



Behavioural responses of dogs to dog-human social conflict situations



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ARTICLE INFO

Article history:

Received 3 January 2016

Received in revised form 27 April 2016

Accepted 1 May 2016

Available online 6 May 2016

Keywords:

Dog-human interaction

Learning

Conflict-related behaviour

Problem-solving

Dog

ABSTRACT

A human-dog relationship is characterized by living close together in the same environment which might provoke social conflicts around particular resources, such as food and social partners. Dogs developed behavioural patterns in response to dog-human social conflicts as well as to receive reinforcement and to prevent punishment. However, few studies have investigated the behavioural responses of dogs to dog-human social conflict situations. Therefore, 22 dogs' behavioural responses to the thwarting of food by a human over a period of 180 s (frustration-provoking situation) and to an operant conditioning task were studied. The 2 testing situations were applied in a random order to each dog. Dog-human interactions, such as gazing and seeking out contact, passive and active behavioural responses, exploration and submissive behaviour were recorded. The dogs' behavioural responses in the frustration-provoking test and the learning test were analysed using descriptive statistical and repeated measures analysis of variance within the linear mixed models procedure. Throughout both test situations, the main behavioural responses displayed by the dogs were interacting with the experimenter or standing alert. The dogs tried to get to the withheld food using their mouth (frustration-provoking test: mean = 70.97 s, SD ± 45.23; operant conditioning task: mean = 12.72 s, SD ± 18.99) and gazed at the experimenter (frustration-provoking test: mean = 26.86, SD ± 40.86; operant conditioning task: mean = 11.55, SD ± 13.96). The time the dogs tried to get to the withheld food using their mouth and gazing at the experimenter significantly influenced the time the dogs took to lie down ($F_{1,15} = 28.15, P = 0.000$). Standing alert, a passive behavioural response to a social conflict, significantly influenced the time the dogs needed to lie down in the operant conditioning task ($F_{1,30} = 61.16, P = 0.000$). There was a significant relationship between the standing alert and withdrawal behaviour ($r_s = 0.670, P = 0.000$), that means the dogs moved backwards a few steps before they stood alert. All dogs licked their noses or lips 1–32 times (mean = 11.59, SD ± 7.84) throughout the frustration-provoking test and only half of the dogs performed those behaviours 1–14 times (mean = 2.91, SD ± 3.10) throughout the operant conditioning task. The data suggest that dogs primarily show the same behavioural responses when comparing a frustration-provoking situation to an operant conditioning task during dog-human interaction. This paper highlights the importance to increase our understanding of dog's behavioural patterns and body language displayed during dog-human conflicts.

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1. Introduction

Food and water, social partners, territory, and physical integrity are resources, which are essential for survival of both, men and dogs. The actual human-dog companionship is characterized by living close together in the same environment which might provoke social conflicts around such resources. Research has shown that social conflicts arise between man and dog depending on the trait of the dog, the human-dog relationship and the resource itself (Guy et al., 2001; Bennett et al., 2012; Casey et al., 2013). Resources

are of variable importance to a dog dependent on a dog's emotional and physiological state. For example, the importance of food can change if the individual has just eaten. Therefore, the resource holding potential of an animal depends on the resource value which influences the individual's motivation to protect it as well as to risk an agonistic encounter with a social partner (Parker, 1974). For human-dog companionships, there is an additional component that determines the dog's behavioural response which might increase the social conflict: the potential misinterpretation of dogs' behavioural signals by men in human-dog interactions (Barlow et al., 1986; Hurd, 2006; Bradshaw et al., 2009).

Conflict avoiding gestures, e.g. blinking, licking owns nose/lip, averted head, and attempting to move away, are submission strategies (appeasement gestures) of dogs used to avoid a social conflict

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and to indicate companionship (Cools et al., 2008; Cordoni and Palagi, 2008; Baan et al., 2014). On the other hand, an individual might respond to a social conflict situation with behavioural signs of withdrawal, immobility, or aggressive defence (Marks, 1987). Those behavioural strategies are all responses with which the dog attempts to escape, to remove, or to deflect the social conflict. If the social conflict can not be solved in that way, the dog might then show behavioural signs which mainly help the individual bridge the time gap until it can resolve such social conflict. Those behavioural signs of dogs' emotional state in an apparently not removable social conflict situation have been defined as displacement activities such as scratching, stretching, and vocalization and as redirected behaviours such as sniffing/licking on the floor, playing with inanimate objects, and drinking (Overall, 1997; Casey, 2002; Feddersen-Petersen, 2008; Kuhne et al., 2014). An additional advantage of such displacement activities and redirected behaviours is to shortly interrupt the direct communication with the social partner by doing something else.

Several studies have suggested that the omission of an expected reward in learning tasks elicit frustration. Frustration also often leads to displacement activities and redirected behaviours which has been observed in various species (domestic fowl, pigeons, pigs, and squirrel monkeys) (Azrin et al., 1966; Duncan and Wood-Gush, 1972; Dantzer et al., 1980; Flory and Smith, 1983; Rodenburg et al., 2005; Kupfer et al., 2008; Kuhne et al., 2013). If an animal's access to a preferred resource is blocked or if an animal's motivation to perform a behaviour is high but it is prevented from doing so the intensity of the performed displacement activities and redirected behaviours indicates the degree of frustration. Thus, those are behavioural signs, which reveal to the receiver key information about the emotional state of the sender. Therefore, displacement activities and redirected behaviours have been described as the origin of ritualised gestures (Casey, 2002; Feddersen-Petersen, 2008).

Rushen (2001) has stated that "... the types of responses are often specific for a particular type of stressor". Nevertheless, regardless of the type of social conflict, there are a limited number of behavioural responses dogs can show in a social conflict situation. A comprehensive evaluation of human-dog interactions is necessary to identify particular behavioural responses in dogs provoked by social conflict situations.

Gray (1994) and Carver (2001) have shown that receiving reinforcement (e.g. 'wanting' behaviour) and preventing punishment (e.g. fight-flight-freeze response) occur in response to social conflicts around specific resources. The observable behavioural response of a dog in such a human-dog conflict is influenced by the individual experiences in dog-human communication and the motivation of the dog. The measurement of animal's behaviour in social conflict situations is a useful parameter to assess the individual emotional state (Mason and Mendl, 1993; Paul et al., 2005). The extent to which the situation itself influences a dogs' behaviour in human-dog social conflict situations is continuing to be explored.

Therefore, the goal of this study was to provide dogs with the challenge of an unsolvable frustration-provoking situation, that might elicit negative emotions, and with a solvable operant conditioning task, that might elicit positive emotions. Dog's access to food was prevented by an unfamiliar person withholding the food in her hand. Secondly, the dogs learned to lie down in an operant conditioning task. The frequency and duration of each behavioural response of the dog were recorded. It was hypothesized that dogs display different behavioural responses depending on an unsolvable frustration-provoking situation and a solvable operant conditioning task of a dog-human interaction. Results might provide information whether particular behavioural responses are typical signs of dogs' emotional state if it is access to a resource is prevented by a social human partner. The knowledge of a dog's

particular behavioural responses in social conflict situations is important for an undisturbed human-dog companionship.

2. Materials, animals and methods

2.1. Animals

A sample of 22 privately owned dogs was recruited through contacts to dog schools and veterinary clinics (4 intact females, 9 spayed females, 6 intact males and 3 neutered males). There were no size or breed restrictions for this study. The dogs had to be at least 1 year of age (average 3.64 years, minimum 1 year, maximum 10 years) and 6 months owned. The dogs' breed varied and included purebreds and mixed breed. None of the dogs had a food allergy or had previously shown fearful or aggressive behaviours toward unfamiliar people. The dogs were not fed on the day prior to testing. Small pieces of Vienna sausages were used for treats. The dogs' physical conditions were previously revealed by a clinical examination. All dogs were well socialized to people and obtained a basic obedience training based on positive reinforcement. Informed consent was obtained from each dog owner for the participation. The dog owners were fully aware of the testing procedure including videotaping of the testing situations.

The testing procedure and dog handling were in line with the requirements of the German Guidelines for the Care and Use of Animals in Research and Teaching and were approved by the institutional animal welfare officer to avoid any unnecessary discomfort to the testing animals.

2.2. Testing procedure

The testing took place in an office. It measured 5 by 8 m and contained normal office setting (chairs, tables, and filing cabinets). Each dog was tested individually. Upon entering the test location, the owners were asked to unleash their dog's. The dogs were allowed to roam the room freely for exploration for 5 min. During the entire testing period the dogs were not leashed. The person who conducted the testing was the same woman for all dogs and unfamiliar to the tested dogs.

2.2.1. The frustration-provoking test

The frustration-provoking test sequence started by offering the dogs five treats, i.e. the number of treats to test the dogs' motivation was set at five treats. The sixth treat was withheld by the experimenter in a closed hand. The experimenter knelt in front of small and medium dogs and stood in front of large dogs. Apart from offering the treat the experimenter did not interact with the dog. She remained kneeling or standing motionless and did neither look nor talk to the dog. The test sequence started by closing the hand with the treat inside and ended after 3 min. Thereafter, the dogs were reinforced for any behaviour they showed other than trying to get to the food.

2.2.2. The operant conditioning task

The operant conditioning task also started by offering the dogs five treats. Then the next treat was withheld in a closed hand in front of the dog in the same way as described above. If the dog showed the predefined behaviour (lying down), it was reinforced immediately with the withheld treat. This test procedure was repeated four times.

Half of the dogs started the testing procedure with the frustration-provoking test and the other one with the operant conditioning task. The dogs were randomly distributed to the testing order. The inter-test interval was set at 15 min.

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