



Friend or foe: Context dependent sensitivity to human behaviour in dogs

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ABSTRACT

During the course of domestication dogs (*Canis familiaris*) have inhabited a social field characterized by inter-specific interactions with humans. The mutually advantageous social contact between dogs and humans is facilitated by effective mechanisms that negotiate ongoing interactions and avoid the escalation of conflicts.

We investigated the reaction of 37 family dogs towards the approaching owner and experimenter who communicated either threat or friendliness both in playful and non-playful situations. Dogs' behavioural responses were in accordance with the conflicting (threatening) and non-conflicting (friendly) manner of the approaching humans both in the non-playful and the playful situations. The familiarity of the interacting human partner (owner or experimenter) affected the behaviour of dogs only in the non-playful situations, where contact-seeking was less typical and gaze-averting tendencies were more pronounced towards the experimenter. The threatening approach elicited tolerant/contact-seeking reactions towards the owner in both situations and also towards the experimenter in the playful situation. But dogs were avoidant/aggressive with the experimenter in the non-playful situation. Play bows were triggered by both human partners' threatening approach, but only in the playful situation. Results suggest that this signal appears when the human partners' behaviour becomes ambiguous in relation to the social context.

We propose that the flexible utilization of various conflict-resolving behaviours depending on the actual partners represent fundamental elements of dogs' social competence. These skills help dogs to manoeuvre efficiently in the course of dog–human interactions in various social contexts.

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1. Introduction

Living in social groups provides obvious benefits to group members. Nevertheless, group-living has also costs because conflicts among group members may occur in many contexts. In stable and individualized groups, members need effective mechanisms to prevent harmful escalation of conflicts (Aureli and de Waal, 2000). Escalation of conflict into potentially harmful aggressive

interaction can occur during serious agonistic interactions when a subject reacts fearfully or aggressively to the threat or physical aggression of a companion (Aureli et al., 2002). Social play provides a context for the escalation of agonistic interactions, because it is characterized by the incorporation of behavioural elements from various interactions such as mating, predation and fighting, which could be misinterpreted by the playing partner (Bekoff, 1995; Bekoff and Allen, 1998).

Play signals are suggested to be play-specific behavioural elements that can be used by participants (and also by human observers) to distinguish playful from non-playful interactions (Fagen, 1981). Communicating the maintenance of ongoing play is particularly important

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when one of the participants performs an ambiguous action (Bekoff, 1995). The highly stereotyped form of the canid play bow and its occurrence before or after certain non-playful actions (e.g. bites) supports its communicational function during intra-specific play in canid species (wolves, coyotes and dogs) (Bekoff, 1977, 1995).

So far research has mainly been focused on the species-specific differences in canid play (e.g. Feddersen-Petersen, 1986, 1991), and developmental changes (Koda, 2001). However, dogs are unique candidates for studying social play also because they engage in social play not only with conspecifics but also with humans throughout their entire life. In two recent papers Rooney and her colleagues have investigated the forms and effects of play signals in inter-specific playful interactions between dogs and humans (Rooney et al., 2001; Rooney and Bradshaw, 2006). They observed that humans utilize various forms of behaviours as play signals in spontaneous playful interactions with their dog. They also tested the effectiveness of some human behaviours in eliciting play behaviour from the dog, and showed that dogs decoded a diverse set of human signals as play invitations. The most effective forms (lunge, human bow) resembled some important features of the dogs' species-typical play signals. These findings are in line with Mitchell and his colleague's earlier study (Mitchell and Thompson, 1991) which pointed out that dogs might have individual preferences for engaging in certain play routines. They observed that dogs were ready to join in compatible play projects with humans and with compatible interactions they could extend and easily initiated mutual play. Most recently, in a study of 68 family dogs, Tóth et al. (2008) found that over time the dogs and their owners developed a routine of games and the dogs did not generalize the observed behaviour routines to other, functionally different situations. They suggested that no direct relationship exists between competitive behaviour in game situations and striving after dominance in non-playful activities, because the human partners' play signals clearly distinguish games from real competitive situations.

It has been assumed that forming stable groups with another species presented new challenges for dogs, and selection during the course of domestication favoured the fine tuning of their ability to read and anticipate the behaviour of humans while interacting with them (Miklósi et al., 2004). Here we investigate the ability of dogs to adjust their behaviour flexibly to different human partners (owner and experimenter) when they communicate friendly or threatening intentions embedded in playful or non-playful situations.

Importantly, it has been reported that dogs show remarkable behavioural flexibility in an inter-specific agonistic situation (Vas et al., 2005, 2008). In these studies the researchers compared the reaction of dogs to an approaching unfamiliar human who sequentially communicated either friendly or threatening intention. They found that dogs were able to switch rapidly between friendly and agonistic motivational states in accordance with the behaviour of the approaching human. The stranger's friendly approach resulted in friendly or passive behaviour responses of the dogs, while a threatening stranger (approaching silently, gazing at the dog) evoked

mainly fear, avoidance or aggression. The main component of the threatening behaviour was direct staring into the dog's eyes. Continuous staring is mainly used in dominance related interactions between canid conspecifics (Schenkel, 1967), but it has also been observed when a human intimidates or aggressively arouses a dog and thus evokes agonistic or active appeasing behaviour (Bradshaw and Nott, 1995; Fox, 1971; Vas et al., 2005). A human's threatening display may present a conflict situation to dogs, that they can best resolve by quickly and flexibly adjusting their responses to the actual changes of their human partner's behaviour.

In our study we applied a modified version of the Vas et al. procedure (2005). The dogs were subjected to a series of interactions with their owner and an experimenter, in playful and non-playful situations, during which they were approached either in a friendly or threatening way by the human partner. Our hypothesis is that the uncertainty about the consequences of a threat can lead to different behavioural strategies in different contexts, and can vary according to the familiarity of the interacting partner. Bekoff and Allen (1998) found that during mutual play activities play-signals are used to maintain playful interactions and prevent misinterpretation of ambiguous situations when out of context actions occur (e.g. threatening during play). Based on their findings we expected that a potentially ambiguous situation evokes play signals only in playful situations, and during conflicts dogs show less tolerating/submissive and more aggressive/avoiding behaviour toward the partners with whom they do not have a close relationship.

2. Methods

2.1. Subjects

All dog owners were volunteer participants; they were recruited from a dog school (Top Mancs, Budapest, Hungary) and from common dog walking areas in Budapest. All dogs were kept as pets, they lived in their owner's flat or garden. Three owners participated with two dogs and one with four dogs; these dogs were assigned to groups with different orders of test situations. Only dogs that could be motivated to play with a rope tug or a wooden stick were selected. Thirty-seven adult family dogs (17 females, 20 males; age range between: 1 and 10 years, mean age: $2.99 \text{ years} \pm 2.34$) participated in the study. The dogs were from 14 different breeds and 15 mongrels (four golden retrievers, three Belgian shepherds, two Cavalier King Charles spaniels, two border collies, two Parson Russell terriers, one boxer, German shepherd, kelpie, Labrador retriever, miniature spitz, pumi, Shetland sheepdog, Staffordshire bull terrier, Welsh terrier). The only selection criterion was that the dogs should not be harmfully aggressive towards the experimenter (BG). As in one of the test situations the unleashed dogs encountered the experimenter (E) in a potentially aggression evoking situation, we had to be sure that our subjects do not have attacking tendencies. Eighteen dogs had former playing experience with E, which suggested that these dogs would not show unexpected aggressive behaviour

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