

Effects of different human approaches on dog's behavior: preliminary results

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Abstract: The study of dogs' responses to an approaching human plays an important role for the development of human-dog relationship.

The aim of the research was to develop a protocol for a behavioral test in order to assess the behavioral responses of dogs to two different approaches performed by an unknown man.

Twenty-five dogs of different breeds or mixed-breed, 17 females and 8 males, 56.4±26.2 months old, underwent a behavioral test in which a male stranger approached the subject using two different modalities, named indirect approach (IA) and direct approach (DA).

Test were video recorded and dogs' responses to the approaching man were analyzed in order to attribute the following scores: aggressive (=1), active avoidant (=2), passive avoidant (=3), ambivalent (=4), neutral (=5), or friendly (=6). In addition, each videotaped session was analysed with the continuous sampling method registering the duration (s) of 11 behaviors: nose licking, paw lifting, yawning, blinking, and body shaking (their duration was summed and used as a measure of dog stress); orientation toward the stranger, barking, and growling (their duration was summed and used as a measure of the attitude toward the unknown man); orientation toward the owner, approach and contact with the owner (their duration was summed and used as a measure of the attitude toward the owner). Statistical analysis was performed using Wilcoxon test ($p < 0.05$) in order to compare responses to DA and IA and the duration of behaviours during DA and IA.

Dogs responded in a more friendly way to IA than to DA ($Z = -2.049$, $p = 0.021$). For stress signals, the time was higher for DA, respect to IA, although the differences did not reach statistical significance ($Z = -1.280$, $p = 0.201$). Concerning the attitude toward the stranger, significant differences between DA and IA were found ($Z = 2.64$, $p = 0.008$), i.e. dogs looked at the stranger, barked and growled more during DA. As regards to the behaviors towards the owner, no statistically significant difference between the two approaches was observed.

These preliminary results seem to show that dogs behave in a more friendly way towards strangers when approached in an indirect way. DA seems to be more stressful for dogs, likely because it is perceived as more threatening.

Key Words: human approach, stress, dog, behavior.

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Introduction

Dogs, like humans, are a social species; from sexual to predatory behavior, from urine marking to mutual grooming, the subtleties for much of the canine daily life are based on social relationships (Beaver, 2009). Communication among individuals is fundamental during management of the social relationship. Considering the long domestication history of the dog, it is not surprising that this animal has improved efficient communicative skills also in the relationship with the human being: according to Kubinyi et al. (2007), "the social niche of family dogs is the human social environment".

Dog use different communicative channels, from postural communication to vocalizations. They emit a variety of sounds to communicate with conspecifics and humans. Beaver (2009) listed

seventeen types of vocalization; among these are bark and growl, used in various circumstances, not only during agonistic interactions (see Simpson, 1997; De Palma et al., 2005; Yeon, 2007).

Visual communication is also widely used. Dogs, in fact, utilize a broad variety of body postures to communicate and they are skilful at reading subtle changes (Beaver, 2009). This is true for both dog-dog and dog-human interactions; in fact, dogs' ability to understand, react and rely on human gesture was confirmed by several studies (e.g. see Hare et al., 2002; Dalla Costa et al., 2008; Riedel et al., 2008).

Moreover, canids can display distance-reducing signals such as avoiding direct eye contact, lowering head and neck, positioning the tail between the legs and raising foreleg (Fox, 1969; Beaver, 2009). Other postural signs are, instead, functional to increase the distance between the sender and the receiver. Some of agonistic behaviors described in wolf, like moving the opponent away, inhibited bite, aggressive gape and staring (Beaver, 2009) are present in dogs but are not fully expressed in all canine breeds (Goodwin et al., 1997).

Several authors recognized some particular behaviors as possible indicators of stress, such as yawning, body shaking (Beerda et al., 1998), looking elsewhere (Rooney et al., 2009), turning head, nose liking, paw lifting (Schilder & van der Borg, 2004). Rugaas (2005) firstly speculated these and other signals (e.g. blinking) could have a calming function, reducing the aggressive motivation in the dog, as other authors have afterwards demonstrated (Gazzano et al., 2014). Many dog trainers and behaviorists (see Chapman et al., 2000; Mariti et al., 2011), inspired by observing the mode of communication existing among dogs, recommend approaching the dog in a way defined as "indirect", following a non-frontal trajectory, without staring him in the eyes and with normal and calm gait. This type of approach could be less fearful for the dog as opposed to a frontal approach (direct approach) in which the person leans over the dog and stares at him.

In recent years, several experimental studies have focused on the interaction between man and dog. Lore & Heisemberg (1986) evaluated reactions of male and female dogs to unfamiliar humans; Wells & Hepper (1999) studied kennel dogs' responses towards the presence of men and women standing at the front of the cage, in a manner typical of a shelter visitor; Barrera & colleagues (2010) tested shelter dogs and pet dogs during an interaction with an unknown woman acting passively initially and actively later.

Vas and colleagues (2005) have developed an experimental protocol in which an unknown woman approaches a dog in a "friendly" and "threatening" way. The dog was tied to a tree and the owner was located about a meter away, behind the dog. The friendly way consisted in a frontal approach, during which the woman tried to maintain eye contact with the dog, trying to pet the dog and bending over him. In the threatening approach the woman was moving slowly and haltingly with slightly bent upper body and she was looking steadily into the eyes of the dog. The majority of dogs showed cues of tolerant, friendly behaviors upon friendly approach by the stranger; many of them gave various signs of avoidance or aggressiveness when the stranger approached them threateningly. However friendly approach reported by Vas (2005) is quite different from that commonly indicated as indirect and considered the best one.

The aim of the research was to develop a protocol for behavioral test in order to assess the behavioral responses of dogs to two different approaches (direct and indirect) performed by an unknown man.

Subjects, materials, and methods

Subjects

Twenty-five dogs, 8 males (2 neutered) and 17 females (8 spayed), from different breeds and mixed-breed (5 Labrador Retriever, 4 Golden Retriever, 1 Australian Kelpie, 1 German Shepherd, 1 Dogo Argentino, 1 Border Collie, 1 Beagle, 1 Springer Spaniel, 1 Bracco Italiano, 1 Flat Coated

Retriever, 8 mixed-breed) were involved in the study. The owners were volunteers recruited by personal contact.

All subjects were adults (56.4 ± 26.2 months old) and free from behavioral and organic disorders. None of the females was in oestrus or pregnant around the time of observation.

In order to gather information on dogs and their characteristics, owners were asked to complete a questionnaire (including owner data, dog description and management, activities carried out with the owner, dog reaction to people and other dogs).

Participants

- owner with the dog on a 60 cm long leash;
- “stranger”, i.e. a man unknown to the dog. The stranger had never met the dogs before the present study.

Two trained behaviorists (“operators”) were present in the setting during the test: they managed the cameras, gave instructions to the owner, and wrote down the timing of the phases of the test.

Setting and procedures

Each dog was tested twice in two consecutive tests, consisting in a direct approach (DA) and in an indirect one (IA) performed by the stranger, in a random sequence. Tests were performed at Veterinary Sciences Department, University of Pisa, in a fenced field, measuring 20 x 30 m, unknown to the dogs, equipped with hedges, walls and a gate. Hedges and walls allowed the stranger to hide the sight from the dog’s sight before entering the gate.

The owner entered the test field with the dog on the leash and let the dog explore the field for two minutes, then he was positioned, with his animal, at 10 meters from the gate. He was asked to stand still and to leave the leash as loose as possible; in case the dog went towards the stranger, the leash was held taut.

The stranger whistled to attract the dog’s attention and entered the field via the gate. In IA, the stranger moved towards the dog with a semicircular trajectory, avoiding eye contact, until reaching the distance of 1.5 m from the dog, as indicated by a sign on the ground. Once the stranger got to this point, he stood for 10 seconds showing his side to the dog.

In DA the stranger walked in a straight line staring at the dog and then he stood with his front side facing the dog, still staring into the eyes of the animal.

In both types of approach, at the end of the procedure the stranger moved away along the same initial path. All tests were filmed using two cameras (JVC® GZ-MG 130E) mounted on a tripod.

Between the two approaches, the dog walked on a leash with the owner in the field for 3 minutes.

Data collection from videos

Two trained observers watched the videos (100 sessions: 4 test x 25 dogs) to make a holistic evaluation of dogs’ response to the approach. The possible dog responses were (modified from Vas et al., 2005):

- *Neutral response*: the dog is immobile, looking at the stranger, without wagging.
- *Friendly response*: the dog looks at the stranger (remaining still or moving towards him); he can wag without aggression signals or jumping on the stranger, looking for a physical contact.
- *Passive avoidant response*: the dog is still and he avoids looking at the stranger.
- *Active avoidant response*: the dog moves away from the stranger, looking at him or not, showing escape attempts or trying to hide behind the owner. The dog can yelp.
- *Ambivalent response*: the dog approaches and moves away from the stranger.
- *Aggressive response*: the dog growls or barks.

In addition, each videotaped session was analyzed with the continuous sampling method, registering the duration (s) of 11 behaviors (see Table 1).

Table 1. Description of dog behaviors and relative references.

Behavior	Definition	References
Yawning	The dog opens his mouth, breathing in and out in quick succession	Modified from Beerda et al., 1998; Hennessy et al., 1998
Nose/lips licking	The dog licks the upper part of the muzzle	Modified Schilder & van der Borg, 2004
Blinking	Shutting and opening the eyes rapidly	Rugaas, 2005
Contact with owner	Any physical contact with the owner	Modified from Topàl et al., 1998
Approach the owner	The dog approaches the owner	Present study
Barking	Dog characteristic vocalization	De Palma et al., 2005
Paw lifting	A fore paw is lifted, the other legs are on the ground	Modified from Beerda et al., 1998
Growling	Low frequency vocalization; the dog bares his teeth	Horvath et al., 2007
Body shaking	The dog shakes his body	Beerda et al., 1998
Orientation toward the owner	Looking (direction of the head) at owner, even if the behavior is not reciprocal	Modified from Horvath et al., 2007
Orientation toward the stranger	Looking (direction of the head) at stranger, even if the behavior is not reciprocal	Modified from Horvath et al., 2007

Data analysis

All statistics were run with the software SPSS® Statistic 17.0 (Chicago, IL, USA).

Dogs' responses were scored as follows: aggressive (=1), active avoidant (=2), passive avoidant (=3), ambivalent (=4), neutral (=5) or friendly (=6). Statistical analysis was performed using Wilcoxon test ($p < 0.05$) in order to compare responses to DA and IA.

Statistical analysis of dog behaviors concerned the duration (s) of:

- nose licking, paw lifting, yawning, blinking, and body shaking, named “stress signals” (their durations were summed and used as a measure of dog stress);
- orientation toward the stranger, barking, and growling (their durations were summed and used as a measure of the attitude toward the unknown man);
- orientation toward the owner, approach and contact with the owner (their durations were summed and used as a measure of the attitude toward the owner).

The analysis on such behaviors was performed on the whole test and dividing the test in two phases, named walking phase (i.e. stranger walking towards the dog) and closeness phase (i.e. stranger standing at the side or in front of the dog).

Wilcoxon test ($p < 0.05$) was used to compare dogs' behavior in DA and IA.

Results

A high level of agreement (88%) between the two observers was obtained for the analysis of response to the approaching man.

Figure 1 shows median values (horizontal line), 1st and 3rd quartile (box), minimum and maximum values (whisker), outliers (dot), and extreme values (asterisk) of scores obtained by dogs in DA and IA. Wilcoxon test revealed that dogs responded in a more friendly way to IA than to DA ($Z=-2.049, p=0.021$).

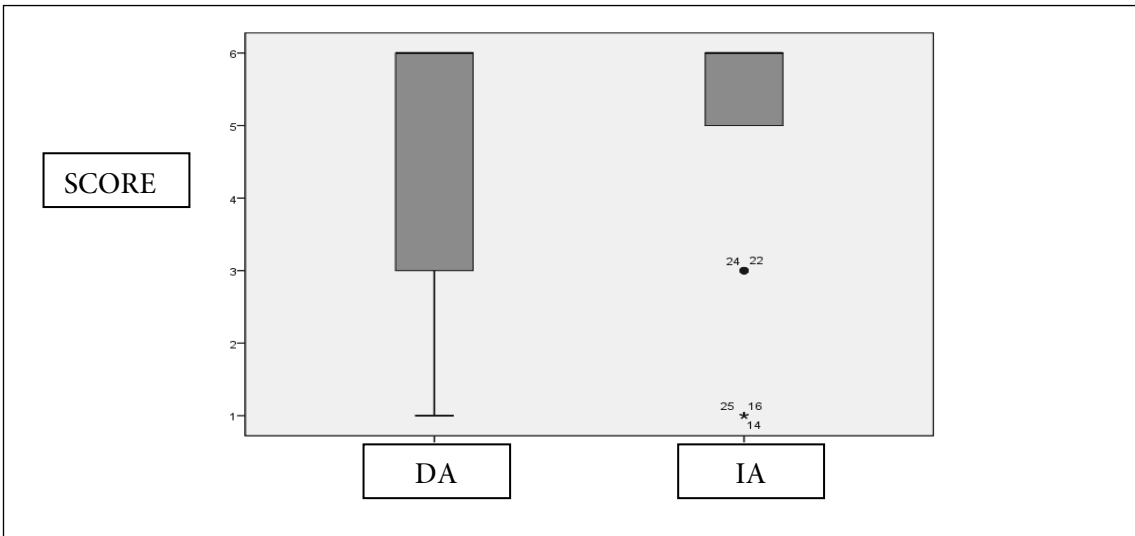


Figure 1. Dogs' response (from score 1= aggressive to score 6 = friendly) to DA and IA.

Figure 2 shows the amount of time spent displaying stress signals in DA and IA. When analyzing the whole test and the two different phases of the test (the walking and the closeness phase), the time was higher for DA, respect IA, although the differences did not reach statistical significance ($Z=-1.280, p=0.201$; $Z=-0.975, p=0.330$; $Z=-0.286, p=0.775$).

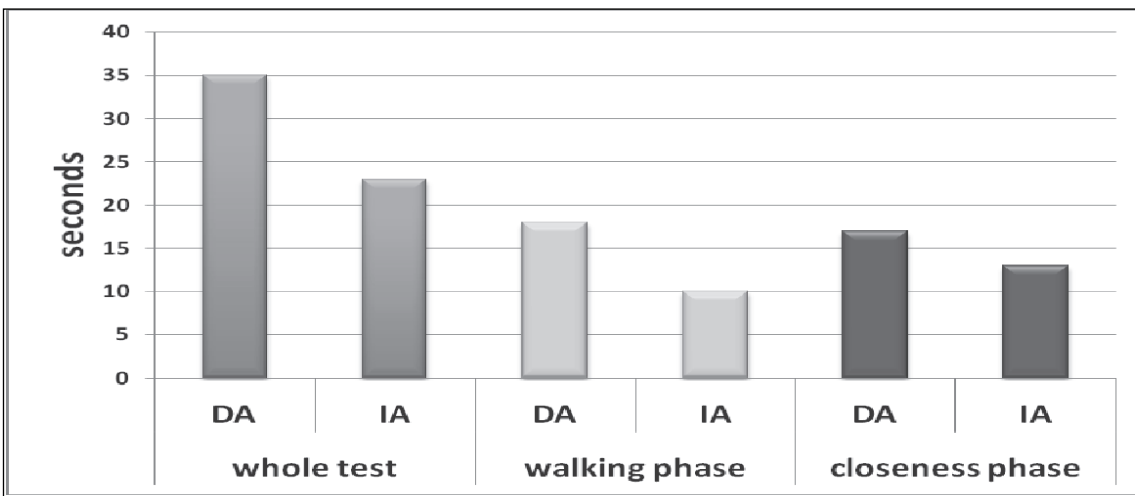


Figure 2. Time (s) spent exhibiting stress signals during the whole test and in the two different phases of the test.

Concerning the attitude toward the stranger, significant differences between DA and IA were found for the whole test (median 15 vs 12; $Z=2.64$, $p=0.008$) and the closeness phase (median 8 vs 3; $Z=3.271$, $p=0.001$), i.e. dogs looked at the stranger, barked or growled more during DA. No significant differences were found for the walking phase: median 8 vs 9; $Z=0.586$, $p=0.558$.

Regarding the attitude toward the owner, no significant differences between DA and IA were found for the whole test (median 6 vs 14.5; $Z=1.400$, $p=0.162$) and the walking phase (median 0 vs 0; $Z=0.338$, $p=0.735$). Considering the closeness phase, Wilcoxon test revealed that dogs displayed such behaviors more during IA (3rd quartile 0 vs 1; $Z=2.240$, $p=0.025$).

Discussion

The study of the dog's reactions to the approach of strangers is crucial as it allows the person to figure out how best to interact with the animal to prevent fear and stress and to avoid aggressive responses. In literature, there are few experimental studies on this aspect. Vas et al. (2005), for example, proposed a "friendly" approach quite different from that commonly suggested and considered the best. Moreover, the dog was tied to a tree and the owner was positioned at a certain distance from the dog behind it.

In the present research, the friendly indirect approach was distinguished from direct approach better than in Vas' study; in addition, as dogs usually meet people when they are on the leash, this research simulated such condition. This difference is likely to have a strong impact on the dog response to strangers, because the owners may act as a secure base for their dogs (Gácsi et al., 2013; Mariti et al., 2013).

Regarding stranger's stare, results found by Vas and others (2005) seemed to suggest that the attempt to keep eye contact with the dog does not evoke unconditional fear or aggression, whereas other cues of human behavior pattern, like body posture, way of movement and verbal cues, could have an influence on dogs' response. However, as suggested by Line & Voith (1986), staring the dog is a factor that can affect the animal's reaction. For this reason, in our research, the stranger during IA avoided looking the dog in the eye, while in DA he attempted to maintain eye contact.

Data from the holistic evaluation of dogs' responses, stress signals, and behaviors toward strangers seem to show that dogs behave in a more friendly way towards the stranger when approached in an indirect way. DA seems to be more stressful for dogs, likely because it is perceived as more threatening.

As regards to the behaviors towards the owner, no statistically significant difference between the two approaches, analyzing both the whole test and the walking phase, was observed. Instead, a statistically significant difference with regard to the closeness phase, in which the dogs emit longer direct behavior towards the owner in IA compared to the DA, existed. These data might seem discordant with the other results: it would indeed be expected that, being the owner an attachment figure (see Miklósi et al., 2003; Mariti et al., 2013), the dog is more referring to him during the DA, the most stressful situation, and not during a friendlier IA. This result could be explained by interpreting these behaviors expressed towards the owner during AI as a reassurance that the dog gives him in a quiet setting of communication.

More research will be necessary, increasing the number of subjects, especially male that would tend to avoid the physical and visual contact with unknown people (Lore & Heisenberg, 1986).

It would also be useful to include typical family dogs, while the sample used for this study contained a variety of subjects who were particularly used to the contact with strangers, probably because of the training courses they had previously attended.

Finally, an analysis of physiological parameters, such as the heart rate, could be combined with the behavioral data. In particular, the analysis of heart rate variability (HRV and LF / HF) (Bergamasco et al., 2010; Jonckheer-Sheehy et al., 2012) might be relevant.

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Effetti di differenti modi di approccio umani sul comportamento del cane: risultati preliminari

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Sintesi

Lo studio delle reazioni dei cane a diverse modalità di approccio da parte delle persone, gioca un ruolo importante per lo sviluppo della relazione tra uomo e cane.

Lo scopo di questa ricerca è stato quello di sviluppare un protocollo per un test comportamentale al fine di valutare la reazione dei cani a due differenti approcci effettuati da un uomo sconosciuto all'animale.

Venticinque cani di differenti razze e meticci, 17 femmine e 8 maschi, di $56,4 \pm 26,2$ mesi di età, sono stati sottoposti ad un test comportamentale in cui un uomo sconosciuto approcciava il soggetto, utilizzando due differenti modalità, definite approccio indiretto (IA) ed approccio diretto (DA)

I test erano videofilmati e le reazioni dei cani all'approccio dell'uomo erano analizzati per attribuire i seguenti punteggi: aggressivo (=1), attivo evitante (=2), passivo evitante (=3), ambivalente (=4), neutrale (=5) o amichevole (=6).

Ogni filmato è stato analizzato in modo da rilevare la durata in secondi dei seguenti 11 comportamenti: leccarsi il naso, sollevare la zampa, guaire, chiudere le palpebre e scuotimento del corpo (la loro durata è stata sommata ed usata come misura dello stress del cane); orientamento verso l'estraneo, abbaiare e ringhiare (la loro durata è stata sommata ed usata come una misura dell'attitudine verso la persona sconosciuta); l'orientamento verso il proprietario, l'approccio ed il contatto con il proprietario (la loro durata è stata sommata ed usata come una misura dell'attitudine verso il proprietario). L'analisi statistica è stata compiuta usando il test di Wilcoxon ($p < 0,05$) al fine di confrontare le risposte a DA e IA e la durata dei comportamenti durante DA e IA.

I cani hanno risposto in modo più amichevole alla modalità di approccio IA che a quella DA ($Z = -2,049$, $p = 0,021$). Per quanto riguarda i segnali di stress, la durata è stata maggiore in DA rispetto a IA, sebbene la differenza non abbia raggiunto un valore statisticamente significativo ($Z = -1,280$, $p = 0,201$). L'attitudine verso l'estraneo si è dimostrata diversa ($Z = 2,64$, $p = 0,008$) in DA rispetto a IA: i cani guardavano all'estraneo, abbaiavano e ringhiavano maggiormente durante DA.

Infine, nessuna differenza statistica è stata osservata nei due diversi approcci per quanto riguarda i comportamenti rivolti al proprietario.

Questi risultati preliminari sembrano mostrare che i cani si comportano in modo maggiormente amichevole verso un estraneo che si avvicina a loro in modo indiretto. DA sembra essere più stressante per i cani, probabilmente perché percepiscono questa modalità di approccio come più pericolosa.