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Research

Behavior and cortisol responses of dogs evaluated in a standardized temperament test for military working dogs

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ABSTRACT

Military and police working dogs are often exposed to stressful or threatening events, and an improper response, e.g., fear, may implicate both reduced working efficiency and welfare. Therefore, identifying individuals that display a favorable response to potentially threatening situations is of great interest. In the present study, we investigated behavior responses of 85 prospective military working dogs in 4 subtests in a standardized temperament test used to select working dogs for the Swedish Armed Forces. Our goal was to evaluate behavioral responses in specific subtests and cortisol responses of candidate dogs. After dogs were rated as approved or nonapproved based on the test leader's assessment of the full test result, we independently analyzed video recordings of 4 subtests. In addition, for 37 dogs, we analyzed pretest and posttest salivary cortisol levels. Dogs which were approved by the test leader for further training scored higher in the video recordings on emotionality and, in particular, fear-related behavior during a subset of the test and had higher levels of cortisol both before and after the test, than nonapproved dogs. Although this may actually reflect the desired traits, it could also indicate a bias in the selection procedure, which may pose limitations on the attempts to recruit the most suitable working dogs.

Introduction

Military working dogs (MWDs) and police working dogs are often exposed to stressful or threatening events (Horváth et al., 2007). Identifying individuals that display a favorable response to threats, that is, no or low levels of fearfulness, is of great interest to recruit suitable (i.e., stress resistant) police and MWDs worldwide. Showing signs of fear, such as trembling or freezing, may implicate both reduced working efficiency and welfare (Haverbeke et al., 2010). Consequently, fearfulness has received considerable research attention in dogs (Jones and Gosling, 2005). Several studies have used signs of fearful behavior in dogs as a predictor for suitability to become successful guide or working dogs (Goddard and Beilharz, 1985; Wilsson and Sundgren, 1997; Serpell and Hsu, 2001; Duffy and Serpell, 2012). Although fearfulness is an unwanted trait in working dogs, Haverbeke et al. (2010) found that almost 70% of active military dogs showed fear-related aggression. This apparent paradoxical discrepancy between preferred and actual response of fearful behavior could be a result of systematic misinterpretations of the reactions of dogs in the selection tests used, and may in worst case lead to dysfunctional working ability and welfare problems for the dog.

Screening of potential working dogs for suitable temperament is usually done with standardized behavior tests (Wilsson and Sundgren, 1997; Haverbeke et al., 2009), often including different subtests. Different startling stimuli are used to measure fear, exploration (King et al., 2003), and aggression (Netto and Planta, 1997; Wilsson and Sinn, 2012). According to Jones and Gosling (2005), test batteries, which consists of the behavioral test and the measurement method used to measure the reaction, are the most objective and commonly used method to assess temperament

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in dogs. The behavioral measurement method is most often based on subjective rating, but objective behavioral coding, sometimes aided by video analysis, can potentially provide more reliable and predictable results (Jones and Gosling, 2005; Vazire et al., 2007).

Behavioral responses to fear in dogs are typically to move away from the frightening stimulus, or to show immobility (e.g., freezing or crouching and low body posture, and restlessness) (Beerda et al., 1998). Hence, 1 common behavior evaluated in many temperament tests is the speed of recovery from a startle response or willingness of the dog to approach the fearful stimulus. A dog that recovers quickly (i.e., only show brief signs of fear followed by an immediate willingness to approach the stimulus) is interpreted as more stable, stress resistant and suitable than one which responds with prolonged fear responses and does not approach the stimulus. Furthermore, different physiological responses are associated with fear, including increased heart rate, and an activation of the hypothalamus-pituitary adrenal (HPA) axis (Beerda et al., 1998). This is the same physiological response as evoked by stress, and several studies have established cortisol as a biochemical marker for stress and fearfulness in dogs (Clark et al., 1997; Beerda et al., 1998; Kobelt et al., 2003; Dreschel and Granger, 2009). Cortisol levels can be measured in plasma, urine, or saliva. It is released in the blood stream and secreted in the saliva within less than a minute, with the maximum cortisol level shown 10 to 30 minutes after the stressor has been presented (Kirschbaum and Hellhammer, 2000; Davenport et al., 2006). Potentially, the efficiency in selecting suitable military and other working dogs could be greatly increased with improved understanding of the relationship between different behavioral profiles in standardized test situations and the HPA-axis activity of the dogs.

In Sweden, prospective MWDs are evaluated in a standardized temperament test battery and rated as suitable or approved for further training based on the assessment of their behavior by an experienced test leader (TL). We have previously shown that dogs more likely to pass the Swedish Armed Forces (SAF) suitability test are more often rated by host families as hyperactive or restless, that is, having difficulties settling down in the home environment (Foyer et al., 2014). Hyperactivity or restlessness can be a behavioral response to stress and fear, and may provoke similar physiological responses (e.g., increased cortisol secretion). Hence, dogs reported as being hyperactive or restless in their home environment may be more stressed than dogs reported as being calm by caretakers outside test situations. This might be reflected in higher salivary cortisol level than dogs rated as calm. Consequently, the behavior test used by the SAF, which is very similar to selection tests used in many other countries (Slabbert and Odendaal, 1999; Haverbeke et al., 2009; Sinn et al., 2010), could perhaps inadvertently select dogs, which are not as resistant to stress and fear as generally assumed. In the present study, we aimed to more closely investigate both physiological and behavioral responses in the standardized temperament test used to select potential MWDs for the SAF and investigate if results based on the subjective ratings from the temperament test and the behavioral coding of video analysis of 4 different subtests, would indicate any discrepancy regarding the results of evaluated dogs.

We hypothesized that dogs, which were approved (see General test procedure) for further training based on result in the temperament test, would show less fearful behaviors and lower cortisol responses, indicating more stable temperament and less stress sensitivity compared to nonapproved dogs.

Material and methods

Layout of the experiment

Data were collected from the SAF temperament tests (SAF T-test) conducted during 2 consecutive years. Of the 12 subtests that constitute a complete SAF T-test, we chose to focus on 4 in this study; the acoustic startle (AS), the visual startle (VS), the gradual visual startle (GVS), and the searching subtest (SS). The 3 startling subtests were chosen because they were designed to be potentially fearful to the dogs. The SS was included as a contrast, because it did not include any deliberate fearful stimuli, and the searching ability is a specific working task for an MWD that allows the dog to work independent of the handler in a nonthreatening environment. In all 4 subtests, the behavioral responses of the dogs were video recorded for detailed analysis. Score sheet, based on the subjective ratings of the TL, was obtained from the SAF database. To assess the HPA-axis activity, we also measured cortisol before and after the test collected noninvasively via saliva sampling (Dreschel and Granger, 2009) for all dogs tested during the second year.

Subjects

All dogs in the present study were prospective MWDs of German shepherd breed, stemming from dogs with a varied genetic background, from within the SAF selective dog-breeding program. More details about the breeding program have been described elsewhere (Wilsson and Sinn, 2012). All tested dogs in the study are born at SAF Dog Training Centre Department of Breeding in Sollefteå, Sweden, where they are housed with their mothers and littermates until weaned at an age of 8 weeks. At that age, they are placed in foster homes (puppy raisers), and later brought back for evaluation and behavioral testing. Testing takes place at 5 different locations around Sweden: Ronneby, Göteborg, Märsta, Sollefteå, and Luleå. However, none of the subjects in the present study were tested in Luleå. Approved dogs are kept for further training while nonapproved dogs are sold as companion dogs.

All dogs available during the times of data collection, a total of 85 dogs (44 males and 41 females), were included in the behavioral analysis, of which 48 were tested during the first year and 37 during the second, at which time we also obtained saliva for cortisol analysis. All dogs were intact when tested. The dogs from the first year were distributed among 24 different litters ranging from 3 to 11 in litter size. The dogs were 15-19 months old when tested, except for 1 male, which was 23 months. Of the 85 dogs in the behavioral study, 44 were rated by the TL as approved (24 males and 20 females) and 41 as nonapproved (20 males and 21 females) (for approval criteria, see the following sections).

Dogs from the second year were distributed among 10 different litters and were 15-19 months of age when tested. Of the 37 dogs in the cortisol study, 20 were rated by the TL as approved (12 males and 8 females), and 17 as nonapproved (6 males and 11 females) in the SAF T-test (for approval criteria, see the following sections).

General test procedure

The behavior test (SAF T-test) used by the SAF to select suitable dogs for training to become MWDs is described in detail in Wilsson and Sinn (2012). Briefly, the dogs are assessed in a behavior test consisting of 12 different subtest situations, which measure the reactions of the dogs to a range of different potentially fearful stimuli, such as suddenly appearing dummies, loud noises, or frightening floor structures. But also nonthreatening situations such as the willingness of the dog to cooperate and engage in social interactions with humans are recorded. Based on the subjective scores assigned by the TL, each dog is assigned an index value (IV), describing the probability of success in a subsequent military training program. For the exact method used to calculate the IV, see Wilsson and Sundgren (1997). Briefly, it compares the subjective scores of a particular dog with the historical outcome of all previously tested dogs. An IV of zero signifies a 50% chance of being