
4. By consequence, the early embryo of a higher animal does not look like the adult of a lower animal, but simply like its early embryo. The human embryo, for instance, never assumed, in its early stage, the mature form of an invertebrate or of a fish.

Von Baer had a certain fascination for metaphysical ideas connected with Schelling's transcendental idealism, and allowed such ideas to permeate his scientific discourse, possibly damaging part of his otherwise solid structure and conclusions (e.g., he would maintain that the archetype of the organism, now a sort of transcendental entity, was in fact "guiding" the organism's morphological development: "The type of every animal both becomes fixed in the embryo at the beginning and governs its entire development" – 1828–1837 Vol. 1: 220). His

rejection of recapitulation theory was in any case a crucial step in the later, "official", denial provided by the entire biologists' community.

Von Baer is known also, or perhaps mostly (at least in **>biosemiotics**) for his alternative, non-darwinian, way to evolutionism. He shared Georges Cuvier's taxonomy, maintaining that the animal kingdom is separated into four "archetypes": radiata (like starfish and sea urchins), mollusca (like clams and octopus), articulata (like insects and crabs), and vertebrata. Therefore, he found unacceptable that the different class of vertebrates were in fact descended from a common ancestor (funnily enough, **>Darwin** had supported this idea in his writings by also quoting von Baer's findings as a source: misuse or rhetorical strategy?). Von Baer's theory of natural history allowed for "limited" evolution, among closely related organisms, rather than large-scale transformation, as instead suggested by Darwin. By consequence he found it hard to believe in the mechanism of evolutionary causality.

Most of all, from a semiotic point of view, von Baer was not content with Darwin's conviction that species variation and natural selection were random processes, a stand which obviously was against his romantic teleological interpretation of life: "for a true understanding of nature, we cannot dispense with a governing intelligence" (1876, vol. 2: 473). This view, predictably rejected by modern biology, proved instrumental for two anti-darwinian schools: the quasi-creationist cause of the Intelligent Design and the sign-based biosemiotics. Particularly through Kalevi **>Kull**, von Baer's theories went through a consistent process of semiotic revisionism that placed him as a key-figure in evolutionism, to the detriment of Darwin:

> An explanation of the scarcity of semiotic biology in the twentieth century thus stems from the fact that Baerian biology has been in a suppressed minority position almost throughout of the century, except may be only for the first and last decades (i.e., in the periods of neovitalism or organicism, and post-Darwinism), when its supporters were slightly better known or noticed. However, the dialogue between these two lines of thinking in biology has never stopped, and has continuously enriched both views. The rapid growth of biosemiotics in the last decade can be seen as a parallel to the rise of post-Darwinism in evolutionary biology, which is also a result of that dialogue. What is needed, and what it may hopefully bring, is both the broadening and deepening of the views. This would include the better understanding and skillful interpretation of deep but forgotten investigations, grasping more from scientists of other views. (Kull 2005: 23–24)

This position, a program in fact, is one of the founding characters of a consistent portion of the biosemiotic community, which "not only presents a revolutionary idea of biology, but also announces that such a revolution comes from the heirs of the historical opposition to mechanism" (**>Barbieri** 2006: 102). The current situation, in biosemiotics, witnesses a rather heated discussion on this very position, as opposed to the "official" darwinian-mechanistic paradigm of biology. The debate is very much beyond the scopes of this companion, however it is mentioned in Chapter 1, Section 1.2.4.

Barbieri, Marcello (1940)

Italian biologist and biosemiotician, currently working at the Department of Morphology and Embryology, University of Ferrara (Italy). He is the leading figure in one of the two current main schools in biosemiotics, the so-called Code-based Biosemiotics (or Code Biosemiotics). His work is not primarily concerned with **>zoosemiotics**, if not at a very general level (see, for instance, his account on the different theories of evolution in 2003: 33–66), but his plea for a "Scientific biosemiotics" (discussed in Chapter 1, Section 1.2.4) creates an important bridge, in terms of scientific agenda, with the type of zoosemiotic paradigm that is being promoted in this companion.

About code biosemiotics, Barbieri says:

> [. . .] natural selection and natural conventions are two distinct mechanisms of evolution because information and meaning are two distinct components of life. Natural selection is the long term result of copying, whereas natural conventions are the long term result of coding, and the two mechanisms are distinct because coding cannot be reduced to copying (proteins cannot be copied). This is a version of biosemiotics that can be referred to as code-based biosemiotics, or more simply, as code biosemiotics because it assumes that semiosis is defined by coding not by interpretation. The main reason for this conclusion is that the rules of the genetic code have been virtually the same in all living systems and in all environments ever since the origin of life, which clearly shows that they do not depend on interpretation. (Barbieri 2009: 228).

Barbieri is also scientific director of the very book series in which this companion is published, and editor-in-chief of the journal *Biosemiotics*.

Bateson, Gregory (1904–1980)

Primarily an anthropologist, Bateson's work covered a range of interests that included biology, psychology, semiotics, social sciences and cybernetics. He offered several important insights for **>zoosemiotics** (and **>biosemiotics** in general), in terms of both methodology and analysis. Worth of mention are at least his reflections on such topics as **>Instinct**, **>Play**, **>Aesthetics**, **>Mind**, **>Communication** and Intelligence. His reflections, and writing style too, are often provocative and unconventional, and possibly best embodied by his famous metalogues, imaginary dialogues between a father and a daughter over controversial topics of the most diverse nature.

Particularly interesting, from a zoosemiotic perspective, is his view on communication. In the article "Problems in Cetacean and other mammalian communication" (Bateson 1972: 364–78), Bateson addresses the difficulty, as humans, in approaching communication processes in non-human species, with the hypothesis that the latter might use communication in a consistently different manner. The communication of relationship statuses (affection, disaffection, dependency and so on) is to Bateson the predominant communicative function in non-human (that is, to him, non-linguisitic) mammals. Among humans, the communication of relationship is less explicit when it comes to language, and mostly found in that proto-linguistic communication (such as gestures and proxemics) that is common to all mammals.

In Bateson, we also find a distinction between "analogic" and "digital" aspects of communication, the former concerning proto-linguistic communication (a muscle can be more or less tensed, a facial expression more or less intense, etc.), and the latter concerning possibly only human language (although the question is left open when it comes to dolphin communication).

Further contributions by Bateson to zoosemiotics are discussed in Chapter 3 of the present companion.

Bayle, Pierre (1647–1707)

French philosopher, particularly instrumental in the development of agnostic and secular ideas in Western thought, by arguing that faith cannot be justified by reason. In his *Dictionnaire historique et critique* there is a very interesting entry "Beasts (souls of)", which discusses matters regarding reasoning and other inner states in non-human animals (Bayle 1697/1825: 199–219), in an openly anti-cartesian fashion. The entry starts with a direct attack on mechanism ("a strange notion"), and then proceeds by defining the elements in perception and cognition in animals. Among the topics tackled (all gathered in the umbrella term "soul"), there is **>awareness**, *memory*, **>intentionality**, *sensations*, *reasoning* and *morality*. The general message conveyed is that of the biological continuity between humans and other animals, where differences are never of qualitative type ("it would not be more absurd to maintain, that the soul of man knows actually an object without knowing that it knows it; than it is absurd to say, that the soul of a dog sees a bird, without perceiving that she sees it"; "it is impossible for the school-philosophers to prove that the souls of men and those of beasts are of a different nature"; and finally "differences are only accidental, and are no marks of a specific difference").

Bee Dance

Also referred to as a form of **>language**, the dance of the honey bee is easily one of the most impressive examples of animal **>communication**. Its discovery is mostly due to the work performed, during the 1960s, by Karl von **>Frisch** and his then student Martin **>Lindauer**, who carefully observed and described the behavior of the *Apis mellifera*. By means of this dance, one or more bees inform the hive about the presence of food, nesting sites or water sources in the more or less immediate vicinity. The process is roughly organized in the following stages:

1. One bee (called scout) goes in perlustration of the neighbourhood of the hive, and finds, for example, a rich food source.
2. Impregnated with the pollen of the flowers found there, the scout flies back to the hive, starts acting frenetically and performs either a round or an eight-shaped redundant movement, very close to the other bees of the hive. The scout also produces sounds by vibrating its wings, therefore the other bees can receive

information via the **>tactile channel**, the **>olfactive channel** and the **>acoustic channel** (not the **>visual**, though, as the hive environment is too dark for allowing this type of communication).

3. By smelling the scout, the other bees get indexical (**>index**) information on the quality of the object found (in the example, the bees smell pollen, therefore it is a food source, and not – say – a nesting site that the scout has found). After **>Wenner** 1969, and the discussion followed, it became clear that the olfactive channel is playing a more relevant role than previously suspected (although it remains untrue, despite Wenner's beliefs, that odor is the *only* factor intervening in bees' communication)
4. By touching the scout, thus by perceiving what kind of dance it is performing, the bees get symbolic (**>symbol**) information on the location of the place (Fig. 4.1). If the dance is round, it means that the place is very close and does not exceed a distance of about 100 m. A dance in figure of eight represents a distance that ranges between circa 100 m and 13 km. When the distance is so big, it is clearly of great help to have precise indications on the route to follow, as well. That is provided by the orientation of the 8 figure in relation to the position of the sun. The middle part of the 8 (the one where the two lines cross each other) is the moment when the scout indicates the direction. That part is performed very carefully, and creates an ideal angle with the sun position: from that very angle, the other bees understand what direction to take. In the same part of the figure, the scout also provides information on the distance of the site.
5. By hearing the scout, the bees get additional (or reinforced and more precise) information on distance and direction of the site. For a long time, the presence of acoustic communication was not noticed by the researchers, but after Esch 1967 it became clear that the scout can create a tridimensional acoustic field through the wings' vibrations, and that the other bees can perceive the sound through their antennas (specifically on the so-called Johnston's organ).

Fig. 4.1 The two types of bee dance

When showing the distance of the site, the scout – von Frisch noticed – provides an accurate and directly proportional correspondence (what in semiotics is called **>diagrammatic iconism**) between the time spent on the middle part and the distance of the site. In the community studied by von Frisch, the scout would spend a time between half and one second if the site was within 500 m, less than 2 s if the distance was within 1,500 m, up to 3 s when the site was within 3 km of reach, and so on.

Also, the axis of the very movement in the "8" middle part is progressively varied by the bee, As the directional aspect of the dance is crucial for saving time and energy to the other bees, the scout rotates approximately of 15 degrees per hour, in perfect accordance with the position of the Earth towards the Sun. This is possible thanks to the bees' endowment of the so-called solar chronometric orientation. Even in those weather conditions that make sun not visible, the bees equally succeed in conveying and learning the right information, as they are anyway sensitive or sensitised to polarized light.

Additional information on the type of route, and the travel conditions, are detected by the rhythm of the dance. From this element, the bees understand how much energy was spent in order to reach the place. Matched with the data received about the distance, this piece of information reveals whether the scout was flying against or in favour of wind, or if the route was particularly demanding.

Finally, the approximation in specifying the exact distance of a site requiring a round-dance (in point 4 of the above list) is not due to uncertain data, but to the existence of a local **>dialect**. Depending on their geographical origins, bees have a different conception of "close" and "far". For certain communities, it is important to perform a round-dance strictly if the site distance does not exceed the 50 m. Other communities seem to have a better sense of orientation, and can even afford a round-dance (that is, a dance without specific indications on the direction) if the site is 150 m far.

Lindauer 1961 and Frisch 1967 remain two "classics" on bee-dance, but the subject is still very popular among biologists and communication scholars, and new publications appear regularly: worth of mention are at least the works of Thomas Seeley (1995) and Fred Dyer (2002). For an insight on the discussion raised by Adrian Wenner, see Wenner 1969.

Behaviorism

Behaviorism is a theoretical trend (mainly in psychology), founded on the idea that all actions performed by an organism do not have to be interpreted as the result of internal physiological or mental processes, but are rather the result of a direct contextual conditioning. Key behaviourist scholars were Ivan Pavlov, Edward Lee Thorndike, John B. Watson and Burrhus F. Skinner.

Before being challenged (and partly overcome), in the second half of the twentieth century, by **>cognitive** approaches, behaviorism was widely popular in the study of animal behavior, affecting the early developments of **>ethology** and **>zoosemiotics** (the so-called Early **>Ethological Zoosemiotics**). For a short period, it was

up to semiotics itself, through the work of Charles >**Morris**, to develop a specific "behaviorist" theory of signs: sign was to Morris "something that directs behavior with respect to something that is not at the moment a stimulus" (1946: 366).

Bekoff, Marc (1945)

American cognitive ethologist Currently Professor Emeritus of Ecology and Evolutionary Biology at the University of Colorado, Boulder, Bekoff is one of the most prominent figures in >**cognitive ethology**. His range of interests includes the study of mental and emotional aspects of animal behavior and different ethical subjects. Some of his publications (particularly Bekoff 1975, published in the journal *Semiotica*) constitute an important theoretical bridge between >**ethology** and >**zoosemiotics**. Interdisciplinarity, and particularly collaboration with human sciences, is to Bekoff an important goal to achieve in the process of building a theoretical paradigm for cognitive ethology (Bekoff 1995: 139). The question is discussed in Chapter 1, Section 1.1.2.

Bentham, Jeremy (1748–1842)

English philosopher, jurist and political radical. Heavily influenced by enlightenment thinkers, especially John >**Locke** and David >**Hume**, Bentham is primarily known today for his advocacy for utilitarianism and various forms of individual freedom (including women, homosexual and animal rights). His impact on the animal rights movement, particularly through the 1789 work *Introduction to the Principles of Morals and Legislation*, has been crucial, and therefore difficult to overlook also at a specific zoosemiotic level. Bentham argued that the ability to suffer, rather than the ability to reason, is the actual "insuperable line" to determine whether a living being is worth of ethical and juridical attention:

> The day has been, I grieve to say in many places it is not yet past, in which the greater part of the species, under the denomination of slaves, have been treated by the law exactly upon the same footing, as, in England for example, the inferior races of animals are still. The day may come when the rest of the animal creation may acquire those rights which never could have been witholden from them but by the hand of tyranny. The French have already discovered that the blackness of the skin is no reason a human being should be abandoned without redress to the caprice of a tormentor. It may one day come to be recognized that the number of the legs, the villosity of the skin, or the termination of the os sacrum are reasons equally insufficient for abandoning a sensitive being to the same fate. What else is it that should trace the insuperable line? Is it the faculty of reason or perhaps the faculty of discourse? But a full-grown horse or dog, is beyond comparison a more rational, as well as a more conversable animal, than an infant of a day or a week or even a month, old. But suppose the case were otherwise, what would it avail? the question is not, Can they reason?, nor Can they talk? but, Can they suffer? (Bentham 1789/1996: 283, footnote).

Bioacoustics

Interdisciplinary field of inquiry that mainly combines biology and physical acoustics, devoted to the investigation of the neurophysiological and anatomical mechanisms of sound production, spreading and reception in all animals. Although sharing a consistent range of interests with **>zoosemiotics**, bioacoustics (theoretically and empirically) rather proceeds on a parallel path, which does not cross but in few occasions with the former (e.g., **>Sebeok** 1968 and **>Tembrock** 1971). In that sense, the statement that "the branch of zoosemiotics studying acoustic systems of communication is also known as bioacoustics" (Nöth 1990: 161) should be considered misleading.

Biocentrism

Biocentrism is a ethical-philosophical orientation (not to be confused with a scientific theory of the same name, related to quantum physics) within human and natural sciences, theorized by several scholars, including Peter **>Singer** (1975), Tom **>Regan** (1983), Paul W. Taylor (1986), Sergio Bartolommei (1995), Leena Vilkka (1997), Dario Martinelli (2006a, in a specific semiotic application), and (not as a direct promoter, but as an acknowledged source) Charles **>Darwin**. It aims to the overcoming of **>anthropocentrism,** particularly in issues of research ethics and methodology. Unlike anthropocentrism, biocentrism stresses the centrality of the concept of "life", and deals with nature and animals as intrinsic, rather than instrumental, values.

Biocentrism is strictly linked with two other forms of critiques of anthropocentrism, i.e., zoocentrism and ecocentrism. The difference between the three concepts are described by Finnish philosopher Leena Vilkka:

> (1) Zoocentrism means a philosophy in which the issues, concepts and values of animals are central;
> (2) Biocentrism means a philosophy in which the issues, concepts and values of life are central;
> (3) Ecocentrism means a philosophy in which the issues, concepts and values of ecosystems are central (Vilkka 1997: 37)

And by the following scheme:

	Zoocentrism	*Biocentrism*	*Ecocentrism*
Key-concept	Consciousness	Livingness	Wholeness
Value	Well-being	Biodiversity	Beauty
Field	Animals	Life	Ecosystems

(from Vilkka 1997: 37)

In zoosemiotics, the notion is implemented by the use of Jakob von **>Uexküll**'s theories on **>Umwelt**, the concept of **>Zoosemiotic universals**, and a firm critique of **>Morgan's canon** and other similar notions. The first two elements in particular, with their general stress on biodiversity and life, plus the decision of rejecting "consciousness" as benchmark (as the concept is of risky application for a few animal species), have made "Biocentrism" a preferable term to "Zoocentrism" within the zoosemiotic discussion.

The question is discussed at length in Chapter 5, Section 5.5.

Biocommunication

Umbrella-term, defined in **Tembrock** 1971 and used in different fields of inquiry to describe certain types of **>intraspecific** and **interspecific semiosis** among different living (i.e., not only animal) **>species**. The term is adopted and theorized in a semiotic sense by Günther **>Witzany** (in 2007), particulalry according to the traditionally-semiotic classification of **>syntactic**, **>semantic**, and **>pragmatic** aspects.

Biorhetorics

Applied branch of classical rhetoric, introduced in **>biosemiotics** by Stephen **>Pain** in the 1990's (see Pain 2002). Pain maintains that human-animal relationship and nature conservation-related issues can be interpreted in terms of a "natural argumentation", where the force of a successful argument is equal to the distance from the position of the audience at X to the required position Y. Tropes, figures (sometimes meant in a metaphorical sense, sometimes in the traditional rhetoric sense) and the central components of the argument can be measured as factors of the force.

In a recent effort (Pain 2009), Stephen Pain thought also of a specific application of this concept to **>zoosemiotics**, using the term "Zoorhetorics".

Biosemiotics

Biosemiotics is an applied branch of semiotics whose main area of investigation is sign production and relationships in life forms. It consists of (1) the study of **>semiosis** in living organisms; (2) the interpretation of living systems as sign systems; and (3) the identification of **>semiosphere** with **>biosphere**.

Leaving aside the ancient "semiotics" of the medical observation of the body, carried out by the likes of Hippocrates or Galen of Pergamon, semiotics achieved an interest in extra-human and extra-cultural topics only in the nineteenth century, with Charles S. **>Peirce**, and in the early twentieth century with Jakob von **>Uexküll**. The Italian oncologist Giorgio **>Prodi** then came to denominate "Nature Semiotics" as the study of biological codes. It was however Friedrich S. Rothschild (1962: 777) who first used the term "biosemiotics" in a scientific context. In 1971 the Russian

semiotician Yuri Stepanov extensively used the term "Biosemiotics" in his work, and – after Thomas **>Sebeok** used it in international contexts in 1986 – it started to spread all through the semiotic community, becoming nowadays one of the most important areas of expertise in semiotics.

Biosemiotics is also discussed in Chapter 1, Section 1.1, where a few definitions of the field are provided. In this entry, however, the following can be added in order to provide a more complete perspective:

> Sign processes penetrate the entire body of an organism. [...] Signification is the fundamental property of living systems that can be taken as a definition of life. Hence, biosemiotics can be viewed as a root of both biology and semiotics rather than a branch of semiotics. (Sharov 1998: 404–405)

Apart from the reaffirmation of the centrality of semiosis in biological processes, in this definition we also learn about the intimately interdisciplinary nature of biosemiotics. Such a concept is confirmed by Claus Emmeche, who also emphasizes the fact that biosemiotics focuses most of all in the "emergence of semiosis" in nature, and that this emergence may or may not coincide with the emergence of living forms.:

> Biosemiotics proper deals with sign processes in nature in all dimensions, including (1) the emergence of semiosis in nature, which may coincide with or anticipate the emergence of living cells; (2) the natural history of signs; (3) the ′horizontal′ aspects of semiosis in the ontogeny of organisms, in plant and animal communication, and in inner sign functions in the immune and nervous systems; and (4) the semiotics of cognition and language. [. . .] Biosemiotics can be seen as a contribution to a general theory of evolution, involving a synthesis of different disciplines. It is a branch of general semiotics, but the existence of signs in its subject matter is not necessarily presupposed, insofar as the origin of semiosis in the universe is one of the riddles to be solved. (Emmeche 1992: 78)

As that branch of semiotics that deals with the living beings of the kingdom *Animalia*, **>zoosemiotics** must be considered part of biosemiotics.

Biosphere

The globality of the Earth's environments where living organisms live and operate, interacting with the lithosphere, the hydrosphere, and the atmosphere. The birth of the biosphere, by means of biopoesis, is dated at some 3.5 billion years ago. In the biosemiotic view, the concept of "biosphere" overlaps with that of the **>Semiosphere**.

Bower

See **Pergolate**

Camouflage

See **Deception**

Cassirer, Ernst (1874–1945)

German philosopher. A crucial figure in the post-Kantian idealist school of the early twentieth century. His major contribution to Western thought was the three-volume *Philosophy of Symbolic Forms* (published between 1923 and 1929). There, and in one of his subsequent works, *An Essay on Man* (1944), Cassirer defines the human being as a "symbolic animal" (*Animal symbolicum*). Non-human animals, says Cassirer, perceive their world by means of **>instinct** and senses, while the human being creates and shapes reality through symbolic meanings, that allow the conception of projects, hypotheses, forecasts and utopias. Symbolic forms are of linguistic, scholarly, scientific, and artistic types.

In a more semiotic-friendly form, the notion of "Symbolic animal" was partly re-elaborated in the concept of "Semiotic animal". For more, see Chapter 1, Section 1.2.3.

Channels

Channels are in semiotics the sensory modes used to transmit a message. The notion roughly corresponds to (but does not overlap with) that of the "senses", although attention should be paid not to limit the notion to the five senses possessed by humans. In **>zoosemiotics**, indeed, at least seven channels are classified: the olfactory, the gustatory (these two normally grouped into the definition of **>chemical channel**), the tactile, the thermic, the electric (these three gathered under **>tactile channel**), the **>acoustic channel**, and the **>visual channel** (not to mention the possibility of including also **>magnetoception**, as a channel of its own).

Chantek (1977)

From the Indonesian "Cantik" (beautiful, lovely), Chantek is a male orangutan of the species *Pongo abelii* raised at the Yerkes Regional Primate Research Center in Atlanta (Georgia) for a number of **>Interspecific Communication Experiments**, coordinated by anthropologist Dr. Lyn Miles. A program based on **>American Sign Language** was successfully attempted with Chantek starting in 1978. The distinctive feature of this program was that the trainee was put in a context in which all trainers would communicate with ASL, even among themselves, and nobody was making specific attempts to train him directly. Simply, when Chantek was told something, he was told in ASL, and when he wanted to communicate, he had to use ASL. Very soon, the orangutan learned to use the sign system spontaneously and efficiently, amounting to a vocabulary of several hundreds of signs, later enriched by a quasi-second language: the understanding of spoken English. His skills were so convincing that they had a political impact in the application of the ethic and juridical concept of **>personhood** in Great Apes (as for instance promoted by Paola Cavalieri's and Peter **>Singer**'s *Great Ape Project*)

Chantek is also known for his creativity, particularly expressed in **>tool-making**, painting (**>pictorial signs**), music-making (**>zoomusicology**) – alone or in collaboration with Lyn Miles herself, who is also a professional percussionist (the "duo"

has also released some recordings under the stagename Animal Nation) – and several forms of handicrafting (especially necklaces); and for allowing advancements in the studies of **>self-consciousness** in non-human animals by displaying a great variety of revealing reactions to the mirror test.

Besides several documentaries and "popular science" articles and books, Chantek's efforts in ASL training are also academically documented in, a.o., Miles (1990, 1994).

Chemical Channel

The most elementary and common of the **>channels**. The chemical substances serving as sign vehicles between organisms within a shared environment are called semiochemicals (e.g., pheromones are those semiochemicals used in **>intraspecific** animal **>communication**). In animal **>semiosis**, there are species who have a clear distinction between taste and smell, and others who do not, and basically have the same receptor organ for both functions (as a matter of fact, there is always a close collaboration between these two senses: in humans the taste of food is always provided by a combination of the olfactory and the gustatory channels).

The main advantages of the chemical channel are three: it is relatively permanent, it can act at relatively big distances, and it can be decoded at a given time distance. In contrast, this channel has a slow variability and a high susceptibility to interferences. The territory signal emitted by dogs through their urine is a perfect example of these pros and cons: the message is quite permanent, it can be smelt at a certain distance, and can be decoded after several days by other dogs. At the same time, there is not much information spread (except a "this is my land!" kind of message), and the next dog will easily invalidate the message by urinating over it.

Cimatti, Felice (1959)

Italian zoosemiotician, currently Associate Professor in Philosophy of Mind at University of Calabria (Italy). A very important figure in the development of a cognitive approach to **>zoosemiotics**, through the seminal *Mente e linguaggio negli animali* (1998). Topics discussed in this work include the question of the **>semiotic threshold**, the **>functions of communication** in animals (according to Roman Jakobson's framework), the **>interspecific communication experiments**, and the **>zoosemiotic universals**.

Cimatti is also author of one of the few essays available on the figure and theories of **>biosemiotics** pioneer Giorgio **>Prodi** (Cimatti 2000).

Cleaning Symbiosis

See **Symbiosis**

Clever Hans Effect

Der Kluge Hans (German for "Clever Hans") was a horse owned by a math teacher and horse trainer named Wilhelm von Osten, between the nineteenth and the twentieth centuries, and who achieved a certain notoriety for allegedly being able to perform arithmetic and other intellectual tasks.

During increasingly popular shows, throughout the whole Germany, Hans would amaze the spectators by solving problems of different types by means of hitting his hoof on the ground (he was known for adding, subtracting, multiplying, dividing, working with fractions, telling time, keeping track of the calendar, distinguishing musical tones, and reading and understanding German). As a problem was presented to him (either orally or in written form), Hans would start tapping his foot and stop when the exact figure was reached.

A first investigation on Hans' skills was performed in 1904 by psychologist Carl Sumpf and 13 collaborators (known as the "Hans commission") from different fields, including veterinary doctors, circus managers and zoo directors, only to conclude that no trick was involved in the horse's performances. Psychologist Oskar Pfungst, in 1907, started a more thorough investigation on the case, introducing a few variables that turned out to be crucial (preventing Hans from seeing the questioner, making sure that the questioner did not him/herself know the answer to the problem, etc.). This way, Pfungst could demonstrate that Hans was not actually cognitively able to perform the tasks, but was instead very skilful in watching his observers' reactions to his "counting", until some involuntary cues in their body language would alert him that the task had been correctly performed.

The case of Clever Hans became paradigmatic for those experimental contexts where (a) the subject of the experiment ends up manipulating, rather than being manipulated by, its trainers, and (b) the trainers, possibly driven by the enthusiasm of an apparently remarkable performance of their trainee, fall victim of excessive **>anthropomorphism** in their interpretation. The phenomenon is known as "Clever Hans Effect", and became, among other things, the war . . . *horse* of semioticians criticizing **>interspecific communication experiments**. The fear of falling prey of this methodological bias encouraged some of the researchers of these experiments to adopt the so-called **>emotion-free experimental contexts**, loosely based on Pfungst's principles of investigation in the Hans' case.

A detailed discussion on the Clever Hans Effect appears in Chapter 3, starting from the Section 3.3.

Code

The totality of the rules of transformation, shared by at least two subjects (and normally by an extended community), through which signs are more or less deliberately associated to one or more meanings. A code is at the same time a causal factor and a direct consequence of **>sociality**, in that it requires social interaction in order to be created, and – after being established – allows an increase and an improvement of such interaction. As a set of rules based on convention, **>arbitrariness**

and **>ritualization**, codes tend mostly to create signs of symbolic type (**>Symbol**), however few are the cases where the sign-meaning association is purely and exclusively arbitrary. Codes can be established through any of the **>channels** available in each **>species**, and take different configurations according to the degree of familiarity and interaction within a community (up to the generally most difficult case of **>interspecific >semiosis**). Within the same community, let alone species, codes may be subject to progressive variations and adjustements, due to different factors: increasing efficiency of a new sign-meaning association, as compared to an old one of the same type; introduction of new subjects from a different community, who carry a different sign-repertoire (see also **>Dialect**), etc.

Using a well-known classification by Daniel Chandler (2002: 148–59), it can be said that non-human animal codes can be

1) *Social*, in at least the *bodily* and *behavioral* sense (but also in the *commodity* and *verbal* one, if these are meant in a broad sense);
2) *Textual*, when they result in an artificial or semi-artificial production (for instance in those specimens used in **>interspecific communication experiments**);
3) *Interpretative*, in at least the *perceptual* sense (but also in the *ideological* one, if we take to the letter Chandler's indication of ideology as a determinant for dominant, negotiated and oppositional rules for encoding and decoding).

In addition to Chandler's formulation, or perhaps as an extension of the category of Textual codes, one may also think of **>contextual codes**, that is, those sign repertoires that are typical (and somehow exclusive) of a specific situation and interaction.

Coetzee, John Maxwell (1940)

Writer and academic, 2003 Nobel Prize in Literature. Born in South-Africa, he is currently an Australian citizen. A passionate advocate for the animal rights movement, Coetzee tackled, in novels such as *Disgrace*, *The Lives of Animals* and *Elizabeth Costello*, a number of topics related to animal **>cognition**, **>communication** and **>ethics**, often offering reflections and interpretation of scientific relevance. A passage from *Elizabeth Costello* is used in Chapter 3, Section 3.3.4 of this Companion.

Cognition

The totality of mental activities and information processing occurring within an animal, in a fashion partly or totally untied from **>instinct**. It is the main target of **>cognitive ethology** and of **>modern ethozoomiotics**, the latter mostly focusing on how signs are constructed, interpreted and mediated. The study of animal cognition focuses on at least the following aspects:

1) *Attentive skills*: the capacity of focusing on and discriminating between different stimuli.
2) *Classification and categorization*: the capacity of creating semantic fields, and therefore making types out of tokens.
3) *Temporal cognition*: the capacity of learning, retaining and transferring past information for (immediate and/or remote) future use,
4) *Spatial Cognition*: the capacity of orienteering and navigating
5) Production and use of **>tools**
6) *Problem-solving*: the capacity of pursuing a goal by avoiding especially complex and unusual obstacles
7) **>Language**
8) **>Consciousness**
9) *Counting and computing*: the capacity of discriminating between quantities and perform basic mathematical tasks.

Cognitive

See **Cognition**

Cognitive Ethology

The evolutionary and comparative study of animal **>cognition** (thought processes, consciousness, beliefs, rationality). Cognitive ethology was pioneered by Charles **>Darwin** in his last works of of a *zoo*logical nature (1871 and 1872), and established by Donald **>Griffin**'s *The question of animal awareness*. It is a rapidly growing field with (rather unusually in a natural science) a strong inclination for interdisciplinary work. Currently, the list of eminent cognitive ethologists include Colin Allen, Marc **>Bekoff** (who also wrote articles of zoosemiotic contents), Frans **>De Waal,** Dorothy Cheney, Robert Seyfarth, Dale Jamieson, Remy Chauvin, and the great majority of scholars in **>interspecific communication experiments**. Cognitive ethology may easily be considered the closest relative to **>zoosemiotics**.

The main issues and problems which cognitive ethology deals with are efficiently summarized in Colin Allen's e-text "Philosophy of cognitive ethology":

> "There are two major planks [. . .] for cognitive ethology, both of which have come under attack. One plank is theoretical: it concerns the kinds of questions that scientists should be asking about animal minds. According to Griffin, scientists should no longer ignore questions about the intentionality, thoughts and conscious experiences of animals. This theoretical plank of Griffin′s program has been attacked on the grounds that mentalistic, folk-psychological notions such as 'thought' and 'consciousness' are too imprecise or for serious scientific investigation. The other plank is methodological: it concerns the ways in which scientists should go about answering questions about animal minds. Here Griffin argues that our best chance for answering such questions comes from observing animals under natural conditions solving the kinds of problems for which their intelligence has become adapted by evolution. This methodological plank has been attacked on the grounds that such observations lack the controls required for proper hypothesis testing". (Colin Allen, at host.uniroma3.it/progetti/kant/field/ceth.htm).

Cognitive Map

See **Mental Representation**.

Comfort

Comfort, or comfort behavior, indicates a series of behavioral patterns related, to different extents, to the care, welfare and health of an animal's body. Such patterns include on the one hand activities like dustbathing, grooming, preening, rubbing, scratching, shaking, washing and others (pertaining, that is, to body-care), and on the other, activities like defecating, stretching, urinating, yawning and others (pertaining to the tension release of metabolic functions). Some of this activities, subject to a process of **>ritualization**, became essential components of social interaction (the typical example being grooming among great apes).

Within **>zoosemiotics**, a specialist in comfort behavior is Aleksei **>Turovski** (e.g., 2001 and 2002).

Communication

In general semiotics, communication is the process of transmission *and* reception of a message. For the purposes of this companion (within the framework of a tripartite definition of **>semiosis**, as discussed in Chapter 1, Section 1.1), communication is that particular semiosic process which, unlike **>representation** and **>signification**, requires *both* a source and a destination for the message. In communication, at least two animals (a sender and a receiver) take part in the semiosic phenomenon, and therefore the "sense" is exchanged, understood or misunderstood.

Communicational Anthrozoosemiotics

See **Anthropological zoosemiotics**

Conative

One of the six **>functions of communication** postulated by Roman Jakobson (1963). A message is conative when its focus is the receiver.

Condillac, Etienne Bonnot De (1715–1780)

French philosopher. A relevant exponent of a certain radical empiricism in the discussion around **>mind** (an approach that is often referred to as "sensationism"), a discussion that he took to a further extreme than John **>Locke**, by rejecting all forms of innate activities (while, in Locke, that rejection was limited to principles and ideas). In 1755, Condillac published a *Treatise on Animals*, meant as an attempt

to explain the difference between human from animal souls. Free will, intelligence and individuality are the main discrimants: each human being forms him/herself on the basis of different models, assembled in a synthesis that creates the uniqueness of the individual. Animals, on the contrary, have a limited range of needs, and are fundamentally moved by **>instinct** and habit.

Moreover, as the philosopher later explains in the *Essay on the origin of human knowledge* (1756), they lack reason and symbolic **>language** (being able to express their feelings only through "inarticulate cries"), the latter activity consisting in "conventional signs" that require memory (another element missing in animals). Despite this consistent difference, Condillac is still in favour of a natural continuity between human beings and other species (openly rejecting **>Descartes**' mechanism), and – in the specific of semiotics – does not deny that animals can communicate with one another by using natural signs (such as the inarticulate cries, that become habitually associated with natural feelings):

> The similarity between animals and us proves that they have a soul; and the difference between us proves it is inferior to ours. The matter is made evident by my analyses, for the operations of the animal soul are limited to perception, consciousness, attention, reminiscence, and to an imagination which is not at their command, whereas ours possesses additional operations (Condillac 1756/2001: 39).

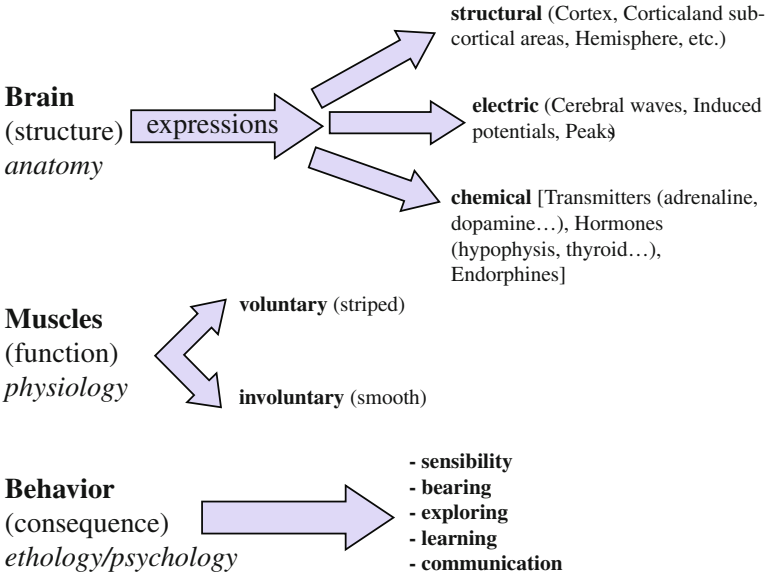
Condillac then pioneers the notion of "Semiotic animal" by asserting that the human ability to "attach ideas to arbitrary signs" creates a "mystery" in our imagination that allows to recall ideas from distant spaces and times, while animals are "stuck" in the immediacy of the present.

Consciousness

An umbrella-term that may refer to a vast scale of mental states, from subjective experience to simple awareness. When it comes to non-human animals, the data at scholars' disposal are not abundant, and must regularly be accompanied by philosophical conjectures. The range of hypothesis goes from the "pessimistic" Nagel 1974, who practically answered "No idea!" to his question "What is it like to be a bat?", to the optimistic Cheney-Seyfarth 1990, who instead offered a few hypothesis to their question (ironically referring to Nagel himself) "What is it like to be a monkey?".

The problem is largely part of the more general philosophy of **>mind**, and it is often discussed in terms of body-mind dualism and **>etic-emic** methodologies. It is obviously a central theme in both **>cognitive ethology** (it was, after all, the main issue in **>Griffin** 1976), and **>modern ethozoosemiotics** (where a thorough analysis can be found, a.o., in **>Cimatti** 1998). A convincing treatise on the subject is found in Mortenson 1987, where different anatomic-physiological-behavioral clues for consciousness are gathered as abductive indications for the presence of the phenomenon (Table 4.1).

Table 4.1 Indicators of consciousness, accordino to Mortenson 1987



Contextual Codes

In this companion, a contextual code is defined as a type of **>code** developed specifically for a particular activity/interaction. It features signs that are used only in that context, and not in others (unless undergone a process of **>Ritualization**). Among the many examples of situations mediated by a contextual code, there are **>play**, courting rituals, **>food request,** cleaning **>symbiosis,** etc.

Convention

See **Codes**, **Symbol** *and* **Ritualization**.

Critical Anthropomorphism

Philosophical notion elaborated by Italian philosopher Luisella Battaglia in the essay *Etica e diritti degli animali* (Battaglia 1997). Within semiotics, it is applied as an attempt to overcome the methodological problems raised around **>Anthropomorphism** and **>Morgan's Canon.** As in both cases this companion suggests the adoption of a critical attitude, critical anthropomorphism constitutes a theoretical counter-proposal. It aims to use human experience as a means for recognizing given manifestations of emotional type, and integrate such experience with the theoretical and empirical findings of natural sciences (Battaglia 1997: 123–124). This way scientific and ethical reflections are not in contrast, but rather complementary to each other, avoiding certain, recurrent forms of methodological contradiction

("If human-animal similarities are accepted for scientific experimentation purposes, they should also be accepted in the field of emotional sensibility. In any case, any doubt about emotional sensibility should be gauged so as to benefit the weakest subject. In particular, the presupposition of similarity, when there is no clear counterproof, should be interpreted in favour of the animals" – from Battaglia 1997: 124).

Critical anthropomorphism is discussed at length in Chapter 3, Section 3.3.5.

Culture

The totality of information acquired and developed by a community and transmitted non-genetically from one generation to another. Phenomena of this kind have been observed in some insects, fishes, amphibians and reptiles, and in most birds and mammals. With few exceptions, the presence and the quantity of cultural processes are directly proportionate to the degrees of **>sociality** and social organization displayed by each **>species**.

At the core of any cultural process, there is the capacity of social **>learning**, which implies the transmission of some information from one or more "demonstrators" to one or more "observers/listeners". Several factors, at different (and changeable) stages, intervene in the process. These are (in no specific order): (1) **>imprinting**; (2) attention; (3) imitation (**>mimicry**); (4) memory; (5) social facilitation; (6) creativity; and of course (7) **>communication**. One famous case in which all of these factors are operating at the same time, and which was also a breakthrough in this topic's research, is that of the macaques *Macaca fuscata*, closely observed during the 1940s and 1950s by a group of researchers led by Masao Kawai in Koshima, Japan (Kawai 1965). Researchers had the idea of introducing a "novelty" in the life of a group of macaques, by leaving some sweet potatoes along the beach. One macaque began to wash the potatoes in the water, instead of brushing the sand off with her hand as other macaques did. In short time, this behavior became popular among the other members of the community and was passed on from generation to generation. In addition, the macaques proved to make a cognitive use of the innovation, as further modifications to this pattern were eventually provided (for instance, they started washing the potatoes in salt, rather than fresh, water, in order to enahnce their flavor).

Although the **>intraspecific** examples of cultural transmission are certainly more recurrent in nature, it must be underlined that **>interspecific** cases are far from rare, a most peculiar example being that of the so-called slave-ism performed by certain species of ants on weaker species of insects. Among the vast literature on animal culture, worthy of attention are Thorpe 1961 and 1963, Gardner et al. 1994, Bonner 1980, and Box 1973 could be singled out.

Dance

See **Kinaesthetic signs**

Darwin, Charles (1809–1882)

English naturalist. Quite simply, the most important animal scholar of all times. All fields of inquiry pertaining to the study of animals owe an incalculable debt to his theories and observations, and there is certainly no point in listing all of them, besides those that have been instrumental for the development of **>zoosemiotics** (and still considering that Darwin'ss many other contributions to animal studies were instrumental to this field anyway, although possibly in a less direct way).

If the theory of Natural Selection is what gave Darwin most of his fame, it is in his later works that one finds the basis for the development of **>cognitive ethology**, zoosemiotics, **>sociobiology**, and other fields that characterized animal studies in the twentieth century (including elements of research ethics: Darwin's methodology, notoriously, relied upon personal observations and descriptions of an anecdotal and non-invasive nature). In *The Descent of Man* (1871), Darwin introduces reflections and observations about animal **>cognition**, reasoning, use and making of **>tools**, **>consciousness**, **>learning**, **>aesthetics**, **>sociality** and morality (and even spirituality, when one considers those remarks on the supernatural in animals). In the subsequent *The Expression of Emotions of in the Man and Animals* (1872) Darwin follows up the arguments of the previous book, and focuses on topics that are even more pertinent to modern zoosemiotic research: signalling behaviour, **>representation** and interpretation. Darwin also meticulously describes the main features of what is nowadays known as **>multimodality**.

The importance of Darwin's writings in the zoosemiotic (as in any other) context, certainly resides in their modernity. Accurate descriptions of signalling behaviour, important methodological distinctions (**>intraspecific semiosis** and **>interspecific semiosis**, or "intercommunication", as he calls it; innate, learned and ritualized sign repertoires, etc.), and specific theoretical formulations.

It is safe to affirm that Darwin is to animal studies as Bach is to music and Shakespeare to theatre.

Dear Enemy

Ethological phenomenon that describes an animal's particular reaction to the invasion of its territory on the part of a neighbor. The aggressive response, in this case, is shorter and less intense, as compared to the case when a total stranger is invading the territory. The "dear enemy" phenomenon, thus, implies the animal's capacity for individual recognition, and it is observed especially in birds and mammals, although relatively recent studies on the coral reef fish *Pomacentrus partitus* (e.g., Myrberg and Riggio 1985) showed that fishes are also less aggressive towards their own "dear enemies".

Deception

In semiotic terms, deception is a communicative action where a sender (1) breaks the association of a sign-meaning established in one or more codes, (2) mentally

represents the receiver's mind (for instance, mapping his/her expectations), and (3) takes advantage of the broken association.

It is an extremely common practice in the entire animal kingdom, and includes such phenomena/patterns as **>mimicry** and **>imitation**, through to linguistic lies, created by the likes of **>Koko**, **>Washoe** and other subjects of **>interspecific communication experiments**. A classification of the different typologies of deception was provided in Bouvet 2000, and is articulated in seven cases:

1) *performing* – as in several courting rituals implied different forms of **>exhibition**;
2) *hiding* – as in mimicry;
3) *simulating* – as in **>play**;
4) *dissimulating* – as in those cases where a certain pattern is purposively displayed ("staged") in order to keep the receiver's attention off from another pattern;
5) *deceiving* – as in those cases where a sign associated to a given meaning is deliberately emitted for achieving a different goal than the one pertinent to that meaning;
6) *disguising* – as in cases of body-decoration or transvestitism;
7) *pure lying* – as in the mentioned "linguistic lies".
8) A thorough discussion on deception appears in Chapter 2, Section 2.4.1.

Deely, John (1942)

American semiotician and philosopher. Currently Professor of Philosophy at the Center for Thomistic Studies of the University of St. Thomas (Houston, Texas). Deely is a key-figure in contemporary American semiotics. His work is particularly concerned with general theory of semiotics, and its impact on philosophy (an activity resulting in the volume *Four Ages of Understanding*, a monumental history of philosophy from a semiotic perspective). Deely is also very active in **>zoosemiotics**, having several times discussed the notions of **>Umwelt** (e.g., Deely 2001), Semiotic Animal (e.g., Deely 2005), and others, often following in the footsteps of Thomas **>Sebeok**, of whom he was close friend, and to some extent heir.

Descartes, René (1596–1650)

French philosopher and mathematician. Descartes' theories on animals are probably among the very few on the subject to be well-known. Animal-rights activists have always been very critical of Cartesian conceptions, mentioning them as the typical example of human prejudices towards other animals. What is certain is that the Cartesian idea of the animal-machine was a major breakthrough in a discussion that, until then, was mostly animated by theological, ethical and political reflections.

Descartes' philosophy, as always happens to the most influential thinkers, is to a large extent controversial. While it is generally acknowledged that he marked

the beginning of modern philosophy, one cannot avoid remarking that many of his reflections, starting from his metaphysics, were in fact animated by a truly medieval spirit.

The opinion expressed by Descartes on animals is quite difficult to misunderstand: animals are totally thoughtless and conscienceless. They are simple mechanisms. To maintain that a cat thinks is to Descartes as silly as stating that a clock does. Descartes does not distinguish between mechanism and organism: his view is a form of reductionism that replaces organic structures with mechanic components. The main points in Descartes' argumentation on animal cognition, as illustrated in his *Discourse on the method* (1637, here edited and translated in Veitch 2008) are the following:

1) Descartes does not deny the existence of emotions in animals: he simply maintains that they have no awareness of them. All bodies are machines, in the Cartesian system, including human bodies (Veitch 2008: 44–5);
2) The difference between humans and other animals concerns the human possession of a soul, expressed through ratio and language (Veitch 2008: 45–6. "There are no men so dull and stupid, not even idiots, as to be incapable of joining together different words")
3) The "problem" with animals is thus the absence of soul. They are *res extensa*, but definitely lack *res cogitans*. The existence of soul in humans is to Descartes an undisputable fact: to deny this fact is as big a mistake as denying the existence of God (*sic*). Similarly, to consider "beasts" as provided with soul is also a mistake, for it means to put up for discussion well-established theological and moral dogmas, which the whole civilization is based on (Veitch 2008: 48).

In this respect, Descartes' philosophy has a strong ideological component and guarantees a scientist's support to a conception highly promoted by Christianity: the absolute domain of humans on Nature. This is probably one of the reasons why Cartesianism was so successful in the following centuries, and – to some extents – is still alive in certain scientific environments. Together with **>Aristotle** and Christianity, Descartes constitutes the most important step in the formation of the western anthropocentric attitude towards non-human animals.

The notion of Cartesian mechanism was already being criticized in the eighteenth century, **>Hume** being one of the most illustrious examples. The main weakness, as was remarked on several occasions, was the use of the living being-machine comparison as a full explanation of life, rather than as effective metaphor. As philosopher Gino Ditadi remarks:

> Machines are built, organisms grow. This means that a comprehension of organisms must focus on processes. Cells, for instance, can be understood only on the basis of relational processes that reflect the dynamism of an organic system. While the activities of a machine are determined by its structure, such a relation is reversed in organisms, for their structure is determined by processes. Organisms display a high degree of flexibility

and plasticity. Machines work according to linear cause/effect chains, organisms work with retro-action and are an open system, in a constantly dynamic balance (translated from Ditadi 1994: 116).

Descriptive Zoosemiotics

The portion of zoosemiotic research that studies **>pragmatics**, **>semantics** and **>syntactics** in zoosemiosis.

Design-Features of Language

See **Hockett**, Charles.

De Waal, Frans (1948)

Dutch ethologist and primatologist. Professor of Primate Behavior in the Emory University psychology department in Atlanta, Georgia. A major expert in primate behavior, De Waal plays a central role, in modern ethology, in the study of morality and **>sociality** in great apes, offering an approach that he openly ascribes to the recent tradition of **>cognitive ethology**, of which he is one of the leading exponents. It is particularly through studies such as De Waal 1996 that his research achieved world notoriety. A central thesis in that work is that most animals, and particularly great apes are not only, and fully, "moral patients", but also provide evidence of "moral agency", becoming thus, like humans, *insiders* of the ethical discourse.

De Waal's research is not of semiotic type, however it offers several insights for the ethical program proposed in the Chapter 5 to this Companion.

Diagrammatic Iconism

A particular case of iconism (**>Icon**). It occurs for instance when a scout bee relates the distance of the food source to the speed of its dance (see **Bee dance**): the greater the distance, the faster the dance. This way a form of qualitative relation between sign and object is created, even if the speed of a movement is obviously not a "feature" of a spatial distance: what matters in this case is the correspondence (almost metaphorical, yet clearly iconic) between the increase of a value (distance) and the proportional increase of another value (motion).

Dialect

A variety of a sign system that is distinguished from other varieties of the same system by features of sign-object association, structure, social use, and by its use by a community of users that are set off from others geographically or socially. Normally, the structures and characteristics of semiosis among animals are species-specific, i.e., they vary from species to species. As in humans, however, there are individual nuances and, most of all, differences from one population group to another within

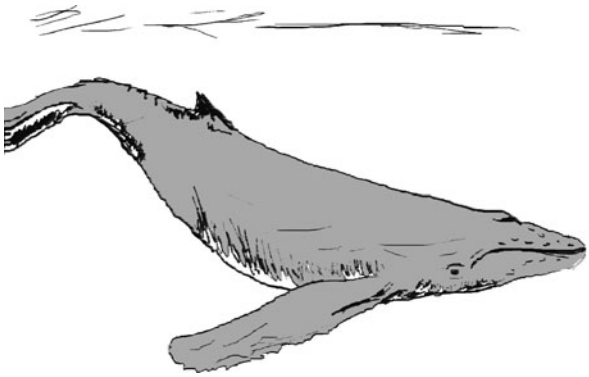


Fig. 4.2 The songs of the humpback whale present a wide range of local and regional dialects

the same species. These are called dialects, and are basically divided in mycrogeographical (or local) and macrogeographical (or regional) dialects. In the first case, variations are very subtle, and mostly concern very close-knit populations which interact with much frequency, so that their communicative codes mutually affect each other. In the second case, variations are quite evident, being put into action by communities which have very little, if any, occasion for communicative exchange, their respective codes thus growing in total autonomy. Present in a wide number of species, dialects are prototypical in birds (see, a.o., Armstrong 1963) and cetaceans (a.o., Payne 1996) (Fig. 4.2), and are closely connected with the development of **>culture**.

Discontinuity

The idea that, from an evolutionary point of view, human beings constitutes a radical deviation from the rest of the animal kingdom, and therefore the differences between the human and the other animals are of qualitative type.

It consitutes one of three general methodological frameworks, along with **>gradualism** and **>Umwelt** theory, to classify the different scholarly approaches to nature and animals, as explained in detail in Chapter 1, Section 1.1.4.

Distant Space-Time Semiosis

The capacity, typical of very complex semiotic systems like human **>language**, to construct or refer to entities or situations that are not spatially or temporally tangible. Distant space-time semiosis includes description/account of non-experienced past (like historical events), planning/forecast of not immediate future, and the dialectic/rhetorical/discoursive creation of possible worlds (non-existent situations or characters, abstract reflections, what-if scenarios, etc.).

The notion generally corresponds to Charles **>Hockett**'s design-feature of "Displacement", and is discussed in Chapter 3, from Section "3..

Domestication

Generally speaking, domestication is the process of taming an **>animal** (usually a non-human one), normally by generations of breeding, to live in close association with another animal (usually, a human one), in such a way that the former becomes dependent on the latter's care and, in most cases, unable to live in its original conditions again. According to Thomas **>Sebeok** (e.g., 1998: 70), a pre-requisite to domestication is the "reduction or possibly total elimination of the reaction of escape in a non-human animal from a human one". Domestication implies a consistent introduction of new signs and codes (**>code**) in the interaction between the subjects involved, up to the point that the **>ethogram** of the tamed **>species** is radically altered.

Early Etho-Zoosemiotics

See **Ethological Zoosemiotics**

Echolocation

Echolocation is the most typical example of **>proprioceptive semiosis**. It is the animal's capacity to locate objects of different type (obstacles, preys, co-specimens) and locate him/herself through the emission of sounds (especially ultrasounds) and the reception of their feedback, once they hit the various elements of the environment. Echolocation is predictably characteristic of those species that have to deal with environments of limited visibility (e.g. in the night, or underwater). Although not empirically defined, echolocation was first "guessed" by the Italian scientist Lazzaro Spallanzani in 1793, as he found out that blind bats were still fully able to find their way among obstacles of all kind. It was Donald **>Griffin**, in 1944, to coin the term and elaborate a theoretical model on the subject (Griffin 1958). Started in 1938, his research on echolocation was crucially supported by the world's first ultrasound microphone, devised by the American physicist George W. Pierce.

Echolocation has reached a remarkable specialization in mammals, in the bats *Chiroptera* and in the cetaceans *Odontoceta*, but less refined systems can be found also among bird species like the *Steatornis caripensis* or the genus *Collocalia*, and among insects, like the moths of the family *Arctiidae*.

Ecocentrism

See **Biocentrism**

Ecosemiotics

Term introduced in Nöth 1998 to define the semiotic study of the human-nature (or culture-nature) relationship, mostly focusing on how human being relates to and make sense out of the natural environment.

Eibl-Eibesfeldt, Irenäus (1928)

Austrian ethologist, particularly known for founding Human **>ethology**. Currently Professor at, and Head of, the Max-Planck-Institute for Behavioural Physiology, in Andechs (Germany). Pupil of Konrad **>Lorenz**, Eibl-Eibesfeldt is one of the key-figures in the development of the ethological disciplines, and produced several works of (indirect) zoosemiotic interest, focusing on such topics as morality (**>Ethics**), **>sociality** and **>communication** (a.o., 1970 and 1971), plus specific contributions to the study of human behavior.

Electric Channel

See **Tactile Channel**

Emic-Etic

Terms derived from the linguistic words "phonemic" and "phonetic", and introduced by Kenneth Pike (1954). They indicate respectively the description of one or more behavioral patterns from the inside perspective of the actor (emic); and the description of one or more behavioral patterns from the outside ("culturally neutral") perspective of the observer (etic).

Methodologically useful in several fields of inquiry, particularly ethnology and anthropology, the concept is essential also in **>zoosemiotics**, and is here discussed in Chapter 2, Section 2.3.1.

Emotion-Free Experimental Context

In **>interspecific communication experiments**, an emotion-free context is a type of experimental setting arranged in order to avoid any possible unwanted input from the experimenters that might result in a **>Clever Hans effect**. Such inputs include facial expressions that might unconsciously suggest to the subject of the experiment the solution for a specific task, affective – therefore, allegedly, not anymore scientific – relations established with the subject of the ICE, and others. In an emotion-free context, researchers might wear masks, observe the experiment unseen from another room, leave the subject alone in the laboratory, avoiding any kind of interaction, double- or triple-check data, and so forth.

The majority of interspecific communication experiments constructed within an emotion-free context throughout the last decades ended up producing poor results (i.e., the attempts of teaching human language to specimens of non-human species failed), in contrast with those contexts where emotional and personal relationships with the animals were encouraged (as the **>Washoe**, **>Kanzi**, **>Chantek** and **>Koko** programs), which were reportedly successful. Such discrepancy activated a heated discussion, animated by two schools. On the one hand, those (including many semioticians) who think that the failure of emotion-free experiments is the ultimate proof that: (a) non-human animals are not able to learn human language; and (b) the Clever

Hans effect is the real core of the problem, and therefore interspecific communication experiments are in principle misleading non-scientific practices. On the other hand, those who maintain that the attempt to teach language in a context that eliminates, rather than encourages, emotional and personal interaction is a contradiction in terms, as language is both caused by and focused on interaction. In favour of this orientation, Felice **>Cimatti** (1998: 147–151) argued by presenting a typical experimental situation (using Washoe and **>American Sign Language** as example). According to the detractors of interspecific communication experiments, at the very moment Washoe is asked to perform the ASL gesture corresponding to a given object, she does not have the slightest idea of how to perform such a task, since she is not able to understand the relation between signifier (the ASL gesture) and signified (the object). Thus, she proceeds by attempts, moving her arms at random, until – unconsciously or not – her trainers display apparent satisfaction, which lets her know what the right gesture is. In the detractors' opinion, this is a typical example of Clever Hans effect (and, more generally, a form of anti-scientific **>anthropomorphism**): unless one is able to invalidate any risk of this type, the experiment will be a waste of time, and the risk can be avoided only by creating an "emotion-free" context. However, says Cimatti, to consider the use of a communication system as unrelated to social and emotional interaction is a self-evident contradiction and a more serious mistake than anthropomorphism. What is the point in learning a communication system if one has no one to use it with, does not receive adequate stimuli, and, in the end, does not have any reason to learn it? In such a case, says Cimatti, the mistake is not only methodological, but also theoretical: "if language is a system based on emotional interaction [. . .], then it is simply impossible to study it without considering this aspect" (translated from Cimatti 1998: 149).

Endosemiotics

See **Endosemiotics-Exosemiotics**

Endosemiotics-Exosemiotics

Biosemiosis can take place either *within* a living being and/or *between* two or more of them. Discussions around the former case do not yet include the field of **>zoosemiotics**, and instead consists of a branch of biosemiotics named *endosemiotics*, or – according to the specific cases – protosemiotics, microsemiotics, cytosemiotics, etc. Endosemiotics involves the message exchange among cellular organelles, cells, tissues, organs and organ systems. The interpretation of the symptoms of a given disease as signs of the disease itself, as suggested by Hippocrates, can be considered an early example of endosemiotic analysis.

Along with endosemiotics, there is *exosemiotics*, which regards the entire spectrum of message exchange between two or more complex organisms. Fields of exosemiotics are mainly *phytosemiotics* (whose object is the semiosis among plants), *micosemiotics* (semiosis among fungi) and finally *zoosemiotics* (semiosis

among animals). A relevant branch of zoosemiotics is obviously **>anthroposemiotics**, i.e., the semiosis among the human animals.

Finally, the globalistic conception of life as a whole of sign processes, that is, the interpretation of the fully and intimately semiotic nature of life, mostly promoted by the American semiotic tradition (**>Peirce** and **>Sebeok**, first of all), led a few biosemioticians to the belief that the entire universe can be analysed and interpreted semiotically (see **>Pansemiotism**).

Ethics

Branch of philosophy that deals with the values underlying, and relating to, human conduct, with a focus on the (social, legal, etc.) rightness and wrongness of actions and to the (culturally-specific) "goodness" and "badness" of the motives and ends of such actions.

The possibility that animal ethics (animal rights, **>biocentrism,** conservation, ecology, etc.) can and/or should be part of the zoosemiotic agenda is discussed in the Chapter 5 to this companion.

Ethogram

In **>Ethology**, an ethogram is the behavioral catalogue of a species, that is, the totality of activities and patterns that tipify it. The compilation of an ethogram is preceded by a stage of careful observation (in real time, and through footage) of the animal in different circumstances, while it normally avoids experimental contexts (as captive animals tend to present a varied and incomplete repertoire of behavioral patterns, as compared to free ones). Sebeok suggested a semiotic interpretation for this concept:

> In semiotic terms, this concept encompasses an animal′s species-specific communicative code, in confrontation with which the human observer′s role necessarily becomes that of a cryptanalyst, of someone who receives messages not destined for him and is initially ignorant of the applicable transformation rules. (Sebeok 1990: 40)

Ethology

A branch of zoology, ethology is the scientific study of animal behavior. The term stems from the Ancient Greek "ethos" ("custom", "behavior"), and was first coined in 1762, by the Academie Française des Sciences. John Stuart Mill employed the word in his *System of Logic* (1843), but in a different sense, proposing the establishment of a field of inquiry, "ethology" indeed, that would account for individual and national differences in character. It was the American Myrmecologist William Morton Wheeler, in 1902, to popularize the term in the modern sense. Leaving aside the word, however, traces of, so to speak, proto-ethology can be already found in studies on **>instinct** and innate behavior, such as Pernau 1716, Reimarus 1773

and Spalding 1873. Not to mention the acknowledged pioneering contribution by **>Uexküll**.

Before ethology, the main field devoted to the study of animal behavior was comparative psychology. The differences between the two disciplines are both epistemological (obviously, as the scientific context is very different) and methodological: comparative psychology prefers to perform empirical observation in artificial experimental contexts, while ethology concentrates on behavior in natural situations. Because of this, the two approaches may be considered either complementary or competitive, and so they acted all through the twentieth century (collaborating in some cases, and disputing over their respective findings in others). Another difference is of geographical type, as comparative psychology developed most strongly in North America, while ethology was more followed in Europe (this distinction not being alien from philosophical and ideological consequences).

One of the main focuses in ethology is the study of the evolution of behavior and the interpretation of behavior in terms of natural selection, and that of course reveals the instrumentality of Charles **>Darwin** to the foundation of modern ethology (particularly, the book The expression of the emotions in animals and men, 1872). Early ethologists, like Oskar Heinroth and Julian Huxley, focused primarily on the notion of instinct, as an explanation for animal behavior. An important step was the construction of the concept (and research related) of **>ethogram**, which allowed both a qualitative and quantitative data-collection about behavior.

The turning point was the generation of Konrad **>Lorenz** (whose name is still the most immediate association with the term "ethology"), Karl von **>Frisch** and Nikolas **>Tinbergen**, who (1) established unmistakeably ethology as an autonomous discipline; (2) set a number of methodological standards that are still used nowadays (like Lorenz's identification of the so-called Fixed Action Patterns, Tinbergen's famous **>Four Questions**, or the notion of **>imprinting**), and (3) engaged in sophisticated investigations of animal behavior that led to important, and sometimes revolutionary, discoveries (like von Frisch with **>bee dance**).

Through the work of this generation, ethology became strong particularly in Europe before World War II, and also in UK right after, when Tinbergen moved to Oxford University, and figures like William Thorpe, Robert Hinde and Patrick Bateson came onto the scene. In continental Europe, meanwhile, another generation of ethologists, pupils of the old masters, was growing fast, providing new names of historical importance, such as Irenäus **>Eibl-Eibesfeldt** and Martin **>Lindauer**.

The appearance of **>zoosemiotics** in 1963 had a small but significant impact on ethology, and, because the early stage of **>Sebeok**'s conception of the field aimed to an umbrella term that would unify different approaches on animal **>communication**, collaborations between semioticians and ethologists were not rare (e.g., Sebeok 1968). This collaboration decreased from the 1980s onwards after Sebeok's biosemiotic turn, and the conception of the entire **>biosemiotics** as a field more rooted in **>philosophy** and in the Peircean tradition, rather than in natural sciences (in fact, often dismissing them as inadequate to accurately describe life phenomena).

During the 1970s, ethology underwent a certain theoretical "restyling", witnessing the birth of two branches that eventually replaced classical ethology in many of its methodologies and general conceptions. These were **>sociobiology** and, most of all, **>cognitive ethology**. It was precisely the impact of a cognitive approach to animal studies that created the conditions for a *entente cordiale* between ethologists and zoosemioticians, on the basis of a common paradigm and a common research ethics (see Martinelli 2009).

At present, it is safe to say that ethology consists of at least the following branches:

1) *Field ethology*: the classical investigation of animal behavior in natural conditions;
2) *Applied ethology*: the practical exploitation of ethological knowledge in activities like breeding, veterinary medicine, companion animals, etc.;
3) *Cognitive ethology*: the study of the mental processes of acquisition, representation and use of information in animals;
4) *Quantitative ethology*: the study of animal behavior via the employment of quantitative data analysis (to be considered a "continuation" and a refinement, in a statistically-oriented and nowadays informatized environment, of the research started on the field);
5) *Human ethology*: the application of ethological theories to the study of human behavior (in the way pioneered by Darwin 1872);
6) *Social ethology,* or *sociobiology*: the systematic study of the biological bases of social behavior.

An excellent introduction to classical ethology, before the cognitive breakthrough, is Eibl-Eibesfeldt 1970. The relationship between ethology and zoosemiotics is discussed in Chapter 1, Section 1.1.2.

Ethological Zoosemiotics

The most classical branch of **>zoosemiotics**, that studies the semiosic processes occurring among animals. Introduced by Thomas **>Sebeok** in 1963 and developed by him and several other scholars, this field is discussed at length in this companion in the entire Chapter 2.

Ethological zoosemiotics can be divided into an early stage (eEZ) and a modern one (mEZ). The first case includes the period when zoosemiotics was mostly conceived as an umbrella term for gathering different approaches on animal **>communication** (that is, not **>semiosis** altogether). In this stage, zoosemiotics was mainly influenced by classical **>ethology** and **>behaviorism**. The second stage, started in the late 1970s, witnesses some important innovations: the extension of zoosemioticians' interests to the entire spectrum of semiosis; the (attempt to a) formation of an autonomous paradigm for zoosemiotics; and the introduction of **>cognitive** approaches.

Etho-zoosemiotics
See **Ethological Zoosemiotics**

Exosemiotics
See **Endosemiotics-Exosemiotics**

Expressive
One of the six **>Functions of communication** postulated by Roman Jakobson (1963). A message is expressive when its focus is the sender.

Exhibition
In a semiotic sense, exhibition consists of a set of displays which, through a process of **>ritualization**, become simplified, stereotyped and exaggerated. Generally, but not exclusively, exhibitions are species-specific and occur in courting- fighting- or feeling-related contexts. Forms of exhibition can be detected in most species, particularly birds and mammals, and – for what we are able to perceive – seem to occur mostly through the **>visual channel** and/or the **>acoustic channel**. The biological function of some exhibition patterns is often not clear, and a typical case is that of **>kinaesthetic signs**.

Food Request
A form of **>intraspecific** (and occasionally **>interspecific**) interaction, aimed at obtaining food. It usually occurs between parents and offspring, but also in other forms of relationship, such as between mates or between pets and human beings. Food request is one of those situations that require a specific **>contextual code**: young chicks of nesting birds **>species** open their beak wide in vertical position; other species (like the *Larus argentatus*) request food by repeatedly hitting the parents' beak on a specific spot; various *canidae* (including jackals and wolves) regurgitate their food after being rubbed on their mouth by the young specimens; apes of the species *Hylobates*, *Macaca*, *Papio* and others may request food by opening up the palm of their hands (like "beggars"), and so on. The semiotic nature of these signs is evidently of indexical type (**>index**). However, a very interesting phenomenon occurs when these signs (or entire codes) are subject to a process of **>ritualization**. In these cases, the signs do not assolve their original function anymore, but are abstracted to a symbolic function (**>symbol**). The jackal *Canis aureus*, for instance, extended the mouth-rubbing sign not only to the simple, indexical, request for food, but also to a general situation of affection and friendly recognition (a "greeting" or a "kiss"). In the sea lion *Otaria byronia* the same sign is also used to pacify conflicts among females. In these cases, as in others, it is clear that the sign goes through different stages of redefinition and abstraction of its meaning

(indeed: ritualization), and assumes a symbolic connotation: I rub your mouth to request food, *therefore* I am in a close relationship with you, *therefore* I use this sign also to friendly greet you, *therefore* (in the sea lions' case) I use this sign also for re-establishing a friendly situation.

Four Questions

Expression employed to define Nikolas **>Tinbergen**'s influential methodological model for ethology, articulated into four fundamental points (Tinbergen 1963). The questions are grouped into two categories (including two questions each): *Proximate mechanisms* and *Ultimate mechanisms*. Proximate mechanisms include

1) *Causation* (or *Mechanism*), investigating the stimuli eliciting the response, and the modification of the latter after recent learning.
2) *Development* (or *Ontogeny*), investigating the modes of behavioral change in time units (age), in relation with earlier experiences.

As for ultimate mechanisms, the questions concern

1) *Evolution* (or *Phylogeny*), investigating the animal behavior in relation with other species performing similar patterns, and in general the phylogenetic aspects of such behavior.
2) *Function* (or *Adaptation*), investigating the impact of the given behavioral pattern/s on the animal's general survival and reproduction chances.

The four questions, clearly framed in a behavioristic approach (**>Behaviorism**) had a remarkable impact at interdisciplinary level as well, being employed also in **>Sociobiology** and Social sciences.

Fouts, Roger (1943)

American primatologist and psychologist. Currently Professor of Psychology at the Central Washington University and co-director of the Chimpanzee and Human Communication Institute (CHCI) in Washington. At first assistant, then leader of the **>Washoe** program, Fouts has been very instrumental in the development of what is commonly regarded as one of the most succesful **>interspecific communication experiments**. Encouraged by a special bond with Washoe (he was hired in 1967, after an unimpressive interview, for the sole reason that the chimpanzee showed immediate sympathy to him), he accompanied her and the other chimpanzees eventually added to the community throughout her entire life, following their improvements and popularizing the training program via different media (including the publication of the very succesful and informative Fouts 1999).

As with many colleagues in primatology, Fouts too became an animal rights advocate, fighting particularly for the extension of human rights to Great Apes.

Fossey, Dian (1932–1985)

American zoologist and primatologist. Together with Jane **>Goodall** and Birutė **>Galdikas** (the three are also known as Leakey's angels, for being all pupils of famed anthropologist Louis Leakey), the most important scholar in **>interspecific semiosis** with great apes in the wild. Inspired by Prof. Leakey, Fossey became fascinated with the rare mountain gorillas of the Rwandan wilderness, and decided to go studying closely their lives and habits. Fossey achieved the gorillas' acceptance in their community by developing means of **>communicaton** with them (a.o., Fossey 1972 and 1974). Her study interest developed into a passionate commitment for the gorillas' welfare and preservation, up to become a *persona non grata* to Rwandan natives, who extensively hunt gorillas for their skin (sold to rich tourists in form of various gadgets). After years of campaigns and fights with local institutions, Fossey was found murdered in her tent. in officially mysterious circumstances. Her legacy remains big, and her autobiography (Fossey 1983) is still the best-selling book about gorillas.

Frisch, Karl Von (1886–1982)

Austrian ethologist and Nobel Prize winner in Physiology or Medicine in 1973. Along with Konrad **>Lorenz** and Nikolas **>Tinbergen**, with whom he shared the prize, von Frisch must be considered the most important figure in classical **>ethology**. His main contribution to animal studies remains the extensive research conducted on the **>language** of honey bees (**>Bee dance**), together with his then student Martin **>Lindauer** (as documented, a.o., in Frisch 1967). Their work included studies on the bees' sensorial mechanisms, their various communication systems, their sensitivity to polarized light, and the pheromones emitted by the Queen bee and her daughters (these topics are also discussed in the specific entry on "Bee dance", and in various points of the companion).

Less known but still important, are von Frisch's studies on **>architectural signs** in animals (Frisch 1974).

Functions of Communication

According to Russian linguist Roman Jakobson (1960: 353–7), there are six main functions within a communication system, each concerned with a particular element of the semiotic process: **>expressive** (referring to the *sender*), **>conative** (referring to the *receiver*), **>phatic** (referring to the establishment of *contact* between sender and receiver), **>referential** (referring to the *context* of the message), *metalinguistic* (referring to the *code* used in a given communication act), and **>aesthetic** or *poetic* (referring to the form of the *message*). These functions do not work in isolation and are not mutually exclusive. A message typically is the intersection of two or more functions, where one of those is simply (but not always) the dominant and more evident one.

Felice **>Cimatti** (1998: 59–105) proposes a systematic application of Jakobson's model within **>zoosemiotics**. The issue is dealt with in Chapter 2, Section 2.2.3.

Gabriel, Peter (1950)

World-famous singer-songwriter, former member of the progressive rock band Genesis. "Traditional" musical merits apart, Gabriel is a promoter of **>interspecific** musical interaction: in 2001, he visited the Georgia State University's Language Research Center, leading a keyboard-based jam session with some bonobo apes. Later, more importantly, Gabriel founded the project "ApeNet" (since 2007 renamed "InterSpecies Internet", and currently inactive), with the intention of linking great apes through the internet:

> ApeNet is a consortium of foundations and individuals who support interconnecting great apes with each other, as well as with humans, through enculturation and technology. ApeNet was founded by British musician Peter Gabriel and American philanthropist Steven Woodruff to provide new living and communication solutions for enculturated great apes.

[. . .] Mission: To link enculturated great apes with each other through the internet, establish culture-based great ape preserves, establish an internet-based Journal, and to encourage and support great ape welfare and conservation. (from www.apenet.org, no longer online)

Gaius Plinius Secundus (23–79)

Roman philosopher and naturalist, also known as Pliny the Elder. His presence in a zoosemiotic companion is self-evident by his massive encyclopaedic work *Naturalis historia*, which arguably comprises the entire knowledge on Nature and animals (and medicine, mathematics, geography, etc.) available at the time. It consists of 37 books, of which the 8th, the 9th, the 10th and the 11th are entitled "Zoology", and contain several topics of ethological and zoosemiotic interest. Among these, the detailed (and fairly complete) description of a few species (particularly the honeybees), a few hypotheses (later found out to be correct) on zoological phenomena (as in his interpretation of the "origin of amber", accurately described as a product of fossilized resin of pine trees), and a rather poetic (and still scientifically interesting) description of the nightingale's singing activity.

Galdikas, Birutė (1946)

German primatologist and ethologist. The youngest of the three **>Leakey's angels**, together with Dian **>Fossey** and Jane **>Goodall**, Galdikas is currently Full Professor at Simon Fraser University in Burnaby, British Columbia. As per anthropologist Louis Leakey's plan (he wanted to perform field research on the three closest "relatives" of the human being, the chimpanzees, the gorillas and the orangutans), Galdikas focused her work on the orangutans of the Tanjung Puting Reserve, in Indonesian Borneo, expanding scientific knowledge on their behavior, habitat

and diet (Galdikas 1995). Like the other two "angels", she then devoted most of her attention to the advocacy of social and ethical causes related to her research subject, achieving several recognitions and founding the Orangutan Foundation International, of which she is currently president.

Gardner, Allen and Beatrix

See **Washoe**

Generalization

See **Abstraction**

Goodall, Jane (1934)

English primatologist and ethologist, and founder of the Jane Goodall Institute. Pupil of anthropologist Louis Leakey (along with the other two **>Leakey's angels**, Dian **>Fossey** and Birutė **>Galdikas**), Goodall studied for nearly 50 years chimpanzees' **>sociality, >cognition**, **>tool** making and **>semiosis** in Gombe Stream National Park, Tanzania (a.o., Goodall 1964, 1968, 1971, 1986). Similarly to the other two "angels", Goodall too accompanied her scientific research with a strong ethical commitment for primates' conservation and awareness. In this activity, she also managed to achieve specifically scientific results, as for instance the taxonomic inclusion of chimpanzees, bonobos and gorillas in the Hominids' family, and the promotion of **>critical anthropomorphism** (she deliberately chose to give names to her chimpanzees, challenging the contemporary conventions that would regard this practice as anti-scientific). This and other methodological aspects of her work generated some criticism, and accusations of biased research.

Goodall's environmental and humanitarian work was recognized in several ways by several institutions: most notably, she is a UN Messenger of Peace.

Gradualism

Term that refers to the idea of an evolutionary adaptive continuum among animal **>species**, in which, depending on the contexts, a given species displays the most refined of a given (physical, behavioural, etc.) trait, and in which, position after position, the characteristics of the diverse animals are less and less complex and refined, although, in most cases, adequate for ensuring the survival of the species in question. In this sense, differences across species are of purely quantitative, and not qualitative, type.

It consitutes one of three general methodological frameworks, along with **>discontinuity** and **>Umwelt** theory, to classify the different scholarly approaches to nature and animals, as explained in detail in Chapter 1, Section 1.1.4.

Griffin, Donald (1915–2003)

American zoologist. He is generally considered the founder of **>cognitive ethology**, or rather his 1976 book *The Question of Animal Awareness* is considered the main transition point from classical to cognitive ethology. His "historical" role apart, Griffin performed extensive research on several topics of zoosemiotic interest, including animal **>communication**, navigation, acoustic orientation and sensory biophysics, delivering a major contribution to the discovery of **>echolocation** in bats (see Griffin 1958).

Gustatory Channel

See **Chemical Channel**.

Hediger, Heini (1908–1992)

Swiss zoologist, director of Zürich zoo and founder of the field of "zoo biology" (i.e., the ethological observation of captive animals). Considered by his friend Thomas **>Sebeok** as one of the main influences for the whole **>zoosemiotics**, Hediger had a crucial impact on the study of human-animal interaction (**>Anthropological zoosemiotics**) in contexts of captivity. He studied closely the proxemic, social and territorial aspects of animal behaviour, combining **>Uexküll**'s **>Umwelt**-theory with modern **>ethology**. Among his many focuses:

1) Animal's *expression*, defined as "variable nonpathological phenomena of the animal, which may help to an understanding of their situation" (Hediger 1968: 143): face-displays, general posture, kinesics are organized into acoustic, optic, olfactory and "internal" expressions (the latter including reactions of secreting tract, vomiting, urinating, level of adrenaline etc.);
2) Animal's managing of *interpersonal distances* (e.g., 1968) in social or generally interactional contexts (among other things, this research inspired Edward Hall's theories on social distance).
3) Different forms of human-animal relationship (e.g., 1965), setting the basis of later reflections by Sebeok, and in general opening the door to a very important portion of anthropological zoosemiotics;
4) The **>clever Hans effect** (e.g., 1981), this, too, extremely influential for Sebeok, and for most of zoosemioticians' reviews on **>interspecific communication experiments**.

Among the several tributes given by zoosemioticians to Hediger, one should at least mention Sebeok 2001b and **>Turovski** 2001.

Heterotroph

A living organism that is not able to chemically produce its own food, and must therefore consume other organisms. Being heterotrophic is one of the conditions that

separates an **>animal** from other organisms like plants, which are on the contrary autotrophic.

Hockett, Charles (1916–2000)

American linguist. One of the key-figures in structural linguistics, Hockett made a very important contribution to the study of **>language**, by elaborating a so-called design-feature approach, aimed to emphasize the differences between non-human animal **>communication** and human language. Such approach led to the definition of 13 design-features of communication (Hockett 1960a), all of which available in human language, while only some can be traced in other animal communication systems. These are:

1) Vocal-Auditory Channel (**>Acoustic channel**).
2) Broadcast transmission and directional reception (**>Acoustic channel**).
3) Rapid Fading (**>Acoustic channel**)
4) 4Interchangeability: A subject can both speak and hear the same signal, therefore anything that can be heard can be also spoken.
5) Total Feedback: A subject can hear him/herself speak, therefore s/he can control speech production.
6) Specialization: Hockett meant specialization mostly as that capacity to "produce information" (in other words, what Jakobson called the **>referential function** of communication), arguing that this is typical of human beings, while other animals mostly tend to communicate their own emotional state (**>expressive function**)
7) Semanticity: A signal can be matched with a specific meaning.
8) Arbitrariness: Signs can be symbolic, and do not need to have a specific/natural connection with the objects they represent (**>symbol**).
9) Discreteness: Phonemes can be distincted from each other in a digital sense.
10) Displacement (see **>Distant space/time semiosis**).
11) Productivity: New and unique meanings can be created from previously existing utterances (associated to different meanings).
12) Traditional Transmission: languages are also acquired through **>learning**.
13) Duality of patterning: Phonemes are combined into words, and words are combined into sentences.

While leaving no doubt that only human language is the very communication system that is able to incorporate *all* the 13 features, Hockett also discussed the presence of some of them into other animals, particularly focusing on honeybees (**> Bee dance**), whose communication implies at least the existence of Broadcast Transmission and Directional Reception, Semanticity, Displacement and Productivity; and gibbons, who display all features except Displacement, Productivity, Traditional Transmission, and Duality of Patterning.

Hoffmeyer, Jesper (1942)

Danish biosemiotician. Currently associate professor at the Institute of Biological Chemistry, Copenhagen University, he is president of the International Society for Biosemiotics Studies, and a leading figure in one of the two main schools in biosemiotics, the so-called Sign-based Biosemiotics (see also **>Barbieri**, Marcello). His work is not primarily concerned with zoosemiotics, but his contribution remains important in the framework of a general systematics of the semiotic study of living organisms (see 1996), a field where also his colleague Claus Emmeche deserves a mention.

Homology

See **Analogies-Homologies**

Human-Other Animal Relation

See **Athropological zoosemiotics** and **Anthrozoology**

Hume, David (1711–1776)

Scottish philosopher. Key figure of the Enlightenment, Hume represents a radical cut with the "sick metaphysicians" (as he calls them) of the seventeenth century, i.e. Spinoza, Hobbes, and most of all **>Descartes**. His points of reference are rather **>Montaigne**, **>Locke**, Bacon, **>Bayle** and Newton. By consequence, his considerations of non-human animals follow more closely a proto-evolutionary approach. Similarly to Locke, Hume makes it clear that the differences between humans and other animals are simply a matter of degree. His attack to Cartesianism, as appearing in the *Treatise on human nature* (1740/2003) is pretty direct and to the point:

> Next to the ridicule of denying an evident truth, is that of taking much pains to defend it; and no truth appears to me more evident, than that beasts are endowed with thought and reason as well as men. The arguments are in this case so obvious, that they never escape the most stupid and ignorant. (Hume 1740/2003: 126)

The main points of his argumentation are the following:

1) Similarities between humans and other animals concern both the emotional and the intellectual area: all animals aim at seeking pleasure and avoiding pain, all animals care about their own life, all animals share the same principles at the basis of reasoning (Hume 1740/2003: 127–8);
2) Exactly on the issue of reasoning, Hume most radically challenges the philosophical tradition. Reasoning, in Hume, departs from the senses, imagination and experience: they allow the act of deducing and believing that future (whether immediate or not) will conform to given expectations. Hume argues against one of the very foundations of traditional philosophy: mathematic thought is not

the expression of reason, but simply a consequence of senses and imagination. In fact, it is expressively the search of the perfect science that makes humans imperfect beings (Hume 1740/2003: 295);

3) Although reasoning, in humans and other animals, is claimed to be caused by passions, Hume does not mean to be an irrationalist: his goal is simply that of establishing an adequate causal relation between emotions, experience and feelings on the one hand and intellect, thought and act on the other (Hume 1740/2003: 233).
4) Finally, although he excludes them from the idea of justice, Hume includes the other animals in the idea of morality and **>ethics**, and in fact asserts very clearly that the exclusion from justice has nothing to do with taking care of them. Morality, as founded on feelings, is a primary virtue: justice is an artificial one. It is no coincidence that modern philosophical utilitarianism – inspired by Hume – includes many of the philosophers most concerned with the animal rights case (Peter **>Singer** above all). Hume seems to have no doubts about the fact that all animals are moral beings (Hume 1740/2003: 283)

Icon

In Charles S. **>Peirce**'s theory of signs, an Icon is a sign that bears qualitative features of the object. An iconic sign is a sign that looks/sounds/smells etc. like the object.

Iconic **>semiosis** is rather common among animals, the various phenomena of **>mimicry** (visual and vocal) being possibly a classic example. Several forms of **>deception**, also, are of an iconic type. Finally, on a more general level, prey-predator interactions and **>adaptation** processes often imply the production and the exploitation of iconic signs. A particular case of iconism is the so-called **>diagrammatic iconism**.

Icons are further discussed in Chapter 2, Section 2.2.1.

Imitation

A paricular case of **>mimicry** consisting of taking from a model (i.e., another individual or **>species**) one or more patterns not present in the mimic (i.e., the imitating individual/spiecies). Imitation may occur through any of the **>channels** available to a species, although it is normally associated with the **>acoustic channel**, and may be displayed for various purposes, including courtship, deception, defence or aggression.

Imprinting

One of Konrad **>Lorenz**'s most important contributions to **>ethology** (although generically anticipated by Douglas Spalding in 1873). Imprinting can be defined as the capacity to learn specific types of information at certain critical periods in

development. Lorenz had an insight of this phenomenon while famously observing young geese and chickens spontaneously following their mothers from almost the first day after they were hatched. He then reproduced the procedure with eggs that were incubated artificially, discovering that the stimulus can come from any source and still serve as imprinting, as long as it is presented during a critical period (the few days after hatching).

Index

In Charles S. **>Peirce**'s theory of signs, an Index is a sign that bears a physical connection with the object. An indexical sign is thus a natural cause or consequence of the object. Its categorization requires a semantic memory, in that one has to recognize the relation between the referent and event/state.

Indexes (or indices) may safely be defined as the most recurrent signs in zoosemiosis. A large number of markers, symptoms, indicators and signals produced through any of the available **>channels** are in one way or another indexical, from the tail-wagging of a dog (index of its excitement) to the wheel display of a peacock (index of its health conditions). By consequence, the significance of indexicality, within zoosemiotic study, is to be considered more central than in the case of **>anthroposemiotics**, particularly when it comes to its cultural aspects, whose logocentric nature predictably manifest a greater interest for symbols (**>symbol**) and icons (**>icon**).

Indexes are further discussed in Chapter 2, Section 2.2.1.

Ingold, Tim (1948)

British anthropologist. Currently Chair of Social Anthropology at the University of Aberdeen. In 1988, he edited the collection *What is an animal?*, one of the most thorough inquiries on the many aspects of the concept of "animal" in cultural and anthropological sense (without diregarding **>zoosemiotics**, and hosting one essay by Thomas **>Sebeok**). The book is a crucial source for **>anthropological zoosemiotics**. Ingold contributes two texts, both very relevant for the context of this companion. The first one, an extensive introduction to the whole book, is an overview of the subjects of the volume, as dealt with by the various contributors (a.o., Mary Midgley, Stephen Clark and Brian Goodwin). In his second contribution, entitled "The animal in the study of humanity", Ingold goes through some of the "hot" topics in the humanity-animality debate: **>culture**, **>language**, symbolic communication (**>symbol**) and others. Many of the recent definitions of culture, Ingold observes, have been taking for granted its human species-specificity, but without really proving it. That applies also to the often-made distinction between a supposedly *true* human culture and a non human *proto-culture*, or to the use of language symbolic quality as a prove that only human information is transmitted in ways that are not only genetic: "What most anthropologists have failed to realize. . . is that the opposite of symbolically encoded behavior is *not* genetically transmitted

behavior, or crudely, 'instinctive' behavior" (Ingold 1988: 84–5). Although not disputing the human uniqueness of symbolic thought, Ingold rejects the idea of using it as a passepartout for explaining humanity, the latter presenting more elements than not of continuity with animality, and rather concludes that the main human achievement, and witness of its uniqueness, expressed through language (and its implications at cognitive level), is the fact of being the only species that was able to make a world for itself.

Instinct

A critical notion *par excellance*, instinct is generally defined as a genetically acquired force that drives animals to react to a stimulus in certain fixed ways. A central notion in classical **>ethology**, in fact – at least, partly – the very notion *around which* the whole field moved its first steps, instinct is becoming more and more an obsolete, if not trivialized, concept, and has been almost completely abandoned by modern **>cognitive ethology**. The main critiques of the notion, and its supporters, came from at least three sides: (1) from a behavioristic point of view, it makes no allowance for environmental influences upon behavioral patterns; (2) from a cognitive point of view, it long prevented from an accurate description of several patterns, originally thought of as "instinctive"; but later found out to be the result of different categories of motivation and cognition; (3) from a methodological point of view, it became a banal "black box" (or "explanatory principle", as it is called in **>Bateson** 1969) where scholars put most (or all) of the observations they were not able to explain with the necessary simplicity required by **>Morgan's canon**, or to explain in principle.

The notion of instinct is thoroughly discussed in Chapter 3, Section 3.3.5.

Intentionality

In a general sense, intentionality represents the conscious planning or performance of a given action, aimed to a goal. In philosophy, particularly in the scholastic and gnoseologic traditions, the expression has been used in a broader sense, designating any mental state provided with a content (e.g., thinking, willing, longing), and nearly overlapping with the notion of **>consciousness**. In **>ethology**, the concept has been practically overlooked (and replaced with the notion of **>instinct**), until the coming of **>cognitive ethology**, when – on the contrary – it became central. In semiotics, finally, the concept is often used in relation to the so-called **>semiotic threshold**, as a watershed between semiotic and non-semiotic acts (this aspect is discussed in Chapter 1, Section 1.1).

Interspecific

Any form of **>semiosis** occurring between two or more different animal species. It is an expression largely relying upon the notion of **>species**, in itself highly problematic, in that (a) it is a human elaboration, and (b) it is constantly under revision

and update. Having said that, and taken into account the multitude of grey areas where the boundary between one species and another is far from being clear, many are the examples of semiotic interaction where the specific difference goes beyond any doubt. Among these, the prey-predator interaction, several forms of **>mimicry**, and **>symbiosis**.

From a semiotic point of view, a difference between species (or, more simply, groups or communities) implies that the two parties involved share only a limited number of patterns of perception and codification of the world (i.e., very possibly, they live each in their own **>Umwelt**), and in that sense the interaction is either very basic, or largely subject to interference and misunderstanding. A simple **>code** is normally established via a trial-and-error process, and, depending on the situation, the parties may strictly stick to it (e.g., in the case of cleaning symbiosis), or highly manipulate it (e.g., in prey-predator interaction).

A particular case of interspecific semiosis is the **>communication** occurring, in experimental contexts, between human beings and other species, particularly the attempt of the former to teach their own language to the latter (**> Interspecific communication experiments**). This instance is widely discussed in Chapter 3, from Section 3.3 of the present companion.

Interspecific Communication Experiments

The expression "Interspecific Communication Experiments" (ICE, from now on) refers to a range of experimental programs (conducted usually by biologists, psychologists or linguists), aimed at testing the possibility of teaching human **>language** to other animal **>species**, particularly great apes.

Generally, the scholars working on ICE advanced the basic claim that there is no unbridgeable gap between human language and other **>communication** systems. Such a claim relied on the Darwinian idea of evolutionary continuity between *homo sapiens* and other species, a continuity where language plays only the role of a more refined system for communication. Together with the Darwinian one, another stand, of behaviouristic type, would define language as a **>conative** tool, whose function is basically that of transmitting thoughts from a sender to a receiver. In this sense, language was seen as a "normal", albeit complex, behaviour, that could be learnt as any other.

The first experiments were affected by the (eventually proven) wrong assumption that the vocal and **>acoustic channel** was the only reliable source for a communication system to be considered true language. The idea probably originated from writings by Samuel Pepys (*The diary of Samuel Pepys*, 1661), Johann Conrad Amman (*Surdus loquens*, 1692 and *Dissertatio de loquela*, 1700) and Julien Offray de La Mattrie (*L'homme machine*, 1748), who all shared the opinion that monkeys could easily be taught to speak. Among the first experiments of this type, the chimpanzees Peter, raised by clinical psychologist Lightner Witmer around 1909, and Joni, raised by ante-litteram cognitive primatologist Nadia **>Kohts** between 1913

and 1916. Later attempts to teach spoken language to chimpanzees were performed on Vicki, raised by Keith and Catherine Hayes between 1952 and 1958, and Gua, raised by Winthrop and Luella Kellog during the late 1960s. All the chimpanzees – after years of intensive training – learned a maximum amount of 3–4 words, of the likes of *mama*, *papa*, *cup* and *up*. All of them, however, proved to understand dozens of words. Similar attempts were also made with other primate species, like the orangutans trained by William Furness around 1916, and the gorilla Toto (Maria Hoyt, in 1942). The real problem – as demonstrated in Liebermann 1968 and 1972 – lay in the neurological and anatomical incapacity of non-human bodies to articulate sounds in the way humans do. The difficulties of these apes were *expressive*, not *cognitive*.

Later, in 1977, Irene Pepperberg applied the idea to a species that does not have these expressive limitations, the parrot **>Alex**. This experiment was more successful, and Alex proved to be able to understand and pronounce about 100 English words.

As it became clear that not only verbal communication had to be considered language, the interest in ICE increased, also because of the growing fame of behaviorism. In 1966, Allen and Beatrice Gardner started a program based on **>American Sign Language** (i.e., gestures, not spoken words) with the chimpanzee **>Washoe,** with remarkable results. Other succesful ASL-based programs started in 1972 (by Francine Patterson with a gorilla named **>Koko**), and in 1978 (by anthropologist Lyn Miles, with an orangutan named **>Chantek**). ASL was also used in Herbert Terrace's **>Nim Chimpsky** program. After few years of apparent success, Terrace had a very famous second thought: he realized that the whole training was heavily affected by the **>clever Hans effect**, and – with rare professional honesty – he admitted it.

ASL was not the sole alternative to speech. David Premack, whose project started in 1966, trained the chimpanzee Sarah by using colored plastic symbols that had no iconic or indexical relation with the object represented (e.g. an apple was represented by a blue triangle). The project achieved mixed results: apart from concrete objects, whose acquisition was fast and efficient, Sarah showed ability to learn abstract concepts like "name of" (used as "what's the name of x?" when she did not know how to call a certain object), colors, big-small, equal-different, square-round, etc. She could also answer questions like "what is the color of. . .". However, suspicions that her training was again affected by the Clever Hans effect remained high.

Scholars then elaborated ICE that excluded, as much as possible, any interaction between trainer and trainee (**>emotion-free experimental contexts**). Duane Rumbaugh, in the mid 1970s, attempted to teach language by employing symbols. The trainee was a chimpanzee named Lana. Rumbaugh felt that computer automation could prevent anyone from cueing the animal. The machine was programmed to perform certain tasks, like dispensing food or displaying an image in response to pressing the proper symbol on the keyboard. Lana was then given a special keyboard which had symbols (called **>lexigrams**) in place of regular keys. The trainer was connected to Lana with another, equally equipped, computer. The interaction

would thus occur only through the respective monitors. Results were again controversial: Lana learned to formulate requests and to engage in relatively complex conversations, but she would also do so only in response to a specific need (usually, hunger or thirst). Rumbaugh was followed by his wife, Sue Savage-Rumbaugh, who carried out one of the most interesting and successful ICE programs, with the bonobo **>Kanzi,** and with a technique that was still based on the use of lexigrams.

Another ICE worth mentioning, among many that were and are performed, is the program conducted by Lou Herman on two dolphins, Phoenix and Akeakamai, in the 1980s. The training consisted of two simple sign systems: Phoenix learned an acoustic language generated by an underwater speaker, and Akeakamai an adapted version of ASL. In both cases, the words produced consisted mostly of concrete entities, actions, modifiers (like "right", "left", "bottom", "surface") plus **>metalinguistic** signs, such as "yes", "no" and "erase" (used as a signal to interrupt an activity). In order to avoid the Clever Hans effect, the trainers wore a mask that prevented them to show facial expressions. Moreover, one trainer would give the message, and another one, without knowing the message, would record the dolphins' answers. The **>syntax** of the messages was organized in sequences, like "surface frisbee bring-to basket" (i.e., on the surface there is a frisbee: bring it into the basket). When a task could not be performed, the dolphins would touch a panel correspondent to "no"; when it was, then, after performing it, they would touch a panel correspondent to "yes". This project, too, achieved interesting results. Phoenix and Akeakamai also proved to be able to understand messages that referred to a distant time. They would memorize the instructions, and – as the conditions became favourable – perform the task.

Intraspecific

Any form of **>semiosis** occurring within the same animal **>species**. It is the "space" where most of zoosemiosis occurs, and the most refined and complex forms of **>communication** can be found. Members of the same species (or group or community) share the same **>Umwelt**, therefore share information on a basis that can be at the same time objective and subjective, and that relies on well-established codes (**>Code**), and, not rarely, cultural innovations and exchanges (**>Culture**).

Joni

See **Koths**, Nadia.

Kant, Immanuel (1724–1803)

German philosopher, one of the most influential in modern Western thought. Among his most prominent works, one must mention the *Critique of Pure Reason*, the

Critique of Practical Reason, and the *Critique of Judgment*. It is in the latter work that Kant expresses his finalistic ideas about human beings, and their role in Nature. Human beings, and human beings alone, are the ultimate purpose of creation. No being can actually claim to be the final goal of creation, but since humankind is the final goal of Nature and is a moral species, therefore it can be considered the final goal of creation, as well. This moral character is founded on intellect and ratio, which – says Kant – are superior in humans than in other animals (Kant 1790/1978: 77). The principle is extended also to **>aesthetics** and aesthetic sense (the main subject of the *Critique of Judgment*), which are issues that may concern exclusively a being that is at the same time animal and rational:

> The agreeable, the beautiful, and the good thus denote three different relations of representations to the feeling of pleasure and displeasure, as a feeling in respect of which we distinguish different objects or modes of representation. Also, the corresponding expressions which indicate our satisfaction in them are different The agreeable is what GRATIFIES a man; the beautiful what simply PLEASES him; the good what is ESTEEMED (approved), i.e., that on which he sets an objective worth. Agreeableness is a significant factor even with irrational animals; beauty has purport and significance only for human beings, i.e., for beings at once animal and rational (but not merely for them as rational-intelligent beings-but only for them as at once animal and rational); whereas the good is good for every rational being in general-a proposition which can only receive its complete justification and explanation in the sequel. Of all these three kinds of delight, that of taste in the beautiful may be said to be the one and only disinterested and free delight; for, with it, no interest, whether of sense or reason, extorts approval. And so we may say that delight, in the three cases mentioned, is related to inclination, to favour, or to respect. For FAVOUR is the only free liking. An object of inclination, and one which a law of reason imposes upon our desire, leaves us no freedom to turn anything into an object of pleasure. All interest presupposes a want, or calls one forth; and, being a ground determining approval, deprives the judgement on the object of its freedom (Kant 1790/1978: 49).

The consequences of such statements, in Kantian philosophy, are mostly of an ethical type: human beings have no real obligation or duty towards other animals. What they have is a moral duty towards humanity, in order not to damage it in any form, and this may occasionally include the exploitation of other animals as well. Kant is not opposed to it when it is "useful" to humankind, but he is rather clear on the fact that none of these exploitations should be excessive or unmotivated. The reason, as already emerging from **>Plato**, **>Locke** and most of all **>Porphyry**, is: those who are cruel towards animals are more likely to be cruel towards other humans. However, the difference in the spirit animating Porphyry and Kant is enormous: ferocious attack versus wars, violence, Christianity and meat-eating in Porphyry's case, simple invitation to humane attitudes in Kant's.

Kant's reflections have been of great influence for modern **>anthropocentrism**, because of their seemingly moderate and reasonable approach. They add kindness and some ethical conscience to the Aristotelian and Cartesian frameworks. The non-human animal's life is clearly subordinate to that of the human being, and the intellective capacities of the former have nothing to do with those of the latter. Still, a certain respect and the avoidance of gratuitous and unnecessary exploitation are due.

Kanzi (1980)

A male bonobo *Pan paniscus* trained in human **>language** through the use of **>lexigrams**. The program was (and still is) conducted at the Language Research Center at Georgia State University. Sue Savage-Rumbaugh, leader of the project, felt that the core-question for interspecific communication was to establish whether apes understand the signs they produce, rather than finding out about their grammatical capabilities. Therefore, the entire methodology of the program deviated from the trends of that time (for instance by moving away from some of **>Hockett**'s design features of language – productivity and displacement, most of all – which were so popular in other studies). Savage-Rumbaugh's work departed from a quite critical attitude towards other **>interspecific communication experiments**. In all previous programs, she maintained, the primates were not using signs symbolically (**>symbol**), but rather indexically (**>index**): they learned to associate certain behavioural patterns with certain consequences. In her view, indeed, the main point of human language is that it uses symbols, according to a three-steps process: (1) the physical external substance of a word, e.g. "door", as either written down or spoken with a given linguistic pattern; (2) the relationship between that and a real door (when the word "door" is pronounced one conjures up a mental representation of a door); and (3) the capability of symbols to make one think about things that are not present, or even not existent.

The experiment, performed on a small community of bonobos, among which Kanzi is the most famous, achieved excellent results. Kanzi, who was born when the project had already begun with other apes, took everybody by surprise from the very beginning of his own training, showing he already knew some lexigrams and could already understand a remarkable amount of spoken words (evidently, this competence was achieved by observing his fellow apes, especially his adoptive mother Matata, who was part of the initial stage of the project). Kanzi's competences grew rapidly. Once it became clear that he did not need a "basic course" to grasp the meaning of spoken words and written symbols, the trainers abandoned the usual reward-based training, and went straightaway to the "advanced" level, by adding new symbols to his keyboard. Kanzi was not trained to associate the lexigrams with specific objects, but rather the trainers would naturally employ the symbols in conversations with him, generally helping him to understand the general sense (as it is often done in certain techniques for learning a foreign language). This way, Kanzi's vocabulary steadily increased to over 200 produced and 500 understood words. Kanzi, particularly, showed an unquestionable comprehension of spoken words, something that had always been a weak point of the other interspecific communication programs. In the various tests he was given (including recorded words played to him through headphones), he was nearly 100% accurate on all words that were part of his vocabulary at any given age. He was also able to respond to speakers with different accents as well as to artificially-produced words. Far from succeeding only with single words, Kanzi showed comprehension of sentence structures, word order and grammar rules. Similar results were achieved with two other bonobos of Kanzi's community, Panbanisha and Panzee.

Kaplan, Gisela (1944)

Australian cognitive ethologist, with a specific interest in animal **>communication** (with an impact on **>zoosemiotics** and **>zoomusicology**, too). Kaplan is professor in Animal Behaviour at the University of New England. Her education (she has one PhD in Arts and one in Animal Behaviour) led her to animate her approach to animal studies in that fully interdisciplinary manner that both zoosemiotics and **>cognitive ethology** envision. A prolific writer of over 300 research articles and 20 books (and multiple award-winner for her research publications), Kaplan is a specialist in vertebrate cognition, primate and avian behaviour, particularly birdsong (benefiting also from her first career as a musician). Since the 1990s, she specialized on in Australian songbirds' vocal communication, **>cognition**, and the functions of song and **>mimicry** (focusing mostly on the Australian magpie *Gymnorhina tibicen*). Such topics have been tackled also within specific zoosemiotic contexts (as in Kaplan 2009).

Also worthy of mention is her long collaboration with Prof. Lesley Rogers, a very relevant figure to the study of animal cognition and brain development (a.o., Rogers-Kaplan 1998 and 2004, particularly the first – an innovative research on animal communication).

Kinaesthetic Signs

One of the four "prefigurements of art" emphasized in Thomas **>Sebeok**'s *The Play of Musement*, (1981: 210–259), along with **>architectural signs**, **>musical signs**, and **>pictorial signs**. The word "kinaesthetic" designates any use of bodily movement for aesthetic purposes (**>aesthetics**), and focuses on the vast area of "dancing" rituals performed in front of a potential partner, or with/against a contendant. As such, dance may or may not be an implement to musical signs (**>zoomusicology**). Kinaesthetic performances have been observed in a great number of **>species** and configurations. Among the many examples:

1) The particular "postures" assumed as visual displays or in relation to a musical performance (as, a.o. the 45-degree body inclination of humpback whales before their notorious songs, see Payne 1982: 472).
2) Particular group performances serving as social rituals (like the chimpanzees' "rain-dance" described in Goodall 1971: 54);
3) Courting rituals of different types (to a certain extent recurrent in nearly all species, particularly birds, but also in insects like the Nymphalid butterflies described in Akimushkin 1988: 16–7)
4) Ritualized or semi-ritualized challenges to mating or territory rivals (another extremely recurrent pattern in birds);
5) Duet dances that reinforce a monogamic bond (as the so-called ceremony of triumph in geese of the genus *Anser* – see Mainardi 1992: 122–3);

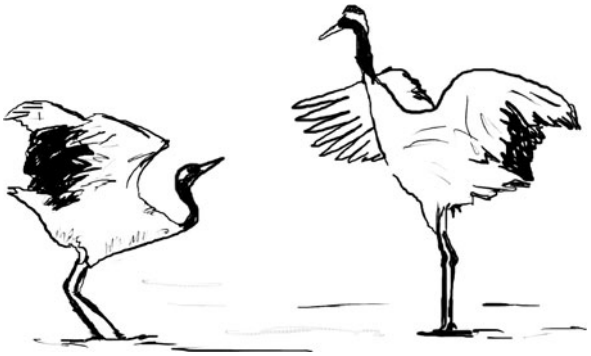


Fig. 4.3 A dancing ritual between two cranes

6) Performances involving role-playing (such as those rituals based on body-decoration occurring among cichlid fish like *Tilapia* or *Haplochromis* – see Akimushkin 1988: 113–4)
7) Performances imitating "real" life – see Akimushkin 1988: 107–8)

Anthropologists like Curt Sachs (1937), Anya Royce (1977) or Gertrude Kurath (1977) also showed a certain interest in animal kinaesthetic signs, particularly in relation to their search for the biological origins of dance (as in the case of Sandhill Cranes portraited in Fig. 4.3). Aspects like the recurrence of the circling choreographies (Kurath 1977: 47 and Sachs 1937: 10), the presence of spectator (Royce 1977: 4) or the social transfiguration/identification (Kurath 1977: 43) were often mentioned.

Kircher, Athanasius (1601–1680)

German scholar, "master of a hundred arts". Often referred to as "the last Renaissance man", Kircher cultivated the most diverse interests in the most diverse fields of knowledge, discussing with equal competence egyptology and geology, medicine and music. It is in this latter area that one finds a very intriguing contribution to the study of animal acoustic **>communication**. In 1650, Kircher published the twelve books of *Musurgia universalis* (a work nowadays known as the forerunner of the so-called "theory of passions"). However, the first volume (*Anatomicus de natura soni et vocis*, Chapter "De vocibus naturalibus in animalibus eorumque anatomia") is, considering the times, one of the most complete dissertations on the subject of animal vocalizations of aesthetic type (**>zoomusicology**).

Kircher works essentially on three levels: (1) direct investigation of the anatomical and physiological aspects of sound production; (2) personal observation, which points out those features that are not detectable on empirical basis; and (3) anecdotes, collecting facts related to the subjects discussed (a practice that more recently has been accused of **>anthropomorphism** and general scientific inaccuracy, but is now experiencing a "second youth" in **>cognitive ethology**).

Kircher elaborates a classification of singing species, using the (very limited) zoological knowledge of that time (Kircher 1650: 25), and noticing that the definition of "voice" is something that fits best to humankind and some birds, while nature has gifted other animals with rough vocalizations ("Boues mugiunt, balant Oues, Equi hinniunt, barriunt Elephantes" and so on – Kircher 1650: 26), that are nevertheless still suitable for displaying emotions and feelings.

Kircher transcribes different birdsongs on score, and does the same also with the American animal *Pigritia* (the sloth *Choloepus didactylus*), of whose night call Kircher emphasizes the ascending and descending diatonic scale, covering the interval of a major 6th.

Birds remain however the main focus, and are taken into consideration in sections 3–5 of the chapter. Species analyzed, and trascnribed on a score, are the parrot (with their "amazing imitations of human speech"), the nightingale (with their "beautiful chant", and their capacity to sing "planus, gravis, acutus, creber, extensus" – Kircher 1650: 29), the magpie, the wren, the rooster and the hoopoe. The chapter is concluded with a small dissertation on insects (cicadas, locusts and crickets) and amphibians (frogs), of which Kircher provides only anatomical descriptions.

Kluge Hans, Der

See **Clever Hans Effect**

Kohts, Nadia >(1890–1963, full name: Nadezhda Ladygina-Kohts)

Russian primatologist, she can be considered a forerunner of cognitive primatology. Between 1913 and 1916, she raised a young chimpanzee, Joni (see Kohts 1935), in her home in Moscow, conducting different types of cognitive test (including tool, mirror, art and discrimination tasks). She invented the matching-to-sample paradigm, and worked specifically on emotional responses in Joni, providing in-depth studies of such feelings as jealousy, guilt, empathy and loyalty, and describing facial expressions in detail. She would then compare Joni's behavior to her own infant son, Roody. Among her experiments, of particular semiotic interest is her failed attempt to teach spoken human language to the chimpanzee.

Koko (1971)

Short for Hanabi-Ko, Koko is a female lowland gorilla (*Gorilla gorilla*) trained in **>American Sign Language** (in fact, to an *ad hoc* version of it called "Gorilla Sign Language") by psychologist Dr. Francine **>Patterson**. Along with **>Washoe**, **>Kanzi** and others, Koko provided one of the most successful results of **>interspecific communication experiments**.

Trained since 1972, first in Woodside, California, then in Maui, Hawaii, Koko is reported to understand and use more than 1,000 ASL (or GSL) signs, and to

understand more than 2,000 spoken words in English. Within the same training program, there were and are also other gorillas, namely Michael (Mike), a long-term "buddy" for Koko (the latter repeatedly signing GSL grief expressions when the former died in 2000), who reached a proficiency of about 600 signs (and showed very strong inclination towards painting – >**Pictorial signs**), and the younger Ndume, who was chosen by Koko herself in a kind of audition (Koko was exposed to some videos, and asked to choose her favourite companion from the gorillas displayed). In 1998, Koko was also the first non-human animal to "chat" through the Internet, in a specific event hosted by AOL.

One of the most important characteristics of Koko's training program was a direct challenge to >**Clever Hans effect**: Dr. Patterson wanted to establish a solid and emotionally-close relationship with the ape. Her theory was that children gain motivation in learning a >**language** most of all because of the interaction with parents. To deprive them of such a fundamental element would mean to deprive them of language itself. Results with Koko proved very satisfying, just like Washoe's case (who received similar affective treatement). Koko could comprehend spoken words and use the correspondent symbols (which means that the signified was a semiotic entity in her mind). Moreover, she could create new signs to describe objects she did not know the name of (among the most revealing cases: "white-tiger" for "zebra", "finger-bracelet" for "ring", "drink-fruit" for "melon", "animal-person" for "gorilla" and "water-bird" for "swan"). Such a skill is crucial in distinguishing a cognitive use of the signs from a mechanical one.

The >**referential** use of the signs was also very important. Koko did not make just simple requests, but she would talk to Patterson about what she could see around her. Basically, she would engage into casual conversation, once more dismissing the widespread belief that language-trained apes could not go beyond a basic, >**conative** use of the signs.

Well-documented, as with Washoe, is also Koko's extensive use of lies (> **Deception**), as with her recurrent habit of stealing candies and then blaming her friend Mike in front of Dr. Patterson.

Koko's life and training is documented in both scientific and semi-scientific literature. Among the former: Patterson 1978, 1981, and Patterson-Linden 1981. Interesting resources are also available at The Gorilla Foundation website (www.koko.org).

Kull, Kalevi (1952)

Estonian biologist and biosemiotician. Currently Professor of Biosemiotics and Head of the Department of Semiotics at Tartu University, Kull is a relevant exponent of the so-called Tartu-Copenaghen school of >**biosemiotics**. His interests occasionally cross with >**zoosemiotics**, but his importance is mostly to be found in the effort to systematize the biosemiotic disciplines in a general, also historical, sense (see, a.o., Kull 1999 and 2005). Further important contributions include a thorough analysis, from a semiotic viewpoint, of the notion of >**Umwelt** (Kull 1998 and Kull-Torop

2003), **>semiosphere** (as corresponding to **>biosphere**), and an attempt to emancipate the figure of Karl Ernst von **>Baer** and his alternative non-darwinian theory of evolution.

Lana

See **Interspecific communication experiments**.

Language

With the possible exception of **>instinct**, there is hardly a more critical topic in animal studies than the notion of language. The definition itself is already a problem, and is very far from producing a compromise among scholars (*across* different disciplines, or even *within* the same one). In semiotics, a certain agreement has been reached (especially after **>Sebeok**'s repeated efforts in the last 20–30 years of his life) in considering language (a) a secondary and tertiary **>modelling** system (as opposed to non-verbal sign systems, that can only be primary); and anyway, quite simply, (b) the "name" to give in principle to the *human* modelling system, regardless of similarities or differences with other systems (making therefore the concept a founding element of human identity as such). As Sebeok firmly pointed out, it is not even *allowed* to use the word "language" as a colorful metaphor to describe complex, but non-human, semiosic processes ("As a rule of thumb, picturesque conjunctions of the word 'language' with the generic word 'animal' . . ., ape or dolphin, or a category of domestic pets. . ., or in phrases like 'the language of flowers', are unscientific nonsense, rhetorical tricks designed to mislead by assuming as part of the premise the conclusion that is supposed to be demonstrated" Sebeok 1995: 10).

The problematicity of such stands is however very high, and calls into question the possibility that these affirmations lack an empirical basis (becoming, thus, exactly what Sebeok accused other scholars to practice: *petitio principii*), and – not least – the fact that plenty of other disciplines (directly or indirectly involved in the study of language) seem not to agree *at all* with this position. The risk, it is feared, is to make this terminological choice (language as the human modelling system, *a priori*) semantically as irrelevant as the choice (exercised only in nine world countries) of calling "soccer" what everywhere else is known as "football", without changing a single comma in the rules of the game.

As a general rule, it seems that human sciences are very eager to consider language as a **>species-specific** human feature (and, as mentioned, as the very characterization of human identity), radically separated from other animals, while natural sciences are often in favour of a **>transpecific** extension of the concept, suggesting that, if anything, a difference between the human and other **>communication** systems is only a matter of degrees. To start with, natural sciences (and some human sciences, too) hardly share the opinion that, in language, the "modelling" function precedes in importance the "communicative" one, as instead suggested in semiotics. Secondly, most natural sciences do not agree that **>syntax**

and symbolicness (**>symbol**), which characterize respectively secondary and tertiary modelling systems, are exclusive property of (human) language. Counterproofs offered include phenomena like birdsong, **>bee dance** (indeed, often referred to as "language"), **>alarm calls**, and the results of **>Interspecific communication experiments**, all extensively (and empirically) studied in **>ethology** and other sciences. Thirdly, if it is possible, as it *is* possible, to study the biological evolution of language, then it becomes hard to maintain the hypothesis of a "radical", clear-cut, separation between human language and other modelling (and communicative) systems.

The discussion remains lively and far from concluded, and it is probably significant to notice that, despite their firm interdiction of the use of the word "language" even as a simple metaphor within a non-human and non-verbal context, semioticians themselves (including Sebeok) hardly manage to resist the temptation to talk about "language" in the most diverse (non-human and/or non-verbal) contexts (for instance when referring to primary modelling systems as typical of "natural languages", an expression which, from *that* semiotic point of view, should be an oxymoron).

The notion of language is discussed in Chapter 2, Section 2.2.2 and in Chapter 3, from Section 3.3.

Leakey's Angels

Nickname given to the three main pupils of anthropologist Louis Leakey who performed research on great apes' **>interspecific >semiosis** in the wild. The "angels" are/were Dian **>Fossey** (researcher on gorillas), Birute **>Galdikas** (researcher on orangutans), and Jane **>Goodall** (researcher on chimpanzees).

Learning

The term defines the process of acquiring and retaining information through ontogenesis, i.e., the consequence of interaction between an animal and its environment, rather than through phylogenesis. While in classical **>ethology** it was often claimed that almost all non-human behavior is due to instinctive predispositions (**>instinct**), the current scholarly position (a.o., Bekoff and Jamieson 1990, Hamilton and Marler 1966, Mainardi 1975) generally holds that:

1) All animal **>species** (including protozoa) are provided with so-called "non-associative" learning abilities (i.e., learning based on constant exposure to a unique event or stimulus);
2) Most of them (except for protozoa) are provided with "associative" learning abilities (i.e., learning based on constant exposure to numerous causally related events or stimuli);
3) In many species, particularly the so-called higher ones, there is "complex" learning (i.e., learning based on **>cognition**, rather than simple association).

Further categorizations of the concept concern (a) the specific learning processes associated with singing abilities in bird and mammal species (*song learning*); (b) the form of learning that occurs without an explicit stimulus, with the animal acquiring information on his/her own environment in an exploratory way (*latent learning*); (c) the learning processes specifically tied to an organism's **>Umwelt** (*perceptive learning*); (d) the information received and stored by an organism in its prenatal life (*prenatal learning*); (e) the acquisition of a (subjectively or objectively) "correct" reaction to a stimulus, after repeated attempts (*trial-and-error learning*); and (f) the type of learning specifically emerging from social interaction and parent-to-offspring transmission (*social* or *cultural learning*).

Leclerc De Buffon, George-Louis (1707–1788)

French naturalist and mathematician. His *Histoire naturelle*, published between 1749 and 1788 in 35 volumes, is considered the most important work by a naturalist in the entire eighteenth century, and was extremely influential for those such as Jean-Baptiste Lamarck and Georges Cuvier. The books encompass most of the knowledge of the time on the animal and mineral kingdoms, fully reflecting the encyclopaedic spirit of the Enlightenment. Because of its essentially secular nature, the *Natural History* had a few problems with religious institutions, and was for instance condemned by the Faculty of Theology at the Sorbonne (an event that forced Buffon to publish a retraction).

Innovative in many respects, there are several aspects of Buffon's work that make it particularly worthy of note:

1) The so-called Buffon's Law, i.e., the notion that, despite similar environments, different geographical areas display distinct plants and animals (an anticipation of biogeography);
2) A rough anticipation of **>Darwin**'s theories, appearing in volume 14, where Buffon maintains that all quadrupeds developed from 38 species only;
3) The considerations of similarity between humans and apes (although not corroborated by the hypothesis that they might have a common origin);
4) A general inclination to a systematization of animal **>species**, that makes him a pioneer of modern taxonomy.

Lenneberg, Eric

See **Morgan's Canon**

Lestel, Dominique (1961)

French social scientist with a strong interest in **>zoosemiotics**. Maître de Conférence at the Department of Cognitive Sciences at Paris' École normale supérieure, Lestel is internationally renowned for his works in the field of human-animal relationship

(1994, 1995, **>Anthropological zoosemiotics**), particularly **>interspecific communication experiments** (1996, 1998, 1999) and animal **>culture** (2001, 2002). Dominique Lestel contributes to zoosemiotics with insights from social sciences. Social scientists, to him, have been rather insensible to such issues as animal cultures (and particularly the communication processes involved), and a scientific interaction with **>biosemiotics** may be of benefit for both parties. Lestel maintains that "the semiotic dimension of animal cultures has been totally neglected by ethologists" (2002: 40), as animal communications are in fact more complex than normally believed. In a fashion similar to **>Griffin**, he shows that most of the supposedly distinctive features of human **>language** are in fact present in other animals as well, particularly the notions of tradition, meta-communication, innovation, flexibility, multiple articulation and dialogues.

Lexigrams

Symbols placed on a keyboard, used in **>interspecific communication experiments**, that represents words in a purely symbolic (**>Symbol**), non-iconic (**>Icon**) and non-indexical (**>Index**), manner. Lexigrams must also be combined according to certain rules, therefore reproducing an elmentary grammar. The term was coined in 1971, thanks to Ernst von Glasersfeld (who designed the first 120 symbols and the first draft for a grammar), and first employed in interspecific communication in the occasion of the Lana project, directed by Robert M. Yerkes (**>Interspecific communication experiments**). The system was then extended to 384 signs, and the grammer upgraded, when the **>Kanzi** project started in 1980.

Lindauer, Martin (1918–2008)

German ethologist, specializing in animal **>communication**. A pupil of Karl von **>Frisch**, with whom he collaborated upon extensive research on the **>bee dance**, Lindauer is an important figure in **>zoosemiotics** as well, for being not only a field researcher on communication, but also a remarkable theoretician on the subject. Works like Lindauer 1990 are crucial for the meticolous systematization of **>biocommunication** research, including a definition of it, a classification of the **>channels**, and an investigation of its social dimension.

Locke, John (1632–1704)

English philosopher. Apart from being one of the most important protosemioticians, John Locke showed consistent interest in medical, chemical and biological sciences, and his work on animal **>cognition**, as displayed in his *Essay Concerning Human Understanding* (1690, here in the 1825 edition) is of particular importance for **>zoosemiotics** too.

His main arguments are:

1) In contrast to Descartes, Locke makes no division comparable to the Cartesian *rex extensa* and *res cogitans*. To him "matter" is able to think. Neither is any suggestion made that animal life is actually comparable to the functioning of a machine. The sole realm that can possibly be interpreted in terms of mechanism is to Locke the vegetal one: there, and there only, the subject is incapable of sensations and ideas. What marks the difference between animals and plants is perception (Locke 1690/1825: 100).
2) Perception varies in grades according to the single capacities of each species. Animals are thus organisms provided with sense, memory, and ability to make plans and comparisons. In the *Essay*, Locke discusses both human and non-human memory and its capacity to activate reasoning, and uses birdsongs as main example (Locke 1690/1825: 104).
3) Locke's consideration of birdsong is also interesting from an aesthetic point of view (>**Aesthetics**), as he stresses non-utilitarian characteristics in this activity: Locke describes birds as "wasting their time" by re-composing their sound models, without any apparent evolutionary advantage being secured for themselves or their own species. These birds are consequently able to sing "just for the sake of singing", expending the same effort as they would if it were a matter of life or death (Locke 1690/1825: 104). Another reflection on the subject is rather sarcastic about Cartesianism

> For, though I should grant sound may mechanically cause a certain motion of the animal spirits in the brains of those birds, whilst the tune is actually playing; and that motion may be continued on to the muscles of the wings, and so the bird mechanically be driven away by certain noises, because this may tend to the bird′s preservation; yet that can never be supposed a reason why it should cause mechanically- either whilst the tune is playing, much less after it has ceased - such a motion of the organs in the bird′s voice as should conform it to the notes of a foreign sound, which imitation can be of no use to the bird′s preservation. But, which is more, it cannot with any appearance of reason be supposed (much less proved) that birds, without sense and memory, can approach their notes nearer and nearer by degrees to a tune played yesterday; which if they have no idea of in their memory, is now nowhere, nor can be a pattern for them to imitate, or which any repeated essays can bring them nearer to. Since there is no reason why the sound of a pipe should leave traces in their brains, which, not at first, but by their after-endeavours, should produce the like sounds; and why the sounds they make themselves, should not make traces which they should follow, as well as those of the pipe, is impossible to conceive. (Locke 1690/1825: 104–5)

4) In any case, the mental faculties of non-human animals remain to Locke inferior, in degrees, to those of human beings. Ideas are composed and compared, but not at such a complex level as in humans. Animals do not count, do not easily distinguish and finally lack the ability of abstraction (Locke 1690/1825: 107–8). Yet, with Locke there is no doubt that non-human animals "are not bare machines", and that "we cannot deny them to have some reason. It seems as evident to me, that they do some of them in certain instances reason, as that they have sense".
5) Finally, in another of his works, *Some thoughts concerning education* (1692, here in the 1823 edition), Locke anticipates a topic that will be also discussed

in Kant's *Critique of Judgement*, that is, our ethical obligations as humans to respect other animals and treat them kindly (Locke 1692/1823: 112–3)

Lorenz, Konrad (1903–1989)

Austrian ethologist and Nobel Prize winner "for discoveries in individual and social behavior patterns". Possibly the most influential figure in classical **>ethology,** and certainly the most popular one. Following the steps of his teacher and mentor, German biologist Oskar Heinroth, Lorenz contributed crucially to the foundation of ethology, in its modern form. Among the (many) concepts he helped to define and/or develop, one must mention at least **>instinct** (a.o., in Lorenz 1949, 1963, 1965) , **>imprinting** (a.o., 1949 and 1979), human-dog co-evolution (1950), aggression (a.o., 1965), plus an extensive (and positively ethical-philosophical) discussion on humanity and its role within and towards Nature, especially in the last years of his life (a.o., 1973 and 1974). Among the **>species** he observed closely, and always in a non-invasive way (something that animal-right supporters always like to point out in relation to the category in which he won his Nobel prize – "Physiology or Medicine"), there are the jackdaw *Corvus monedula*, the greylag goose *Anser anser* and other nidifugous birds.

Magnetoception

The capacity to use magnetic fields to gather information about direction, altitude or location of given objects or places. Magnetoception is important, if not central, in the navigational skills of many animal **>species**, particularly migratory ones. It has been observed in many birds (first and foremost), and in flies of the family *Tephritidae*, honeybees *Apis mellifera*, turtles of the species *Caretta caretta* and *Dermochelys coriacea*, lobsters of the family *Palinuridae*, crocodiles of the family *Crocodylidae*, sharks of the superorder *Selachimorpha*, cartilaginous fish of the order *Chimaeriformes*, stingrays of the family *Dasyatidae*, common cows *Bos primigenius*, and deers of the family *Cervidae*. In humans, too, the presence of magnetic deposits of ferric iron in the ethmoid bone, allows, to a certain extent, magnetoceptive abilities.

As discussed in Chapter 2, Section 2.1, the question remains open whether magnetoception, a sensorial ability that seems to function only in **>signification** processes, should or should not be considered a **>channel** in all respects.

Maran, Timo (1975)

Estonian zoosemiotician. Currently Senior Research Fellow at the Department of Semiotics of Tartu University. One of the most important figures in the new generation of zoosemioticians, and certainly one of the most active. Maran is a specialist in **>mimicry** research (2005, 2007a, b, 2008a), but also tackled general issues in the theory and history of **>zoosemiotics** (2005 and 2009), extending his interests to **>ecosemiotics**, as well (a.o., 2008b). Maran regularly gives lecture courses in zoosemiotics and ecosemiotics for the University of Tartu.

Marchesini, Roberto

(1959) Italian biologist and epistemologist. One of the world leading figures in **>anthrozoology** (or Zooantrhropology, as he reformulated the discipline, by introducing new and specific theoretical and methodological elements – see Marchesini 2000b, 2004 and 2005) and animal **>ethics** (a.o., 1996, 1999, 2000a). He is President of the Italian society for applied behavioral sciences (Società italiana di Scienze Comportamentali Applicate) and founder and director of a School in Human-Animal Interaction (Scuola di Interazione Uomo Animale).

Marler, Peter (1928)

English ethologist, with a strong interest in **>zoosemiotics**. Currently Professor Emeritus at the Animal Communication Laboratory of University of California, Davis. Initially trained as a botanist, Marler turned quite early in his carreer to ornithology, giving a major contribution to the research on the social functions of birdsongs (Marler-Slabbekoorn 2004). He also studied extensively animal acoustic **>communication** (particularly primates'vocalizations, as in Marler 1977). His approach has always been keen to zoosemiotics, by both adopting explicitly its paradigm (a.o., Marler 1978), or – perhaps more valuably – by "hinting" at it in biological contexts. In this sense, it is certainly remarkable that Marler had used semiotic theories in the study of animal communication even before **>Sebeok**'s introduction of zoosemiotics in 1963. In Marler 1961, indeed, there is an interesting attempt to combine ethological and semiotic viewpoints by using Charles **>Morris**' theories (1948), particularly his distinction between identifiers, designators, appraisors and prescriptors, as applied to the analysis of birdsong.

Martinelli's Canon

See **Zoosemiotic Canon**

Maynard Smith, John (1920–2004)

Evolutionary biologist with a strong interest in animal **>communication**. Maynard Smith's use of (and contribution to) **>zoosemiotics** must be regarded as one of the most significant points of contact between traditional biological sciences (particolarly evolutionary ones) and semiotics, in that way envisioned by **>Sebeok** (1972 and 1990) and practised by the likes of Peter **>Marler** (1961 and 1978). Timo **>Maran** (2009) summarizes very efficiently the most relevant deployments of semiotic terminology and methodology in Maynard Smith's work. They include **>Peirce**'s sign typology (particularly the **>icon->index->symbol** triad, as in Maynard Smith-Harper 1995 and 2003), the concepts of "signal"and "meaning" (Maynard Smith-Harper 2003), the concept of "information" (Maynard Smith 1982, 1999 and 2000), and several others of less frequent recurrence.

Mechanism

See **Descartes**, René.

Mental Map

A mental, or cognitive, map is the capacity of orienting oneself in space and heading towards a certain destination, by using signs available in the environment (and belonging to any of the possible **>channels**). To possess a cognitive map means to be able to solve a consistent number of spatial and temporal problems: finding the shortest way for a familiar destination, finding an alternative way when the usual one is not available, going back to familiar places from unknown ones, etc.

Many experiments were made in order to verify the existence of mental maps in animals, on a basis that was cognitive and not simply instinctive (**>instinct**). One of the most interesting concerns the honey bees *Apis mellifica* and was illustrated by Stephen Gould (1986: 861–3). The bees were trained to reach a place (P1), north from the hive (H), and after a while were suddenly closed in a dark box, and moved to a completely unknown place (P2), south from H and from which P1 was not visible. The hypothesis was: if the map is a simple instinctive reflex, then all that bees will be able to do is reaching H from P2. If, on the contrary, bees can develop a map regarding places they are exposed to eventually (as P1 was), then they should be able to reach also those places. The result was, indeed, that the bees *could* reach P1 from P2, despite the fact that this was the first time ever they were attempting that path. In other words, the spatial representation in the bee's **mind** is not behavioristically ruled by external stimuli, but by an inner source, gathered with experience and with a mental processing of the information available.

Mental Representation

A mental representation is an inner sign of an external object (which functioned as its stimulus), and that can be reactivated also in absence of the original stimulus. It is defined at length in Hebb 1949 and, with a specific zoosemiotic approach, in **>Cimatti** 1998. The most typical example of mental representation is the **>mental map**.

Metalinguistic

One of the six **>Functions of communication** postulated by Roman Jakobson (1963). A message is metalinguistic when its focus is the **>code**.

Metasemiosis

The capacity of using signs being aware that they are signs, as in **>deception** or **>play**.

Miles, Lyn

See **Chantek**

Mimicry

Mimicry, or more precisely Biological Mimicry, is an umbrella-term that covers several forms of iconic similarity (appearance, behavior, messages. . .) of one **>species** to another. It involves all **>channels** (not only the visual, as is sometimes implied), and occurs largely (but, by far, not only) in insects. Mimicry occurs when an organism (called the *mimic*) evolves to share common characteristics with another organism (the *model*), while a third party (the *dupe*) is the receiver of the mimicry sign (e.g., a predator common to the mimic and the model). Sometimes, model and dupe are the same organism. Mimicry is, in the majority of cases, advantageous to the mimic and harmful to the receiver. Usually, models and mimics are closely related organisms, but sometimes the phenomenon occurs among biologically "distant" species.

A particular case is *Camouflage*, occurring when the model is a non-living or abiotic part of the environment (as in the famous case of chameleons). Occasionally, mimics may have multiple models during the stages of their life, or they may be polymorphic, i.e., different individuals imitate different models. Models, also, may have more than one mimic.

The main typologies of mimicry are the following:

1) *Defensive* (or protective): it occurs when mimics avoid/deceive predators or other enemies by resembling other species or (in the *Camouflage* case) inanimate parts of the environment. Forms of defensive mimicry include the *Batesian* (after English naturalist Henry Walter Bates: the mimic shares signals similar to the model, without being as unpalatable as the latter. It is observed, a.o., in *Lepidoptera*, *Hymenoptera*, some snakes, and Octopuses of the genus *Thaumoctopus*); the *Müllerian* (after German naturalist Fritz Müller: two or more species have very similar signals, and both are "unpalatable". Observed in *Lepidoptera* and *Hymenoptera*); the *Mertensian* (after German herpetologist Robert Mertens: an unpalatable prey mimics a less dangerous species. Observed in some snakes species); the *Browerian* (after biologist Lincoln P. Brower: an intraspecific case of Batesian. Observed in *Lepidoptera*).
2) *Aggressive*: it occurs when the mimics are predators or parasites that deceive/lure the prey/host by appearing like a harmless species, or (in the *Camouflage* case) inanimate parts of the environment. It is observed in many different orders.
3) *Auto-* (or *intraspecific*) *mimicry*: mimic and model belong to the same species, although the dupe could easily belong to another. It occurs typically (but not only) in acoustic **>imitation**, especially among birds (as in the case of the Superb Lyrebird portraited in Fig. 4.4).

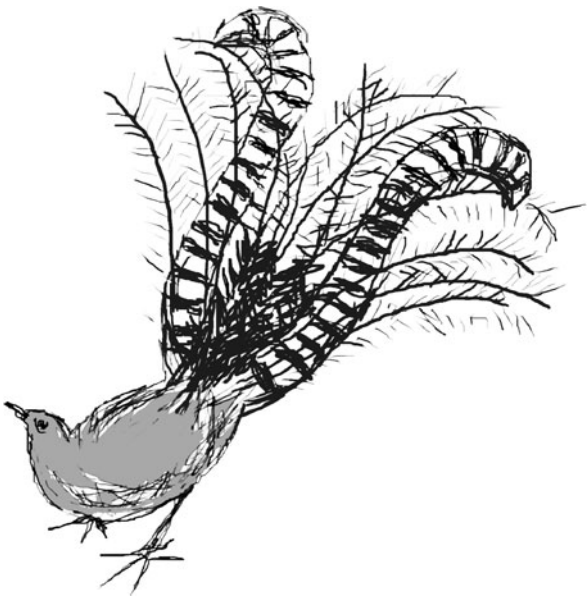


Fig. 4.4 Superb lyrebirds are among the most skilful mimics of natural and artificial sounds

A fourth form of mimicry, called *Reproductive*, occurs among plants only.

Within **>zoosemiotics**, the major expert in mimicry is undisputably Timo **>Maran** (2005, 2007a, b, 2008a), while general classics on the subject include Brower 1988, Owen 1980 and Wickler 1968.

The concept of mimicry is closely related to (but does not overlap with) that of **>deception** and therefore constitutes part of the discussion in Chapter 2, Section 2.4.1.

Mind

Leaving aside the endless philosophical, psychological and neurological implications of such a concept, and focusing only on its relevance within the zoosemiotic context, a "mind" can be defined as a network of biological and physiological activities and relations (including brain functioning, sensorial perception, nervous system, etc.) that allow an organism to acquire, store and elaborate the information it is, was, or might be exposed to, and produce an adequate response (which includes not producing any response whatsoever), after a consideration of the variables involved at any stage of this process.

A network of this kind is essential in a great number of semiosic processes, including **>modelling**, **>deception**, **>play**, **>aesthetics**, **>mental representations**, **>metasemiosis**, etc. As such, it must be considered an integral part of any member of the Animal Kingdom (**>Zoosemiotic universals**).

The concept is also discussed in Chapter 2, Section 2.3.2.

Mirror-Test
See **Self-consciousness**

Modelling
A process through which a phenomenon/entity is executed and/or multiplied on the basis of a virtual or real general model. Such a model serves, thus, as a cognitive input for the given phenomenon to be activated and to expand in complexity. Such a quality is for instance typical of sign systems, which are not only a *result* of perception, but in fact support and extend it at many levels. The expression "modelling system" has been indeed used in semiotics for describing the primary quality of natural and verbal >**language**. Originally Yuri Lotman's idea (1977), the "Modelling system theory" was taken up by Thomas >**Sebeok** (e.g., Sebeok-Danesi 2000). Sebeok made a clear distinction among

1) "primary modelling systems", typical of natural languages (gestures, facial expressions, body posture, proximity, and so forth), which consist in an instinctive ability to model reality in an "iconic" manner;
2) "secondary modelling systems", typical of (human) verbal languages, where the modelling process occur in an indexical and syntactical way; and finally
3) "tertiary modeling system", again typical of verbal languages, which *extend* the properties of secondary models to the symbolic extent (as for instance may happen in certain forms of >**culture**, or in specific conventional codes as mathematics or religions).

Modern Etho-zoosemiotics
See **Ethological Zoosemiotics**

Morgan, Conwy Lloyd (1852–1936)
English psychologist who developed the so-called >**Morgan's Canon**.

Morgan's Canon
Named after Conwy Lloyd >**Morgan**, the Morgan's Canon is a particular case of the possibly more famous >**Ockham's Razor**. It asserts that "in no case should actions or behaviors be interpreted as the result of a superior psychic faculty, when it is possible to interpret them as a result of an inferior faculty" (Morgan 1903: 59). The canon was conceived as a reminder to scholars of the dangers of >**anthropomorphism** and what later became known as >**Clever Hans effect**, and still is a "classic" in some animal studies in that role.

Within semiotics, the Canon has been mentioned in relation to the case of >**interspecific communication experiments** by the likes of Thomas >**Sebeok** and

Eric Lenneberg to warn other scholars about the risk of over-interpreting anthropomorphically the results of such experiments. In the book *Speaking of Apes* (Sebeok–Umiker-Sebeok 1980) the Canon is quoted while evaluating chimpanzee **Washoe**'s allegedly spontaneous **>American Sign Language** sign productions. If Allen and Beatrice Gardner, trainers of Washoe, looked favourably at the creation of new signs in Washoe, as symptoms of enthusiasm towards, and cognitive appropriation of, the new communication tool, Lenneberg does not hesitate to apply the Razor and the Canon to such instances, and finds that "we are simply testing our own ingenuity to assign interpretations to productions that might, for all we know, have been emitted randomly" (in Sebeok–Umiker-Sebeok 1980: 80).

Despite these instances, the position held in the present companion (Chapter 3, from the Section 3.3) aims to be rather critical towards the possibility of finding any reasonable application of the Morgan's Canon in semiotic contexts. Taking a similar position to that taken on **>Instinct**, the opinion here is that, in fact, the Canon is in principle an anti-semiotic concept (for this discussion, see the entry **>Zoosemiotic canon**).

Morris, Charles (1901–1979)

American semiotician. His role, within the zoosemiotic context, was instrumental for completing an ideal transition from **>Peirce**'s general idea of semiotics as something "not just concerned with the human being", to **>Sebeok**'s introduction of **>zoosemiotics**. In Morris' semiotics there is a clear description of the sign as a concept encompassing life altogether, and whose extents can be described in biological, rather than anthropological, terms. Strongly influenced by **>behaviorism**, Morris' "behavioristic biospychology" (as his friend Ferruccio Rossi-Landi called it) is exemplified in Morris 1946.

Morris, Desmond (1928)

British sociobiologist and popular science writer. His work has been influential for **>zoosemiotics** at more than one level, particularly in the field animal **>aesthetics** and **>anthropological zoosemiotics**. Pupil of Nikolas **>Tinbergen**, Morris started in the late 1950s a thorough investigation on the painting skills of chimpanzees (**>pictorial signs**), resulting in Morris 1963. The research led also to the curious extravaganza of an exhibition *in incognito* of chimpanzees' paintings, mixed with human ones, that was very favourably reviewed by the unaware critics. Morris, himself a painter, intended to make a point that – when assessed unbiasedly – animal art can stand the comparison with the human one. Later, his work focused on the animal components of human behaviour, resulting in his best-known (and most controversial) works, including *The naked ape* (1967). Morris is still active as writer and TV personality.

Multimodality

Multimodality refers to those instances of **>semiosis** when different patterns cooperate (or compete) to display one or more texts. It operates in almost every semiosic context (particularly in communicative ones), and it can be safely said that only the most elementary occurrences constitute an exception. It is however in such instances like **>play**, linguistic or pseudo-linguistic interaction (**>language**), **>aesthetics**, **>deception** and others that multimodality becomes a primary and unavoidable semiotic strategy.

Zoosemioticians – and communication researchers in general – tend to categorize signals by the primary sensory **>channel** involved, but the reality is rarely so straightforward as multiple channels are regularly engaged simultaneously. This is especially true in highly social, group-living animals. As anticipated by **>Darwin** (1872), multiple, concurrent stimuli are very important in order for a signal to be fully efficient. However, the influence of such stimuli on the signal and its meaning has only recently been closely analyzed (see, for instance, Horn 1983). Behavioral neuroscientists have found that many species (and particuarly primates, birds, and insects) are concerned with the processing of information from multiple sensory channels, in the fields of both attention and perception. In particular, posture and movement are the stimuli most frequently associated with the production of the signal. Partan and Marler (1999) have provided a synthetic but exhaustive account of the most important points in multimodal **>semiosis**. When the diverse signs are redundant (i.e., they all concur to convey the same text), there can be:

– Equivalence: The multimodal signal provokes the same exact reaction as the signs emitted separately.
– Enhancement: The multimodal signal produces a reaction that is increased in intensity.

When the multimodal signal is based on the combination of nonredundant signs (i.e., they convey different texts), there can be a wider range of possibilities:

– Independence: The different signs are independent and produce distinct reactions that are not in relation with each other, although they are combined.
– Dominance: One of the signs prevails on the other(s). It is a typical occurrence in play behavior.
– Modulation: One nonredundant sign affects the other(s), by modulating its/their effect.
– Emergence: The multimodal signal provokes an entirely new reaction that has nothing to do with the separate signs.

Multimodality is discussed more in detail in Chapter 2, Section 2.3.3.

Musical Signs

One of the four "prefigurements of art" emphasised in Thomas **Sebeok**'s *The Play of Musement*, (1981: 210–259), along with **Pictorial signs**, **Architectural signs**, and **Kinaesthetic signs**.

See **Zoomusicology**.

Nim Chimpsky (1973–2000)

An obvious pun with Noam Chomsky, Nim was a chimpanzee *Pan troglodytes* trained in **>American Sign Language** by Dr. Herbert Terrace at Columbia University. The project, which – in terms of the data collected – was moderately succesful (Nim acquired the respectable knowledge of 125 signs, and communicative interactions between him and the trainers were reportedly satisfying), achieved a unique notoriety for Terrace's eventual statement that the whole program was heavily affected by the **>Clever Hans effect**. Going against his own interests, and therefore showing rare professional ethics, Terrace admitted that all what initially looked like Nim's cognitive acquisition of linguistic skills, was simply the result of active manipulation from the chimpanzee's part, and self-deception from the trainers' part. Terrace thought that none of Nim's achievements could be barely compared to what true **>language** should be, and that no more than 25 signs could be *really* considered to be cognitively understood by Nim.

Terrace's statement opened a huge (still on-going) debate on the validity of **>interspecific communication experiments**, resulting in at least three factions: (1) those who thought that Terrace had underrated Nim's cognitive capabilities, and therefore the program was far from being a failure; (2) those who agreed that Terrace had failed, but on the basis of a badly-structured program, not because of the chimpanzees' general impossibility to learn language; and finally (3) those, like most semioticians, who admired Terrace's honesty and agreed that in principle no species other than the human one can acquire a specifically linguistic competence. Thomas **>Sebeok**, in particular, was very firm in considering Nim's case as paradigmatic of all interspecific communication experiments, and praised Terrace for being the only one who did not fall into self-deception, or did not perform an "outright fraud" (as he called it) to the scientific community.

N'kisi

See **Alex**

Objects

See **Things-Objects**

Occam's Razor

See **Ockham's Razor**

Ockham, William Of (1288–1348)

English logician and Franciscan friar, to whom the so-called **> Ockham's Razor** is attributed.

Ockham's Razor

Ockham's, or Occam's, razor is a principle attributed to William of **>Ockham**. It says: *entia non sunt multiplicanda praeter necessitatem*, that is "entities must not

be multiplied beyond necessity" (or, as it is often referred to, "plurality should not be posited without necessity"). It is the main source of inspiration for the more radical **>Morgan's canon**, widely discussed in this companion, both basically conveying the message that, in interpretive (empirical or not) environments, complication is not a preferrable solution, if a simpler option is available and justifiable. Such *lex parsimoniae* was instrumental in the paradigms of many disciplines, including biological sciences, but it was (and is) not immune to criticism, particularly when it comes to a rather common (mis)use that transformed a plea against unnecessary complication into a plea in favour of compulsory simplification (Einstein reportedly said: "Everything should be made as simple as possible, but not simpler"). Historical detractors of Ockham's razor include Karl Menger, Leibniz and **>Kant**, who also went as far as to postulate a *counter*-razor: "The variety of beings should not rashly be diminished".

Most of the discussion on these issues focuses on the Morgan's canon, whose entry is here suggested to consult, together with **>zoosemiotic canon**, and the more detailed discussion available in Chapter 3, Section 3.3.5.

Olfactive Channel

See **Chemical Channel**.

Olfactory Channel

See **Chemical Channel**.

Osten, Wilhelm Von

See **Clever Hans Effect**

Pain, Stephen (1956)

English biosemiotician. His main field of specialization is natural argumentation systems, an area he pioneered by founding a biosemiotic branch called **>biorhetorics** (a.o., Pain 2002). Through biorhetorics, Pain had often the chance to deal with animal **>communication** and **>cognition**, as, for instance, in Pain 2006 and 2009.

Pansemiotism

Holistic conception of life as a whole as sign processes, developed within **>biosemiotics** especially since the 1990s. Pansemiotism interprets the nature of life as fully and intimately semiotic, following thus a path that was mostly traced by the American semiotic tradition (e.g., **>Peirce** and **>Sebeok**), and by teleological biology (**>Baer**). This led a few biosemioticians, particularly those belonging to

the so-called sign-based biosemiotics (**>Hoffmeyer**), to the belief that every single process in life (and possibly not only in life) can be analyzed and interpreted semiotically. Pansemiotism is highly problematic, and is heavily criticized by those scholars who think that biosemiotics and **>zoosemiotics** should exclusively rely upon empirical bases.

In this companion, the question is discussed in Chapter 1, Section 1.1.1 and Section 1.2.1.

Patterson, Francine (1947)

American psychologist, leader of one of the most successful **>interspecific communication experiments**, conducted with the lowland gorillas **>Koko**, Mike and (after Mike's death) Ndume, at the premises of The Gorilla Foundation in Woodside, California. Dr. Patterson trained the apes with a personally modified version of the **>American Sign Language**, called Gorilla Sign Language. She documented her work with scientific and semi-scientific essays and books (among the former: Patterson 1978, 1981, and Patterson-Linden 1981), and via different media, including a 1978 documentary called *Koko, A Talking Gorilla* (directed by Barbet Schroeder), several TV programs, and even a Internet chat event hosted by AOL, featuring Koko herself.

For more on this Interspecific Communication Experiment, see **Koko**.

Peirce, Charles Sanders (1839–1914)

American philosopher and logician. He regarded logic as a branch of semiotics, and contributed enormously to the latter, by establishing a specific paradigm and line of research in the field, particularly in the elaboration of the notion of "sign". His semiotics, open to metaphysics, biology and indeed logic, became in the late twentieth century the most serious alternative to the Saussurean "linguistic" tradition, up to the establishment of two major branches: the American "semiotics" (Peirce, **>Morris**, **>Sebeok**. . .), focused on the entire sign-production of living forms (**>semiosis**) and the European "semiology" (Saussure, Greimas, Barthes. . .), of an intimately logocentric nature. It is certainly thanks to Peirce that semiotics became interested *at all* in non-human semiosis, and this fact alone justifies his inclusion in the olympus of **>biosemiotics**, particularly, but also of **>zoosemiotics**.

Peirce's impact on modern semiotics has been so big and "charismatic" that a few suspicions of misinterpretation/exaggeration of his theories have arisen, particularly when it comes to his metaphysics, heavily relying upon the assumption of God's existence, and employed as straight philosophy of science in more than one case. Another critical remark that has been advanced is of methodological type: the publication, in two main stages, of the *Collected Papers* (1935–1966), created an omnicomprehensive texture of Peirce's writings that include several fragments, revisions and private communications that he himself – it is argued – would have

probably refused to publish. In that sense, it is not rare for arguments that take completely different directions to both cite Peirce (in two different moments of his life) as an authority, regardless of the fact that the philosopher himself evidently and very legitimately changed his mind at some point.

Despite these reservations, however, his contributions to semiotic theory, and particularly to the study of non-human semiosis, have been, and must be considered, of the utmost importance.

Pepperberg, Irene

See **Alex**

Pergola

See **Pergolate**

Pergolate

Pergolates, or bowers, or pergolas, are constructions built for mating purposes by the passeriform Satin Bowerbird *Ptilonorhynchus violaceus*, that are of remarkable interest from a semiotic point of view, and particularly in the field of aestehtic signs (> **Aesthetics**). Karl von **>Frisch** argued that "[. . .] those who consider life on earth to be the result of a long evolutionary process will always search for the beginning of thought processes and aesthetic feelings in animals, and I believe that significant traces can be found in the bowerbirds" (Frisch 1974: 244).

During the mating period of the year, the male specimens (different from females because of a more uniform, dark blue, plumage) build a construction, only vaguely reminiscent of a nest, whose function is that of hosting the mating encounter. The pergolate is extended vertically, in form of two concentric arcs, although other species of the same genus erect cone-shaped maypoles around a tree (famous was the case of the Italian naturalist Ottaviano Beccari, in the end of the nineteenth century, who thought he had found dollhouses built by creative young girls).

Apart from building techniques, pergolas are notable for the meticulousness with which the bird decorates the inside and the outside of his construction. All types of objects are utilized, from those already available in Nature (twigs, shells, flowers, etc.) up to small human artefacts (fragments of bottles, pens, pieces of clothing, etc.). The objects are usually brightly-coloured, preferably blue, like the male's plumage colour. Blue is also the colour of a special paint spread in different places of the bower (especially the entrance), that the bird obtains by chewing some berries, and distributed with a chip of wood held in his beak.

The placing of the objects seems not to be random:

> Every time the bird returns from one of his collecting forays, he studies the over-all colour effect. He seems to wonder how he could improve on it and at once sets out to do so. He

> picks up a flower in his beak, places it into the mosaic, and retreats to an optimum viewing distance. He behaves exactly like a painter critically reviewing his own canvas. He paints with flowers; that is the only way I can put it. A yellow orchid does not seem to him to be in the right place. He moves it slightly to the left and puts it between some blue flowers. With his head on one side he then contemplates the general effect once more, and seems satisfied. (Frisch 1974: 243–244)

Importantly, none of the decorative objects have structural importance to the whole construction: the presence of decorations is thus "unnecessary".

After finishing his job, the male stands awaiting the female, who, if attracted by the pergola, heads towards him. While she "evaluates" the construction, the male welcomes the female by holding a symbolic object in his beak (usually, a flower, a leaf or a berry) and by performing a courtship dance.

Personhood

Legal status generally assigned to individuals who are acknowledged as possessing rights and duties under a country's Constitution. During various historical periods (but predominantly in the twentieth and twenty-first centuries), several philosophers, ethologists and animal rights activists (as individuals or organized in specific groups/projects) have claimed the status of personhood for non-human animals, particularly Great Apes, cetaceans and elephants, considered the closest **>species** to human being, in terms of intelligence, emotional life, **>sociality** and morality. In more than one case, the status was granted, most recently in 2008, when the Spanish Parliament's environmental committee approved the resolutions proposed by the Great Ape Project, an organization founded by philosophers Paola Cavalieri and Peter **Singer**.

Pfungst, Oskar

See **Clever Hans Effect**

Phatic

One of the six **>Functions of communication** postulated by Roman Jakobson (1963). A message is phatic when its focus is the **>channel**.

Phenomenology

See **Animal ontology**

Phyletic Homology

See **Analogies-Homologies**

Pictorial Signs

Pictorial signs are one of the four "prefigurements of art" emphasised in Thomas **>Sebeok**'s *The Play of Musement*, (1981: 210–259), along with **>architectural signs**, **>musical signs**, and **>kinaesthetic signs**. Since the 1950s, the study of pictorial skills among non-human animals has gone hand in hand with **>interspecific communication experiments**, both types of research often performed by the same scholars on the same subjects. It is thus predictable that most attention was paid to chimpanzees, the species most commonly used in these experimental programs. Compared to other forms of animal art, pictorial signs are mostly studied in captivity. Among the few situations *also* studied in nature, is the research on visual aesthetic preferences in animals, which, if not a pictorial context *tout court*, constitute at least a premise to visual arts (Sebeok 1981: 233).

There are nine categories of perception that seem to provoke aesthetic pleasure in animals, particularly in primates:

1. Saturated colours (preferred to unsaturated ones);
2. Primary colours (preferred to mixed ones);
3. Brilliant colours (preferred to non-brilliant ones);
4. Rhythmical repetition of equal components (probably because it facilitates comprehension and produces "pleasure of recurrence");
5. Bilateral and radial symmetry;
6. Steady curves, like circles, spirals, wave-lines, and so on (preferred to irregular curves);
7. Conspicuous lines or shapes (preferred to indistinct ones);
8. A certain balance between the left and right halves of a picture (preferred to an unbalanced arrangement);
9. The same colours or conspicuously different colours (preferred to nearly equal colours), when two objects of different colour have to be combined.

As for the mere pictorial activity, researchers have put into evidence some interesting cases, mostly within Great Apes, noticing that (a) apes seem to display a *wish* to draw, and not only to *play* with paper and pencils; (b) apes are not conditioned or forced to draw: drawing seems to be their own choice. Comparative psychologist Paul Schiller, who worked with several chimpanzees during the 1950s, pointed out that the chimpanzee Alpha would not use a pencil as part of a game, but would use it only for what it is made for, that is, to write (Schiller 1951: 110).

Particular attention was given to the self-rewarding elements involved in pictorial activity. Scholars tried to show that (a) drawing in chimpanzees has a clear aesthetic component; and (b) that the experiments were not affected by the **>clever Hans effect**: "In all cases the animals received no assistance or guidance from the experimenters, except for the provision of and [. . .] the familiarisation with the drawing or painting equipment. Attempts to influence the kind of picture produced by provoking imitative responses were always most unsuccessful" (Morris, 1963: 141).

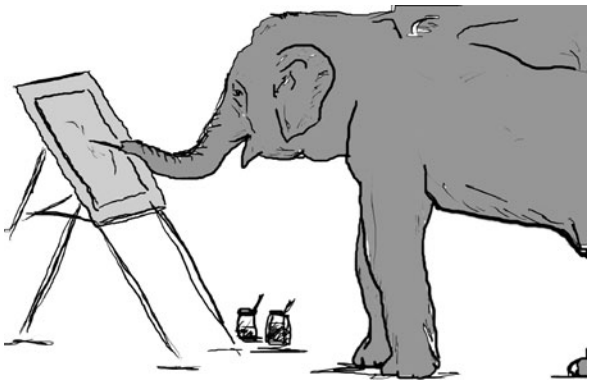


Fig. 4.5 Painting elephants, an increasing (and, most of the times, unethical) attraction in zoos

Desmond >**Morris** (1963: 144) considered the self-rewarding element as the focal point of his theories on chimpanzees' art ("Actions that are usually referred to as play, curiosity, self-expression, investigation, and so forth, come into this category of self-rewarding activities"). Morris systematically analyzed chimpanzees' drawings, emphasizing the constants emerged by comparing the drawings available and the respective processes of realization. This led him to postulate the existence of six basic >**principles of picture-making**: Self-rewarding activation, Compositional control, Calligraphic differentiation, Thematic variation, Optimum heterogeneity, Universal imagery.

Interesting studies were also made on elephants (whose artistic skills – too often evinced through unethical, invasive methods – are nowadays a circus-like attraction in several zoos – see Fig. 4.5). Masson and McCarthy (1996: 311–315) report a few examples from captivity contexts, the best-known being that of the female Indian elephant Siri. Her pictorial abilities went totally unnoticed until 1980, when a new keeper, named David Gucwa, was employed to look after her. Gucwa noticed that Siri would trace signs on the sand, using sharp-shaped stones as pencils, and then seemingly pointing the final product with her proboscis. The keeper thought of providing Siri with a pencil and some big sheets of paper that he would hold steady. The result was a long series of abstract drawings (reportedly praised by artist William de Kooning), for which the elephant received no reward. Once the news spread out, other zookeepers showed no surprise, claiming to have often seen their own elephants drawing the same way.

Plato

(ca. 427–347 b.c.) Greek philosopher and mathematician, one of the most important figures in Western thought. Plato's contribution to topics keen to >**zoosemiotics** departs from his reflections on Nature and reality. Plato does not speak of reality as

it is, but rather as it should be: his main speculations (the Demiurge above all) aim, generally speaking, at the constitution of a better world, founded on intelligence and not on chance. This concept fits perfectly with Nature and its constitutive elements: it is a human duty to refine the natural order, "collaborating" with the Demiurge in order for Beauty to prevail on *Kaos*.

Plato believes that life began as happy, without any such concepts like property, hunting, war and other types of violence. He describes this original life as a time when human beings and other animals established relations and conversations of mostly philosophical matter, exchanging information on each other's knowledge. The work wherein Plato mostly reflects upon non-human animals is the *Timaeus*, i.e. – most probably – the most metaphysical (if not occasionally delirious) of his writings, an off-the-limits attempt to mathematize reality at all costs. According to Plato, each body is provided with a soul, plants included, although the latter are much more limited than other beings (Lee 1965: 105).

The soul is strictly related to the body: the former determines the appearance of the latter, in form of expressions of guilt or merit. Indeed, human and non-human beings were born with faults to be punished for. To be male or female, to belong to a species instead of another, are all exact consequences of such faults or merits. Particularly, almost all non-human animals were in the past human beings that wasted their life in some way.

The animal world has two dimensions. One is the *divine*: animals are not divine, but they anyway "tend" towards the Divine, the Light, the Perfection and the Good. The other dimension is that of *ipseity* (i.e. reflected on the animal itself): this is an obscure, imperfect and fallacious dimension. All living beings have this double face, and their Light depends on how close they are to the Divine. The maximum distance from Divine implies the presence of just a single weak fragment of light.

A peculiar attempt to explain the origin of animals follows, in which – among other things – it is suggested that human beings were constantly remodelled into other organisms in relation to their qualities and actions in their previous life (e.g., innocent light-minded men became birds, pedestrian animals derived from rude, non-philosophical, people, and so forth).

Play

"Playing" is commonly defined as a set of behavioural patterns that non-seriously imitate otherwise serious patterns and situations. Animals tend to play when primary needs are already attended to, and therefore energy can be expended for other purposes than utilitarian ones. Juvenile specimens tend to be the most interested in this category of activity, which probably supports the hypothesis that the two basic functions of this behavior are amusement and the learning of rules of social behaviour.

Playing is one of those situations that require a **>contextual code**, i.e., signs that are specific for that context and not used in others (unless re-articulated in different forms, as in **>ritualization** processes). The communicative patterns employed

– that can be visual, chemical, acoustic and tactile (**>Channels**) – can be either innate or learned, and in most cases are metasemiotic (since they have the dual purpose of pointing out the unserious intention of the sender, and referring to the serious pattern they are imitating), and symbolic (since they have no physical resemblance to the object represented, and they were shaped in consequence of a code agreement).

Play can be distinguished between *autotelic* (when the rewarding element of the activity is the activity itself) and *simulative* (when imitative patterns appear); between *individual* and *social*; and between *kinetic* (when the players do not use any object) and *instrumental* (when the players do). Social play can also be divided into **>intraspecific** (the most obvious case) and – the not rare – **>interspecific**.

A thorough analysis of the issue appears in Chapter 2, Section 2.4.2.

Poetic

One of the six **Functions of communication** postulated by Roman Jakobson (1963). A message is poetic when its focus is the message itself.

Porphyry of Tyre (234–circa 305)

Neoplatonic philosopher born in Tyre (nowadays Lebanon). He is one of the most important forerunners of animal rights philosophy, supported with rational arguments that are also interesting for **>zoosemiotics**. *On abstinence from animal food* (*Perì Apokhês Empsykhon*, in English also known as *On abstinence from killing animals*) is a passionate ethical defence of non-human animals. Although firmly opposed to Christianity (he also wrote a pamphlet named *Katà Khristianon, Against the Christians*, survived in fragments only), Porphyry was an attentive reader of the Bible and other Christian texts, and knew Hebrew language. Even Augustine, who perfectly knew Porphyry's aversion to Christianity, could not help defining him as an "eminent philosopher".

Already in the *Katà Khristianon*, written in 268, Porphyry attacks Paul of Tarsus on the issue of meat-eating. In the First Letter to Corinths, Paul had stated that humans should eat "everything the butcher sells" without feeling guilty, for God owns every living being, and every living being is at human disposal. After the *Katà Khristianon,* Porphyry wrote the *Perì Apokhês Empsykhon,* a neo-platonic and neo-pythagoric treatise on animal life, vegetarianism, justice and peace. Borrowing from Plotinus, Porphyry maintains that we are all intellectual entities tied to the sensible because of two forces: our incapacity to remain endlessly bound to the intelligible, and a gravitational force towards the "lower world". The most efficient ways to "go back" in the realm of intelligible are justice and vegetarianism. Porphyry fears the destruction of truth and justice, but – unlike **>Plato** – does not speculate only abstractly on the issue: he wants *lógoi* and *érga*, knowledge and action.

His idea of vegetarianism implies a radical change, which goes in contrast with the customs of the *polis*, the ritual slaughtering and sacrifices of religion. Like Plato and Pythagoras, Porphyry considers violence on animals as an "appetizer" for war.

The first instruments used for killing non-human animals are exactly the same used in the first conflicts among humans. Hunting and war are inevitably bound, both metaphors of fraud and falsity, both result of an original violation: not really eating the "apple", but eating meat (Taylor 1823: 126).

Among the arguments used by Porphyry to fight the "enemies" of animals, at least three fall under the domain of **>ethological zoosemiotics**:

1) Animals do think and communicate. In contrast to the stoics and peripatetics, Porphyry maintains that we can find the *logos*, the discourse, among non-human animals, and that this discourse can also reach perfection.
2) Animals also have the "inner discourse": the general organization of their organism is similar to the human one, e.g. they suffer the same pathologies. Animals are not less sensible than humans. To maintain that a different physical constitution corresponds to the absence of reason and sensibility, is like saying that gods are not sensible either, because their physical constitution is also different from the human one. The difference between humans and other animals is (in a proto-darwinian fashion) a matter of more/less, rather than presence/absence (Taylor 1823: 114).
3) Animals are intelligent and rational. Porphyry mentions the great amount of information collected by ancient philosophers on the topic. To be able to take care of one's own interests is a first important sign of intelligence ("each animal knows where it is weak and where it is strong, and it protects the former and makes use of the latter, as the leopard uses its teeth, the horse its hooves and the bull its horns, the cock its spur and the scorpion its sting"). Ratio, to Porphyry, does not originate from learning, nor from memory, and that applies to all beings, including gods. The sole fact that we cannot see the world through their own senses and figure out their own way of reasoning, is not a good excuse to state that ratio is missing. Moreover, non-human animals understand our **>language** to many extents, and perceive the diverse signs.
4) Both humans and non-humans are part of the same ethical system. Both search for and have a sense of justice ("Who does not know how animals that live in groups observe justice towards each other?"), both are victims of cruelty and fights. Violence is, in both cases, a sign of starving and desperation. Moreover, they are reciprocally necessary, and that is when humans break the balance: in exploiting and killing other animals that are not necessary to their surviving, human beings show off a superiority that reveals their evil nature. This unnecessary violence can be avoided, and the first important step, concludes Porphyry, is vegetarianism (Taylor 1823: 65).

Portmann, Adolf (1897–1982)

Swiss zoologist. Professor of zoology in Basel University, Portmann was a specialist in marine biology and comparative morphology of vertebrates. He is a figure of some importance in the zoosemiotic context because of his interdisciplinary and philosophical approach to animals studies (he would often promote/label his works

as "Philosophical zoology"), and for often dealing with topics of clear zoosemiotic interest, such as camouflage (>**Mimicry**) (a.o., 1959), >**sociality** (a.o., 1961), and physical appearance (a.o., 1952). Particularly in the latter topic (and in the entire field of morphology), Portmann proposed his most innovative theories, postulating a continuity between the animal's external appearance and its inner status, in open contrast with physiology and genetics.

Pragmatics

In Charles >**Morris**' original formulation (1937: 64), pragmatics is that branch of semiotics that investigates the relation between signs and sign users, dealing with "the origin, uses, and effects of signs within the behavior in which they occur". A pragmatic investigation, thus, deals with the biological aspects of sign functioning, including the processes and the determinants of propagation of the signs: "Zoopragmatics may be said to deal with the origin of signs in the source, or sender, the propagation of signs through a medium, or channel, and the effect of signs on the destination, or receiver" (>**Sebeok** 1990: 43).

Principles of Picture-Making

While studying drawing and painting activities in captive chimpanzees (>**Pictorial signs**), Desmond >**Morris** (1963) noted that the various drawings presented a number of characteristics in common, and seemed to obey to a limited number of general rules (related to motivation, activation, structure of the elaborate, etc.). Such rules, which he called **principles of picture-making**, were altogether six:

1. *Self-rewarding activation*. In order to start drawing, there is – in chimpanzees as in humans – a sort of input, an intrinsic motivation that does not derive from any primary need. It is the prospect of drawing itself that encourages and rewards the subject (Morris 1963: 158–159)
2. *Compositional control*. To Morris, all that is concerned with filling spaces, respecting boundaries, creating balances within the drawing, whether they are rhythmical, chromatic or something else, is part of compositional control. In other words, drawing constitutes a game of rules, that the subject decides to play by creating, and then respecting, an articulated geography of spaces, shapes and colours (Morris 1963: 161).
3. *Calligraphic differentiation*. Style and pictorial skills are not fixed, but rather follow a gradual and constant evolution (Morris 1963: 162).
4. *Thematic variation*. There are several phases in the approach to drawing, which can be interestingly classified. Firstly, the chimpanzee experiences a phase of exploration of the sheet, usually tracing apparently random signs, as if he wanted to achieve familiarity with the sheet (in sports jargon, that would be called warming-up). At some point, a certain graphical pattern (e.g., a roundish figure)

attracts the artist's attention, and s/he starts repeating it over and over, with apparent enjoyment. Little by little, the circular pattern evinces small variations, which constantly increase, until the roundish figure is totally replaced by new patterns. Such a rule may not be simply individual, but, rather, may follow particular inclinations within a community (Morris 1963: 164).

5. *Optimum heterogeneity*. Like the previous principle, this one basically answers a cognitive question: is there a concept of "the artwork is over" in chimpanzees? In other words, when the artist stops drawing, is it because s/he is bored, hungry, etc., or because s/he really means to stop at that point? Optimum heterogeneity is the name given to this ideal sensation that the work is finished. A possible interpretation is that the artist has a certain subject in mind and, consequently, s/he is portraying something specific. Although in most cases chimpanzees' drawings look like an abstract form of expression, in few cases, especially when s/he is able to interact linguistically, the chimpanzee may provide scholars with rather accurate indications, if not actual titles, about his/her own work.
6. *Universal imagery*. Some elements in (not only visual) art imagery are possibly universal. Not necessarily complete and complex figures, but simple graphical patterns may be drawn by different subjects, without any possibility of reciprocal influence. A typical case is the so-called "fan pattern", which emerged in a significant percentage of the drawings analyzed. According to Morris, there are three factors determining the preference for certain patterns:

   – *Muscular factor*. Some movements of the arm are more pleasant and easy-to-perform than are others, thus more recurrent.
   – *Optical factor*. Some forms and proportions are more "acceptable" by the visual apparatus than are others, thus one tends to prefer them.
   – *Psychological factor*. Each individual is equipped with a visual imagery, made of partly cultural and partly universal elements. In growing up, one may occasionally avoid obeying muscular and optical constraints, while the recurrence of certain archetypes does not seem to be abandoned.

Prodi, Giorgio (1928–1987)

Italian oncologist, writer and intellectual. He pioneered **>biosemiotics** by being the first one to label the study of biological codes under the name "Nature Semiotics". He then proposed a number of reflections that went hand in hand with **>Sebeok**'s development of the field and with Jakob von **>Uexküll**'s theory of Umwelt.

Prodi is also discussed in Chapter 1, Section 1.1.4.

Proprioceptive

>Semiosis is proprioceptive when sender and receiver of a text are the same subject, that is, when the animal is sending messages for its own use and benefit. A typical

case of proprioceptive semiosis is the **>echolocation**, by means of which animals like bats, cetaceans and some birds can receive information about the surrounding environment.

It has also been suggested that all forms of semiosis are in a way proprioceptive, in that there is always a degree of self-semiosis (interpretation, signification, etc.) in an organism that interacts with the environment. In this Companion, however, in order not to generalize (thus, perhaps, banalize) the concept, a choice has been made to stick to the original, narrower, definition.

Proprioceptive semiosis is also discussed in Chapter 2, Section 2.1.

Pure Zoosemiotics

The portion of zoosemiotic research that pertains to the elaboration and establishment of theoretical models of zoosemiosis.

Referential

One of the six **>Functions of communication** postulated by Roman Jakobson (1963). A message is referential when its focus is the **>context**.

Regan, Tom (1938)

American philosopher. Professor emeritus of philosophy at North Carolina State University until his retirement in 2001. Along with Peter **>Singer**, he must be considered the most important contemporary animal rights philosopher, particularly after Regan 1983, which gave him international notoriety. Unlike Singer, who roots his philosophy in the tradition of utilitarianism, In The Case for Animal Rights, Regan argues that non-human animals bear moral rights, Regan's philosophy refers primarily to **>Kant**'s heritage, although Regan specifically disagrees with Kant's assumption that respect is due only to "rational", therefore human, beings: an inherent value, and therefore legal rights, Regan argues, are ascribed also to infants and mentally impaired subjects. Regan's main point, indeed, is that "life", and the care that each subject has for it, not "rationality", is the key-word for the attribution of an inherent value to a subject. Each individual is a "subject-of-a-life". Such value includes the right to be treated with respect and not to be harmed.

Like Singer and others, Regan's importance for **>zoosemiotics** lies first and foremost in his contribution to animal **>ethics**, a subject whose inclusion in the zoosemiotic paradigm is suggested in this companion (seeChapter 5). However, exactly like his colleagues, his crucial role in animal liberation philosophy also has a bearing on the general methodology of animal studies (see Chapter 3 of this companion).

Representation

In general semiotics, Representation is the process through which a message is presented or depicted in some way. For the purposes of this companion (within

the framework of a tripartite definition of **>semiosis**, as discussed in Chapter 1, Section 1.1), this property of representation comes to designate the virtual independence of sign processes from an actual receiver of the message. Representation occurs independently from a specifically identifiable destination: animals codify sense *whether or not* this sense will reach a specific addressee (which can be only virtual, or ideal, or may also not exist in the first place). In representation, therefore, the meaning is produced first and foremost by the sender of the message.

Rhetoric

See **Biorhetorics**

Ritualized Fight

See **Ritualization**

Ritualization

A crucial notion for both ethological and zoosemiotic interpretations of animal behavior. In **>ethology**, ritualization is the process of alteration of a behavioral pattern, in terms of intensity, recurrence, articulation and dynamics, in a way that increases and/or varies its effectiveness as a sign to other specimens. In **>zoosemiotics**, with reference to the traditional notion of **>semiotic threshold** (Eco 1976), ritualization scan be defined as the transition from a non-semiotic to a semiotic behavioral pattern. This may occur in both incidental circumstances that become intentional through selection, or in the use of a specific pattern (part of a more general one), originally non-communicative (e.g., simply physiological) for communicative functions (normally functioning as a synecdoche for the general pattern, **>Biorhetorics**). An example is the transformation of aggressive patterns into "warnings" (a "modern" dog grinds his/her teeth not for fighting, but to ritually warn his/her opponent: before dogs learned this rhetoric use of the sign, the act of grinding was a simple physiological "accompaniment" to the actual aggression, and therefore had no semiotic function above the threshold), or of functional patterns into socializing, **>phatic** signs (e.g., social grooming).

>Eibl-Eibelsfeldt 1970 (100–1) discusses ritualization as a process that produces the following changes:

1) Function. After ritualization, a pattern previously serving a certain function in the animal **>ethogram** comes to serve another one.
2) Motivation. The ritualized pattern can emancipate from its original motivation, and be now animated by a different one.
3) Redundance and exaggeration. Ritualized signs are generally more redundant and exaggerated than non-ritualized ones.
4) Threshold values. The ritualized pattern is generally more easily released than the non-ritualized one.
5) Postures. In the ritualization process, several bodily movements tend to be framed into still or quasi-still postures (exactly as in the case of the dog grinding his/her teeth, who "freezes" his/her aggression into a simple warning)

6) Orientation. Elements in space orientation may be changed during the ritualization process.
7) Intensity. The intensity (and its variations) of a sign may become more stereotyped (and therefore more constant) in a ritualized display.
8) Complexity. A ritualized sign reduces the element of complexity of the non-ritualized sign it refers to.
9) Body structure. Selection may favour variations in the body structure for the ritualized processes (typically, through the addition of ornamental elements in an animal's body).

In its modern, ethological configuration, the notion first appeared in Huxley 1923. In this companion, the concept is briefly discussed in the context of **>zoosemiotic universals** (Chapter 2, Section 2.3.2).

Rorarius, Hieronymus (1485–1556)

Italian philosopher and *Apostolic nuncio* at the court of Ferdinand of Hungary. In a rather peculiar pamphlet called *Quod animalia bruta saepe ratione utantur melius homine* (1548), he maintained that animals make better use of reason than humans do. The book, which failed to have any remarkable impact in his times, was rediscovered and republished in 1648 by the French intellectual Gabriel Naudé, in the particularly propitious period of heated debates around **>Descartes**' mechanism, and since then several reprints of the book were published. In the 1728 reprint (for the German publisher Weigand), editor Giorgio Enrico Ribovio added an extensive "Dissertation historical-philosophical on animal soul", making Rorarius' essay almost a forerunner of the Enlightenment. Additional exposure was given by Pierre **>Bayle**, in his *Dictionnaire historique et critique*, where Rorarius' arguments are used as pretext to discuss the nature of the soul.

Rothenberg, David (1962)

American philosopher and musician, with a strong interest in **>zoomusicology** and **>interspecific >semiosis**. Currently Professor of philosophy and music at the New Jersey Institute of Technology. He studied several cases of interspecific music, focusing particularly on cetaceans (a.o., Rothenberg 2008) and birds (a.o., Rothenberg 2005). His approach combines philosophical and musicological elements, with a particular emphasis on the musician's point of view. He currently works on the relationship between evolution and beauty (**>aesthetics**).

Savage-Rumbaugh, SUE

See **Kanzi**

Sayers, William (1935)

Canadian historian and etymologist, currently working at Department of Comparative Literature and Graduate Program in Medieval Studies, Cornell University. Sayers writes on medieval western European language and literatures, in particular Old Norse, Old Irish, and Anglo-Norman French. A current interest is

English etymology, and lexicographical approaches to technical language and language in the popular register: in this context, he has discussed, for a special issue of *Sign System Studies* on **>zoosemiotics** (Sayers 2009), the issue of Anglo-Norman French and Middle English nomenclature for animal names and vocalizations. This is important also for the fact that issues of this kind are rarely tackled within an explicit zoosemiotic context, and in that sense it contributes significantly to the development of **>Anthropological zoosemiotics**.

Schopenauer, Arthur (1788–1861)

German philosopher. Primarily known for his Philosophy of the Will, Schopenauer found several applications of his thought to questions pertaining non-human animals, particularly **>ethics**. All animals, human and non-human, are to Schopenauer phenomenal manifestations of Will, and therefore embody vitality, strength, energy, and desire. Their inner experience is directly connected to their external essence and behavior: these elements make human beings and other animals indistinguishable from an ethical point of view: they all recognize themselves in each other, they all suffer. Notable works of zoosemiotic interest are *Über das Fundament der Moral* (1840, where an articulated criticism to Kant's conception of the human being as final goal also appears), and *Parerga und Paralipomena* (1851, where an extensive discussion on animal ethics appears in the first chapter).

Schopenauer was also a supporter of the Society for the Prevention of Cruelty to Animals, in London, and the Animals' Friends Society, in Philadelphia. As it is done in this Companion, Schopenhauer, too, maintained that the use of the pronoun "it" in reference to animals was inappropriate, in that it would reinforce their consideration in a cartesian sense.

Sebeok, Thomas Albert (1920–2001)

Hungarian-American semiotician. Quite simply, the most important figure in **>zoosemiotics**. His contribution to the field is incalculable, and it includes the following actions/innovations:

1) Giving birth to zoosemiotics, as a concept and as a term, in 1963;
2) Giving credibility to the field, by defining its theoretical foundations and by creating an important following among semioticians and non-semioticians;
3) Setting the zoosemiotic agenda, for nearly all of its main topics, either by discussing them extensively or by pioneering them and opening doors for other scholars;
4) Leading the field throughout nearly 40 years of its history, until his death; and finally
5) Producing an outstanding body of zoosemiotic literature, that remains in many cases the point of reference for a given topic.

Born in Budapest, and American citizen since 1944, Sebeok starts his carreer in semiotics at Chicago University, by studying linguistics and then anthropology with Charles >**Morris**, his first major influence. Along with Morris, Roman Jakobson, Heini >**Hediger** and Jakob von >**Uexküll** are decisive figures in the formation of Sebeok's "biological way of thinking". At the time of his PhD in Oriental Languages and Civilizations (1945), he joins Indiana University, in Bloomington, an institution to which he remains "faithful" for the rest of his life. During a period of study at the Stanford Center for Advanced Study in the Behavioral Sciences in 1960, Sebeok has the opportunity of deepening his knowledge on biological sciences (ethology and animal >**communication** in particular), which convinces him to seriously explore the potentials of a "biological way" to semiotics (an instance already advanced by >**Peirce**, but only at a philosophical level). The conditions for the birth of zoosemiotics are set, and few years later the chance is taken. For most of the 1960s and 1970s, Sebeok's efforts are directed towards the promotion and the development of zoosemiotics, first as an umbrella-term gathering different approaches on animal communication, then as a field on its own, with an autonomous paradigm and a focus on animal >**semiosis**. He provides from scratch, or adapts from other scholars, most systematics of the discipline, and proposes concrete research on a multitude of topics, including >**language,** >**interspecific semiosis**, >**cognition**, >**aesthetics**, human-animal relationship (>**Anthropological zoosemiotics**).

From the mid-1980s onwards, Sebeok developes a more global and philosophical approach to semiotics (see 2001a), and – after extending the discipline to the non-human world – he opens it up to the non-animal too, giving an institutional birth to >**biosemiotics**. He witnesses the end of the twentieth century ("Sebeok's century", as John >**Deely** once called it) as the most charismatic living figure in semiotics, after Umberto Eco. He passes away in 2001, leaving an impressive body of work and a very strong legacy, not only in zoosemiotics.

Self-awareness

The explicit acknowledgment of one's own existence as individual, that is, separated from other subjects, with an individual mental activity (including, possibly, the acknowledgment that other subjects possess self-awareness too). It may be considered a slightly **"**lower" degree of >**self-consciousness**, which additionally implies the development of a sense of identity. For practical reasons, but also because in several studies the two concepts are treated as synoniyms, in this Companion a discussion of the two notions is found in the entry "Self-consciousness".

Self-consciousness

The reflective mental activity thanks to which a subject becomes aware of him/herself and of his/her identity, and from which a process of investigation of the self may be activated. A long-debated issue in the whole history of thought, self-consciousness was a problem discussed by all the great thinkers of Western philosophy, including, a.o., Socrates, >**Plato**, >**Aristotle**, >**Aquinas**, >**Descartes**, >**Locke**, Spinoza and >**Kant**.

Although often anticipated, in a speculative sense, by some of the above-mentioned, and other, philosophers, the systematic study of self-consciousness non-human animals started with the seminal Gallup 1970 and the famous "Mirror Test". As it was already known that chimpanzees could use mirrors to inspect their own body, Gallup intended to empirically determine whether this form of awareness corresponded to a true recognition of their identity. Gallup would anesthetize chimpanzees that were already familiar with mirrors and, during their sleep, he would mark their heads with a colorful dye. Once awake, some of the marked apes would be put in front of the mirror, and, indeed, they would be observed touching their foreheads in correspondance of the mark, significantly more often than those who would not be allowed to the mirror. Gallup repeated the test with other apes, and also with some monkeys, however only Great Apes, and particularly orangutans, besides chimpanzees, showed remarkable results. More recently, other species that successfully "passed" the mirror test were bottlenose dolphins (Reiss and Marino 2001), elephants (Plotnik – DeWaal – Reiss 2006) and magpies (Prior – Schwarz – Güntürkün 2008).

Semantics

In Charles **>Morris**' original formulation (1937: 64), semantics is that branch of semiotics that investigates the relation between signs and signified objects, dealing with "the signification of signs in all modes of signifying". An investigation of the semantic type thus focuses on the meaning of a given message, or combination of messages. Zoosemantics "is devoted to the signification of signs, and must take account of the context referred to by the source and apprehensible by the destination; this is the least well understood dimension of animal communication studies" (**>Sebeok** 1990: 43).

Semiosis

In general semiotics, semiosis is any sign action or sign process, or, following Charles **>Morris**, the process in which something is a sign to some organism. In this companion (Chapter 1, Section 1.1), semiosis is defined as the primary focus of **>zoosemiotics** (here, indeed, defined as "the study of *semiosis* within and across animal species"). Such definition is also useful to avoid confusion between semiosis and **>communication** (which is a special, therefore smaller, case of semiosis). Constituting parts of semiosis are at least the following:

a) **>Signification**, occurring when the receiver is the only subject taking part in the semiosis, and a true sender is missing;
b) **>Representation**, occurring when the sender is the only semiosic subject; and
c) **>Communication**, occurring when sender and receiver take both part in the semiosic phenomenon, and therefore the above-mentioned "sense" (or text) is exchanged, understood or misunderstood.

Semiosphere

The globality of environments where sign processes operate and interact in each respective **>Umwelt**. Developed by Yuri Lotman in 1984 (for a thorough description, see Lotman 1990), the notion was widely succesful in nearly all fields of semiotics. In **>biosemiotics**, because of a basic assumption that semiosis and life overlap, it has been suggested (in different articulations and by different authors) that the concept of "semiosphere" in fact corresponds directly to that of **>biosphere**. For a review of these suggestions, see Kotov 2002.

Semiotic Threshold

A Multifaceted notion, originally formulated by Umberto Eco (e.g., 1976: 16–28) to separate research topics that fall under the domain of semiotics from topics that do not. To Eco, the boundary roughly corresponds to the difference between a direct action and an action mediated by signs. Most indexes (symptoms, physiological stimuli, physical information…) are below the threshold, while forms of interaction that imply the presence of codes and conventions, and require interpretation, are above. In subsequent, commonsensical, interpretations of the notion, the threshold came to separate natural sign systems from cultural/artificial ones, unintentional from intentional interactions (**>Intentionality**), or – in hardcore semiological formulations – non-human from human semiosis.

Since then, the idea itself of threshold has always been very charming and controversial within semiotic discussions, there have been many systematic attempts to redefine it, by establishing lower or higher boundaries. Among the formulations of interest for **>zoosemiotics**, worthy of mention are the biosemiotic idea of the threshold (based on the Peircean holistic view of semiotics, and therefore a practical negation of the concept altogether); John **>Deely**'s notion of the "Semiotic animal" (2005, where a threshold between "semiosic" and "semiotic" is based on **>distant space-time semiosis**); Susan Petrilli's concept of **>metasemiosis** (1998, metasemiosis itself being the line of separation between human and non-human semiosis); and, finally, **>Cimatti** 1998, which, instead of changing, accepts Eco's original formulation of the threshold as a phenomenon marked by interpretation and codes, and simply works in the direction of proving which part of non-human semiosis is characterized by those elements as well.

Signification

In general semiotics, Signification is the process by which signs and meanings are produced. For the purposes of this companion (within the framework of a tripartite definition of **>semiosis**, as discussed in Chapter 1, Section 1.1), this main property of signification comes to designate the virtual independence of sign processes from an actual sender of the message. Signification occurs independently from a specifically identifiable source: animals make sense out of each other and out of their environment *whether or not* this sense is explicitly codified and conveyed. The act of producing meaning, therefore, is first and foremost performed by the receiver of the message.

Significational/Representational Anthrozoosemiotics

See **Anthropological zoosemiotics**

Singer, Peter (1946)

Australian philosopher, currently Professor of Bioethics at Princeton University. Together with Tom Regan, the most important figure in animal rights philosophy. Similarly to Regan himself and to **>Bentham**, who he follows to some extent, Singer's work is not directly relevant in terms of pure **>zoosemiotics** (not, of course, unless one includes the reflections proposed in the Chapter 5 to this Companion), yet his impact and influence in animal ethics is so poignant that he cannot be ignored by any animal-related fields of inquiry.

Singer's groundbreaking work is *Animal Liberation* (1975), arguably the founding paradigm of the modern animal rights movement. As a utilitarianist philosopher, Singer is not fully comfortable with the idea itself of "rights", which he prefers to replace with the notion of "interest": the interest of non-human animals must be taken into consideration because of their ability to suffer and feel pain. The "greatest good of the greatest number" – argues Singer – is the only valuable parameter for measuring ethics: in that sense, there is no argument in principle not to apply this line of reasoning to non-human animals.

Singer, together with Richard Ryder (author in the same year of the book *Victims of Science*) is also responsible for the coinage and popularization of the term (and concept of) **>speciesism**, and – together with Paola Cavalieri – founded the Great Ape Project, promoting, among other things, the ethical and juridical status of **>personhood** in Great Apes.

Singing

See **Zoomusicology**

Smith, William John

American ethologist, with a specific interest in animal **>communication**. Currently affiliated to University of Pennsylvania, Smith developed a personal ethological paradigm that makes his research very zoosemiotic-friendly, particularly in relation to his interest in structure-function and message-meaning relations and distinctions in animal signs (in a way rather similar to Peter **>Marler**). In general, Smith's position in defining communication is critical towards the ordinary understanding of the concept: "preconceived categories of behavior must be questioned continuously and modified or replaced as necessary, and a considerable range of events must be studied" (Smith 1991: 214). In his most important book so far (1977), Smith argues that animal communication should be classified according to seven features:

1) Distinctive displays within sign repertoires (which for Smith, vary from 15 to 45);
2) Subsequent division of such displays into specific messages;
3) The critical role of context in the meaning articulation of each message;
4) Message-meaning association within the following 12 contexts: identification, probability, general set, locomotion, attack, escape, non-agonistic subset, association, bond-limited subset, play, copulation, frustration;
5) Relation between messages and current events;
6) Relation between displays and social interaction;
7) Role of the motivation and the emotional state within communication.

Controversial in many respects, Smith's theories are anyway pretty close to **>zoosemiotics**, particularly in the great prominence given to choice and interpretation in the receiver's role.

Sociality

"The basic assumption of **>zoosemiotics** is that, in the last analysis, all animals are social beings, each species with a characteristic set of communication problems to solve." (Sebeok 1963: 465) This sole quotation should be enough to give the notion of sociality the role of quasi-synonym to **>semiosis**. Sociality, not to be confused with socialization (which is a concrete action), is the condition or quality of being social (tendency to intersubjective interaction and association, to form groups, to establish social roles, to mentally represent other entities, etc.). Sociality is at the basis of nearly all processes and activities related to animal semiosis, up to the point of becoming indistinguishable from the latter. The two phenomena, in particular, are in a mutual causal relation, that allows reciprocal increase of specialization and complexity. Semiosis, for instance, may increase the level of an animal's sociality, by taking a **>cognitive** role and therefore producing and exchanging more complex forms of behavior (conveyed through an increasingly sophisticated information level). Such exchange is possible when the subjects involved are able to create **>mental represention**s of the environment and recognize the entities within it (including other subjects). This process, itself a result of the semiosis-sociality alliance, is in turn possible thanks to another effect of this combination: the sharing of a similar form of mental categorization (i.e., a **>code**).

Sociobiology

A relatively recent branch of **>ethology**, sociobiology studies the structure and the dynamics of social behavior in animals within a strictly Darwinian framework (for instance, emphasizing the evolutionary advantages produced by a given pattern). Sociobiology, in other words, is the name given to an ethologist's inquiry whose focus implies the interaction between two or more animals, with the essential difference that, unlike ethology, which mostly investigates the mechanisms that maintain social systems, sociobiology concentrates on the ultimate factors that determine social behavior. Methodologically, it largely relies on notions like **>Tinbergen**'s **>Four questions**.

The main goal, as an evolutionary science, is that of proving that social behavior is also the result of natural selection, even in those cases (like aggression) where it seems clear that context and stimuli play a prominent role. For this reason, particularly when it comes to its application to human behavior, sociobiology has been the subject of several controversies.

Wilson 1975 is generally regarded as the landmark in the development of the field, although it must be reminded that proto-sociobiological approaches to animal behavior had existed since the end of nineteenth century already (e.g., in Kropotkin 1902), while the term itself "sociobiology" was allegedly circulating since the 1940s in biological and psychological environments.

Species

Technically, a species is the last taxonomic rank before the "individual" (with the exception of those cases where a "subspecies" is identified). Theoretically, it is one of the most controversial notions. As nearly all cases in taxonomy, the concept of "species" has to face the basic problem of being a digital/discreet category designated to represent an analogical/blurring body of entities. There is no point, in space or in time, in which, say, a nightingale is *neatly* and *unmistakably* a *Luscinia luscinia* and not a *Luscinia megarhynchos*. The sole fact that the boundaries across species are constantly (a) redifined, (b) updated and (c) contested confirms the high level of problematicness of the topic. (for a practical illustration, the reader may check the taxonomic "histories" of species that are particularly complicated to classify, as those of the genus Haplochromis. In this case, no less than currently-acknowledged 41 genera, for a total of 354 species, all part of the Haplochromini tribe, were at some point considered a single genus "Haplochromis", before researchers would find significantly distinctive features across them). Not to mention the presence of the so-called "ring species", that is, species that interbreed with closely related groups creating constant hybridizations (as in the case of the genus *Larus*).

Since Linnaeus' first (and, partly, still valid) attempts to systematize taxonomic classifications of living organisms, the definition and conceptualization of "species" has undergone several revisions and discussions (including a number of comments by **>Darwin** himself) until the publication of Mayr 1942, which – although far from *unifying* the diverse theoretical approaches to taxonomy – established a dominant paradigm, and a general agreement in defining species as "groups of actually or potentially interbreeding natural populations, which are reproductively isolated from other such groups" (Mayr 1942: 120). However, already at this stage, several contradictions appear (e.g., how about those species who reproduce asexually? What about the many cases of hybridization? What about the "ring species" phenomenon?), and in general it became soon clear that the notion is unclassifiable under the Aristotelian logic of the "necessary and sufficient features" (as in the notion of "triangle", where three corners are *all* and *only* needed), but rather falls in that group of problematic semantic fields (like Wittgenstein's

example of "Game") not definable in absolute and instead requiring a contextual categorization.

In that sense a species can at least be defined in terms of the following types:

(1) *Typological*, when they display fairly fixed properties (in the Linnaenian sense);
(2) *Morphological*, when indeed a specific separation is possible on the basis of morphological characteristics.
(3) *Biological*, an all those cases when Mayr's definition is applicable.
(4) *Reproductive*, when the reproduction generate offspring that is in turn fertile.
(5) *Recognition-based*, when it is based on shared reproductive systems (possibly, in the semiotic sense, too).
(6) *Mate-recognition-based*, when a group of organisms appear able to recognize each other as potential mates (again, this definition is interpretable in a rather direct semiotic sense).
(7) *Evolutionary*, when a group of organisms shares an ancestor, therefore maintaining a lineage's integrity and distinctiveness.
(8) *Ecological*, when a group of organisms adapt to (and create) a particular niche.
(9) *Genetic*, when it is based on similarity of DNA.

The same uncertainty in definitions and boundaries occurs when strictly semiotic problems are at stake. The identification of such semiosic categories like **>intraspecific**, **>interspecific** and others, is subject to identical controversies. In this companion, a choice was made to maintain the use of "species" as basic terminological point of reference, but it must be clear that such choice is more a commonsensical and solomonic strategy, rather than a theoretical stand. When possible, the term has been replaced with words like "community" or "group".

Speciesism

Expression coined in 1975 by Richard Ryder and Peter **>Singer** (in two different works) in order "to describe the widespread discrimination that is practised by man against other species ... Speciesism and racism both overlook or underestimate the similarities between the discriminator and those discriminated against". As such, it has both an ethical and methodological impact on animal-related studies, and it is closely related to the notion of **>anthropocentrism**.

Speciesism is further discussed in Chapter 1, Section 1.2.3.

Species-Specific

Any form of **semiosis** that occurs typically and exclusively in one **>species**, up to the point of tyipifying it, in a certain respect (as in the case of **>bee dance** for the *Apis mellifera*). The term should not to be confused with **>intraspecific semiosis**, which occurs *within*, but not exclusively in, one species.

Symbiosis

Umbrella-term that describes various phenomena, like mutualism, commensalism, amensalism, or parasitism, which share the common denominator of two dissimilar organisms sharing a number of complementary and reciprocally useful interests. The concept is particularly interesting for **>zoosemiotics**, as it implies the establishment of an **>interspecific >code** between two species that may be biologically very different (like in the case of "cleaning symbiosis" between so-called cleaning and client organisms). The interaction between these two species implies at least semiosic formulations that linguistically correspond to "I'm not an enemy", "I want to do something useful for you", and "this is what I am about to do". And, indeed, as all semiotic actions, symbiosis has its fair share of cheaters as well (as those cleaning organisms that, instead of eating their client's ectoparasites, feed mainly on its tissues.

Symbol

In Charles S. **>Peirce**'s theory of signs, a Symbol is a sign that relates to the object by means of convention, habit or social rules. A symbolic sign is thus an arbitrary representation of the object, of which – in principle – it may bear no whatsoever resemblance (although many are the cases where such resemblance can be traced at some point of the history or the articulation of the sign, a typical case being onomatopoeias).

A great deal of skepticism, within the semiotic environment, surrounds the notion of symbolic **>semiosis**, as applied to non-human animals. As a matter of fact, this seems to be one of the points of disagreement between (some) semioticians and ethologists. While the latter, especially those belonging to the latest generations, offer an increasing body of evidence (empirical and/or theoretical) in favor of this application, most semioticians base their own definition of humanity, in the semiotic sense, upon the label of "symbolic animal" (**>Symbol**). Such skepticism applies both to the alleged capacity of non-human animals to use symbols belonging to a species-specific human **>language**, and to the possibility that forms of symbolic semiosis occur spontaneously *within* the natural interactions of a given species.

However, even excluding the ever-increasing variety of examples provided by ethologists, and focusing exclusively on instances of purely semiotic interest, it becomes rather adventurous to classify certain instances of zoosemiosis as something else than symbolic. The condition, quite simply, is to take Peirce's definition of "symbol" literally, without – perhaps unnecessarily – narrowing the concept. And, despite the fact that Peirce himself essayed to define the term on dozens of occasions, it is always extremely clear that the necessary requirement for a symbol to be recognized is no more and no less than the existance of a convention, and its main characteristic is arbitrariness. A sign which bears no resemblances or physical connections with an object, and yet represents it, via a more or less explicit

agreement between two or more subjects, *must be* considered a symbol, not least because it cannot be considered either as an icon or an index.

Once that has been accepted (and not so many semioticians seem to be eager to do it), the instances of symbolic semiosis in non human animals suddenly become abundant in number and variety. Part of the **>bee-dance** sign repertoire is arbitrary and conventional (see also Sebeok 1990: 43, for a specific interpretation in this respect), so are many social rituals in different species, including mating and/or **>aesthetic** ones (the process itself of **>ritualization** of a pattern implies the transformation of the specific function of that pattern into a symbolic one). Symbolic is the nature itself of a **>dialect**, instances of which are found in numerous species. In Chapter 2, Section 2.2.2, a specific discussion on these examples is offered.

To this, one shall also add the several experimental contexts in which non human animals were taught to understand, use and re-elaborate symbols created in human language. The cases of **>Washoe**, **>Koko**, **>Kanzi**, **>Chantek** and other great apes reveal encouraging success in that direction.

Syntactics

In Charles **>Morris**' original formulation (1937: 64), syntactics is that branch of semiotics that investigates the relation between signs and other signs, dealing with "the ways in which signs are combined". A syntactic investigation concerns thus the sign repertoires of living systems in themselves, their structure, their spatial-temporal features, the way they form meaningful combinations. In **>Sebeok**'s words, zoosyntactics "deals with combinations of signs abstracted from their specific signification or their ecological setting" (Sebeok 1990: 43).

Syntax

In general, the term refers to the principles (or study of them) that regulate the structure of a sentence structure in a natural or artificial **>language**. It is generally considered a distinctive trait of human language, although a number of ethological studies have provided evidence of the existence of both *Phonological Syntax* (a combination of sounds that, taken alone, do not necessarily have a specific meaning), and *Lexical Syntax* (a combination of sounds that are also meaningful as single units) in non-human animals (Robinson 1984, Mitani-Marler 1989, Arnold-Zuberbühler 2006). This issue is further developed in Chapter 2, Section 2.2.2.

In his theory on **>zoosemiotic universals**, Felice Cimatti (1998: 179–190) formulates the hypothesis that a syntactic attitude (which he calls "Syntax of perception") exists in principle in animal minds. Animals perceive the environment as gestalts, through a figure-background scheme. In the data available, animals pay attention mainly to those that are pertinent to their experience and **>Umwelt**. (more details in Chapter 2, Section 2.3.2.

Tactile Channel

In this glossary, the umbrella term "Tactile Channel" is used to identify all the sensory modes that pertain to a physical contact, that is the **>thermic**, the **>electric** and indeed the **>tactile**. The messages transmitted through these channels all occur by direct body contact or by vibrations produced in the close vicinity of the receiver. Of the three, the human animal possesses the tactile, and – possibly – the thermic channel (in the sense that a certain degree of information is conveyed also through body temperature).

The main advantage of this channel is variability in time and intensity. The main disadvantage is the total absence of distance transmission (as physical contact between sender and receiver is compulsory). One may think of human bodily contact as an example: the degree of variability is extremely high, and people can communicate a whole set of messages through a simple touch (caresses, slaps, scratchings, contacts of sexual type, etc.). At the same time, unless sender and receiver are at touching distance, no message can be transmitted. The case of thermic communication, widely documented in ecosystem, is still not empirically studied among animals (although it appears obvious that bodily temperature is a carrier of many different messages), while for the electric one, there are several examples among fish families, like the *Mormyridae*, the *Gymnotidae*, and, famously, the *Torpedinidae*. Through the electric signals, besides predatory purposes, these fishes can exchange a very high variety of messages, including detection of objects, social status, conflicts, courtship and others. Species like the Atlantic torpedo, *Torpedo nobiliana*, which is the biggest Torpedo still in circulation (it can reach up to 90 kg of weight), is capable of delivering a 220v electric shock.

Taylor, Hollis (1951)

Australian-American musicologist, with a strong interest on **>zoomusicology** and **>interspecific >semiosis**. In her PhD at University of Western Sydney, Taylor specialized in the singing activity of the Australian Pied Butcherbird *Cracticus nigrogularis*. She developed a template that combines biology, **>ethological zoosemiotics**, avian neuroscience and current state-of-the-art sonographic analysis with a wide range of both historic and novel musicological techniques. A paradigmatic aspect of her research is the assumption (and application) of a musician's point of view in analyzing her case-studies.

Tembrock, Günther (1918)

German ethologist. Professor at Humboldt University in Berlin, he there founded the first German research facility for **>ethology**, in 1948 (in times when the field was still known as *Animal Psychology*), and the European largest Animal Sound Archive (*Tierstimmenarchiv*) in 1951 (the archive currently consists of some 120,000 recordings). His contribution to ethology is enormous, and his interests

intimately keen to **>zoosemiotics**, most notably in the study of acoustic **>communication**. In this area of inquiry, Tembrock provided an extensive body of research, including theoretical and methodological innovations. The term and concept of **>Biocommunication**, developed in semiotics by Günther **>Witzany**, was already postulated in Tembrock 1971, while his promotion of the field of **>Bioacoustics** is also notable).

Although not a semiotician, Tembrock has always been sympathetic with the zoosemiotic program, regularly contributing to semiotic publications with an explicit semiotic approach (as in Tembrock 1993).

Terrace, Herbert

See **Nim Chimpsky**

Thermal Channel

See **Tactile Channel**.

Thermic Channel

See **Tactile Channel**.

Theophrastus (ca. 370–287 b.c.)

Greek philosopher. A follower of **>Aristotle**'s, Theophrastus shared with the great stagirite the poliedric interest for many fields of inquiry, including biology and **>ethics**, which make him a relevant figure for **>zoosemiotics** as well. He wrote extensively about human-animal biological continuity, human rationality (as opposed to non-human animal irrationality), and the ethical implication of physical cruelty on non-human animals. The vast majority of his works, surviving only in fragmentary form, or completely lost, are reported by Diogenes Laërtius' *Lives and Opinions of Eminent Philosophers*.

Things

See **Things-Objects**

Things-Objects

Notion introduced by John **>Deely** (e.g., in 2001) postulating that any organism establishes two types of relation with the environment: one independently and one dependently of the (sensorial, semiotic, etc.) experience:

> [. . .] experience, for any organism, does not simply consist of anything that is 'there' prior to and independently of the experience, but only of 'what is there' within and dependently

> upon the experience. So that however many or few relations within the experience may also obtain independently of the experience, these relationships have meaning only insofar as and as they are incorporated with that larger network of relations, which constitutes perception in contrast to (while inclusive of) sensation, upon whose pattern the appearance of objects as such depends. And this larger network involves relations which would not obtain but for the biological constitution of the perceiving organism acting as interpretant even of what is given in sensation along with, indeed, within, the perception of objects as objects (Deely 2001: 128–9)

A "thing" is thus a "notion of what is what it is regardless of whether it be known or not" (Deely 2001: 129), while an "object" requires "a relation to a knower, in and through which relation the object as apprehended exists as terminus" (Deely 2001: 129).

The implications of this distinction are that an object *may* or *may not* be a thing, and a thing *may* or *may not* be an object, but as Deely points our this is hardly playing with words:

> [. . .] to say that a thing may or may not be an object is merely to say that any given element in the order of what exists independently of finite knowledge ('things') may or may not be known, whereas the inverse saying that an object may or may not be a thing is to say that what is not known is not an object, or, equivalently, to say that whatever is known is an object. And since whatever exists as an object does so only within that network of relations (what Sebeok characterized as 'a semiotic web' and Uexküll called an 'Umwelt') indifferently from nature and from mind (yet according to a mixture or pattern wherein those relations within and by cognition itself tend to predominate in the presenting of an object as this or that), we see at once that 'what an Umwelt is' amounts to a species-specific objective world, with elements of the physical environment made part of a larger, 'meaningful' whole or 'lifeworld' wherein the individual members of a given species live and move and have their being as members of that species rather than some other. (Deely 2001: 129)

The notion of things and objects is closely connected to that of **>Umwelt**, as it takes into account the connection between objective and subjective environment in an organism's **>semiosis**.

Tinbergen, Nikolas (1907–1988)

Dutch ethologist and ornithologist, and Nobel Prize winner in 1973 together with Karl von **>Frisch** and Konrad **>Lorenz**. One of the most important figures in modern **>ethology**, Tinbergen's interest covered a wide range of topics of interest for **>zoosemiotics**, including studies on the notion of **>instinct** (a.o., 1951) and social behavior (**>Sociality**) (a.o., 1953 and 1974). His contribution extends to the very foundations of methodology in ethological sciences, often influencing other fields of inquiry like **>sociobiology** and **>social sciences**, as in the well-known case of the so-called **>Four Questions** (Tinbergen 1963)

Tools

The use of tools in an animal **>species** is usually defined as the capacity of using material elements from the environment, in order to reach an otherwise unattainable

goal. Such a definition includes both goals that could *not* be reached altogether, and goals that could be reached only *partially* (smaller in quantity, shorter in distance, etc.): in that case the tool acts as an *upgrade/extension* of the body. In Beck 1980, a seminal study on the subject, it is suggested that a tool, in order to be defined so, has to be an object clearly detached from the body of its user: it may be animated or not, and it may be a *product* of the user's body or not, but it cannot be a *part* of its body. In Parker-Gibson 1977 there is an important distinction between actual and *proto*-tools, the latter consisting in those instances where tool and goal coincide (as in the case of those birds, like the vulture *Neophron percnopterus*, crashing a nut against a rock). Tools, for Parker and Gibson, can also be context-specific and intelligent. Intelligent tool-use involved trial-and-error processes and "accomodation to the specific situation and exploring and manipulating physical causality in a generalized manner" (Parker-Gibson 1977: 628).

Baber (2003: 21–24) suggests that the relevant parameters in tool-use are species, object, function and activity. Insects, birds and mammals are the tool-makers and users most witnessed and studied. Apart from the Egyptian vulture discussed above, recurrent examples of tool-usage include:

1) the weaver ants *Oecophylla smaragdina*, "sewing" leaves with a type of silk secreted by a gland (see, a.o., Hölldober–Wilson 1990);
2) the Galapagos finches *Cactospiza pallida*, inspecting trees' cavities with twigs and cactus spines (see, a.o., Tebbich 2002);
3) the sea otters *Enhydra lutris*, who notoriously dive to the bottom of the sea to collect a mollusk and a rock, then, swimming on their backs, place the rock on their abdomens and repeatedly hit the mollusk against it in order to break open the shell (see, a.o., VanBlaricom 2001). Otters often keep the same stone throughout their entire life, placing it inside their armpit for later use;
4) the digger wasps *Ammophila*, using fragments of stones and twigs in order to secure the entrance of the cavities where their eggs are laid (see, a.o., Brockmann 1985, although the first observations date back as early as 1892, thanks to Samuel W. Williston).

However, it is certainly within the family of Primates (not only great apes, but also such species as the widely-documented capuchin monkeys *Cebus apella*), that scholars found the most impressive examples of tool-making and use, both in natural (a.o., **>Goodall** 1964 and 1986, Beck 1980, and Visalberghi 1993) and captive (a.o., Tomasello-Call 1997) contexts.

Within **>zoosemiotics**, it was **>Sebeok** (1981: 239–49) who devoted particular attention to this phenomenon, classifying tool-use as part of the group of **>Architectural signs**. Numerous examples of fabrication and use of tools are provided there, according to different degrees of (humanly perceived) complexity: (a) the body itself (or a part of it) as a utensil; (b) ready-made, nature-provided tools; and (c) *ad hoc*-fabricated tools. In this case, thus, the body itself *is* classified as tool. Sebeok also wonders whether tool-use may be ascribed an aesthetic quality (> Aesthetics), besides the obvious functional/practical one (Sebeok 1981:

245–6). Examples of an aesthetic use of tools are not rare, mostly within what Juhani Pallasmaa (1995: 55) calls the "communicative function" of architecture, and particularly within the courting-related strategies.

In Chapter 2, Section 2.4 and in the entry **>Pergolate**, the behavior of the male Satin Bowerbird is extensively reviewed, but there are more instances, like the case of the males of the fly *Hilara sartor*. The courting ritual is performed by several of them around one single female. Each male carries a sort of big balloon produced by an anal secretion, apparently serving the purposes of a "gift" (see, a.o., Kessel 1955). The pattern probably developed from a more "useful" one (**>Ritualization**), which is still displayed by some species related to the *Hilara sartor*: gifting the female with an actual prey (i.e., food, and not a pleonastic anal secretion). In a way, it is like presenting candies instead of flowers.

Certain species of spiders, too, display "food-offering" patterns. The remarkable novelty, in this case, is that they package their gifts. The prey, already killed, is packaged with silk then offered to the female (Akimushkin 1988: 108–9).

Tool-Making

See **Tools**

Tool-Use

See **Tools**

Training

The procedure of teaching one or more animals specific responses to specific stimuli, generally by using the methodologies of **>behaviorism**, based on reinforcement and/or punishment. Training is generally practiced in contexts like companionship, entertainment, labour and others.

Training is one of the key-concepts in Communicational **>Anthropological zoosemiotics**, and has been theorized by several semioticians or quasi-semioticians, including Gregory **>Bateson** (a.o., 1972), Thomas **>Sebeok** (a.o., 1990) and – most notably – Heini **>Hediger** (a.o., 1968). According to the latter (1968: 120), there are two types of training: (a) apprentissage, i.e. laboratory training; (b) dressage, or circus-like training. The difference consists basically in the typology of relation established between trainer and trainee: almost non-existent in the first case, quite intensified in the second. Sebeok reinforced the concept by emphasizing that "the two procedures are distinguishable in at least two respects: the semiotic character of the sign which initiates the requisite action (unmarked vs. marked), and the degree of emotional intensity coupling the interactants (minimal vs. maximal)" (Sebeok 1990: 45). The question is discussed at length in Chapter 3, Section 3.2.1.

In Bateson 1972, a particular accent is put on the relation between training and the animal's intelligence, particularly on how the former is (erroneously, for

Bateson) used as a criterion for testing the latter. This aspect is dealt with in Chapter 3, Section 3.3.5.

Trans-Specific

Form of **>semiosis** that occur in different **>species**, not to be confused with **>inter-specific** semiosis, which occurs *between* different species. Trans-specific is a sign, a **>code**, or else, that appears *independently*, but in the same, homologous (**> homology**), configuration in more than one species, but that does not *necessarily* serve the purpose of establishing an interaction between these species.

Trophallaxis

The practice of exchanging liquid food by means of regurgitation within the members of a community of social insects, or between these and the so-called *guests*. The exchange may occur mouth-to-mouth (oral trophallaxis) or anus-to-mouth (anal trophallaxis). It serves an important communicative function of enhancing a group's cohesion, and in that sense it qualifies as a form of **>phatic >semiosis**.

Turovski, Aleksei (1946)

Parasitologist, zoologist and zoosemiotician at Tallinn Zoo, Estonia, Aleksei Turovski is one of the leading figures in today's **>zoosemiotics**, with a strong emphasis on empirical and field-work. A specialist in **>comfort** behavior, Turovski has published several articles where the topic is given an openly semiotic interpretation (like 2000 – where he also comments on the figure of Heini **>Hediger**; 2001 and 2002). He is also very committed in popularizing zoological topics, especially through Radio programs, an effort for which he was granted the *Guardian of Estonian Life Science* prize in 2007.

Uexküll, Jakob Johann Von (1864–1944)

German-Estonian biologist, possibly the most decisive figure in **>zoosemiotics** after **>Sebeok**. Although not a semiotician (the closest he ever got to it was being in contact with Ernst **>Cassirer**), Uexküll and his work have been promptly revisited as major influences for the establishment of both **>biosemiotics** and zoosemiotics, mostly after publications by his son Thure and Thomas Sebeok (both extensively analyzing his work from a semiotic perspective). He himself was defined as a cryptosemiotician, i.e., a semiotician who was not aware of being such. Leaving aside the dubious validity of such labels, it is undeniable that Uexküll's impact on semiotics has possibly been bigger (and in general, on human sciences) than on biology itself, although he was certainly credited by ethologists as an important influence:

> Great influence was exerted upon the development of ethology by J.v.Uexküll (1921), who conducted experiments to investigate the interrelations between organisms and their

> environment. He showed that an animal can perceive only a limited part of its potential environment with its sense organs. Some of these perceived characteristics of the environment serve as specific cues. According to Uexüll only those objects serve as cues which are of siginificance in the life of an animalm, thereby becoming the bearers of meaning for the subject. [. . .] K.Lorenz was the first to appreciate the full significance of these discoveries. (Eibl-Eibesfeldt 1970: 6, 7)

However instrumental the role of Uexküll's in the development of **>ethology**, that still is little compared to the huge debt owed to him by any biosemiotician or zoosemiotician. Other illustrous scholars who acknowledged Uexküll's influence on their work were Martin Heidegger, Gilles Deleuze and Maurice Merleau-Ponty.

Most of Uexküll's fame revolves around the revolutionary notion of **>Umwelt**, which is here discussed at length in a specific entry and in Chapter, Section 1.1.4. Recently, however, another portion of his work became part of a biosemiotic project of anti-darwinian revisionism:

> [. . .] the redeployment operation had to face the fact that Uexküll's philosophy of life was, to put it lightly, somewhat dated. He was not only a staunch anti-Darwinist, but also a feeble evolutionist (verging on creationism), had strong sympathies for Hans Driesch's vitalism, and often resorted to musical metaphors to explain the perfection of the living world (Barbieri 2006: 104–5).

For more on this issue, see the entry Karl Ernst von **>Baer.**

Umwelt

One of the most important notions within **>zoosemiotics**, "Umwelt" means in German "Environment", but in Jakob von **>Uexküll**'s formulation came to designate a much more complex notion, usually referred to as "subjective universe" (Sharov 2001: 211), or also "semiotic world of organisms" (Kull 1998: 304). The starting assumption is that the environment inhabited by an organism is not merely the actual environmental niche, but is a larger not purely physical **"**environment", of which the niche is just a part, that is perceivable and meaningful in its entirety only from the perspective of that particular organism. Uexküll (1982: 29–30) exemplifies this concept by describing the completely different meanings that a flower may have to a young girl (an element of decoration), an ant (a path for reaching food), a cicada-larva (construction material), and a cow (fodder). In John **>Deely**'s words, the same *thing* becomes four different *objects* (**>Things-Objects**).

An Umwelt is the result of a *Merkwelt*, i.e., the specific perceptive field of a given organism, and a *Wirkwelt*, i.e., the field of actual interaction between the organism and the environment (the latter being also the organism itself, as the example of **>proprioceptive semiosis** paradigmatically explains. Perceptual and operational elements come to establish the specific Umwelt of the given organism, which is exclusive for each **>species**, in particular, but also – broadening the concept – for each community, individual, class, family and so forth. The Merkwelt and the Wirkwelt are constantly in action, as the organism (also called a "structure", or a

"receiver of meaning") affects and is affected by the environment (the "counter-structure", or "carrier of meaning"). In that sense, the process is described as an "Umwelt circle".

Probably because of its original meaning in the German language, but also because of the complexity of the concept, the Uexküllian "Umwelt" has often been confused with concepts like "environmental niche", "habitat", or, indeed, "environment". It is evident, though, that Umwelt does not propose a tangible category, but rather an array of subjective and perceptive elements:

> We see then how different and richer is the concept of Umwelt than the subalternate concept of 'environmental niche'. The concept of environmental niche simply identifies that part of the environment as physical upon which a given biological form mainly depends in deriving the physical aspects of its sustenance. The concept of Umwelt, by contrast, shows us how a given 'environmental niche' is merely the physical part of a larger, objective, not purely physical whole which is, as it were, fully comprehensible only from the perspective of the particular lifeform whose world it is, whose 'environment' is meaningful in the specific way that it is thanks only to an irreducible combination of relations many of which have no being apart from the lifeworld and all of which contribute to the contrast between the physical environment as neutral or common respecting all organisms, on the one hand, and parts of that same physical environment interpreted and incorporated within a meaningful sphere of existence shared by all the members of a species, on the other hand. Only things which are objects make up part of these species-specific worlds, but within these worlds are many objects which also are not things apart from the worlds. (Deely 2001: 129–130)

As already mentioned, the Umwelt theory is crucial for the whole paradigm of zoosemiotics, but in fact it is a central concept in the entire biosemiotic area. For this reason, there is a very rich literature on the subject, and different theoretical applications, including the above-mentioned Kull 1998, Sharov 2001, Deely 2001, but also Kull-Torop 2003, Martinelli 2006e, Turovski 2002, Uexküll (Thure von) 1987, and others.

The concept of Umwelt is further discussed in Chapter 1, Section 1.1.4.

Vilkka, Leena (1964)

Finnish philosopher. Currently associate professor of philosophy at the University of Helsinki and Hyvinkää city council member, she is one of the leading European animal right philosophers. Similarly to Tom >**Regan** and Peter >**Singer**, her theories are of remarkable relevance for >**zoosemiotics** mostly when it comes to general ethical and methodological discussion. Of particular interest is Vilkka's 1997 definition of >**biocentrism** that is adopted in this companion, and in other semiotic uses of the concept (e.g., Martinelli 2006a).

Visual Channel

The sensory mode (>**channels**) connected with the production, emission and reception of visual signs. From a >**cognitive** point of view, it perhaps represents the

main perceptive vehicle for the human **>species**, even though it is hardly the best-specialized. Visual signs can be divided into extrinsic and intrinsic. An extrinsic sign is produced in the organism's environment (tracks, nests, traces, etc.), while an intrinsic sign is part of the organism's body or behavior (orientation towards the receiver, body shape, colour, movement patterns, etc.). Several forms of animal nonverbal **>communication** are to be considered intrinsic. The main advantages of visual **>semiosis** are the specialized orientation in space, and the great (virtually endless) quantity of information that may be conveyed. The biggest limitation is the need for light (which, contrary to common belief, is a handicap also for nocturnal species, whose perceptive qualities are anyway limited in comparison with daylight conditions).

Washoe (1965–2007)

Named after the Washoe County, Nevada, when she was first raised, Washoe was a female chimpanzee of the species *Pan troglodytes*, and the main subject of one of the oldest **>interspecific communication experiments**, started in 1967, and performed in different sites and US countries. The program was designed and initially carried out by Allen and Beatrice Gardner, then taken over by their former student and current project leader Roger **>Fouts**. Over the years, the project accumulated more chimpanzees, until a whole colony was formed, that allows the program to continue, in spite of Washoe's death at age 42.

The Washoe-project was a true watershed between the past and the present of interspecific communication experiments. It was the first one to be generally acknowledged as a success, it set several methodological indications eventually followed in other programs, and it inaugurated a series of experiments based on linguistic sign systems alternative to speech. Washoe was trained with an *ad hoc* version of the **>American Sign Language** (ASL). The Gardners wanted to prove that (1) chimpanzees are able to learn a human **>language**, and (2) real **>interspecific >communication** between humans and other animals is possible. The **>training** was organized so that Washoe could imitate her trainers' gestures, and – at the same time – through direct manipulation of her arms. The training environment was set in a cosy, relaxing, non-laboratory-like atmosphere, an aspect which the Gardners and later Fouts considered very important in order for Washoe to be trained properly (Gardner-Gardner 1969: 666)

The first signs taught were the *passepartout* "more" and "come here", the latter being not only a request for a trainer to approach her, but also for objects and – associated with other signs – for certain actions (e.g., "come here tickle"). After the initial training stage, Washoe showed increasing curiosity in learning signs. Some were very close to the natural **>intraspecific** gestures by which a chimpanzee interacts with his/her fellows. The sign for "come here", for instance, was homologous (**>analogies/homologies**) to the "grooming" sign. Instead of considering that a problem, the Gardners encouraged such mixtures, in order to facilitate Washoe's

work, claiming that the same process occurs in human language, when abstract signifiers often carry characteristics of the signifieds (as in onomatopoeic words). Plus, their resemblance to nature sounds do not make these words *less words* than – say – "wardrobe", or "acknowledgment".

The results of the project were remarkable: Washoe spontaneously used the signs, even to name things, rather than just making requests (differently from usual reports by semioticians, who often maintain that all these animals were capable of doing was requesting food), then started to associate the ASL signifiers to more complex meanings – for instance, the words *flower* or *car* were used not only for real flowers and real cars, but also for pictures portraying those items (Gardner-Gardner 1969: 667). Signs were no longer strictly related to the context in which they had first been produced: the sign "open" was used not only for doors, but also for refrigerators, windows, taps: Washoe had turned those signs into *cognitive entities* (Gardner-Gardner 1969: 670). Furthermore, Washoe learned that signs had purely abstract meanings, and were not necessarily connected with perceptive resemblances: in the beginning the sign for "flower" represented all smelling objects, and started to designate a flower only when Washoe was taught the sign "perfume".

Later, Washoe showed interest in adjectives, and compiled metaphoric object-attribute relations (e.g., the term **"**dirty" acquired a moral connotation: Washoe would use the expression "Roger dirty" every time she wanted to insult her trainer for not having granted one of her requests). In formulating sentences of the object-attribute or object-action type, Washoe had her personal rule on how to establish syntactic orders: with no exception, the perceptively most relevant or most dynamic entities were signed for first. So, it was "Roger good" and not "Good Roger"; "Bottle red" and not "Red bottle"; "Look there" and not "There look", etc. This "gestaltic" process appears in most interspecific communication experiments with other animals, and seems to reflect a basic *perceptive* syntax.

Washoe was also given ASL-trained company (including equally-talented chimpanzees like Moja, Tatu and Ally, who used ASL quite regularly in **>intraspecific** communication, as well – possibly suggesting that the intraspecific use of ASL was meant more like a game for the chimps, or like a rehearsal of the idiom that is necessary in order to communicate with the humans), and was also allowed to form a family, with natural and adopted offspring. Her adopted infant, Loulis, by Fouts' deliberate decision, was not taught ASL in the first 5 years of his life, but nonetheless acquired more than 70 signs by watching the other chimps (reflecting the manner in which human children acquire language). Later in time, Washoe taught ASL to her natural infant Sequoyah by her own initiative.

Along with **>Koko**, **>Kanzi** and **>Chantek**, Washoe acquired over the years a wide popularity, almost becoming the "speaking ape" by definition. In 1981, the no-profit organization "Friends of Washoe" was founded in order to promote the welfare of chimpanzees. At the time of her death, thousands of condolence messages were sent to the website of the organization (www.friendsofwashoe.org), prompting the opening of a specific tribute page (www.friendsofwashoe.org/washoe). Washoe's

story is also described in several programs and "popularizing science" literature, most notably the very informative Fouts 1999.

Wenner, Adrian (1928)

American biologist. Wenner is very well known, besides his scientific merits, for raising a long-lasting controversy around Karl von **>Frisch**'s theory on **>bee dance**, by maintaining that bees actually locate foods exclusively through the **>olfactory channel**. Officially the "loser" in the challenge (in 1973 von Frisch was awarded a Nobel Prize, and Wenner withdrew from bee research), Wenner recently had some compensation in the findings of a study conducted in 2005 by the Rothamsted Research (consisting in bees-tracking with radars), which confirmed that odor is *also* a guide for the bees.

Besides this episode, Wenner has been active also in the specific zoosemiotic department, by contributing to one of the classics in the field (Sebeok-Ramsay 1969) with an important overview of animal **>communication** studies. Wenner 1969 is, first and foremost, a plea against superficial discussion on this complex topic, and a warning about the many risks related. It reminds scholars (as this companion also does in Chapter 1, Section 1.2.3) that the expression "animal communication" itself is in principle superficial, as any discussion on communication should always focus on *that* specific organism engaging in *that* specific type of communication, instead of using an expression that put in the same cauldron flies and chimpanzees, alarm calls and play-bows.

Wenner thus proposes a classification of communication typologies that, among other things, include an intra-individual, inter-individual and animate-environmental level of signalling, and specific elements/parameters such as the variability of the signals, the redundancy within/between signals, the ontogenetic development and role of learning, and others.

Witzany, Günther (1953)

Austrian philosopher and semiotician. Mostly focusing on **>biosemiotics**, Witzany's work is often of specific zoosemiotic interest, particularly for his investigation on Coral **>communication** (Witzany 2007: 85–118), and for elaborating the concept of *Mitwelt*, in relation to "all rule-governed sign-mediated interactions of organisms" (Witzany 2007: 207). He is responsible for a systematic theorization and application of the concept of **>Biocommunication** in semiotic contexts (Witzany 2007).

Zooanthropology

See **Anthrozoology** and **Marchesini**, Roberto.

Zoocentrism

See **Biocentrism**

Zoomorphism

According to Webster's Dictionary, Zoomorphism stands for: (1) the transformation of men into beasts; (2) the quality of representing or using animal forms; as, zoomorphism in ornament; (3) the representation of God, or of gods, in the form, or with the attributes, of the lower animals. In biological sciences, zoomorphism, similarly to **>anthropomorphism** (to which it is strictly related) is regarded suspiciously by scholars, and normally labelled as a methodological bias. The dictionary of **>ethology**, edited by one of the most authoritative Italian ethologists, Prof. Danilo Mainardi, defines the concept in the following way:

> Zoomorphism is an attitude that is less spontaneous, more intellectual, and opposed to anthropomorphism. It consists of considering the human being as an animal like all others, giving more emphasis to the characteristics it shares with other species, and very little emphasis, if any, on human species-specific features. A well-known example of zoomorphism is Desmond Morris's The Naked Ape, a best-selling essay in which our species is described without any stress on its capacity to produce and transmit culture. (translated from Mainardi 1992: 48).

Unlike anthropomorphism, zoomorphism is thus not considered a spontaneous, but a culturally-shaped phenomenon, which implicitly admits that the instinctive human interpretation of the surrounding environment is centripetal rather than centrifugal. Curiously, the primary difference between humans and animals indicated by Mainardi is the presence of **>culture** in the former. It is a curious line of argumentation because it was Mainardi himself who promoted the existence of culture in non-human animals, dedicating a whole essay to the issue (see Mainardi 1975). In addition, in the dictionary of ethology itself, the concept of culture is illustrated as something that is in fact present in most animals: "The capacity to produce and transmit culture is present in some insect, in some fish, in few reptiles, and in numerous birds and mammals" (translated from Mainardi 1992: 227).

As anthropomorphism, *in primis*, but also zoomorphism, are perceived by the scientific community as serious mistakes, unable to provide ethological knowledge with any useful contribution, most zoosemiotic theses are highly problematic, since, depending on the situation, they can be accused of being affected by either the former or the latter attitude. To assert the existence of, say, **>language** in honey bees indeed can be (a) anthropomorphic, when one considers language as an exclusively human characteristic; and (b) zoomorphic, when one interprets such assertion as an attempt to reduce language to a sub-human level. All in all, however, zoomorphism is considered a less "dangerous" attitude than anthropomorphism (at least, a less practiced one), but still a serious "disease" in scientific research. A statement like "human beings are animals" is certainly true and indisputable, but for whatever reason some of its implications are not acceptable to most researchers (**>Animal**).

The risk, it is claimed, is to simplify, or reduce all that natural evolution has granted to humans and made them different and, most of all, "unique" in the animal kingdom.

In actual fact, following the theses defended in this companion, the concept itself of "zoomorphism" seems rather unnecessary, as based on a *petitio principii*, that – more than anything – reveals yet another manifestation of qualitative binary **>anthropocentrism**. That is, it puts human species into an autonomous and independent niche, while all other animals have to share the same big pot. What seems inaccurate here is that a self-styled evolutionary approach (as ethology, and other animal sciences, at this historical point, generally pursue) should not forget the basic assumption of natural evolution, i.e., the gradual, layered organization of living species and, most of all, the commonalities between humans and other animals. Secondly, and more specifically for the semiotic context, one should not forget the implications of the **>Umwelt** theory. A dog offering a dirty and disgusting (to humans) bone to his/her owner, is said to act zoomorphically. However, the point is that the dog is not acting zoomorphically, but rather "cinomorphically"; i.e., s/he observes and evaluates the world through the eyes of a dog, not of a generic animal. Not only would a *Homo sapiens* not know what to do with a bone, but neither would a lizard, an ant, a cow, or a jellyfish. At the same time, there is possibly nothing wrong in dealing with humans as animals, as long as observations concern the human animal. However exaggerated, the question of anthropomorphism at least makes sense, but a word like zoomorphism should probably not even exist: can anyone accuse an animal (including the human one) of looking/behaving like an animal? And if so, which animal are we talking about? Which **>species**? Apparently, there is quite a difference between an ant and a cow. To legitimate zoomorphism is then, possibly, the real mistake, i.e., to admit one's own approximate, binary, and anthropocentric interpretation of the world.

Zoomusicology

Branch of both musicology and semiotics that studies the "aesthetic use of sound communication among animals" (Martinelli 2002: 7), or – in other words – what **>Sebeok** had called "Musical signs" (1981: 210–259). Its area of investigation includes all those sound manifestations that zoologists and ethologists, partly as metaphor, and partly for suggesting a homological correspondance, have described with musical terminology (songs, duets, antiphonal singing, etc.) The idea of zoomusicology, in the modern sense of the term, originated with composer and musicologist François B. Mâche (1992), although the idea itself of animal music dates back to the dawn of human thought (it is already mentioned by the likes of Democritus and **>Aristotle**). Similarly to **>zoosemiotics** with **>semiosis**, zoomusicology approaches "non-human animals" from the direction of human sciences, and music from the direction of biological sciences. Its basic innovation is the assertion that music is not an exclusively human phenomenon, but rather a zoologically-based one. Hence, to adopt the zoomusicological paradigm

means to question present definitions of music, starting from its anthropocentric connotations.

The use of the expression "sound communication" in Martinelli 2002 explicitly takes zoomusicology into the domain of semiotic analyses of the musical phenomenon. Musicologists for a long time (and to some extent still) have refused to consider music as an exteroceptive phenomenon, regarding it purely and exclusively as an aesthetic expression 'closed in' on itself. Referring to music as "communication" removes that *closure* and brings back musical processes into the territory they always occupied before the more recent "art for art's sake" interpretations.

In classifying its analytical domain, zoomusicology adopts the same basic and well formulated tripartition proposed by ethnomusicology (the closest field to zoomusicology, mostly for the common fate of having to deal with musical *otherness*, and with western- or anthropocentric definitions of music):

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 sounds covered, recurrent intervals, timbres, scales, and so on. Mâche 1992 proposes exactly this typology of research;
2) *Processes*. Acts and behavioral patterns related to the structures, in the fields of emission and reception. This is the realm of the para-musical, and it includes the whole cultural dimension of making music, with its rituals (like the almost inseparable relation between musical and **>kinaesthetic signs**), social rules and so on. In zoomusicology, this level constitutes the best-known part of the research, with many of its aspects having already been investigated by ethology. The same type of analysis is also found in Sebeok 1981;
3) *Experience*. This is the level that musicologists like Gino Stefani (1998), François Delalande (1991), and Philip Tagg (1987) have proposed in their discussions about musical universals. Since musical experience may be considered a general experience that takes place between a subject and an object (musical event), they advanced the idea that a universal feature in each experience is the restatement of particular conducts and competences. This view is used for zoomusicological purposes with similar presuppositions. If the first level (structures) was that of the objective, and the second (processes) of the cultural, the investigation of music as an experience lived by an individual is surely the level of subjectivity, although it is clear that many of these experiences follow general rules.

Zoomusicology is an increasingly adopted paradigm, and, by now, an established branch of musicology (with publications, seminars and other events – see Fig. 4.6). Contaminations between zoomusicology and zoosemiotics, besides Martinelli, appear also in the works of musicologists/musicians like Hollis **>Taylor**, Emily Doolittle and David **>Rothenberg**.

Fig. 4.6 Nightingales were the subject of the first international symposium in zoomusicology (in Jäärvenpää, Finland, 2008)

Zoosemiotic Canon

During a biosemiotic seminar in 2004, in Estonia (see Martinelli 2006a: 276–288, for a lengthier account), the issue of the anti-semioticness of the **>Morgan's Canon** was raised, and a proposition of its exact contrary (i.e., "in no case should actions or behaviors be interpreted as the result of an inferior psychic faculty, when it is possible to interpret them as a result of a superior faculty") was named by biosemiotician Kalevi **>Kull** *Martinelli's Canon*. The objective of that notion was to formulate the main semiotic contradictions (and therefore incompatibility) of Morgan's Canon. For obvious reasons of conflict of interests, in this Companion the notion was renamed "Zoosemiotic canon" (a much more detailed discussion is available in Chapter 3, Section 3.3.5):

1. In talking about the **"**possibility" of interpreting animal behavior in a given way, Morgan does not seem to make clear a distinction between analogous and homologous behavioral patterns (**>Analogies-Homologies**): does the animal *seem*, or is it *really* behaving in a given way?
2. Also, the concept of **"**superior" and **"**inferior" psychic faculty is not made clear, but it hints a reference to a greater or lesser similarity to the human psychic faculties. In that sense, it results in a biased case of **>anthropocentrism**.
3. Morgan seems to promote simplicity by **"**chaining" observation in such a way that it gives the least possible disturbance. In that sense, the risk of "banalizing" the interpretation is greater than the risk of making it unnecessarily complicated.

4. Further important remarks on the inefficiency of Morgan's Canon are discussed in the entry **>Critical Anthropomorphism**.

In the light these points, a fair formulation of an alternative semiotic-inclined canon (as Martinelli's Canon was formulated in Martinelli 2006a: 286–8) should take into account at least the following:

1) Unlike Morgan's, a zoosemiotic canon (ZC) shall *approach the problem of inferior and superior psychic faculties in terms of abductive* (**>Abduction**)*, not rhetorical, possibility*.
2) A ZC shall *aim at economic and ergonomic research*.
3) A ZC shall *reject the criteria for establishing differences between psychic faculties in the way Morgan's Canon does*.
4) As a semiotic-centred formulation, a ZC shall *treat any behavioral phenomenon as complex and multi-layered and rejects reductive one-sided interpretations*.
5) A ZC shall *fully support the notion of* critical anthropomorphism*, and therefore rejects reductive hypotheses also on an ethical basis*.
6) On a more strictly scientific level, a ZC shall *promote methodological empathy and*, more generally, *support a more balanced and less radical use of* **>anthropomorphism**.

Zoosemiotic Universals

Behavioral patterns, of semiotic type, shared across different animal species. The expression is borrowed from ethnological studies, where the characteristics common to every or most human communities are called "universals", or "universalia". The search for universals is methodologically based on the principles of continuity **>mind-body** and on the criterion of homology (**>Analogies-Homologies**) between non-human and human **>cognition**.

The universals indicated in this companion include interdisciplinary proposals from Cimatti 1998 (**>Sociality**, Arbitrariness of categorizations, **>Mind**, Principle of complexity, **>Ritualization**, Self- and Hetero-perception, **>Syntax** of perception); San Martin and Pintos 2001 (the phenomenological theses on **>Animal Ontology**); and Partan and Marler 1999 (**>Multimodality**).

The issue of zoosemiotic universals is discussed at length in Chapter 2, Section 2.3.2.

Zoosemiotics

As this entire book, and particularlyChapter 1, is concerned with the definition of the concept, the methodologies, the theories and the applications of zoosemiotics, this entry was conceived for allowing a short selection of definitions, taken from diverse, semiotic and extra-semiotic, sources. In chronological order:

"The term zoosemiotics – constructed in an exchange between Rulon Wells and me – is proposed for the discipline, within which the science of signs intersects with ethology, devoted to the scientific study of signalling behavior in and across animal species. The basic assumption of zoosemiotics is that, in the last analysis, all animals are social beings, each species with a characteristic set of communication problems to solve." (Sebeok 1963: 465)

"*Zoosemiotics* is a term coined in 1963 to delimit that segment of the field which focuses on messages given off and received by animals, including important components of human nonverbal communication, but excluding man's language and his secondary, language-derived semiotic systems, such as sign language or Morse code." (Sebeok 1990: 105)

"Zoösemiotics [is] the study of sign processes occurring within and between species of animals". (Deely 1990: 98)

"Zoosemiotics, the study of the semiotic beahaviour of animals, is a transdisciplinary field of research. Situated between biology and anthropology, it investigates a domain located between nature and culture." (Nöth 1990: 147)

"Zoosemiotics deals with the rules of animal communication by using the theory of information (e.g. mathematic analysis of signals) and the theory of communication. Situated between traditional ethology and sociobiology, it deals with topics of particular interest: (1) the nature of communicative channels (visual, tactile, electric . . .) in relation with the environment; (2) the meaning of a message in relation with the contest it is emitted; (3) the ability of social species to construct symbolic languages. The latter shows similarity between zoosemiotics and cognitive ethology." (Malacarne, in Mainardi 1992: 817–8)

"Study of the use of signs and signals by animals for the purpose of communication and information transfer. See Biocommunication." (Scott 1995: 1285)

"Zoosemiotics can be defined today as the study of semiosis within and across animal species." (Martinelli 2006a: 28)

"Zoosemiotics is the name for the study of animal semiosis, communication and representation. [It] stems from the semiotic tradition that does not limit sign processes to human species. Such an approach is developed most clearly in the pragmatic semiotics of Charles S. Peirce and Charles Morris. Other main sources of the zoosemiotic paradigm established by Sebeok include Jakob von Uexküll's Umwelt theory that describes meanings in animals' subjective worlds, the communication semiotics of Roman Jakobson and Karl Bühler, as well as ehotological studies by Konrad Lorenz, Karl von Frisch and others." (Maran, in Cobley 2009: 357)

"The study of the sounds and signals used in animal communication, as song in birds or tail-wagging in dogs." (www.dictionary.com, retrieved 2009)

"[redirected from *Zoosemiotics*] Animal communication is any behavior on the part of one animal that has an effect on the current or future behavior of another animal. The study of animal communication, sometimes called spencerology (distinguishable from anthroposemiotics, the study of human communication) has played an important part in the methodology of ethology, sociobiology, and the study of animal cognition. Animal communication, and indeed the understanding

of the animal world in general, is a rapidly growing field, and even in the twenty-first century so far, many prior understandings related to diverse fields such as personal symbolic name use, animal emotions, animal culture and learning, and even sexual conduct, long thought to be well understood, have been revolutionized." (www.wikipedia.org, retrieved 2009)