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The pet dogs ability for learning from a human demonstrator in a detour task is independent from the breed and age

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Abstract

There are many indications and much practical knowledge about the different tasks which various breeds of dogs are selected for. Correspondingly these different breeds are known to possess different physical and mental abilities. We hypothesized that commonly kept breeds will show differences in their problem solving ability in a detour task around a V-shaped fence, and also, that breed differences will affect their learning ability from a human demonstrator, who demonstrates a detour around the fence. Subjects were recruited in Hungarian pet dog schools. We compared the results of the 10 most common breeds in our sample when they were tested in the detour task without human demonstration. There was no significant difference between the latencies of detour, however, there was a trend that German Shepherd dogs were the quickest and Giant Schnauzers were the slowest in this test. For testing the social learning ability of dogs we formed three breed groups (''utility'', ''shepherd'' and ''hunting''). There were no significant differences between these, all the breed groups learned equally well from the human demonstrator. However, we found that dogs belonging to the ''shepherd'' group looked back more frequently to their owner than the dogs in the ''hunting'' group. Further, we have found that the age of pet dogs did not affect their social learning ability in the detour task. Our results showed that the pet status of a dog has probably a stronger effect on its cognitive performance and human related behaviour than its age or breed. These results emphasize that socialization and common activities with the dog

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might overcome the possible breed differences, if we give the dogs common problem solving, or social learning tasks.

Keywords: Dog; Breed differences; Social learning

1. Introduction

In a series of experiments we proved recently that pet dogs can learn effectively from human demonstrators either in manipulative (Kubinyi et al., 2003), or detour tasks (Pongrácz et al., 2001b, 2003a,b). For these studies we used only pet dogs and their owners, who were recruited from various dog schools in Hungary. We used all kinds of available dog breeds as well as mongrels. However, one could ask if the different dog breeds are equally smart in learning socially from humans? At least Frank (1980) found that wolves are better in tasks on their own than dogs, but dogs seemed to be more docile than wolves. There is a possibility that dog breeds with a different ''history'' of selection will show different ability for learning from humans.

The different major cynological organizations register many hundreds of dog breeds around the world. The existence of many breeds refers to the long and permanent need and willingness in humans to select and create new forms of dogs. Although the dog breeds show amazing variability in their outer appearance (size, shape, texture and colour of their coat, facial structure, etc.) the classification is done traditionally on the basis of their behaviour. The breeds are sorted into so-called breed groups, depending on their main behavioural characteristics. The major behavioural traits of large breed groups, called ''utilization'', refers truly to the standpoints of selective forces which formed the common character of those breeds. The behaviourally influenced nomenclature of dogs is clearly detectable, if we think to some of the main breed groups of the Fédération Cynologique Internationale (FCI), for example, sheepdogs, scent hounds and pointers.

Although textbooks and popular dog literature associate dog breeds with distinct behavioural features and mental skills, there are very few comparative studies on breed differences. This fact could be: (1) because different breeds have been developed for very specific tasks (e.g. following blood trails by scent hounds, pointing at the game by pointers, herding sheep by the sheepdogs, fighting with foxes underground by the dachshunds), which makes it very difficult to compare different breeds in any one of these strongly special tasks; (2) the more general behavioural and psychological tests are hard to interpret as indicators of some natural feature of a dogs mental and behavioural capacity.

At present, scientific literature on breed specific behaviour among dogs concentrates mainly upon four main topics: (1) behavioural problems detected in the veterinary practice, such as aggression (Lund et al., 1996; Netto and Planta, 1997); (2) specific behavioural problems, such as predatory behaviour on sheep among hunting dogs (Christiansen et al., 2001a,b); (3) behavioural tests estimating the heritability of dog personality traits (Wilsson and Sundgren, 1997a,b; Brenøe et al., 2002; Svartberg and Forkman, 2002); finally (4) comparative developmental studies (Freedman, 1958; Mahut, 1958; Coppinger et al., 1987; Head et al., 1997). Generally, the results of these investigations showed that the breed

differences, for example, in the hunting of sheep, or in the sensitivity to the noise of gunfire, correlate with the different selection of the breeds in question. For example, retrievers showed generally a lower level of fear of gunshots, than did German Shepherd dogs. This could be explained with the strong selective pressure upon retrievers to be insensitive to the noise of shots during hunting (Christiansen et al., 2001a,b). It was found that the testable personality traits, such as curiosity and fearlessness, propensity to chase, sociability, playfulness and aggression, could be found in almost all breeds, suggesting that these dimensions are evolutionarily stable among the changing selection pressures of domestication. This idea was supported by those results, which found that the personality traits, such as curiosity, hunting performance, wariness or fearfulness have quite high heritability indexes (Wilsson and Sundgren, 1997a,b; Brenøe et al., 2002; Svartberg and Forkman, 2002). However, we should not forget that almost all the dogs are living in a highly variable human environment, where not only genes, but also the epigenetic forces can form their behaviour. So when it became evident that different breeds show different behavioural problems (Lund et al., 1996; Netto and Planta, 1997), we should add that these could be explained also with the dog–owner interaction, which could vary with the given owners attitude toward that particular breed.

Recently the interest of ethologists seems to be renewed toward the dog as the animal species that has evolved to be the ideal and multi-functional companion of man. A series of studies on dog–human attachment and cooperation (Topál et al., 1998; Gácsi et al., 2001; Naderi et al., 2001), communication (Pongrácz et al., 2001a; Soproni et al., 2001, 2002), and social learning (Pongrácz et al., 2001b, 2003a,b; Kubinyi et al., 2003), showed that pet dogs have *a seemingly* instinctive ability and readiness for ‘‘reading’’ and following human behaviour. The roots of this feature are in the strong attraction of dogs for human beeings, which most possibly develops in the very young age of each dog, as a consequence of early exposure to humans. However, these studies handled dogs uniformly as a species, and did not deal with the possible differences in the behavioural and mental capacity of different breeds. The above mentioned studies focused on the fact that most of the dogs in the ‘‘developed’’ countries are living in pet status, thus the most important factor that affects the development of their behaviour is the intensive socialisation in the human family system. Recent comparative studies between dogs and wolves mental capacity (Miklósi et al., 2003) considered dogs again as a uniform counterpart species of their wild relatives, regardless of their breed. This approach could be true, if we think of the dog as an outcome of almost 100,000 years of domestication (Vilá et al., 1997). However, if we plan experiments which deal with the dogs behaviour in connection with humans, it seems to be useful to consider the possible differences in the human related behaviour of the different dog breeds.

In the present study, we focus on the effect of breeds and age on the ability of dogs for learning socially from humans in a detour task. For a pet dog to detour around a V-shaped fence proved to be a difficult task (Pongrácz et al., 2001b). However, the observation of a human demonstrator enhanced significantly and quickly the speed of the dogs detours, and dogs tended to follow the learned solution of this task even if a simpler way (a shortcut through the fence) was open for them (Pongrácz et al., 2003a,b). We found that the most important factor of social learning between dogs and humans was the humans verbal attention seeking behaviour during the demonstration (Pongrácz et al., 2004), so one

could suppose that dogs belonging to breeds with different cooperative and mental capacities would perform differently in such a task.

We chose our subjects from among participants of dog schools, where dogs are being trained mostly for basic obedience tasks. Thus, the dogs in this study were all belonging to such families where they were treated as pets, and not for their original working abilities. Our subjects came from the following three major groups of breeds: utility, shepherd and hunting dogs. Additionally, we compared the performance of these 10 breeds, which occurred most frequently at the dog schools when we conducted our experiments. Finally, we analysed the possible effect of the dogs age with their ability for learning from a human demonstrator.

2. Materials and methods

Only dogs with their owner present were used for the experiments. We did not exclude any breed of dog from the experiment, the only criteria was that the dog had to be older than 10 months. A given dog was allowed to participate only once, but an owner could participate with more than one of his or her dogs.

Experiments were executed outdoors. The experimental device was a V-shaped fence, 1 m high, with both of its sides being 3 m long (Fig. 1). The fence was constructed from a steel frame, covered with transparent wire-mesh. The fence was set up by pushing the steel spikes protruding from its bottom into the soil. The steel frame prevented the dogs from digging themselves under the fence.

Every dog had to detour the fence in three consecutive trials. One trial lasted 1 min maximum. The dog was motivated to detour the fence with its favourite toy (or food, if the dog did not like to retrieve objects). One of these targets was placed by the experimenter into the interior intersecting angle, while the owner kept the dog by its collar on the starting point. The starting point was 2 m in distance from the front of the fence. All the trials were video recorded, and these recordings were analysed later. The trials were the following.

2.1. Trial 1 – "No demonstration"

The experimenter placed the target into the interior intersecting angle by reaching over the upper edge of the fence, while the dog remained with its owner on the starting point. During this, the dog was allowed to watch the experimenter. As the fence was made from wire-mesh, the target remained visible to the dog during all the actions of the experimenter and afterwards, too. When the experimenter returned to the starting point, the owner unleashed the dog and encouraged it to get the target. The owner had to remain exactly on the starting point and was told not to command the dog verbally to detour and not to signal the right way around the fence by hand. However, common encouraging words such as "Come on, fetch the ball!" were allowed. If the dog managed to detour the fence and get the target within 1 min, the owner called the dog back, praised it, played with it a little, and the second trial was started immediately. If the dog did not succeed within 1 min, the trial was terminated, and trial 2 was started.

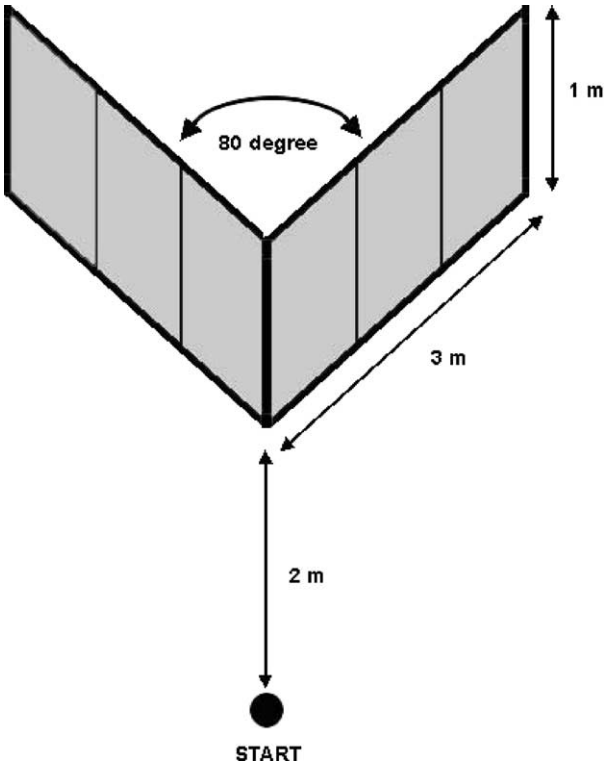

Fig. 1. The schematic drawing of the experimental fence. The steel frames were covered with light, transparent wire-mesh.

2.2. Trial 2 – "Human demonstration I"

The owner held the dog by its collar on the starting point, while the experimenter demonstrated the detour. He/she carried the target conspiciously in his/her hand and walked around the fence. During detouring, the experimenter called the dogs attention by sentences such as ''Watch me!'' When the experimenter reached the interior intersecting angle, he/she put down the target, *showed his/her empty hands to the dog*, and came from behind the fence along the other side. When he/she returned to the starting point, the owner unleashed the dog, and encouraged it to get the target.

2.3. Trial 3 – "Human demonstration II"

Trial 3 was similar to trial 2, with the difference here being the experimenter detoured the fence from the opposite direction, i.e. if he/she had detoured from left to right in trial 2, this time he/she went from right to left. The target was again carried conspiciously by the experimenter to behind the fence.

2.4. Data collection and analysis

We analysed the video recordings. The main parameter was the latency of reaching the target. This was the time interval between the releasing of the dog and when it reached and touched the target. If the dog was unable to detour the fence within 1 min, it was given 60 s as latency for that trial. Additionally, we counted how many times the dog looked back to the owner during its attempts to detour the fence. We derived frequency of looking back by dividing the actual amount with the given dogs latency. We compared the three groups looking back frequencies with the Kruskal–Wallis test and Dunn's post hoc test.

We analysed the *detour latencies* of dogs in two parts. The first analysis focused on the detouring abilities of dogs without human demonstration in trial 1. We used all the breeds from which at least eight specimens were tested. The short descriptions of the 10 chosen breeds are in Appendix A. Additionally, we formed three compound categories: ''utility dog'' ''shepherd dog'' and ''hunting dog'' from all of the various breeds we tested, and compared the abilities of these in detouring the fence by their own. One-way ANOVA with Student–Newman–Keuls post hoc test was used to find possible differences.

The second part of the analysis focused on the social learning abilities of dogs observing a human demonstrator. We compared the latencies of trials 1–3 within the three breed groups. Because there is a difference if the dog was unable to detour the fence in trial 1 (and therefore it has not acquired its own detouring experience *before getting human demonstration of detour*), we analysed the results of these initially unsuccessful dogs separately from the ones that were able to detour in trial 1. ANOVA for repeated measures, with SNK post hoc test were used for statistical analysis.

To analyze the effect of age on the detouring and social learning abilities of dogs, we formed four age groups as follows: Group 1: from 10 to 12 months (initially successful n = 28, initially unsuccessful n = 23); Group 2: between 1 and 2 years (initially successful n = 30, initially unsuccessful n = 12); Group 3: between 2 and 7 years (initially successful n = 28, initially unsuccessful n = 21); Group 4: over 7 years (initially successful n = 37, initially unsuccessful n = 12). When forming these age groups, we tried to rely on generally accepted ontogenetical stages in dogs development, and also we tried to divide our samples into equal parts. In the case of age groups, we analysed the initially unsuccessful dogs separately. At last, we compared the ratio of initially unsuccessful dogs between the age groups by κ^2 tests.

2.5. Results

2.5.1. Detouring abilities of the dogs without human demonstration

At first, we compared the latencies of trial 1 between the breeds, belonging to the different breed groups (Fig. 2). We found significant effect of breed only in the ''utility'' group (one-way ANOVA: $F_{2,23} = 5.08$, $P < 0.05$). The Giant *Schnauzers* were significantly slower than German Shepherd dogs and Rottweilers (SNK post hoc test). In the other two groups there were no significant differences between the breeds (''shepherd dogs'' $F_{4,41}$ = 0.36, P = 0.83; ''hunting dogs'', unpaired t-test: t_{17} = 1.56, P = 0.14). We did not find

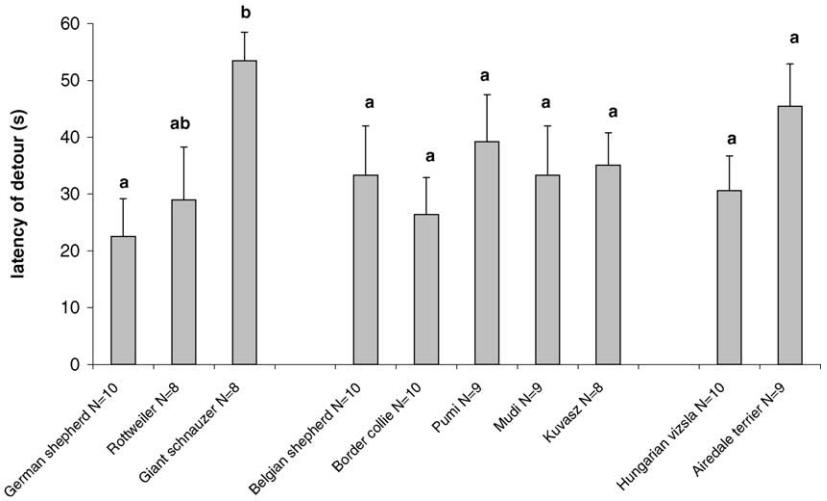

Fig. 2. Detouring latencies during trial 1 of the 10 most frequently occuring breeds in our study, divided into three main functional groups. Different letters above the columns indicates significant differences within a given breed-group (Student–Newman–Keuls post hoc test).

significant differences comparing the three groups of breeds, after pooling all the dogs results belonging to them (''utility'' $n = 63$, ''shepherd'' $n = 68$, ''hunting'' $n = 49$) ($F_{2,177} = 0.80$, $P = 0.45$). The results showed that there are only slight breed differences, within the given breed groups, and none of the breed groups showed better performance than the others.

2.5.2. Social learning form the human demonstrator

At first we analysed the results of initially successful dogs. We formed three groups of breeds: ''utility'' $n = 33$, ''shepherd'' $n = 28$ and ''hunting'' $n = 24$. The latencies of trials 1–3 were compared within these groups. ANOVA for repeated measures proved to be significant in all of the groups: ''utility'': $F_{2,64} = 16.07$, $P < 0.001$; ''shepherd'': $F_{2,54} = 3.50$, $P < 0.05$; ''hunting'': $F_{2,46} = 4.56$, $P < 0.05$. SNK post hoc tests showed that latencies of trials 1 and 2 were significantly longer in the ''utility'' group than in trial 3, and trial 1 was significantly longer in the other two groups than trial 3 (Fig. 3a).

Similar analysis was performed on the results of the initially unsuccessful dogs (''utility'' $n = 19$, ''shepherd'' $n = 20$ and ''hunting'' $n = 14$). As it was described earlier, these dogs were not able to detour the fence in trial 1. Friedman nonparametric ANOVA proved to be significant in all of the three groups: ''utility'': $F_{2,36} = 15.10$, $P < 0.001$; ''shepherd'': $F_{2,38} = 13.85$, $P < 0.001$; ''hunting'': $F_{2,26} = 15.26$, $P < 0.001$. SNK post hoc tests showed that dogs in all groups reached the target with significantly *longer* latency in trial 1 than in trial 3 (Fig. 3b).

We compared the frequencies of looking back in each trial separately among the three breed groups. Kruskal–Wallis test showed that in trial 1 there was no significant difference between the groups ($\kappa_3^2 = 1.50$, $P = 0.47$). However, we found significant effect of the breed groups in both trial 2 ($\kappa_3^2 = 7.75, P < 0.05$) and trial 3 ($\kappa_3^2 = 6.90, P < 0.05$). Dunn's

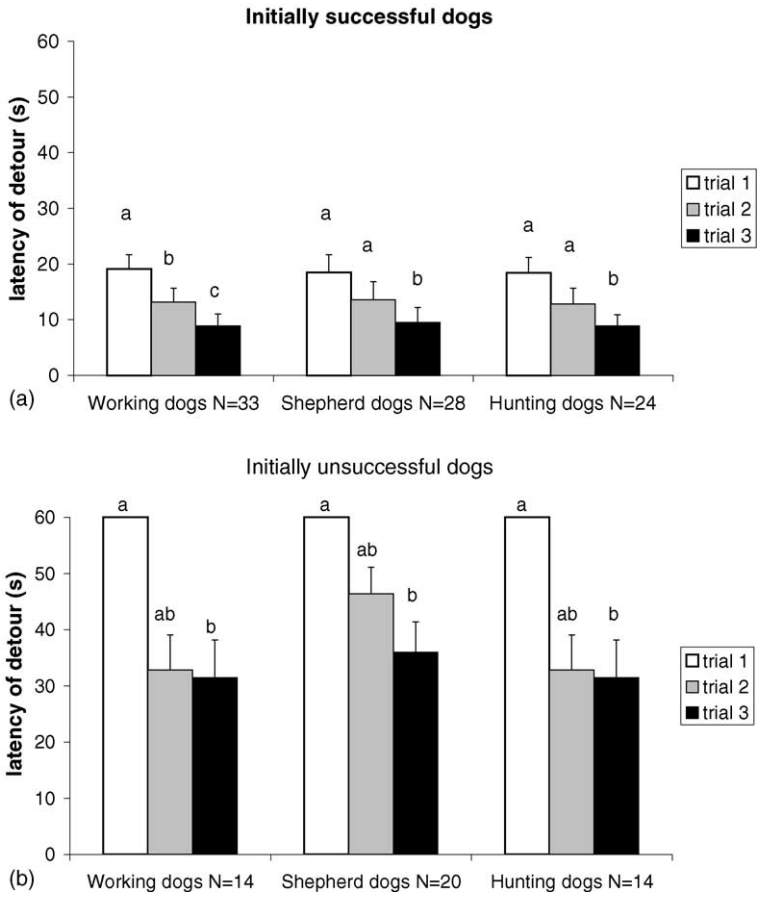

Fig. 3. (a) Detouring latencies of the three breed groups, during trials 1–3. Here we show the results of the dogs who were able to detour just in the first trial also. Different letters above the columns indicates significant differences within a given breed group (Student–Newman–Keuls post hoc test). (b) Detouring latencies of the three breed groups, during trials 1–3. Here we show the results of the dogs who were not able to detour in the first trial. Different letters above the columns indicates significant differences within a given breed group (Student–Newman–Keuls post hoc test).

post hoc test showed that in these two trials ''shepherd dogs'' looked back at the owner significantly more frequently than did the ''hunting dogs'' (Fig. 4).

2.5.3. *The effect of age on detouring*

We compared the dogs detouring abilities and ability to learn socially from humans in four different age groups, regardless of their breed. Kruskal–Wallis ANOVA showed that there is no difference between initial detouring ability of the four age groups in trial 1: $\kappa_4^2 = 3.16$, $P = 0.38$. Friedman test for repeated measures with Dunn's post hoc tests showed that both the initially successful and the unsuccessful dogs learned effectively from the human demonstrator in all age-groups. The latencies of trial 3 were shorter than in trial

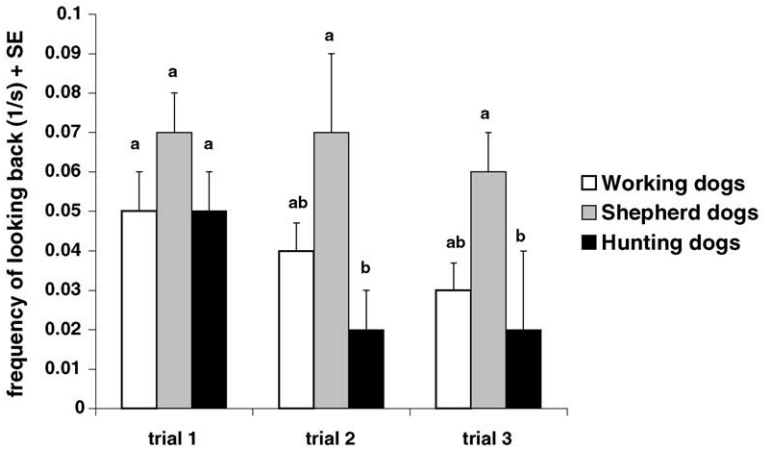

Fig. 4. Frequencies of looking back to the owner during the dogs attempts to detour the fence. Different letters indicate significantly differing groups (Dunn's post hoc test).

1 in all groups: Group 1, successful dogs: $\kappa_3^2 = 28.22$, $P < 0.001$; unsuccessful dogs: $\kappa_3^2 = 20.32$, $P < 0.001$; Group 2, successful dogs: $\kappa_3^2 = 14.86$, $P < 0.001$; unsuccessful dogs: $\kappa_3^2 = 9.00$, $P < 0.05$; Group 3, successful dogs: $\kappa_3^2 = 18.84$, $P < 0.001$; unsuccessful dogs: $\kappa_3^2 = 17.08$, $P < 0.001$; Group 4, successful dogs: $\kappa_3^2 = 29.76$, $P < 0.001$; unsuccessful dogs: $\kappa_3^2 = 8.24$, $P < 0.05$ (Fig. 5a and b).

At last we compared with Chi-square tests the age groups on the basis of proportion of the initially unsuccessful dogs within them (Table 1). We found significant difference only in one pairwise comparison: in Group 1 there was a significantly greater proportion of initially unsuccessful dogs than in Group 4.

3. Discussion

The results showed that: (1) the 10 most common dog breeds in our study performed the detour task on their own with similar latencies; (2) there were no differences between the detouring ability of utility, shepherd and hunting dogs; (3) utility, shepherd and hunting dogs learn equally well from a human demonstrator in the detour situation; (4) shepherd dogs looked back more frequently to their owners than hunting dogs during attempts to detour the fence; (5) younger and elder pet dogs learn equally well from the human demonstrator.

Different dog breeds were selected by humans for very different purposes, compare the utilisation of the numerous variations of hunting dogs, from the greyhounds to dachshunds, or from the elkhounds to pointers. The task of the given breed involves more or less human assistance and contact and this affected the dog breeds' dependency on the humans as well. Utility, shepherd and hunting dogs all can be characterised with having high cooperative ability with their masters during performance of their traditional tasks, but the degree of dependency from humans, the trustfulness toward strangers and endurance of monotonous exercises could show great differences among them.

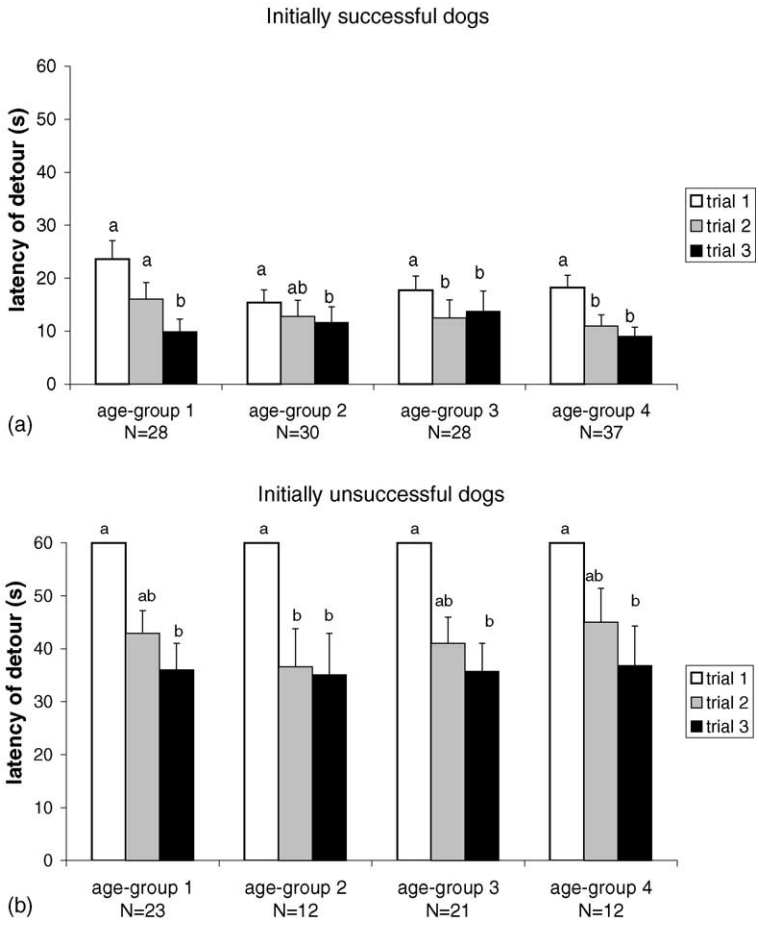

Fig. 5. (a) Latencies of detour in the four age groups. Here we show the results of initially successful dogs, who were able to detour the fence even in trial 1. Different letters above the columns indicate significant differences within a given age group (Student–Newman–Keuls post hoc test). (b) Latencies of detour in the four age groups. Here we show the results of initially unsuccessful dogs, who were not able to detour the fence in trial 1. Different letters above the columns indicate significant differences within a given age group (Student–Newman–Keuls post hoc test).

Table 1
IU/IS means the number of initially unsuccesful dogs divided by the number of initially successful ones

	IU/IS	Group 2	Group 3	Group 4
Group 1	23/28	2.68, $P = 0.10$	0.05, $P = 0.82$	4.67, $P < 0.05$
Group 2	12/30	–	2.00, $P = 0.16$	0.19, $P = 0.66$
Group 3	21/28	–	–	3.70, $P = 0.05$
Group 4	12/37	–	–	–

Chi-square statistics and the P-values are indicated in the cells.

Considering the characteristics of the *three main breed groups in our study*, one could expect that in the detour task, the *relatively more independent* shepherd dogs (and perhaps hunting dogs) will be more effective on their own, while utility dogs will be the more eminent disciples of the human demonstrator than the shepherd dogs. However, our results showed that the breed groups, as well as the individual breeds, showed no significant differences either in their individual detouring abilities, or in their social learning performance. It could be that the detour task was too simple for detecting breed or breed group differences. We think that this is unlikely at least for two reasons. First, our previous experiments showed that dogs faced serious difficulties to detour the V-shaped fence on their own (Pongrácz et al., 2001b, 2003a,b). Second, if we examine the ratio of initially successful/unsuccessful dogs in the different breed groups, it is obvious that a considerable (between 36 and 42%) proportion of dogs were unable to solve the task without human demonstration in all three breed groups. On the other hand, it is very interesting that shepherd and hunting dogs looked back with different frequencies to their owners during attempts to detour the fence. Miklósi et al. (2003) found that possibly the major difference between hand raised wolves and dogs during a human mediated task, was that wolves do not look at the human experimenter, but dogs do. The presence of humans and their encouraging glances (paired with words sometimes) could help dogs to solve difficult tasks (Topál et al., 1997). We found that shepherd dogs looked back to their owners most frequently, however they could solve the detour task as effectively as did the other breeds. This could be a sign of a general habit of sheepdogs to check frequently the ''shepherd's'' possible commands, *or position* during work with the flock.

The lack of breed difference can be explained either with *our relatively small sample sizes*, *or* by assuming that the social environment of the dogs has masked potential genetic effects, as all dogs lived in close association with humans as a pet. Although sample sizes in the single breed groups were relatively small, dog numbers in the pooled breed groups was large enough for more relevant statistical analysis (much smaller sample sizes were enough to detect strong differences in any of our previous detour-experiments, see Pongrácz et al., 2001b, 2003a,b, 2004). The few *other* studies that found significant behavioural differences between some breeds of dog, used either poorly socialised puppies (Freedman, 1958), or compared dogs in tasks that were specific to one or more of the breeds, i.e. shepherd and herding dogs with sheep (Coppinger et al., 1987), or used very strong, fear eliciting stimuli, i.e. suddenly emerging, realistic figures, shooting, etc. (e.g. Wilsson and Sundgren, 1997a,b). For example, Freedman (1958) showed that short, daily repeated human stimulation sessions are enough for the nearly normal development of social behaviour in hunting dog puppies, the same treatment is not enough for shepherd dogs, and pariah-dog like breeds (e.g. basenji), they remain almost unaffected from the same early human interaction. Coppinger et al. (1987) investigated the sheep related behaviour and its development among herding dogs and flock guarding dogs, and they found that herding dogs (e.g. border collie) react to sheep with almost complete predatory behavioural sequences (without the final act of killing), but the large guarding dogs show much more neotenic behaviour toward the sheep lacking almost all the predatory elements. *From these results* we can conclude that significant breed differences in dogs behaviour *could be found only*, *if we would test* their inherited breed specific reactions. In contrast, Head et al. (1997) that human

interaction and presence can decrease breed differences. The pet status of the family dog *usually* involves intensive socialisation and frequently repeated common tasks with humans. Therefore, increased levels of socialisation could balance out genetic ''handicaps'' for given breeds. Social learning is one of the most effective ways to fit together the behaviours of two parties, therefore it is not surprising that utility, shepherd and hunting dogs were all able to follow the human demonstrators actions. The results of this study emphasize the *possible* importance of pet status, *which involves plenty of* socialisation and common activities of humans and their dogs for gaining *relatively* equable outcome from a *wide variety of breeds in a simple problem solving*, *or social learning task*.

Acknowledgments

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Appendix A

Here we give the short descriptions of the 10 most common dog breeds, used for our study. The descriptions were extracted from the official breed standards, published by the Fédération Cynologique Internationale (FCI).

A.1. Airedale Terrier n = 9

Utilisation: The largest of the terriers, originally was a hunting dog, being able to fight with such animals as the otter or badger. Today it mainly serves as a family dog, but it is also used frequently for different sports as well. *History:* It was created from smaller terriers and also from the otterhound, in the 19th century. *Character:* It is outgoing and confident, friendly, courageous and intelligent. Alert at all times, not aggressive but fearless. *Recent status:* Today is an all purpose hobby dog, as well as a family dog.

A.2. Belgian shepherd (Tervuren) n = 10

Utilisation: Originally was a sheepdog. Today a utility dog (guarding, defence, tracking, etc.) and an all purpose service dog, as well as a family dog. *History:* The modern BS was created by the enthusiastic selection from among various Belgian herding dog types at the end of the 18th century. *Character:* Its lively, alert temperament and its confident nature, showing no fear or aggressiveness, makes it the best guard dog of property. Without any hesitation it is the stubborn and keen protector of its owner. The BS should give the impression of that elegant strength which has become the heritage of the selected representatives of a utility breed. *Recent status:* Today is a utility dog (guarding, defence, tracking, etc.) and is an all purpose service dog, as well as a family dog.

A.3. Border collie n = 10

Utilisation: An excellent herding dog. It has been used beside sheep in Scotland for centuries. *History:* Its ancestors were brought probably by the Vikings to Scotland, where they were crossbred by the original local sheepdogs. *Character:* Tenacious, hardworking sheepdog, with great tractability. It is keen, alert, responsive and intelligent. *Recent status:* It is still used for herding, but more importantly it is a very popular sporting and companion dog.

A.4. German Shepherd n = 10

Utilisation: It was 'designed' to be an all purpose utility dog. *History:* The planned breeding of this breed was begun in 1899, with the goal of producing a utility dog, cut out for high performance. *Character:* It should be even in temperament, well balanced and self assured. Except when provoked, totally good natured. He must possess courage, combativity and toughness. *Recent status:* It is probably the most popular breed in the World. It is equally excellent for police, rescue and army duties, as well as for a companion or pet.

A.5. Giant Schnauzer n = 8

Utilisation: Utility and companion dog. *History:* Originally their ancestors were used in southern Germany to drive cattle. Since 1913 the breed has been registered and in 1925 the Giant Schnauzer had officially been recognised as a utility dog. *Character:* Typical characteristics of this dog are its good natured, even temperament and his incorruptible loyalty towards his master. He has highly developed sense organs, intelligence, trainability, strength, endurance, speed, resistance to weather and diseases. *Recent status:* This dog is best suited for being a companion, sporting, utility and working dog.

A.6. Hungarian short-haired vizsla n = 10

Utilisation: A versatile gun dog that must be able to work in the field, forest and water. *History:* The ancestors of the Hungarian Vizsla came into the Carpathian Basin with the nomadic Hungarian tribes. Written descriptions and graphic illustrations are found in documents of the 14th century. *Character:* Lively, friendly, evenly tempered and is trained easily. His outstanding willingness to keep contact with his master while working is one of his essential qualities. He cannot bear rough treatment and must be neither aggressive nor shy. *Recent status:* It is an efficient hunting dog presently, too. However, it is a popular pet breed and can be easily being kept as a companion dog in the house.

A.7. Kuvasz n = 8

Utilisation: The Kuvasz was used originally as a watch and guard dog for flocks. *History:* The Kuvasz is a long established, ancient Hungarian shepherd dog. His ancestors came into the Carpathian basin at the time of occupation by the Magyars. These dogs were used against beasts of prey and thieves. *Character:* They are strong and large, however radiate nobility. The Kuvasz is brave and fearless. It defends the people entrusted to its care

and protection and their property, even with its life. It is self-confident and may become aggressive if ill treated. *Recent status:* Since the decline in stock herding, it has settled in villages and later in towns. However, it is still used as a watch and guard dog for houses, property and other valuables, as well as for people.

A.8. Mudi n = 9

Utilisation: This medium sized dog is very popular with the shepherds for the use of herding large and difficult livestock. It is an alert watchdog. *History:* It was separated from other Hungarian herding dog breeds at the start of the 20th century. Its pricked ears show the possibility for earlier crossbreeding with various German breeds. *Character:* The Mudi is extremely intelligent and able to learn, of lively temperament, courageous, watchful, keen to work, alert and adaptable. *Recent status:* It remains probably the most widely used dog for herding sheep in Hungary. Additionally, it is an excellent guard and companion dog, lovable house pet and a popular agility dog.

A.9. Pumi n = 9

Utilisation: Herding dog of Terrier type. Has excellently proved his worth when combating wild beasts of prey and rodents. *History:* It is a product of crossbreeding of original Hungarian herding dogs with imported German and French dogs of Terrier type with prick ears. It has been recognised as an independent breed at the beginning of the 20th century. *Character:* It has a restless temperament. The Pumi is rather noisy. Its whole appearance embodies thirst for action and it is always active and ready for duty. *Recent status:* Apart from herding sheep, it is an excellent house pet, companion and sporting dog.

A.10. Rottweiler n = 8

Utilisation: Service, utility and companion dog. *History:* Its origin goes back to Roman times. They marched over the Alps with the Roman legions, protecting the humans and driving their cattle. In the region of Rottweil, Germany, these dogs met and mixed with the native dogs in a natural crossing. *Character:* Good natured, placid in basic disposition, very devoted, obedient, biddable and eager to work. His appearance is natural and rustic, his behaviour self-assured, steady and fearless. *Recent status:* This breed is highly suitable for the tasks set by police service and other defence and guarding duty. However, more and more Rottweilers are kept as companions.

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