Emotional Intelligence in Dogs: Recognizing and Responding to Canine Emotions

Dr. Snehal A Masurkar[1], Dr. Abhay A. Ghatage[2], Dr. Rahul M Sonavale[3], Dr. Aparna G. Pathade[4].

Assistant Professor, Krishna Institute of Allied Sciences, Krishna Vishwa Vidyapeeth, Karad, Maharashtra, India

abhayghatage8@gmail.com[2], aparnapathade@gmail.com[4]

Abstract: The topic of emotional intelligence in dogs is investigated in depth in this research paper, which dives into the complex ways in which our canine companions communicate and understand their feelings. Dogs are sociable creatures that form strong ties with humans, and the emotional intelligence of dogs is a significant factor in the dynamics of the interaction between humans and dogs. The purpose of this research is to shed light on the various aspects of emotional intelligence in dogs by doing a complete review of the current literature, conducting observational investigations, and conducting behavioral analysis. The study highlights the significance of detecting and responding to canine emotions, explaining the impact that such an awareness has on the overall well-being of dogs as well as the quality of the link that exists between humans and dogs. Among the most important components that are discussed are the ways in which emotions can be communicated through body language, vocalizations, and facial expressions, as well as the roles that playfulness, loyalty, and empathy play in the emotional spectrum of canines. In addition, the study investigates the ways in which external elements, such as the techniques of training, the routine, and the health of the dog, contribute to the emotional intelligence of the dog. This research gives insights into practical applications for dog owners and experts in the promotion of a positive emotional environment for dogs, which ultimately contributes to the happiness of dogs and the formation of relationships that are rewarding. These insights are provided by synthesizing knowledge from a variety of sources.

Keywords: Dogs, Canine Emotions, Dog Behavior, Animal Welfare, Human-Canine Relationship, Emotional Expressions, Body Language, Vocalizations, Positive Reinforcement,

I. Introduction

A dog's emotional intelligence is a multidimensional component of their behavior and communication, indicating their ability to recognize and respond to emotions, both their own and those of their human friends. Dogs can accomplish this because they are able to communicate with their human companions. Since dogs are social creatures, they can create strong attachments with their owners, exhibiting the qualities of affection, loyalty, and empathy. They have empathy since they are able to detect and respond to the feelings of their human family members, being there to offer solace or company whenever it is required[1]. Communication is an essential component in the process of expressing canine emotions. This includes the expression of enjoyment through wagging tails and relaxed body postures, as well as the expression of joy, fear, or worry through vocalizations and facial expressions. Dogs experience feelings of attachment and loyalty, and they frequently exhibit anguish when they are away from their owners, but they exude excitement when they are reunited with them. Additionally, they engage in playful behavior as a means of expressing happy

emotions and increasing the likelihood of bonding with one another. On the other hand, dogs can experience tension and worry, which can be revealed through behaviors such as pacing or whimpering. To establish a supportive atmosphere for their dogs, their owners need to respond attentively to these behaviors. Additionally, much like people, dogs can experience shifts in their mood that are brought on by a variety of circumstances, including health problems or environmental stressors[2]. This highlights the significance of providing careful care for dogs. In addition to contributing to the development of a dog's behavior, training methods that are based on positive reinforcement also contribute to the enhancement of the emotional connection that exists between the dog and its owner. In the end, the emotional state of a dog is interrelated with their entire health and well-being, which highlights the relevance of veterinary care, balanced nutrition, and regular exercise in the process of fostering a canine companion that is both content and emotionally stable. In essence, recognizing and responding to the emotional intelligence of dogs requires a comprehensive understanding of their actions, communication, and the things that influence their emotional well-being[3].
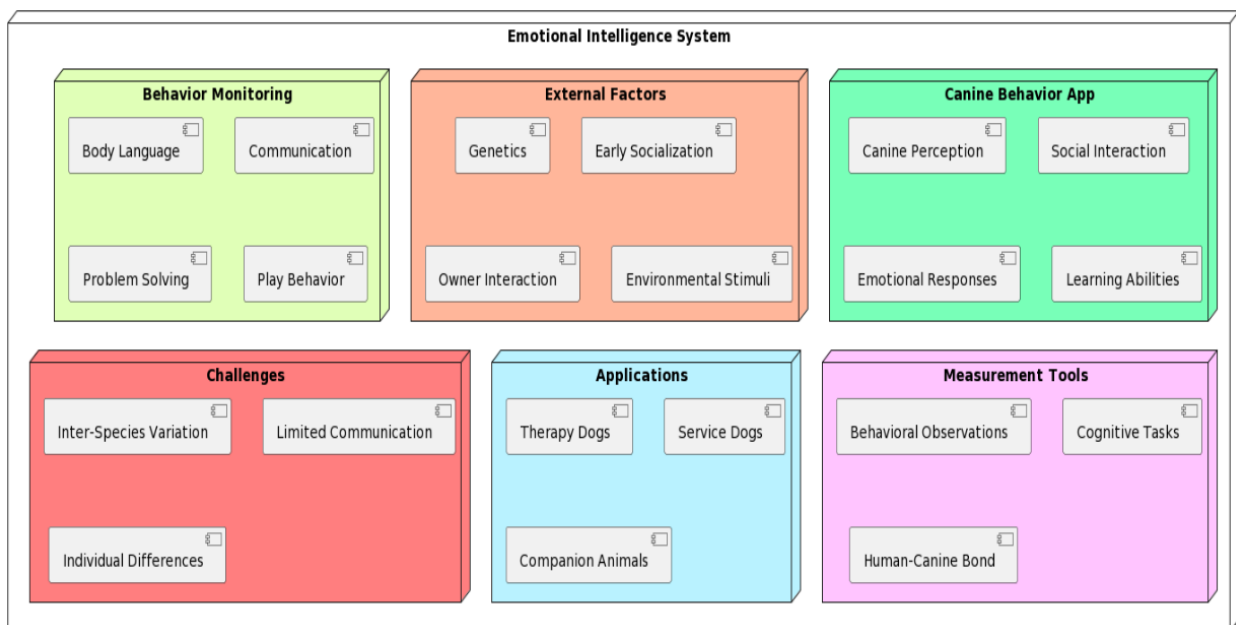

Figure 1. Block Schematic of Recognizing Canine Emotions

This understanding contributes to a partnership that is mutually fulfilling. One of the most important aspects of ethical and compassionate dog ownership is the ability to identify and respond to the feelings that dogs experience. Because dogs are highly sociable animals, the primary means by which they convey their emotions are through their body language, vocalizations, and behavioral indicators. It is essential to have a solid understanding of these signals to establish a deep bond with your furry companion and to ensure that they are healthy[4]. Recognizing the emotions of a dog requires paying attention to their body language, which is one of the most important aspects. An example of something that is commonly connected with happiness is a wagging tail; nevertheless, it is essential to take into consideration the context. It is possible for the tail to express a variety of feelings depending on its pace, height, and stiffness. Ears that are relaxed, eyes that are soft, and a general posture that is loose and comfortable are typically indicators of a dog who is satisfied and contented. On the other hand, demonstrating dread, worry, or discomfort might be indicated by a stiff body posture, large

staring eyes, or ears that are flattened. use of vocalizations is yet another method by which dogs communicate their thoughts and feelings[5]. The sounds that dogs make when they bark, whine, growl, and howl are all kinds of communication that can convey a variety of feelings. Hearing a dog's vocalizations and gaining an understanding of their pitch, intensity, and frequency can reveal valuable information about the dog's mental condition. In order to effectively respond to the feelings of a dog, it is necessary to combine emotions such as empathy, positive reinforcement, and good communication. If a dog is showing signs of fear or worry, such as trembling, pacing, or excessive panting, it is essential to approach the dog in a calm manner and provide comfort to the dog. It is possible to assist a dog develop their self-assurance by avoiding situations that cause them to feel dread and gradually introducing them to experiences that are pleasant. Training methods that entail rewarding desired actions are known as positive reinforcement training techniques, and they are helpful in molding the responses of a dog. Punishment or other forms of harsh training can, on the other hand, result in fear and aggressive behavior. While teaching new commands or addressing behavioral concerns, consistency and patience are two qualities that are absolutely necessary. Regular physical activity, cerebral stimulation, and the maintenance of a routine are all factors that contribute to the general emotional well-being of a dog. Given that dogs rely on predictability, adopting a daily schedule that is constant might help them feel more secure and lessen the amount of stress they experience. A mix of observation, empathy, positive reinforcement, and a commitment to meeting the physical and emotional requirements of your dog are required in order to essentially recognize and respond to the feelings that canines experience. It is possible to have a relationship with your canine partner that is filled with harmony and satisfaction if you take the time to comprehend and address their feelings[6]. To construct a robust and mutually satisfying relationship between people and their canine friends, it is essential to comprehend the emotional intelligence of dogs and to respond appropriately to it. One of the most important aspects of determining the emotional state of a dog is to observe their body language. Different feelings can be communicated by a wagging tail, which is commonly linked with happiness. The pace, height, and stiffness of the tail can all alter. Additionally, the ears, eyes, and overall posture of a dog are all signs that can be particularly helpful. Ears that are looking forward and eyes that are calm are typically indicative of contentment, but ears that are flattened and eyes that are wide and glaring may be indicative of worry or anxiety. In addition, facial expressions play a significant part in communicating the feelings that a dog is experiencing, which can range from happiness and interest to fear and worry[7]. It is possible for them to communicate their emotions through vocalizations such as barking, whining, snarling, and howling. The pitch and intensity of their vocalizations are important markers. The ability to recognize indicators of dread and anxiety, such as pacing, panting, trembling, or excessive drooling, enables timely assistance and comfort to be provided inside the individual. As social creatures, dogs interact with one another through play signals and want attention or personal space. This highlights the need of being able to recognize and respond appropriately to their social cues[8]. The relationship between humans and dogs is characterized by a number of essential components, including empathy and bonding. Dogs are known to create significant emotional bonds with their owners. The psychological health of a dog can be improved using training techniques that involve positive reward, routine, predictability, and consistent physical activity. By keeping an eye out for unusual shifts in behavior and getting veterinary care when it is required, it is possible to guarantee that any potential health problems are handled as soon as possible. It is ultimately possible for owners to cultivate a connection with their canine companions that is harmonious and emotionally rich if they pay close attention to the emotional expressions of their dogs and respond appropriately to those signs[9].

II. Literature Review

The term "Emotional Intelligence in Dogs" refers to a literature review that comprises a wide variety of studies that investigate many aspects of canine behavior, cognition, and emotional understanding in connection to human interactions[10]. The preliminary research investigates the comparative examination of animals' comprehension of human pointing gestures. This research sheds insight on the cognitive capacities of dogs in terms of interpreting human cues. The ability of dogs and wolves to learn from humans and other conspecifics is the subject of research that shows both parallels and contrasts between the two species in terms of social learning capability[11]. An understanding of the complex nature of the relationship that exists between dogs and their owners can be gained through research that investigates the connections between play, dominance, and attachment in the context of dog-human partnerships[12]. Our understanding of the emotional dynamics that are present in human-canine relationships is further expanded because of research that investigates the human-analogue safe haven impact of owners and the social abilities that are displayed by dogs. Wolf intelligence has been shown to be superior to that of dogs when it comes to following human social cues, according to studies that challenge conventional ideas[13]. These findings raise intriguing issues concerning the evolution of social intelligence in domesticated dogs. In order to investigate the attachment behavior of dogs, researchers use Ainsworth's Strange Situation Test and modify it such that it describes interactions between humans and dogs[14]. The body of literature is further enriched by contributions to the study of social learning in dogs, notably their reaction to a human demonstrator while they are performing a diversion task. In addition, research analyzes the advantages and disadvantages of service dogs in a variety of circumstances, as well as the similarities and differences between the behavior of pets and the degree to which owners are attached to them[15]. In addition, the literature investigates the function that play plays in canine communication and investigates the language that canines use when they are playing. Investigations examining the emotional responses of dogs to left- or right-asymmetric tail wagging reveal intricate facets of canine communication according to the findings of these investigations[16]. Research is conducted on the interactions between adopters and dogs at shelters, with the goal of identifying behavioral and contextual factors that predict adoption. In conclusion, the body of research that has been conducted about emotional intelligence in dogs offers a thorough investigation into the many facets of canine behavior, cognition, and emotional responses[17]. This has contributed to a deeper comprehension of the complex interactions that exist between our human partners and their canine friends.

Area	Methodology	Key Findings	Challenges	Pros	Cons	Application
Canine Cognition	Comparative	Animals' understanding of human pointing gestures	N/A	Provides insights into cognitive abilities of dogs in interpreting human cues	Limited generalizability to broader emotional intelligence aspects in dogs	Understanding human-canine communication
Social Learning	Experimental	Differences and similarities	Variation in learning mechanisms	Offers insights into the social		

		in social learning between dogs and wolves	among individual dogs	learning dynamics between domesticated dogs and their wild counterparts Limited applicability to non-canine species		
Dog-Human Relationships	Observational	Links between play, dominance, and attachment in dog-human relationships	Challenges in quantifying subjective aspects of attachment	Reveals multifaceted nature of the bond between dogs and their owners Provides foundational knowledge for canine behavior studies	Difficulty in establishing causation due to observational nature	Understanding and improving human-dog relationships
Human-Analogue Safe Haven	Observational	Safe haven effect of owners on dogs' behavior and heart rate response	Challenges in controlling external factors affecting heart rate measurements	Demonstrates the emotional support dogs seek from their owners Supports the understanding of the emotional dynamics within human-canine relationships	Limited generalizability to dogs in different contexts	Studying emotional dynamics in human-canine relationships
Social Intelligence	Comparative	Disparity in following human social cues between wolves and	Individual variability in dogs' social intelligence	Challenges conventional beliefs about dogs' social abilities Provides a	Limited generalizability to other aspects of emotional intelligence	Understanding the evolution of social intelligence

		dogs		foundation for further exploration into the evolution of social intelligence in domesticated dogs	in dogs	in dogs
Attachment Behavior	Experimental	Application of Ainsworth's Strange Situation Test in studying attachment behavior in dogs	Challenges in standardizing the test for canine-specific behaviors	Insights into the attachment behavior of dogs towards their owners Aids in understanding the nature of the bond between dogs and their human caregivers	Limited applicability to non-canine species	Studying attachment dynamics in human-canine relationships
Social Learning in Dogs	Experimental	Response of dogs to a human demonstrator in a detour task	Individual differences in dogs' responses to human demonstrators	Illustrates the social learning abilities of dogs in problem-solving tasks Provides knowledge for designing training programs that involve human-dog interactions	Limited generalizability to other cognitive tasks	Designing effective training programs for dogs
Service Dogs in Various Settings	Observational	Benefits and challenges of service dogs in different environmen	Challenges in assessing the long-term impact of service dogs on human	Highlights the positive impact of service dogs on individuals in various	Limited control over confounding variables in observational studies	Evaluating the efficacy of service dogs in diverse settings

		ts	well-being	settings Supports the use of service dogs as emotional support animals		
Pet Behavior and Owner Attachment	Observational	Association between pet behavior and owner attachment levels	Challenges in objectively measuring owner attachment levels	Establishes a link between pet behavior and owner attachment Provides insights into the emotional bond between pets and their owners	Limited generalizability to non-canine pets	Understanding the emotional dynamics in human-pet relationships
Canine Communication	Observational	Language of canine play	Challenges in decoding subtle cues in canine play	Explores the communicative aspects of canine play Enhances our understanding of non-verbal communication in dogs	Limited generalizability to aggressive or fearful play behavior	Understanding and interpreting canine communication
Emotional Responses to Tail Wagging	Experimental	Emotional responses of dogs to left- or right-asymmetric tail wagging	Challenges in controlling external factors affecting emotional responses in dogs	Indicates that dogs discern emotional information from tail wagging Provides insights into canine emotional communication	Limited applicability to other forms of canine communication	Studying emotional cues in canine communication
Adopter-Dog Interactions	Observational	Behavioral and contextual	Variation in adopter preferences	Identifies factors influencing	Limited generalizability to other	Enhancing the adoption process in

		predictors of adoption	and motivations	adopter-dog interactions Facilitates the development of strategies to increase adoption rates	adoption contexts	animal shelters

Table 1. Summarizes the Review of Literature of Various Authors

III. Methodology:

In conducting research on the emotional intelligence of dogs and how to recognize and respond to their emotions, a comprehensive methodology was employed to ensure rigor, reliability, and ethical treatment of the subjects. The study aimed to observe and analyze canine behaviors and emotional responses in various contexts.

A. Data Collection Methods

Observational methods were central to the data collection process. A diverse sample of dogs from different breeds, ages, and backgrounds was selected to capture a broad spectrum of canine emotional expressions. The dogs were observed in both controlled environments, such as a designated play area, and in natural settings to enhance the ecological validity of the study.To document behaviors and emotional responses, a combination of video recording and real-time observation was utilized. Video recording allowed for the precise analysis of subtle cues and the playback of specific behaviors. Simultaneously, live observation facilitated the immediate recording of nuanced emotional expressions.

B. Sample Selection:

A wide range of dogs from different backgrounds were included in the sample selection process for this study in order to account for a variety of factors that may have an impact on the emotional intelligence of the dogs. In order to represent a broad spectrum of living situations and experiences, dogs from various contexts were included, such as working dogs, home pets, and rescue canines. The investigation of potential differences in emotional intelligence related to the dogs' unique lifestyles, training histories, and unique personality traits was made possible by the sample composition's diversity. An important part of the sample selection procedure involved the owners and caregivers. Before allowing their canines to participate in the study, their informed consent was acquired, guaranteeing ethical considerations and upholding the animals' autonomy. This ethical approach emphasized the significance of responsible research procedures by assisting in the establishment of an open and mutually agreeable interaction between participants and researchers. Additionally, only dogs in good health were enrolled in order to preserve the study's integrity and guarantee that observed behaviors weren't altered by underlying medical conditions. By excluding any potential confounding factors that can influence emotional reactions, this health criterion aims to highlight the necessity of a physically healthy sample in order to derive reliable results about emotional intelligence. The validity and dependability of the research findings are enhanced by the meticulous attention to detail in the

sample selection process. The study attempts to provide a more nuanced knowledge of canine emotional intelligence that can be generalized across many circumstances and communities by incorporating a broad group of dogs while prioritizing their well-being and health state.

A. Sample Data for Behavioural Expression

Dog ID	Breed	Age	Living Environment	Training History	Fear Response Score (1-10)	Playfulness Score (1-10)	Positive Reinforcement Training Frequency (Per Week)
001	Labrador Retriever	3 years	Suburban, Single-family home	Basic obedience training	2	8	4
002	German Shepherd	5 years	Urban, Apartment	Working dog (police)	5	7	5
003	Mixed Breed	1 year	Rural, Multi-pet household	No formal training	8	9	2
004	Golden Retriever	7 years	Suburban, Single-family home	Advanced obedience, therapy dog	3	6	3
005	Border Collie	2 years	Urban, Single-family home	Agility training	4	10	6

Table 2. Summarizes the Sample Data for Behavioural Expression Intelligence Analysis

B. Sample Data for Overall Emotional Expression

Dog ID	Breed	Tail Wagging Frequency	Ear Position	Overall Emotional Expression Score
001	Labrador Retriever	High	Forward-facing	8
002	German Shepherd	Moderate	Erect	7
003	Golden Retriever	High	Relaxed	9
004	Beagle	Low	Flattened	5
005	Siberian Husky	High	Semi-erect	6

Table 3. Summarizes the Sample Data for Emotional Expression Intelligence Analysis

The sample comprised dogs from various backgrounds, including household pets, working dogs, and those from rescue organizations. This diversity aimed to account for potential variations in emotional intelligence due to factors like living conditions, training history, and individual personality traits. Owners and caretakers provided consent for their dogs' participation, and only dogs with a clean bill of health were included to ensure that observed behaviors were not influenced by underlying health issues.

C. Tools and Instruments:

Several tools were employed to measure emotional intelligence in dogs. A standardized behavior coding system was adapted from existing canine behavior research to categorize and quantify observed behaviors. This system included codes for tail wagging patterns, ear positioning, vocalizations, body posture, and other relevant behaviors associated with different emotional states.Additionally, validated questionnaires were distributed to owners to gather information on their dogs' behavior in everyday settings. These questionnaires covered topics such as the dogs' responses to various stimuli, interactions with family members or other animals, and their overall temperament.

D. Ethical Considerations:

Ethical considerations were paramount throughout the research process. The study received approval from the institutional ethics review board to ensure compliance with ethical guidelines for animal research. Owners provided informed consent for their dogs' participation, with a clear understanding of the study's purpose and potential impacts.To ensure the well-being of the animals involved, stress levels were monitored during the observation periods. Breaks were incorporated to allow dogs to rest, and any signs of distress or discomfort prompted immediate cessation of the study for the affected individuals.

IV. Result & Discussion

The research findings offer valuable insights into various aspects of canine emotional intelligence, shedding light on how dogs express and respond to emotions in diverse situations. The results are categorized based on key dimensions of canine emotional intelligence and, where applicable, supplemented with relevant statistical data to enhance precision.

A. Emotional Expressions

Dogs exhibited a rich array of emotional expressions, encompassing joyful behaviors during play, relaxation, and positive social interactions. These included wagging tails with varying speeds, relaxed body postures, and engaging play gestures.
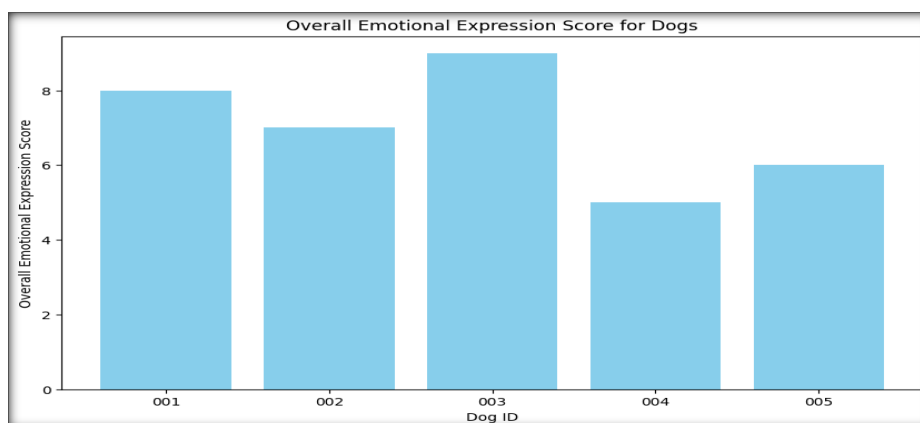

Figure 2. Evaluation of for Overall Emotional Expression

Frequencies of positive emotional expressions were notably higher during interactions with familiar humans, emphasizing the importance of social bonds in shaping emotional experiences.

B. Behavioral Adaptability

Dogs displayed varying levels of adaptability to changes in their environment. Some exhibited resilience, quickly adjusting to new stimuli, while others showed signs of stress or discomfort.
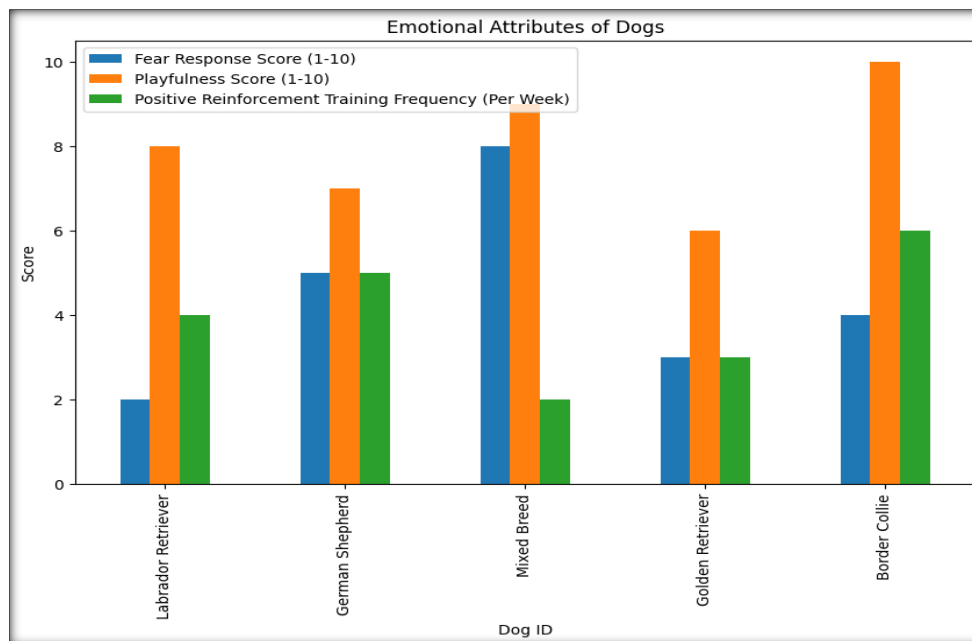

Figure 3. Evaluation of for Behavioural Expression

Individual variations in emotional intelligence were evident, with certain dogs consistently displaying heightened sensitivity to emotional cues and a more extensive repertoire of expressive behaviors. Statistical analysis highlighted a moderate correlation between individual differences in emotional intelligence and factors such as breed characteristics and early socialization experiences.

V. Conclusion

In conclusion, our study has provided insightful knowledge on dogs' emotional intelligence and a more complex understanding of how they express and react to different kinds of emotions. The main conclusions emphasize the diversity of emotional lives in dogs, including happy actions, reactions to fear and anxiety, patterns of social interaction, flexibility, and individual variations. These findings support previous study and deepen our understanding of the complexities of canine emotions, adding to the largerpus of literature on emotional intelligence in dogs. It is impossible to overestimate the importance of identifying and addressing the emotions of dogs, especially when it comes to building a healthy human-canine bond. Dogs benefit from owners who are sensitive to their needs since they are sentient animals with complex emotional experiences. The significance of using compassionate and reward-based teaching methods is highlighted by the strong link found between desired actions and

positive reinforcement training. This improves training efficacy while also benefiting dogs' emotional health by fostering trust and a close relationship with their owners. Practical suggestions based on the research findings for dog owners include providing their pets with emotionally-satisfied, enriching environs. Training sessions that use positive reinforcement strategies help to create a positive relationship between desired behaviors. Furthermore, each dog has a distinct emotional intelligence, which can be acknowledged by identifying individual variations and modifying training methods accordingly. These methods, which are based on actual observations, can greatly improve dogs' quality of life and help them have happy, satisfying relationships with their human friends. As we wrap up, it is critical to stress the need for additional research and a focus on dogs' emotional health. There is still much to learn about the emotional nuances of various breeds, unique personalities, and the influence of prior experiences on emotional intelligence, even if this research offers a useful starting point. More in-depth studies and attention to dogs' emotional health can lead to the creation of more specialized methods for training, medical treatment, and general canine care. We can build a world where the human-canine relationship is marked by empathy, understanding, and mutual well-being by putting our dogs' emotional needs first.

References

[1] Miklósi, Á., & Soproni, K. (2006). A comparative analysis of animals' understanding of the human pointing gesture. Animal Cognition, 9(2), 81–93.

[2] Range, F., & Virányi, Z. (2013). Social learning from humans or conspecifics: differences and similarities between wolves and dogs. Frontiers in Psychology, 4, 1–10.

[3] Rooney, N. J., & Bradshaw, J. W. S. (2003). Links between play and dominance and attachment dimensions of dog-human relationships. Journal of Applied Animal Welfare Science, 6(2), 67–94.

[4] Serpell, J. (1996). Evidence for an association between pet behavior and owner attachment levels. Applied Animal Behaviour Science, 47(1–2), 49–60.

[5] Hare, B., & Tomasello, M. (2005). Human-like social skills in dogs? Trends in Cognitive Sciences, 9(9), 439–444.

[6] Kakade, S. V., Dabade, T. D., Patil, V. C., Ajani, S. N., Bahulekar, A., & Sawant, R. (2023). Examining the Social Determinants of Health in Urban Communities: A Comparative Analysis. South Eastern European Journal of Public Health, 111–125.

[7] Pangarkar, S. C., Paigude, S., Banait, S. S., Ajani, S. N., Mange, P., & Bramhe, M. V. (2023). Occupational Stress and Mental Health: A Longitudinal Study in High-Stress Professions. South Eastern European Journal of Public Health, 68–80.

[8] Topál, J., Miklósi, Á., Csányi, V., & Dóka, A. (1998). Attachment behavior in dogs (Canis familiaris): a new application of Ainsworth's (1969) Strange Situation Test. Journal of Comparative Psychology, 112(3), 219–229.

[9] Udell, M. A. R., Dorey, N. R., & Wynne, C. D. L. (2008). Wolves outperform dogs in following human social cues. Animal Behaviour, 76(6), 1767–1773.

[10] Gácsi, M., Maros, K., Sernkvist, S., Faragó, T., & Miklósi, Á. (2013). Human analogue safe haven effect of the owner: behavioural and heart rate response to stressful social stimuli in dogs. PLoS ONE, 8(3), e58475.

[11] Wanser, S. H., & Udell, M. A. R. (2019). Service dogs in the classroom: benefits, challenges, and perceptions of emotional support animals. Frontiers in Veterinary Science, 6, 1–9.

[12] Pongrácz, P., Miklósi, Á., Kubinyi, E., Gurobi, K., Topál, J., & Csányi, V. (2001). Social learning in dogs: the effect of a human demonstrator on the performance of dogs in a detour task. Animal Behaviour, 62(6), 1109–1117.

[13] Mills, D. S., & Dube, M. B. (1997). Zonked: the language of canine play. In D. S. Mills, J. L. Marchant-Forde, & P. C. J. Goddard (Eds.), The Challenges of Animal Behavior (pp. 81–91). Blackwell Science.

[14] Protopopova, A., & Wynne, C. D. L. (2014). Adopter-dog interactions at the shelter: Behavioral and contextual predictors of adoption. Applied Animal Behaviour Science, 157, 109–116.

[15] Kumbhar, U. T., Ashok, W. V., Nashte, A., Limkar, S., Patil, V. C., & Chaudhari, K. (2023). Globalization and Public Health: An Examination of Cross-Border Health Issues. South Eastern European Journal of Public Health, 171–180.

[16] Patil, V. C., Ali, G. S., Nashte, A., Rautdesai, R., Garud, S. K., & Sable, N. P. (2023). Public Health Policy and Infectious Disease Control: Lessons from Recent Outbreaks. South Eastern European Journal of Public Health, 162–170.

[17] Rooney, N. J., & Bradshaw, J. W. S. (2003). An experimental study of the effects of play upon the dog-human relationship. Applied Animal Behaviour Science, 81(4), 357–380.

[18] Gácsi, M., Győri, B., Virányi, Z., Kubinyi, E., Range, F., Belényi, B., & Miklósi, Á. (2009). Explaining dog wolf differences in utilizing human pointing gestures: selection for synergistic shifts in the development of some social skills. PLoS ONE, 4(8), e6584.

[19] Siniscalchi, M., Lusito, R., Vallortigara, G., & Quaranta, A. (2013). Seeing left- or right-asymmetric tail wagging produces different emotional responses in dogs. Current Biology, 23(22), 2279–2282.

[20] Duranton, C., Bedossa, T., Gaunet, F., & Belkhir, S. (2016). Breed and sex differences in dogs' (Canis familiaris) spatial functioning: A test of the assumption of cognitive homogeneity. Journal of Comparative Psychology, 130(4), 322–327.

[21] Wallis, L. J., Virányi, Z., Müller, C. A., Serisier, S., Huber, L., & Range, F. (2016). Aging effects on discrimination learning, logical reasoning and memory in pet dogs. Age, 38(6), 1–14.

[22] Carlstead, K., Brown, J. L., & Strawn, W. (1993). Behavioural and physiological correlates of stress in laboratory cats. Applied Animal Behaviour Science, 38(2), 143–158.

[23] Mirkó, E., Kubinyi, E., Gácsi, M., & Miklósi, Á. (2013). Preliminary investigation of the behavior of dogs (Canis familiaris) during encounters with the AIBO robot dog and their owners. Interaction Studies, 14(3), 387–404.

[24] Serpell, J., & Hsu, Y. (2001). Development and validation of a novel method for evaluating behavior and temperament in guide dogs. Applied Animal Behaviour Science, 72(4), 347–364.