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The effect of reward-handler dissociation on dogs' obedience performance in different conditions

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ABSTRACT

Dogs' responsiveness to instructions of the handler is known to be influenced by several factors. In this study we examined whether reward-handler dissociation has an effect on the obedience performance of family dogs with basic training history. We looked at situations involving human–dog interactions under controlled laboratory settings by measuring dogs' obedience performance to two known commands ('sit' and 'down') in several different conditions. For two different groups of dogs, we manipulated the source of the food reward: it was provided either by the handler or by a remote controlled food dispenser device during a practising period, when the handler stood in the dog's close vicinity (0.5 m). In three different test conditions the position of the handler was manipulated: he/she stood further away (3 m) from the dog either beside a screen, hid behind the screen or was outside of the room. No food reward was provided during the test trials, which were interrupted by so called reminder sessions, where dog-handler dyads practiced both commands in close vicinity to each other and food reward was also involved. We found that the performance of dogs that experienced receiving food reward from the handler was significantly poorer during the test conditions, i.e. in contexts with increased distance between them and the handler (including handler out of sight), as compared to their performance during the reminder sessions in the handlers' close vicinity. Experience with receiving food reward form the dispenser device lessened the difference in dogs' obedience between the test conditions and reminder sessions, and moreover, it also revealed a more prompt response to the 'sit' than to the 'down' commands. Thus our results show that reward-handler dissociation seems to affect dogs' obedience performance in the investigated conditions.

1. Introduction

Several studies support the notion that dogs (*Canis familiaris*) tend to be sensitive and readily rely on human communicative signals from an early age on, using both visual (Soproni et al., 2001; Riedel et al., 2008) and auditory (Rossano et al., 2014) cues. Dogs also display willingness to cooperate with humans (see e.g. Miklósi, 2014) that is manifested naturally in various breed-specific behaviours (e.g. hunting, herding, shepherding dog breeds). This ability provides the necessary base for dog training as well, as a result of which the species can be deployed in a wide range of arbitrary cooperative tasks which involve rather artificial social contexts and behavioural interactions. These include simple obedience tasks or even more complex ones (e.g. guide dogs for the blind, assistance dogs for disabled people, search and rescue dogs, military dogs, etc.; Naderi et al., 2001; Coppinger et al., 1998; Alexander et al., 2011; Haverbeke et al., 2008). However, reliable canine performance in these special service tasks require suitable, well elaborated training methods backed up by scientific knowledge (e.g. Batt et al., 2010; Dalibard, 2009).

Scientific interest in the efficacy of dog training methods has been increasing recently (e.g. Feuerbacher and Wynne, 2012; Fugazza and Miklósi, 2014; Hiby et al., 2004), and several studies aim at revealing factors that could influence the occurrence of an already trained behaviour upon request (for detailed review see Mills, 2005). Dog training is defined as a technique that is used to promote learning in a predictable way in response to human

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intervention (Mills, 2002). As outlined by Mills (2005), scientific literature on dog training tends to apply two major approaches, i.e. associative and cognitive, when trying to identify determinative factors behind the effectiveness of learning or performance to an instruction. The associative approach focuses on the relationship between specific stimuli (e.g. command) and corresponding behavioural responses, including how the training context influences performance. Accordingly, dogs seem to be able to generalize a learnt task to novel contexts and situations (Gergely et al., 2014), however, their performance might also be context-dependent in case of newly learnt commands in contrast to already well established ones; dogs' responsiveness to a newly learnt command tends to decrease in a new environment, while the response to an already well established one does not change significantly (Braem and Mills, 2010).

The cognitive approach emphasises the importance of mental processes involved, and the communicative nature of human–dog interaction. The communicative signal produced by the human trainer upon the instruction of a command is of very complex nature (Rowe, 2005), which makes it a challenging task to identify the relative importance of its individual components. There is more evidence that that the body position (Fukuzawa et al., 2005a), eye contact (Virányi et al., 2004), visibility of the handler (Pongrácz et al., 2003), acoustic (both verbal and nonverbal) qualities of the human signals (McConnell, 1990; Fukuzawa et al., 2005b; Coutellier, 2006), number of gestures and verbal commands used (Kis et al., 2012), as well as both the humans' (Virányi et al., 2004) and the dog's attentional focus (Braem and Mills, 2010) might influence canine responsiveness to a command.

Most commonly, human–dog interactions happen in the parties' close spatial proximity. However, some situations, such as special search and rescue missions (Flushing et al., 2013) might necessitate the canine partner's more distant work along with reliable obedience performance even when the human is out of sight. Identifying factors that dogs focus on and react to when interacting with humans could help improving the extent to which dogs can be integrated into special collaborative tasks. A few experimental results support the general experience that dogs' responsiveness to certain commands decreases when the handler is not visible (Pongrácz et al., 2003; Virányi et al., 2004). Fukuzawa et al. (2005a) measured dogs' obedience performance to two trained commands ('sit' and 'come') in six different test situations, which followed one another in a fixed order. The distance, visibility and orientation of the handler were systematically changed relative to the dog by first gradually increasing the human's distance, and then altering its visibility as well by means of an opaque screen and by turning away from the dog. The trainer standing approximately 2.5 m away from the dog and being partially obscured by the screen, and also turning away from the dog at the same distance resulted in a decline in the dogs' performance (Fukuzawa et al., 2005a). These findings suggest that dogs' responsiveness to certain commands might decrease when the human trainers' relative distance and visibility changes.

Dog training techniques using any kind of reward (e.g. food) as positive reinforcement are basically building upon the operant learning theory (see e.g. Lindsay, 2000); linking an arbitrary signal (verbal and/or visual command) to a desired action through reinforcement, such as food reward applied right after the performance of the desired action in response to the signal. The provider of the reward is obviously the human trainer in most of the cases, however, other instrumental source might also be applied successfully for giving treats as reinforcement (e.g. Yin et al., 2008; Range et al., 2008; Gergely et al., 2014). Given that reward-based training methods are applied (Rooney and Cowan, 2011), associative (Pavlovian) learning experiences might make the handler a signal for positive reinforcement (food reward) for family dogs. Along with this, increase in the human's distance and/or decrease in his/her visibility in a training context decreases the dogs' instantaneous access to the expected reward, which in turn could have an effect on the responsiveness to a command given in such circumstances.

In our present experiment we studied family dogs with basic training history and aimed to examine whether reward-handler dissociation has an effect on their obedience performance. We looked at situations involving human–dog interactions under controlled laboratory settings by measuring dogs' obedience performance to two known commands ('sit' and 'down') in several different contexts. For two different groups of dogs, we manipulated the source of the food reward, which was provided either by the handler or by a remote controlled food dispenser device during a practising period when the dog and handler stood closely together. In three different test conditions the handler stood further away from the dog beside a screen, hid behind the screen or was outside of the room. We expected that experience with receiving food reward from the dispenser device enhances dog's obedience performance in conditions where the distance between the dog and the handler is increased.

2. Methods

2.1. Subjects

Our subjects were adult family dogs ($N = 30$, 16 males and 14 females, age range: 1.2–10.0 years, mean age: 3.9 years, SD = 2.3 years) from various breeds (13 different breeds and 8 mongrels) with at least basic obedience training history and being ready to consistently respond to at least two different commands ('sit', 'down'). A total of 41 dog-handler dyads participated in our experiment, of which 11 were excluded at some point of the test because of not fulfilling the necessary criteria (i.e. being motivated to obtain a certain type of food reward, not anxious when left alone for short period in an unfamiliar place). Dogs enrolled to the study were all required to have been exposed to food reward-based training methods, and were reported to have had no former experience with a food dispenser device. The experiment was conducted at the Department of Ethology at Eötvös Loránd University, Budapest between December 2012 and August 2013. Owners with their dogs responding to the test's advertisement at the department's homepage (http://kutyaetologia.elte.hu) volunteered to participate and provided written consent.

2.2. Ethical approval

Non-invasive studies on dogs are currently allowed without any special permission in Hungary by the University Institutional Animal Care and Use Committee (UIACUC, Eötvös Loránd University, Hungary). The currently operating Hungarian law "1998. évi XXVIII. Törvény" (Animal Protection Act 28 of 1998) defines experiments on animals in the 9th point of its 3rd paragraph (3. §/9). According to definition by law, our non-invasive observational study is not considered as an animal experiment.

2.3. Experimental setup

The experiment consisted of four different phases: (1) familiarization, (2) warm up, (3) practising, and (4) testing. Throughout the experiment the dogs were interacting with their handlers in obedience tasks. Our subjects were divided in two groups (Handler-rewarded: HR, $N = 15$; Dispenser-rewarded: DR, $N = 15$) depending on the source they received the food reward from for good performance. Subjects belonging to group HR received the treats from their handlers, while those belonging to group DR were solely