



Research

Assessing companion dog behavior in a social setting

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ABSTRACT

There is a growing and important need for large-scale characterization of dog behavior, for example, to conduct genetic analyses or to assess welfare. An extensive number of standardized tests and questionnaires are used for this but few focus on the normal behavior in situations which are frequently encountered in the everyday life of companion dogs. The aim of this study was to develop and validate a fast but standardized method to characterize behavioral variation in pet dogs based on a brief observation in a situation often encountered by many dogs, namely during training classes. The spontaneous behavior of dogs was video-recorded during 3 minutes in a standardized setting, while their owners were occupied filling in a short questionnaire, and during 30 seconds of walking on leash. Behaviors, including contact seeking behavior with the owner, a stranger, and other dogs, together with general activity and interaction with a novel object were later analyzed and further processed in 2 separate principal component analyses. The principal components from the 2 test parts correlated significantly with each other and aspects of both home and test environment influenced several components in both principal component analyses. Age and sex also showed significant effects on test outcome, for example, age affected how social and explorative the dog was and females jumped more on their owner, whereas males pulled the leash more. In addition, dogs that were perceived as cooperative by their owner looked more at their owner and pulled the leash less. In conclusion, this simple test captures essential parts of the normal, everyday behavior profile of dogs, such as owner- and dog-directed social behavior, which are not usually measured in the commonly used test batteries for dogs.

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Introduction

Dogs (*Canis familiaris*) have been domesticated for thousands of years (Clutton-Brock, 1981; Vilà et al., 1997), and their importance in today's society ranges from companions to workers, including examples such as guide dogs and dogs used by the police, the armed forces, and customs. This has sparked a large interest in research into dog behavior, as a means to understand dog welfare and performance, as well as dog-human relationships, and as dogs are increasingly used for behavioral genetic studies (Udell and Wynne, 2008; Yokoyama and Hamilton, 2012). Many such studies require extensive phenotyping of large numbers of individuals, which calls for standardized, high-throughput test batteries. Preferably, such tests should capture essential aspects of the behavior in

situations where the dog is as relaxed as possible. One problem is that observations in the home environment are time-consuming and incompatible with high throughput, whereas standardized test situations may not be representative of the normal life of most companion dogs.

In Sweden, as in many Western countries, most companion dogs participate in training classes such as puppy training classes, various obedience training, agility or show handling at least some time during their lifetime. These courses therefore offer a promising possibility to reach a large number of companion dogs in a limited time and to record their behavior while they are in a setting which resembles their everyday life situation, that is, when they are together with their owners in an environment with less familiar dogs and humans.

Previously, a number of test batteries have emerged with the purpose of determining individual dog behavior (Jones and Gosling, 2005). Most standardized tests are performed in an environment which is unfamiliar to the dog and often include both sudden and novel stimuli (Murphy, 1998; Jones and Gosling, 2005; Svartberg et al., 2005), to a large extent measuring the behavior during

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stress and fear. For example, the Swedish armed forces select dogs for training and breeding based on performance in a battery of more or less fear-inducing test situations (Wilsson and Sundgren, 1997; Foyer et al., 2014; Arvelius et al., 2014). The dog mentality assessment and the new version of behavioral and personality description for dogs in Sweden aim at describing the behavior and temperament of mainly companion dogs. Their subtests score the dog's behavior when approached by different social and nonsocial fear-inducing stimuli, in a play situation, in a passive situation while stimulating chasing, and in behavioral and personality description, also in a problem solving task (Svartberg and Forkman, 2002; Svartberg, 2005). These tests are popular among dog owners, generate large data sets, and can be valuable tools for enhancing our understanding of behavioral differences, for example, between breeds (Svartberg, 2006). However, crucially, the tests fail to measure some of the most important aspects of dog behavior in present society: the relationship with the owners and the behavior toward other dogs. Perceived dysfunction in any of these aspects of dog behavior causes large welfare problems to both owners and dogs and is an important cause of early euthanasia of dogs in the Western world (Lund et al., 2004; Fatjó et al., 2006). Furthermore, the tests rely on subjective scoring of behavior based on the impression gained by a test leader who usually lacks formal ethological training. Hence, there is an urgent need for ethologically rigorous, standardized behavioral tests, which capture a broad range of dog behavior in a situation where a minimum of stress and fear is induced and where behavior can be scored using quantitative ethological methods.

Only a few studies have been performed in an environment familiar to the dog or in situations that are more or less normal to the individual dog (Jones and Gosling, 2005). For example, a recent study video-recorded owners and their dogs under natural circumstances during walks in both city centers and in green areas (Mongillo et al., 2013), but this study did not attempt to evaluate the behavior or temperament of the dogs in a broader context. The small number of studies performed in the natural environment of dogs is probably due to the difficulty in standardizing and evaluating these kinds of tests. Yet, being able to faithfully record the normal behavior repertoire is essential for a full and rich understanding of behavior variation. Social interaction, exploratory behavior, and general activity in everyday life should be valuable behavioral components when comparing breeds, age classes, and sexes and when relating this to, for example, earlier experiences of the dogs.

Another common approach is to use questionnaires to collect owners' subjective impressions about their dogs (Serpell and Hsu, 2005; Starling et al., 2013). The owners' knowledge about their dogs can reduce behavioral noise due to daily or seasonal variations, which cannot be accounted for in a single behavioral test. Although questionnaires are to some extent subjective, they are still regarded valuable complements to behavioral studies (Svartberg, 2005; Mirkó et al., 2013; Meyer and Forkman, 2014).

Facing the limitations of current test methods, the aim of the present study was to develop and evaluate a simple, fast, and standardized behavioral assay for companion dogs that can be applied when they are kept together with their owners and other dogs. The test should be feasible to apply on large numbers of dogs with limited time expenditure while still providing rigorous, quantitative ethological data.

Material and methods

Animals and test environments

Recordings were taken immediately before ordinary dog training classes for companion dogs in the cities of Linköping and Vimmerby, in southeastern Sweden. We visited obedience courses, puppy courses, freestyle courses, and agility and tracking courses (see [Supplementary Table 1](#) for a complete list). In total, we visited 4 outdoor environments, which all were open fields looking similar to each other ([Figure 1A](#)) except for the tracking course that was visited on a forest road. The indoor courses were performed either on the second floor of a barn with fitted carpet and with the total measurements of approximately 12 × 30 m ([Figure 1B](#); we only used half of the length) or in a smaller dog training room with fitted carpet and approximately 5 × 10 m.

It was voluntary for the owners to be included in this study, and they all gave their written consent. All study subjects (N = 85) were privately owned dogs including 33 females and 52 male dogs with an average age of 31 months (standard error of mean = 2.8; see [Supplementary Table 1](#) for breed and individual details). Information about the home situation, the course experience of the dog, the dog-training experience of the owner, and the owner's own subjective scoring of some behavioral parameters was obtained by a questionnaire.

Testing procedure

The general aim of the test was to video-record the behavior of dogs during a standardized procedure which was likely to be perceived by the dog to be as normal as possible. In addition, we aimed for a situation in which the dogs could choose to behave freely without restrictions from their owners. These videos were then subjected to a detailed ethological analysis. The owners were informed about the procedure, without revealing the methods or any details of the intended analysis. During the entire test, the behavior of all dogs in that test session was video-recorded using 1 HD camcorders (Canon Legria HF M52) positioned on a tripod approximately 4–8 m from the dogs.

The test was split into 2 different parts, in which the owners were not paying attention to the dogs during part 1, whereas they did interact moderately during the second part. This procedure was intended to allow calculations of the consistency of the behavioral assessment over 2 different situations. By performing the 2

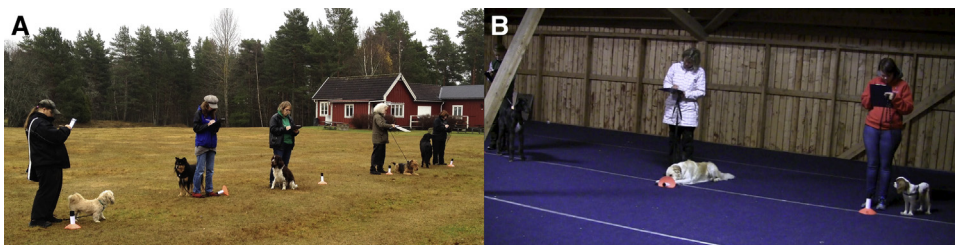


Figure 1. Pictures showing representative outdoor (A) and indoor (B) test environments. During the first part of the test, owners were asked to stand with their dogs behind an orange cone, and during the second part to walk their dogs in a circle around all the cones. (A color figure can be found in the online version of this article).

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