Conditioning or cognition?
Understanding interspecific communication
as a way of improving animal training
(a case study with elephants in Nepal)

Helena Telkänranta

1. Working Elephant Programme of Asia, Himokorventie 82, FI-31380 Letku, Finland
2. Department of Biological and Environmental Sciences, University of Helsinki
P.O. Box 56, FI-00014 University of Helsinki, Finland
e-mail: helena.telkanranta@helsinki.fi

Abstract. When animals are trained to function in a human society (for example, pet dogs, police dogs, or sports horses), different trainers and training cultures vary widely in their ability to understand how the animal perceives the communication efforts of the trainer. This variation has considerable impact on the resulting performance and welfare of the animals. There are many trainers who frequently resort to physical punishment or other pain-inflicting methods when the attempts to communicate have failed or when the trainer is unaware of the full range of the potential forms of human-animal communication. Negative consequences of this include animal suffering, imperfect performance of the animals, and sometimes risks to humans, as repeated pain increases aggression in some animals. The field of animal training is also interesting from a semiotic point of view, as it effectively illustrates the differences between the distinct forms of interaction that are included in the concept of communication in the zoosemiotic discourse. The distinctions with the largest potential in improving human-animal communication in animal training, is understanding the difference between verbal communication of the kind that requires rather high cognitive capabilities of the animal, and communication based on conditioning, which is a form of animal learning that does not require high cognitive ability. The differences and potentials of various types of human-animal communication are discussed in the form of a case study of a novel project run by a NGO called Working Elephant Programme of Asia (WEPA), which introduces humane, science-based training and handling methods as an alternative to the widespread use of pain and fear that is the basis of most existing elephant training methods.

1. Misconceptions about interspecific communication: a widespread problem in animal training

One of the most frequently occurring forms of human-animal communication is the training of animals to behave in a way desired at home, or to perform specific functions to assist people in work, sports, or entertainment. Animals undergoing some type of training include for example pets such as dogs, working animals such as police dogs and police horses, animals in sports such as horses in racing show-jumping and other competitions, and animals performing for entertainment such as in movies, TV commercials, and circuses. The context of animal training includes both the training phase, during which the animal is taught to recognize and obey specific words or other signals, and the rest of its life, during which the animal is expected to react to these signs in the way the trainer intended.

From a semiotic point of view, animal training and use of trained animals provide an abundance of interesting details to analyze. The outcome of animal training or animal use largely depends on how well the trainer or handler understands what actually happens in the process of interspecific communication that he or she is directing. The person sending the signs to the animal always makes some assumptions on the animal's capability to understand the signs correctly, for example by assuming that the animal understands the meaning of a specific word. The animal then either recognizes the sign or misinterprets the situation. In the latter case, the misinterpretation is reflected by either the animal doing nothing or doing something else than expected. This, in turn, can be either interpreted correctly by the person or misinterpreted. The most common misinterpretation is that the animal wants to challenge the "leadership" of the person. Depending on how the person in question perceives these exchanges and reacts to them, they can either result in successful training or in a failure. Unfortunately, the latter case often results in frustration and abusive behaviour towards the animal.

Failures to communicate effectively across the inter-species barrier in the context of animal training and handling frequently lead to animal welfare issues. There are many trainers and handlers around the world who frequently resort to physical punishment or other pain-inflicting methods when the trainer's or handler's attempts to communicate have failed, or when the trainer or handler is unaware of the full range of the potential forms of human-animal communication available. Two of the most frequently arising forms of abusive behaviour towards animals in this context are 1) punishing the animal for not obeying a sign when the animal has not understood the sign, and 2) teaching new signs by physical coercion because the trainer is not aware that there are other methods with which to create associations in the animal's mind to form a link between the sign and the desired action. Both of these could usually be avoided with a better and more detailed understanding of what actually happens during human-animal communicative interactions.

Different individual trainers and handlers, as well as different training and handling cultures, vary widely in their ability to understand how the animal perceives the communication efforts of the trainer. This variation in understanding has considerable impact on animal welfare. To a lesser, but usually still clearly measurable degree, there also are consequences in terms of the reliability of the trained animals. If the training and handling include elements that are stressful, physically painful, or the signs have not been consistent, the animals are less likely to perform their functions reliably, especially in stressful situations. Additionally, repeated pain inflicted by people tends to increase people-oriented aggression in some individuals of a few species, such as dogs, horses, and elephants. Thus, the benefits of a successful analysis of the use of signalling systems in training and handling extend to not only animal welfare and reliable performance, but also to occupational safety of those people who work in the field of training and handling of large animals.

2. Improving elephant training in Nepal: a case study

An illustrative example on how a better analysis on the mechanisms of communication can dramatically improve the outcome of animal training, as well as the welfare of animals in question and occupational safety of people working with them, is provided by an ongoing project with working elephants in Nepal.

Tamed elephants are utilized in several different types of work in more than a dozen countries in southern and south-eastern Asia. The functions of elephants include for example carrying tourists on elephant rides, performing in religious and royal ceremonies, dragging timber from forests in the logging industry, rescuing jeeps and other vehicles stuck in mud during the monsoon season, transporting researchers to otherwise inaccessible forest areas during wildlife monitoring and other biological research, carrying national park guards when patrolling for illegal hunting in nature conservation areas, and functioning similarly to police dogs when arresting illegal hunters. The total number of working elephants in Asia is estimated to be about 15,000. The countries with the largest working elephant populations are Burma (Myanmar), with a working elephant population of approximately 5,000, and India and Thailand, each with a working elephant population of approximately 3,000. (Sukumar 2003)

On other continents, there are smaller numbers of captive elephants that are trained to perform in human-defined functions. In Africa, there are several countries in which trained elephants are utilized to carry tourists on safaris, and around the world there are elephants performing tricks in circuses. Additionally, elephants in zoos are virtually always trained to some extent, because an animal of that tonnage would otherwise be difficult to move from one enclosure to another as needed, and even more difficult for a veterinarian to handle when necessary.

The vast majority of working elephants in Asia, as well as those in Western circuses and some of the Western zoos, are trained with a methodology that has been used in Asia for several thousands of years and in which elephants are controlled by inflicting repeated intense pain on them, often with sharp weapons such as knives, axes, sharpened bamboo sticks, or a bullhook (or ankus, as it is usually called in Asia), which is a metal rod with a sharp hook at the end. The pain-based training method has several disadvantages: the frequent suffering from pain and fear obviously has a very negative effect on elephant welfare, and sometimes young elephants are accidentally killed while punishing them during training, but there are disadvantages to people too: as young elephants often panic especially during the early stages of training, trainers sometimes get severely injured. Grown-up elephants sometimes kill their handlers on purpose, because repeated painful experiences associated with a specific person tend to increase aggression in elephants, especially in males during their reproductively active periods called musth, during which their threshold for action is at its lowest. Moreover, many elephant trainers themselves do genuinely care about elephant well-being and thus suffer from conflicting emotions when inflicting pain on the animals. In the tourism business, staff usually handles elephants rather well in front of tourists — with the result that if a handler is dissatisfied with the behaviour of the elephant during the ride, the elephant usually gets beaten only afterwards, once the tourists are out of sight — but sometimes tourists also happen to witness brutal handling of elephants, which some of them find a distressing sight.

Despite of all the abovementioned problems, the pain-based training system has prevailed virtually unaltered throughout Asia and many western zoos, and is regarded as the standard practice and only possible way to train and handle elephants. The main reason for this is that elephant training is traditionally assigned to the lowest classes in the social hierarchy, in which people have very little opportunity to learn anything about the outside world — for example in Nepal, the

vast majority of elephant trainers and handlers are illiterate — and thus have no way of knowing that the methods for elephant training that they have learned through oral tradition from their elders are not the only possible way that an animal can be trained.

To address this problem by providing a feasible alternative that would benefit elephants and people alike, the author has initiated a pilot project in Nepal, in which elephant trainers and handlers are now provided with science-based understanding of interspecific communication and its practical applications in elephant training. The scheme started in 2005, when the author suggested the idea to the late Dr. Chandra Gurung, then CEO of WWF Nepal (the Nepal office of the conservation organization World Wide Fund for Nature). Led by him and the author, the project was started as a co-operation between WWF Nepal, WWF Finland, WSPA (World Society for the Protection of Animals), and the Elephant Breeding Centre of Chitwan, Nepal; later it has been joined by other partners, such as the Elephant Breeding Centre of Bardia, Nepal. The core of the project is that the author has brought Western experts in animal training and ethology (animal behaviour science) to the field in Nepal, assisted by interpreters fluent in local languages, in order to interact with Nepalese elephant trainers and handlers and to show them with their elephants as to how a science-based, animal-friendly training method works in practice. One of the cornerstones of the project has been a culturally sensitive approach: according to the policy of the project, all interactions are carried out in the spirit of an egalitarian exchange of experiences between colleagues from different countries, respecting the local culture and religion, and never uttering a word of criticism about the traditional Asian training method. Instead, the message is that there is another training method too, and the project staff is available to show that method to those Nepalese trainers who are interested.

The way of establishing an association between a sign and its meaning is one of the core differences between the traditional Asian training method and the science-based method introduced by the

project. The traditional training method is based on the belief that every elephant is capable of understanding every word of human languages. Thus, when the elephant does not obey commands at the beginning of training, this is interpreted as the elephant choosing to disobey. The trainer then reacts by showing the elephant that the trainer is capable of inflicting pain on the elephant until the elephant obeys. Initially, the frightened elephant dashes randomly to various directions, but at some point it discovers by accident that performing a specific movement results in the trainer stopping the pain, and after a number of repetitions the elephant learns that when hearing the trainer utter a specific word, performing a specific movement will prevent the pain.

As an alternative, the training method introduced by the project is based on conditioning the elephant to respond to specific words with specific actions by using painless stimuli and by creating positive associations. The former, a form of negative reinforcement called pressure-release, works by applying a mildly unpleasant but painless pressure on a specific body part of the elephant, for example by placing a hand behind each of its ears, and waiting until the elephant makes even a slight move forward, at which moment the pressure is immediately released. Contrary to popular belief, elephants have a sensitive skin, and releasing a pressure as mild as a fly sitting on the skin is sufficient for the elephant to perceive as an improvement worth working for. Thus, as this practice is repeated, the elephant soon learns that the touch behind the ears is a signal with the meaning that if the elephant now moves forward, the touch will disappear and the elephant will feel a little better. Once this meaning has been associated to this touch, which usually happens in a matter of less than half an hour, the trainers can then keep the hands behind the ears a bit longer, only releasing when the elephant takes a full step forward, and in subsequent repetitions they keep the hands there until the elephant takes several steps forward. This way, the meaning associated with this tactile signal changes to that of keeping on walking. Once this works, the

trainers can also add a vocal signal, by uttering the word for "forward" at the same time when applying the pressure; sufficient repetitions of this lead to the elephant forming the same association with the word as it already had formed with this specific touch. After this, a rider can sit on the back of the elephant's neck and give the same tactile signals with his feet. The full training protocol has a lot of additional details to this, but this is to give an example on how the association between signals and their meanings can be formed during training without a need to resort to physical coercion or pain.

When selecting words to use during training, the functioning of the human brain also needs to be taken into consideration. According to the policy of the project, the alternative training method is tailored to be as similar as possible to the traditional ways of elephant use that are familiar to the local trainers and handlers: the only difference is that the painful and stressful aspects have been replaced with other approaches. Thus, the command words are still the same as traditionally, stemming from the local indigenous Tharu language, and the riding style is also the same as before. There was a need to invent some new words: for example, for training purposes, the project staff needed a sign with which they can indicate to an elephant during training from a distance that the action at that specific moment was a desirable one and will be rewarded with a piece of food later on. The most important aspect of such a signal for marking the specific moment of proper behaviour is that the signal needs to be distinct and easy to recognize; for example, trainers of dolphins use a whistle to blow into, and some dog trainers use a specific small device called a clicker to produce a distinct sound. In the practical context of Nepal, the staff decided to choose a Tharu language word which would have a distinct enough sound to it, but also a meaning to the human trainers that would be easy to remember in that context; out of several alternatives, the staff ended up choosing the word *thik,* which means "correct" in Tharu.

Choosing words is naturally also important in communicating in the society in general, in order to avoid unwanted associations in people's minds. The Nepalese society, similarly to Asian societies in general, has great respect for old traditions. Thus, in the Nepalese way of thinking, the words "traditional" and "old" equal "good", whereas the word "new" has a ring of something a bit suspicious to it. Thus, in the scope of the project, it was essential not to talk about the two training methodologies as "the traditional method" or "the old method" versus "the new method". Instead, with the help of Nepalese co-workers, the project staff ended up in calling the old method "the conventional method", which still is positive (and thus not offending) but yet not as canonised as would be calling it the traditional method; and the new methodology was given the name "Positive Learning Method", with which it is now widely known in Nepal.

The project has been a major success. After some initial hesitating on the Nepalese side in the very beginning in 2005, the vast majority of elephant trainers in Nepal have now embraced the novel, elephant-friendly training methodology. The training of young elephants in Nepal has undergone an extensive shift during the four years of the project so far. The most painful or stressing practices in traditional training of young elephants, such as pressing burning torches on the rumps of those elephants that are too terrified to move, dragging young elephants along the ground by a rope tied to their neck and pulled by grown-up elephants (which usually results in deep wounds in the neck and, in rare cases, in the death of the young elephant), and depriving the young elephant of sleep, food and water for a week or two before the beginning of training (in order to make it weaker and thus easier to handle by force) have now disappeared from all of Nepal, despite the fact that only four years earlier they were the standard practice followed everywhere. Most elephant training facilities now use a mixture of the old method (with the most brutal parts missing) and the new one. There is one facility at which the new method is applied in the pure form, under the supervision of the project staff: the

government of Nepal has assigned the Elephant Breeding Centre of Bardia, which is the second largest elephant training facility in Nepal, to be the official testing ground for the new training method. Once the elephants are fully trained and grown up, the government will evaluate their work performance. If it turns out to be at least as good as that of traditionally trained elephants, the government will then consider shifting all the other training facilities, too, to the use of a pure form of the new method.

At the moment, the project is run by a NGO called WEPA (Working Elephant Programme of Asia) that was founded for the specific purpose to continue this work and to later be able to answer the requests to expand it to other countries; such requests have so far been received from India and Indonesia. The major constraint limiting the rate at which the project can proceed is limited funding, but once new funding sources can be found, plans are underway to repeat the project in other Asian countries too. More information on the project can be found in the internet at www.wepa.su.

3. The difference between conditioning and cognition-based communicating

In addition to the practical issues of animal welfare, reliability of performance, and occupational safety, the field of animal training is interesting from a semiotic point of view too. This is because it effectively illustrates the differences between the distinct forms of interaction that in the zoosemiotic discourse are included under the umbrella concept of communication. Of these distinctions, the one with probably the largest potential in improving human-animal communication in animal training, is understanding the difference between 1) verbal communication of the kind that requires rather high cognitive capabilities of the animal, and 2) conditioning, which is a form of

sending signs and causing learning that does not require high cognitive ability.

Both of the abovementioned activities fall under the definition of communication in the broad sense, as in both cases there is a sender (the trainer), a "text" (a sign with meaning, for example "Sit!"), and a receiver (the animal that is expected to recognize the sign and alter its behaviour accordingly). The crucial difference is that the mental process on the animal's side is remarkably different depending on whether the learning process is based on a cognitive understanding of a verbal signal or getting conditioned to respond to a specific sign with a specific behaviour.

People are so used to living in a world full of verbal communication that we frequently overestimate other animals' capacity to understand verbal communication, especially their ability to understand whole sentences. Mammals and birds are capable of learning to recognize individual words and to associate them with specific behaviours or as "labels" for specific objects, but the capacity to learn to understand whole sentences seems to be very rare in other species than ours. To date, such an understanding of syntax has only been shown among great apes, dolphins, and grey parrots (Hillix, Rumbaugh 2004). Elephants rank among the most intelligent animals: they are the only animals in addition to apes and dolphins to have passed the self-recognition test with a mirror, which is considered to be a sign of higher cognitive functions (Plotnik *et al.* 2006) and their brain size surpasses that of any other land mammal (Shoshani *et al.* 2006). However, to date there are no reports of elephants being able to understand a syntax of several words strung together. The same applies to animals with a lower cognitive ability, such as horses, dogs, and other domestic animals, to which people often speak in sentences, assuming that the animals have a capacity to understand the whole meaning.

The most common mistake that is made during animal training, regardless of whether the animal is the pet dog at home or an elephant

at a Burmese logging camp, is to expect the animal to understand verbal communication in a similar way that people do. When the animal fails to do this, in the worst case it gets punished and in the best case the trainer ends up with less efficient training results compared to what would have been possible with a deeper understanding of animal behaviour. Paradoxically, one thing that most skilled animal handlers have in common is that they use only very few words when talking to animals. This is because they focus on only using those words that the animals have been taught to associate with specific meanings, leaving out the "small talk" of other words, the meaning of which the animals in question do not understand.

Conditioning, according to the findings of modern ethology and of learning theory in psychology, provides the most precise tool for animal training, because it is a way of ensuring that the meaning of the sign sent by the sender indeed does get interpreted by the receiver in the form intended by the sender. Conditioning occurs in two forms: positive reinforcement and negative reinforcement. Positive reinforcement means rewarding the animal for correct action by giving it something that the animal regards as positive, such as a piece of food or a caressing stroke. Negative reinforcement means rewarding the animal for correct action by removing something the animal regards negative, such as the light pressure behind an elephant's ear in the example above. Negative reinforcement is often confused with punishment, although the latter works with a different mechanism: in punishment, the animal is not rewarded by making it feel better at the moment of correct action, but instead the animal is made feel worse during the moment of incorrect action, which is something that most trainers with a good understanding of animal behaviour virtually never need to resort to. Thus, contrary to common belief, negative reinforcement does not need to be painful in order to work effectively in assigning meanings to signs in animals' minds. (McLean 2005)

4. Anthrozoosemiotics and ethozoosemiotics: complementary approaches to the same issues

From a semiotic point of view, animal training provides an illustrative example of the wide range of phenomena that cover and interact with each other in the field of zoosemiotics. As zoosemiotics can be divided into anthrozoosemiotics, which studies how people perceive the rest of the animal kingdom, and ethozoosemiotics, which studies how animals themselves send and receive signs, the example of improving animal training includes fruitful approaches from both.

From the angle of anthrozoosemiotics, it is crucial to address misconceptions about animals' ability to understand human speech, as well as misconceptions about the reasons why animals obey. Many pet owners assume animals obey them if the animals love them; similarly, some dog, horse, and animal trainers assume animals obey them if the animals fear them. Based on research in ethology, however, the two overwhelmingly most common reasons why animals obey people are 1) the animal has learned that performing a specific action leads to pleasant consequences, and 2) after a lot of repetitions, the animal is so used to associating a specific signal with a specific action that it performs the action without considering the consequences.

From the angle of ethozoosemiotics, the benefits from the fields of ethology and psychology can be reaped by an improved understanding of how animals perceive and learn signals and meanings associated with them. When a trainer or handler becomes increasingly skilled in this, the training results and animal welfare improve for the reason that the trainer or handler can now focus on what is essential for an effective carrying of meanings into the animal's mind: on the clarity of their signalling and on gradually shaping the meanings of the signs to accommodate ever more complex behaviours to perform.

Another ethosemiotic approach is that in addition to signs sent by the trainer or handler to the animal, the training and handling situations often involve signs sent by the animal to the person. Many

animal trainers and handlers fail to recognize or properly interpret some or all of them. For example, tail-wagging of a dog is almost always translated as a sign of happiness, although it can also signal nervousness, and a horse that is getting physically punished often nods its head, which most horse owners fail to recognize as an appeasing social signal among horses, aimed at calming down the aggressive individual. Indeed, one of the common features of skilled animal trainers is their ability to not only tailor their own signs according to the cognitive ability of the animal and the most efficient ways of conditioning the animal, but they also have a well-developed skill in understanding the species-specific communication signs that the animal is using.

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Программирование поведения или познавательная способность? Роль понимания различных форм межвидовой коммуникации в улучшении дрессировки и благополучия животных на примере слонов Непала

В подходах к дрессировке животных (домашние животные, полицейские собаки, спортивные лошади) для выполнения различных задач в человеческом обществе наблюдается множество разных направлений, которые отличаются своей способностью понять, как животное воспринимает попытки дрессировщика войти в контакт. Эти различия оказывают заметное влияние на дальнейшее поведение и благополучие животных. В мире много дрессировщиков, которые пользуются физическими или иными причиняющими боль методами наказания, когда не добиваются желаемого результата. Отрицательные последствия такой дрессировки — страдающие животные, их неполная работоспособность а иногда и опасность для человека, так как повторяющаяся боль может вызвать агрессивность животных. Кроме этих практических соображений исследования дрессировки интересны и с семиотической точки зрения, так как дрессировка прекрасно иллюстрирует разные формы общения, которые в зоосемиотике рассматриваются под понятием коммуникации. Из всех используемых в зоосемиотике различных форм общения наиболее полезной для улучшения коммуникации между человеком и животными в ходе дрессировки являются форма вербального общения, требующего от животного применения когнитивных способностей высокого уровня, и форма общения, основывающегося на программировании поведения. В данной статье этот вопрос рассматривается на примере конкретного проекта — Программы азиатских рабочих слонов (WEPA), которая пытается внедрить гуманные и научно обоснованные приемы дрессировки и обращения со слонами как альтернативу наиболее распространенным методам дрессировки слонов посредством методов, основанных на страхе и боли.

Käitumise programmeerimine või taju? Liikidevahelise kommunikatsiooni erinevate vormide mõistmise roll dressuuri töökindluse ja loomade heaolu suurendamisel Nepali elevantide näitel

Loomade dresseerimisel teatud ülesannete täitmiseks inimühiskonnas (lemmikloomad, politseikoerad, sporthobused), näeme palju erinevaid dresseerijaid ja dressuurikultuure, mis erinevad oma võime poolest mõista, kuidas loom dresseerija suhtluspüüdeid tajub. Sel erinevusel on märgatav mõju loomade edasisele käitumisele ja heaolule. Maailmas on palju dresseerijaid, kes kasutavad füüsilist karistust või muid valuaistingut tekitavaid karistusmeetodeid, kui nende katsed loomaga suhelda ei anna soovitud tulemust või kui nad ei ole teadlikud looma-inimese vahelise suhtluse kõigist võimalikest moodustest. Taolise dressuuri negatiivseks tulemiks on kannatavad loomad, loomade poolik töövõime ja vahel ka oht inimestele, kuivõrd korduv valu võib mõnedes loomades tekitada agressiivsust. Peale niisuguste praktiliste kaalutluste, on dressuuri-uuringud huvitavad ka semiootilisest vaatepunktist, kuivõrd dressuur illustreerib hästi erinevaid suhtlusvorme, mida zoosemiootikas kommunikatsiooni mõiste all käsitletakse. Kõigist zoosemiootikas kasutatavatest eristustest on inimese-looma vahelise suhtluse parandamiseks dressuuris ehk kõige kasulikum teha vahet taolisel verbaalsel suhtlusel, mis nõuab loomalt üsna kõrgeid kognitiivseid võimeid, ja käitumuslikul programmeerimisel põhineval suhtlusel, mis ei nõua õppivalt loomalt erilist kognitiivset võimekust. Käesolevas artiklis käsitletakse inimene-loom suhtlustüüpide vahelist erinevust ning nende potentsiaali ühe konkreetse projekti näitel. Näiteprojektiks on MTÜ Aasia Tööelevantide Programm (WEPA), mis üritab juurutada inimlikke ja teaduspõhiseid dressuuri- ja kohtlemistavasid alternatiivina enamuse elevantide dressuuriprogrammide aluseks olevatele valu ja hirmupõhistele meetoditele.