

Latéralité, mesures physiologiques (ECG et EEG) de bien être animal chez le chien et le cheval

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In everyday life animals have to face different stressors that threaten their welfare. In order to deal with them, there occur in the animals' body some physiological, cognitive and behavioural changes that help them to overcome a potential threat or a difficult situation. In particular, stressors cause the activation of the sympathetic division of the autonomic nervous system and then the release of adrenaline. This hormone has several effects on animals' physiology, including the heart rate increase. In animal behaviour, it increases both the level of vigilance and reactivity as well as stress behaviours. Thus, during stressful situations, the higher cardiac activity is associated with the animal "fight or flight" response, characterized by the expression of intense emotions (e.g. escape behaviours, fear or aggression).

It is well established in the animal kingdom that both the heart rate increase and the intense emotion expression are under the prevalent control by the right hemisphere. Animals' brain is divided, indeed, into two hemispheres, the left and the right, which have complementary but different specializations. The left hemisphere plays a main role in the control of routine behaviours and familiar stimuli, while the right one takes charge of novel stimuli detection and is specialized in the expression of intense emotion (e.g. aggression and fear). They also have different roles in processing other individuals emotions: the left hemisphere is involved in processing positive emotions and approach while the right one processes withdrawal and negative emotions. Several neurological techniques can be employed to evaluate directly brain functional asymmetries. For instance, the two hemispheres activity can be measured by the electroencephalography (EEG), using non-invasive devices. Furthermore, brain lateralization and lateralized cognitive processing of other individuals emotion could be indirectly evaluated by analysing animals' behavioural asymmetries in attending stimuli. The head-orienting response is commonly used for this purpose, since it constitutes an unconscious and spontaneous response.

Thus, external manifestations of animals hemisphere dominance (e.g. the head turning response) matched with both behavioural and physiological responses (cardiac activity and brain activity, measured by ECG and EEG respectively) could represent a useful tool for understanding how animals perceive environmental stimuli and emotions, which valence they attribute to them and consequently how these stimuli can impact their welfare.

Concerning horses, I am currently investigating two main topics, analysing their head turning response, their behaviour and their physiological (cardiac and brain activity) responses to human acoustic stimuli. Horses, indeed, have daily contacts with humans for different reasons, including work, care (general management) and medical treatments. Therefore, the relationship that they have with humans can be considered as one of the most important factors influencing their welfare. To investigate this issue, I wondered: how horses perceive human voices previously associated with a positive or a negative experience? How horses perceive and process human emotional vocalizations? Which valence they attribute to them?