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Body language: Its importance for communication with horses

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ABSTRACT

Body language is important for communication between individuals. Body language is based on the fact that the thought of performing a known action, alone, will activate the motor neurons used for the action, resulting in a slight contraction of the involved muscles. These contractions are called intention movements and signal what the sender will do within the next second, enabling the recipient to react. This type of communication is important both for animals and for peoples' interaction with animals. For example, for social animals, body language communication during competitive situations may prevent subsequent physical interaction making life in the social group more peaceful. Domestic animals that have frequent contact with people learn to read human body language. Similarly, experienced animal trainers learn to read the body language of their animals. This exchange of information makes it safer and more efficient to work with horses. The subtleties of body language may also influence results of scientific studies. Research on preferences or cognitive abilities in horses often use choice experiments combined with operant conditioning. Recent studies have thus demonstrated that horses prefer larger quantities of food than smaller quantities, that they have prospective memory, and that they can communicate with people using symbols. These results may be true, but because the experimental horses are handled by people right before they make their choice within the experiment, it is not possible to determine whether their choice is their own or whether it has been influenced by the body language of the handlers. To be valid, this kind of experiment must eliminate any possibility of human influence. In conclusion, better awareness of horses' body language as well as our own body language makes work with horses easier, safer, and more efficient. Furthermore, creating an environment in which foals and young horses are properly socialized will prepare them for an adult life in a social group, something that is a prerequisite for acceptable horse welfare.

Introduction

Exchange of information by means of body language is widespread in nature. Numerous animals and humans use body language as a signal of their intentions, either alone or in combination with other forms of communication. Body language communication is important not only between conspecifics but also for interspecies communication, such as during the interplay between predator and prey. In social animals, body language is important for the cohesion of group members. Not only does it replace physical aggression during conflicts to some extent but it also invites group members to pleasurable behaviors such as play and allogrooming.

All mammals living in close contact with humans learn the meaning of our body language. Often we are not aware of the signals we send, yet the daily routine of caring for the animals involves actions that are noticed and whose consequences are learned by the animals. Being aware of the importance of these signals generally makes the daily chores easier. Equally important is observation of the body language of the animals. Information about their intentions may prevent accidents or make it possible to intervene and change their behaviors before they are performed. In addition, body language may be the first signal to indicate some kind of disease or a sign that something is wrong.

The neurobiological basis of body language

As in other types of communication, body language communication consists of exchange of information between a sender and a recipient. In the sender, body language starts in the motor cortex of

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the brain, a process that was hypothesized more than 150 years ago. In an attempt to explain various spiritual phenomena that were popular in the 19th century (e.g., dowsing, pendulum divination, and ouija boards), the British physician William Benjamin Carpenter introduced the term ideomotor to "characterize the reflex or automatic muscular motions that arise merely from ideas associated with motion existing in the mind, without any conscious effort of volition" (Carpenter, 1852). In other words, his hypothesis was that the thought, alone, of performing an action activates the motor neurons used for the action, resulting in a slight contraction of the involved muscles. Carpenter's hypothesis was based on detailed observations of these minute muscle contractions.

More recently, the existence of this effect was demonstrated in humans by means of positron emission tomography scanning (Elsner et al., 2002). Test subjects were first trained in about 200 learning sessions to press a specific key on a keyboard with their left hand when they heard one specific tone and to press another key with their right hand when they heard another tone. After the subjects had trained the key presses to the point where it became a reflex, they were placed in a positron emission tomography scanner together with the keyboard. They were instructed just to listen to the tones, without pressing any key. While the different tones were sounded, their brains were scanned. What the scanning showed was that just hearing the learned tones activated two different parts of the brain. One was a part of the motor cortex, the supplementary motor area (SMA) that sends messages down the spinal cord to the muscles. The other area was the hippocampus, the brain structure where some kinds of memory are consolidated. Elsner et al.'s study showed exactly what Carpenter hypothesized—that the mere idea of pressing the key activates the muscles that are going to be used. It is the link between the consequences of an action and the action itself.

Although Carpenter's interest was to explain spiritual phenomena, the interest in the ideomotor effect today is to improve our understanding of how we learn various movements and how automatization of the actions occurs (e.g., to ride a bike, to play the piano). Although the ideomotoric effect has not been demonstrated in animals, it is such a basic action that the phenomenon is undoubtedly universal in all nervous systems.

The ideomotoric responses result in minute contractions or tension of specific muscles, contractions that commonly referred to as intention movements. For instance, slightly before the bird takes off in flight, it is possible to observe tension in its wing muscles. Intention movements may become ritualized and form the basis for body language.

To explain the possible effect of the message of the sender on the receiver, it is necessary to involve one of the phenomena constituting the placebo effect. Although the original definition of a placebo is a simulated so-called ineffectual treatment for a disease intended to deceive the recipient, recent studies have shown that a placebo may also be effective if the patient knows he is receiving an ineffectual treatment (Kaptchuk et al., 2010). One aspect of a placebo is that it creates neurological links between a subjective thought and not only the immune system, which explains its effect on the healing process, but also numerous other physiological processes including processes that are powerful modulators of perceptual, motor, and internal homeostatic processes (Benedetti et al., 2005). Research has shown that a predominant brain mechanism involved in the placebo response is expectation and that a variety of learning phenomena are involved, such as Pavlovian conditioning and cognitive and social learning (Benedetti et al., 2011). As far as body language is concerned, it is the receiving of a message that leads to a certain expectations and modulates the response of the recipient. Only a few studies have analyzed the placebo effect in the treatment of disease in animals (e.g., Ader & Cohen, 1975; Einer-Jensen & Sjöberg, 1969); from these, it can be suggested that other aspects of the placebo are also likely to exist in animals.

Taken together, the ideomotoric effect and the placebo effect form the basis for body language communication. As indicated previously, however, the meaning of the intention movements must be learned, a fact that was demonstrated in horses by Proops et al. In one experiment, adult horses with several years' experience with people were able to use a number of cues from the experimenter, such as body orientation, head orientation, and eye direction, to decide which person to approach to obtain a reward (Proops et al., 2010). In contrast, in a similar experiment, young horses that had only had limited contact with people showed that they were only able to use body orientation, not head orientation or eye direction as a cue (Proops et al., 2013). Together, these experiments clearly demonstrate that the understanding of our body language is something horses must learn from experience.

Implications for social cohesion

Although similar studies have not been conducted between horses, practical experience suggests that the meaning of some of the cues from other horses must also be learned. The learning primarily happens through interaction with conspecifics during the socialization period that starts in the second to third week of the foal's life (Ladewig et al., 2005). Some of the cues are easily discernible, such as ear direction. Others are more subtle, such as eye direction or body orientation. Interestingly, unfriendly cues are easier to observe than friendly cues. In general, observation of the different signals that horses use as their body language is an area that has not received sufficient research attention.

The fact that horses living in a social group are able to solve competitive situations without using physical aggression is important for the cohesion of the group. Under natural conditions belonging to a social group is fundamentally important for the survival of the individual. But also under domestic conditions, loose housing in social groups is important for the welfare of horses. Several studies have shown that social contact with conspecifics, without any barriers between individuals, is beneficial for both the physical and psychological health of horses (e.g., Christensen et al., 2002; Hartman et al., 2012). To ensure the benefits of group stabling, however, group members must be properly socialized, not only to ensure the cohesion of established groups but also to render exchange of individual group members less problematic.

Implications for work with horses

The exchange of body language information between horse and human and vice versa is essential when handling horses. Being able to notice what the horse is intending to do within the next fraction of a second may prevent serious accidents. Similarly, showing your intentions by means of your body language may increase the probability that the horse follows whatever you intend to do. For example, a horse is led home from pasture, away from its social group. Half way home the horse turns away from you and runs back to its group. If you are lucky, the horse gets away from you. If you are unlucky (e.g., because you have wrapped the lead rope around your hand), you may be dragged along behind the running horse. Before the horse turns away from you, it will start its reaction by turning its nose. A fraction of a second later, it will turn its head and neck, and once it has also turned its shoulder, you have no chance of stopping the horse. If, however, you pay attention to the horse and turn its head back toward you as soon as you notice its intention, you will be able to stop its attempt and prevent it from running away.

Although we people mostly use vision to "read" the horse, horses also use other senses when they pay attention to our body language. Particularly, when we ride a horse, they use their tactile sense to judge our intentions. For instance, when jumping over

obstacles, experienced horses supposedly feel the difference between a rider focusing on the jump and a rider not focusing or between a determined and a hesitant rider. Presumably, differences in the point of gravity signal the intention of the rider to the back of the horse, something that measurements with pressure sensitive saddle pads will have to confirm.

Another example of how riders may affect horses was demonstrated by Keeling et al. (Keeling et al., 2009). In the study, both riders and horses were equipped with heart rate monitors. The riders were then asked to lead or to ride down a certain stretch several times passing a person. Thereafter, they were asked to repeat the stretch, but this time they were told that, as they passed the person, an umbrella would be opened. Although the umbrella opening did not happen, the heart rate in both the rider and horse was significantly higher. Presumably, the expectation that the horse would get scared made the rider tense, and the tension was somehow passed on to the horse.

Implication for scientific experiments

Research on preferences or cognitive abilities in horses often use choice experiments combined with operant conditioning. Recent studies have demonstrated that horses prefer larger quantities of food than smaller quantities (Uller & Lewis, 2009), that they have prospective memory (Murphy, 2009), and that they can communicate with people using symbols (Mejdell et al., 2016). This insight published in peer reviewed journals may be true. However, because the experimental horses are handled by people right before they make their choice, we cannot be certain that the decision of the horses is not somehow influenced by the body language of the experimenters. This is not to say that the experimenters are cheating. In all studies, people handling the horses took great care to avoid giving any cues. Because the neural processes happen "without any conscious effort of volition," to use Carpenter's phrase, the influence may be there, no matter how neutral the handlers try to be.

As a consequence, choice experiments should be done only without any direct human influence. The test horse should be placed in a start box or enclosure, people should leave, and the horse released by an automatic opening of the start enclosure. Similarly, no person should be visible near the panels or buckets of food or whatever the horse is meant to choose. After all, although Clever Hans was not good at solving mathematical problems, he did a good job in showing us how astute horses are at learning to read body language.

In conclusion, the better we are at observing and understanding horses' body language and the more we are aware of our own body language, the easier, safer, and more efficient our work with horses will be. In addition, ensuring proper socialization of foals and young horses will prepare them for an adult life in a social group, something that is a prerequisite for acceptable horse welfare.

Ethical considerations

The short communication covers studies conducted according to ethical regulation.

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