UDC 636.7.064:591.58 **DOI 10.36016/JVMBBS-2026-12-2-2**

DOG BODY LANGUAGE (LITERATURE REVIEW)

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Summary. The article is devoted to a comprehensive analysis of contemporary scientific research exploring canine body language as a complex system of nonverbal communication. Based on a review of domestic and international publications indexed in PubMed, Scopus, Web of Science, Google Scholar, and other databases, the study summarizes findings on the development of dogs' communicative abilities in the course of domestication and coevolution with humans. Special attention is given to the evolutionary foundations of interspecies interaction, as well as to the role of morphological and breed differences and the influence of sex and age on behavioral signals. The paper also examines modern objective methods for analyzing canine facial expressions and postures, including the DogFACS (Dog Facial Action Coding System) system and machine learning technologies CNN (Convolutional Neural Network), DeepLabCut (Deep Learning-based Markerless Pose Estimation), used for the automatic recognition of body postures and emotional states in dogs. The study systematizes the main components of canine body language, including facial expressions, ear position, eye expression, mouth posture, body stance, and tail movements, emphasizing their integrated interpretation within various social contexts. The importance of correctly interpreting canine signals for conflict prevention, safety enhancement, and strengthening trust-based relationships between humans and dogs is highlighted. It is concluded that understanding canine body language is an acquired skill based on observation, learning, and interspecies empathy, and that it has significant practical value in veterinary medicine, as well as for dog owners, trainers, and animal behavior specialists

Keywords: nonverbal communication, animal behavior, human–dog interaction

Introduction. Communication with animals is not a language in the human sense, but a complex system of signals (acoustic, visual, and olfactory). Interpreting these signals helps strengthen the bond, resolve behavioral problems, and ensure a better quality of life for pets. If we consider the ways a dog 'communicates' with a human, posture and body language come first. Body language is the primary channel of communication (Hasegawa, Ohtani and Ohta, 2014). Experienced pet owners can read these signals and use them as powerful tools. In dogs, this 'language' is expressed particularly vividly (Firnkes et al., 2017).

Dogs do not know how to lie. Their bodies accurately reflect everything they experience. Emotions can change very quickly (for example, when another dog or a person approaches), but in the moment, dogs are sincere in their expressions. Understanding canine body language is essential for dogs' well-being, health, safety, and trust (Brugarolas et al., 2013). For humans, it offers significant advantages in establishing a two-way relationship based on empathy, understanding, and mutual trust, as well as in developing a lifelong bond with the dog. If we learn to read our dog's postures and signals, we will better understand its feelings and motivations and more accurately predict what it is likely to do. Interpreting the signals sent by a dog requires attentiveness and experience (Walsh et al., 2024).

The systematization and analysis of contemporary scientific data on canine body language are important for understanding its role in both interspecies and intraspecies communication, as well as for assessing its practical significance in veterinary medicine, cynology, and human–animal interaction, enabling people to understand dogs more naturally and effectively (Miklósi and Topál, 2013; Crosby and Rider, 2019).

Analysis of recent research and publications. According to recent studies conducted by the Canine Science Research Center at Arizona State University, people do not understand dogs' body language and the emotions associated with it as well as they believe they do (Derra S., 2025). Why is it important to understand canine body language? Dogs are highly expressive animals with a wide range of emotions (Hasegawa, Ohtani and Ohta, 2014). They communicate when they feel happy, sad, nervous, frightened, or angry, using their bodies and facial expressions to convey most of this information (Ballantyne, 2018; Gähwiler et al., 2020). Many owners dream of genuine mutual understanding with their pets but do not always know how to correctly interpret their behavior (Molinaro and Wynne, 2025).

In addition, there are scientific studies devoted to analyzing canine body language using machine learning. Brugarolas et al. (2013) developed an application for behavior recognition that requires data from a wireless sensor worn by the dog. According to Raman, Maskeliūnas and Damaševičius (2022), CNN (Convolutional Neural Network) and DeepLabCut (Deep Learning-based Markerless Pose Estimation) were used for the automatic recognition of a dog's body parts and postures.

Dogs communicate through numerous body language signals, adapting to life with humans. Dogs and humans perceive body language in similar ways (Borgi and Cirulli, 2016). This conclusion was reached by

Austrian researchers in a study involving 40 participants and 15 domestic dogs who underwent magnetic resonance imaging (MRI), as reported by Interesting Engineering. It was found that, like humans, dogs have a specialized area in the temporal lobe responsible for the visual perception of body posture. However, unlike humans, when observing faces and bodies, dogs also activate brain regions associated with olfactory processing. Thus, despite different evolutionary paths, dogs and humans have developed similar mechanisms for mutual understanding and communication (Karl et al., 2020).

In addition to obvious distance-increasing signals such as whining, barking, growling, snapping, baring teeth, and biting, there exists a world of subtle communication that expands the ways we can better interact with this species. Canine body language is often presented in overly simplified narratives, whereas in reality it is a highly developed and complex system.

By noticing the signals expressed through a dog's body, an owner can support and protect the dog when it shows discomfort. This strengthens the trusting relationship between owner and dog and helps the dog remain calmer in uncomfortable environments, as trust in the owner increases the dog's confidence and sense of security. It is also good practice to share information about canine body language with colleagues who may not be familiar with the signals dog display.

The **aim** of the research is to present a comprehensive review of current knowledge on canine body language.

Materials and methods. This review synthesizes findings from relevant literature sources. The research methods determined the direction of this systematic review by identifying gaps in the existing literature. The materials for the study consisted of published works by both domestic and international authors.

To achieve the stated objective, the following methods were applied: the dialectical method, the chronological method, and the methods of analysis and synthesis.

The search strategy was designed to include all relevant studies published up to 2026. A comprehensive literature search was conducted across several databases to identify studies relevant to this systematic review, using the following keywords: canine body language, nonverbal communication, communication, animal behavior, and combinations of these terms. Online databases searched included PubMed, Scopus, Web of Science Theses, Google Scholar, and ResearchGate (to identify potentially significant studies published by authors). In addition, the findings were supplemented by the authors' knowledge of the literature in the field of human-dog interaction.

Presentation of the main research material. ***How canine language was formed: evolution and domestication.*** For many thousands of years, dogs have closely coexisted and interacted with humans. In recent years, social cognition in dogs has been intensively studied (Grewal et al., 2020). It appears that during the process of domestication, dogs acquired unique abilities for interspecific social behavior with humans (Miklósi and Topál, 2013; Serpell, 2017).

The bond between dogs and humans is unique and serves as a defining indicator of the evolution of human cultures. Since ancient times, the animal known as the dog has forged its path through numerous challenges. Humans began domesticating dogs approximately 15,000–16,000 years ago. In fact, it was not dogs that were initially domesticated, but wolves — some of which were less aggressive and more tolerant of humans (Serpell, 2017). Some researchers suggest that the domestication and transformation of wolves into dogs began even earlier, possibly around 30,000 years ago (Virányi et al., 2008). From that point, a gradual restructuring of brain architecture began. However, the initial steps that led to wolf domestication remain unknown (Kaminski et al., 2019).

The estimate of 15,000–16,000 years is currently the most widely accepted. There is greater disagreement regarding the geographic origin of domestication. Comparing genetic and archaeological data, some scholars point to the Middle East, others to Western Europe, and some propose that domestication occurred independently in multiple regions. It is believed that the cold and dry climate of that era facilitated interaction between wolves and humans. At the same time as the wolf was simplified into the domestic dog, domestication occurred in a broader sense, which can be described as 'humanization'. This process has even given rise to the concept of coevolution — the joint historical development of dogs and humans (Kubinyi, Virányi and Miklósi, 2007; Tebelmann and Ganslosser, 2024).

Charles Darwin also noted how domestication influenced the behavior of domestic dogs by reducing their fear of humans. He argued that dogs possess emotions such as love, fear, shame, and rage, as well as the capacity for dreams, imitation, and reasoning (Darwin, 1871).

During domestication, dogs lost some of the complex communicative signals characteristic of their wild ancestors — the Gray wolf. Instead, they developed an enhanced ability to understand humans and adapted their body language and behavior for human interaction. Dogs recognize and interpret human communicative cues and interact with people in ways not observed in their wild ancestors (Miklósi and Topál, 2013).

As a result, dogs developed a kind of 'human–dog dialect', which makes them more understandable to their owners. They use their entire bodies to communicate, conveying information both intentionally and unintentionally (Siniscalchi et al., 2018).

Modern researchers actively study similarities between animals and humans in terms of language and communication (Gábor et al., 2026). However, the main reason dogs have not 'developed speech' may be social rather than biological. Humans evolved language as a tool for cooperation in complex group tasks, enabling the transmission of highly specific messages. Dogs, by contrast, coordinate effectively without words —

through gaze, movement, scent, and vocal signals. There was simply no evolutionary need for speech to develop in dogs (Marshall-Pescini and Kaminski, 2014; Elgier et al., 2009).

Thus, the domestication of wolves may have occurred not only as their populations became more tame, but also as they adapted to human preferences. These findings enhance our understanding of early dog domestication as a communicative evolution toward refined human comprehension and effective nonverbal interaction (Mandal, 2014; Kaminski and Marshall-Pescini, 2014).

Canine body language. The fact that dogs cannot verbally tell us what they think or feel does not mean they cannot communicate with us. Instead of verbal language, dogs often rely on body language to give humans or other animals clues about their emotions (Elgier et al., 2009). In dogs, body language plays a central role in maintaining social hierarchies, preventing conflicts, and initiating affiliative interactions such as play (Górski, Kondracki and Kępka-Borkowska, 2026). Understanding canine body language is a fundamental skill of critical importance for preventing injuries to the public, dog owners, veterinarians, and people working in dog-related environments, as well as for helping dogs avoid negative emotional states such as fear, anxiety, and stress.

Unlike humans, dogs rely heavily on body postures and olfactory (scent) signals, while vocal communication is less significant. Humans are primarily listeners, whereas dogs are observers. Another key difference between human and canine communication lies in the type of information transmitted (Carson, 2007). Your dog can communicate a lot through its posture. According to Ertürk (2006), differences in behavior and body language in dogs are influenced by sex and age. One review noted that males tend to be more aggressive and bold, and to show more social contact with humans during play. Females, on the other hand, are more sociable during cooperative tasks with humans. Differences in body language also partly depend on breed, height, and weight (Mota-Rojas et al., 2021; McGreevy et al., 2013; Duffy, Hsu and Serpell, 2008; Eken Asp et al., 2015).

These differences are explained by the fact that dog morphology, shaped through artificial selection, has led to the loss of certain components of their body language (Zepeda et al., 2024). However, body language is often misunderstood, which can predispose to behavioral problems and conflicts.

But what exactly is canine body language? It is a complex and elegant system of nonverbal communication. Nonverbal communication is a channel of interaction between humans and animals, with human body language often expressed at a subconscious level (Hasegawa, Ohtani and Ohta, 2014).

Some amusing manifestations of canine body language often noticed by humans include yawning and lip-licking, which are considered calming signals and have been observed in studies assessing animal welfare (Palestrini et al., 2010). Body language is also used to convey threats, aggression, submission, and attempts to regulate distance during social interactions, both with other animals and humans (Walsh et al., 2024).

Dogs communicate visually by altering the position of various parts of their bodies. Control of voluntary muscles allows dogs to display a wide range of postures and positions that convey different information about the signaler's internal state and intentions (Mariti et al., 2012). Consequently, communication can be extremely complex for some dogs, both in terms of accurately sending and interpreting visual information (Simpson, 1997).

A dog can and will use its entire body to communicate with humans or conspecifics (Völter et al., 2025). Dogs can express confidence, alertness, or threat by making themselves appear larger, stretching to full height, and increasing muscle tension. Canine body language signals can be divided into facial expressions (mimicry), gestures, and the posture and movement of different body parts. Gestures involve the ears and tail, while facial expressions primarily rely on the eyes and mouth (Quaranta, Siniscalchi and Vallortigara, 2007). Finally, posture also plays a crucial role. These nonverbal signals are combined to create a coherent message that the dog intends to convey.

Facial expressions (mimicry) in dogs. Facial expressions are involuntary reactions that serve to convey the emotions dogs experience (Darwin, 1872). They are considered sensitive indicators of emotional states in humans and many other animals (Bremhorst et al., 2019). Due to their close coexistence with humans, significant attention has been given to identifying these expressions, particularly in dogs (Bloom and Friedman, 2013). Consequently, facial expressions are increasingly studied as potential indicators of subjective states in research on animal emotions and welfare (Mota-Rojas et al., 2021).

Machado and da Silva (2019) assert that animals can produce facial movements — especially with their ears and eyes — linked to specific emotional states. Scientific tools and automated analysis of facial expressions help make such interpretations more objective (Borgi and Cirulli, 2016). To reduce subjectivity, researchers developed the DogFACS system (Dog Facial Action Coding System), which functions as a kind of 'dictionary' of canine facial expressions (Waller et al., 2013). It breaks down facial movements into discrete 'units', such as raised eyebrows, flattened ears, downward corners of the mouth, and so on (Martvel et al., 2025).

In experiments, dogs are exposed to different situations: a treat (joy), anticipation without a reward (frustration or annoyance), a loud noise (fear) (McPeake et al., 2019). The findings show that facial expressions change differently depending on the context, yet the patterns are generally consistent across breeds (Burrows et al., 2021). This demonstrates that a dog's face can reliably indicate what it is feeling (Boneh-Shitrit et al., 2022).

Humans tend to interpret canine expressions through an anthropocentric lens. For example, a dog's 'averted gaze' might be perceived as embarrassment, similar to how a human looks when caught doing something forbidden. However, canine facial expressions function differently: what appears as embarrassment to us may mean something entirely different for the dog. It is as if we are using the same alphabet but speaking different languages (Correia-Caeiro, Guo and Mills, 2023).

Breed differences further complicate interpretation. The same facial expression in a Collie and a Pug may look very different to humans. In Pugs, Huskies, or Dobermans, identical muscle movements can produce different visual effects. What appears as 'furrowed brows' in one breed may simply be a normal anatomical feature in another (Duffy, Hsu and Serpell, 2008).

In conclusion, when interpreted correctly, facial expressions play a crucial role in successful human–dog interactions (Mota-Rojas et al., 2021; Pickersgill, Mills and Guo, 2023).

Canine body language — calming signals. What are calming signals, and why do dogs use them? Turid Rugaas, a Norwegian dog trainer and behaviorist, coined the term 'calming signals' (Rugaas, 2006). This type of body language is used by dogs to diffuse stressful, uncomfortable, or frightening situations.

Dogs use calming gestures, such as yawning or lip-licking, to communicate to humans or other animals that they come in peace. For example, if another dog approaches, a dog may avert its gaze and lick its lips. This signals to the approaching dog that it does not intend to fight. You may also notice your own dog doing this if you scold or punish it — the dog is simply trying to convey that it poses no threat to you (Siniscalchi et al., 2013).

Dogs may also use calming signals to redirect attention in certain situations, a behavior often called 'displacement behavior' (Firnkes et al., 2017). For instance, when a dog is learning a new command it does not yet understand, it might start scratching itself excessively. This action expresses the dog's tension and nervousness. Once the dog understands the command, the scratching stops.

Calming signals are therefore an important part of canine communication, helping dogs manage social interactions and reduce potential conflicts while expressing their emotional state (Firnkes et al., 2017).

Ears as an indicator of a dog's mood. A dog's ears can reveal a great deal about its emotional state. Body language and ear position play a crucial role in expressing emotions in dogs (Machado and da Silva, 2019). Dogs' ears are highly mobile: about 20 muscles control the movement of the ear, allowing not only precise localization of sounds but also the expression of emotional states.

Ear position serves as an important indicator of mood: slightly raised ears indicate a sense of security and calmness (Siniscalchi et al., 2018), while upright ears help with sound localization. Flattened ears, pressed close to the head, most often signal pronounced fear. When a dog is interested in something, the ears are directed toward the stimulus — usually forward, as the dog is looking in that direction. The ears become pointed, and the dog often holds its head high.

Flattened or lowered ears indicate insecurity, fear, or sometimes submission. If the ears are pulled backward, it can signal aggressive intent (Pedretti et al., 2022).

By observing ear positions alongside other body signals, owners can better understand their dog's feelings and intentions in any given situation.

Mouth and facial expressions in dogs. A relaxed and slightly open mouth usually indicates that a dog is calm and content (Ertürk, 2006). When a dog is very happy or excited, it may raise the corners of its mouth — essentially smiling. Yes, dogs can smile too!

Observing the mouth, along with the eyes, ears, and overall posture, helps owners interpret a dog's emotional state more accurately and strengthens the bond between human and pet (Burrows et al., 2021; Siniscalchi et al., 2018).

Baring teeth and mouth tension in dogs. A dog's baring of teeth differs significantly from a relaxed, slightly open mouth. When a dog bares its teeth, the lips are tense and raised, revealing the teeth. Sometimes the dog also wrinkles its nose (Burrows et al., 2021). The more pronounced the baring, the more aggressive the dog is likely to be. Often, this is accompanied by growling and raised hair along the neck and shoulders.

A tightly closed mouth is a sign of insecurity, which may escalate into aggression or fear. Lip licking is another important signal, indicating that the dog is scared or anxious. This gesture is sometimes combined with a nervous yawn, showing that the dog is experiencing significant stress or discomfort (Ertürk, 2006).

Observing these subtle cues is essential for understanding a dog's emotional state and preventing potential conflicts.

Eyes in canine body language. Eyes play a key role in canine body language, serving not only as sensory organs but also as important tools for social communication (Savalli, Resende and Gaunet, 2016). Eye contact, especially in dogs, is one of the most significant and effective channels for conveying information (Vas et al., 2005). Direct staring usually occurs during close interactions. Most often, it can be a challenge, but some dogs will gaze intently at a beloved owner to anticipate their wishes (Topál, Kis and Oláh, 2014). It is important to consider other signals to accurately interpret what a stare means (Borgi and Cirulli, 2016).

Eye shapes vary by breed: some dogs have round eyes, others almond-shaped. Eyes that appear larger than usual typically indicate that the dog feels threatened, stressed, or frightened. Aggressive dogs also often have eyes that seem larger than normal (Bremhorst et al., 2021). Conversely, small or squinted eyes can indicate fear or stress.

Dogs frequently avert their gaze to show that they are not seeking conflict. This gesture can be exaggerated by turning the muzzle or lowering the head. Some owners interpret this as guilt, but in reality, the dog simply senses displeasure and attempts to appease humans.

Eyes are also used to communicate emotional states to other animals. Extremely wide eyes can signal that the dog feels threatened, whereas gaze aversion serves as a calming signal, reducing tension (Crosby and Rider, 2019). Observing eye behavior in conjunction with other body signals provides a more complete understanding of a dog's emotional state.

Body posture in dogs. A dog's body posture communicates a wide range of emotions and intentions. When a dog lowers its front body to the ground, it is inviting you or another dog to play. In this posture, the dog may eagerly chase a ball or engage in playful wrestling.

A tense body — especially with raised fur along the neck or spine — indicates alertness and can signal aggression (Duffy, Hsu and Serpell, 2008). Highly nervous dogs may pace or walk in circles (Siniscalchi et al., 2018).

When a dog is scared, it often tries to make itself appear smaller: lowering its body, dropping its head, and hunching its back. Conversely, when demonstrating dominance, the dog's legs stiffen, the back straightens, and the head is held high. If a dog in this posture looks at another animal or person and moves toward them, it may be preparing to attack.

Rolling onto the back shows trust and submission, indicating that the dog recognizes the human's authority. Sometimes, dogs also do this to request belly rubs. Submissive behavior can also be displayed when a dog lies down with its head and tail lowered.

By observing a dog's body posture alongside other signals such as facial expressions, ears, and tail movements, owners can better interpret the dog's emotional state and intentions.

Talking tails in dogs. The tail is a true indicator of a dog's mood and plays an important communicative role. Its position and movement, combined with facial expressions, create complex signaling patterns that reflect different emotional states (Machado and da Silva, 2019). Due to its length and high mobility, the tail serves as a highly visible means of communication, effective even over considerable distances and allowing a wide range of interpretations (Leonetti et al., 2024). Tail position and dynamics provide insight into a dog's intentions and emotional state. A high tail usually signals confidence, excitement, or motivation to initiate interaction, such as during greetings or play. When anxious, the tail lowers — the lower it goes, the more fearful the dog (Siniscalchi et al., 2013). In cases of extreme fear, the tail is tucked tightly between the hind legs. Many people assume that a wagging tail always indicates happiness, but this is not necessarily true. A slightly lowered tail moving slowly can indicate confusion (Stellato et al., 2017). Quaranta, Siniscalchi and Vallortigara (2007) studied asymmetry in tail movement control in dogs, as well as differences in movement amplitude to the left and right depending on visual stimuli. They found that when seeing their owners, dogs showed a pronounced rightward bias with greater amplitude in tail movement. A similar reaction was observed toward strangers, though the range of motion was less pronounced (Quaranta, Siniscalchi and Vallortigara, 2007).

Paws also play a role in communication. Placing a paw on another dog's head, withers, or back can signal a claim to leadership; if the other dog disagrees, a fight may occur. Owners should be attentive when noticing this gesture. Dogs may also touch their human's hand or body with a paw to get attention, request a treat or toy, or lead the person somewhere.

Practical advice: How to learn to understand your dog. When trying to understand dogs, the first thing to pay attention to is their body language and posture, including the position of the head and neck, ear placement, tail position and activity, raised fur along the shoulders or back, eye and ear orientation, facial expressions, and vocalizations (Darwin, 1872; Rugaas, 2006). Learning to understand canine body language is primarily a matter of practice. It is evident that building good mutual understanding with a dog should begin at a young age, and a quality puppy school often includes training in these skills. Take time to observe dogs in various situations and pay close attention even to small changes in their posture and facial expressions. You can consult an animal behaviorist or professional dog trainer, who can provide advice and exercises to help you better interpret what your dog is trying to communicate. These activities will reinforce your understanding of how dogs interact with one another, leading to more positive experiences when meeting new puppies. Through observation and experience, you will learn to interpret more accurately what your dog is really trying to tell you (Ertürk, 2006; Siniscalchi et al., 2018).

Understanding canine body language is an ongoing learning process that offers numerous benefits. By carefully attending to your dog's signals, you can improve communication, enhance safety, and strengthen the bond with your four-legged friend. Use this knowledge to ensure a happy and harmonious relationship with your dog (Firnkes et al., 2017; Górski, Kondracki and Kępka-Borkowska, 2026).

Conclusions and future research perspectives. Dogs are sincere in expressing their emotions, but they do not always experience the same feelings as humans in similar situations. The ability to read canine body language helps recognize when a dog is relaxed, tense, fearful, or ready to respond, allowing for appropriate reactions and ensuring the safety of everyone involved.

Communicating with a dog is an art of attentiveness. Their signals require sensitivity from us. By learning to understand them, one can discover a remarkable world of loyalty, joy, and complex emotions that can reside in even the smallest paw. This is a dialogue in which one

must listen not only with the ears, but also with the eyes and the heart.

Understanding canine body language is not an innate skill but a result of observation, learning, and love for your pet. By studying signals, postures, and sounds, it is possible to establish a strong bond with a dog and create a more harmonious shared life. Do not interpret individual signals in isolation; pay attention to how they manifest together as a whole.

As we continue to uncover the mysteries of the animal world, it becomes increasingly clear that our furry companions have much more in common with us than previously thought.

Thus, by applying knowledge of canine body signals, opportunities arise to understand how dogs communicate with each other, to interact with a dog on its own terms, to strengthen the bond with your dog, and to give the dog confidence through trust in its owner.

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Received 27.03.2026 **Accepted 20.04.2026** **Published 12.05.2026**

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