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Astrid Böhm BSc

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Abstract

Veterinary care is important for dogs' welfare by maintaining or improving health, yet can impair welfare by causing fearful reactions. Cooperative veterinary care, as commonly used with zoo animals, denotes positive reinforcement training, in which the animal learns to voluntarily participate in medical procedures. This study investigated the feasibility of cooperative training being carried out by dog owners instead of experienced animal trainers and the applicability of the learned from a training situation to a veterinary situation.

Forty pet dogs were included in the study. After first standardised veterinary examination, dogs were assigned to a training and a control group, with groups balanced for age, sex, owner-assessed fearfulness at the veterinarian and dogs' and owners' training experience. The training group (N=22) took part in 8-12 group classes on cooperative veterinary care training. The dog owners were instructed to teach their dogs a front paw target behaviour to signal their readiness for the procedure, and to familiarise them with handling of the body and taking of rectal temperature. The control group (N=18) received no such lessons. A second examination was performed at least 13 weeks after the first examination. Videos of the veterinary examinations were divided into 5 second time segments, and scores for ear- and tail-position, presence/absence of tail wagging, avoidance behaviours, lip licks and "freezing" were coded in each segment by a blinded coder. The resulting 1/0 data were converted into proportions and the mean of each variable was analysed for each dog and each veterinary examination. Generalized linear mixed Models were calculated to assess the Group*Visit interaction on the behaviours, with group and visit (first or second veterinary examination) determined as fixed factors and dogs' ID included as a random effect. To assess the dogs' and owners' ability to transfer the learned from the training to the veterinary situations, videos of the training group during the second examination were coded and descriptively analysed with regard to dogs' performance and interruption of the target behaviour and whether the owners requested a pause or termination of the examination contingent on the dog's behaviour. For the evaluation of training success outside of the veterinary situation, the trainer's and owners' ratings were taken into account, as well as a training documentation.

The results showed no significant changes in the so called stress related behaviours in the Group*Visit interaction. However the analyses of the training assessments indicated that the training by instructed dog owners was successful in the majority of dogs. In contrast to this, it seems that the transfer from the training situation to the veterinary situation was not. Although they were informed that they could pause or stop the examination at any time, the majority of the dog owners did not react when the dogs interrupted the cooperation signal. This unsuccessful transfer could be one possible reason for the lack of a significant decrease in stress related behaviours in the training group.

Introduction

Veterinary care is an important aspect of our dogs' welfare, but besides the health status, the wellbeing during clinical examinations and treatment is another aspect influencing general welfare (Christiansen & Forkman, 2007). However, fear in dogs at the veterinary practice is common. Studies found that up to 78% of dogs at a veterinary clinic could be categorised as fearful (Döring et al., 2009). Not only is fear associated with impaired welfare, but it may also hamper the examination, or even result in aggressive behaviour causing a risk to the veterinary staff (Döring et al., 2009; Wright, 1996). Thus also the need of sedation, to make treatments feasible, increases (Döring et al., 2009). It is not uncommon for visits to become increasingly more stressful and difficult, due to contextual fear conditioning, each time having unpleasant experiences during a visit (Garelick & Storm, 2005; Simpson, 1997). Additionally stress for pets and owners at the veterinary practise can also be a reason for pet owners to postpone or avoid potentially necessary veterinary visits (Hetts et al., 2004; Rodan et al., 2011; Volk et al., 2011). Volk et al. (2011) found 22% of surveyed dog owners to visit the vet less often due to stress reasons.

The Journal of the American Animal Hospital Association has published guidelines to reduce patient fear in the veterinary clinic. Those guidelines suggest to adapt the hospital design such as using non-slip mats to increase the feeling of safety, adapting the waiting area or the use of towel wraps to increase both safety and comfort feeling (Hammerle et al., 2015), but there is still a lack of research to proof these suggestions. Pressure vests, such as ThunderShirts® or Anxiety Wraps® are also suggested to potentially increase the feeling of security (Lloyd, 2017). They create local pressure which is supposed to have a similar indirect calming effect to the rest of the body like touches have (King et al., 2014; Lloyd, 2017; Lloyd & Roe, 2013). Pressure vests and other comparable garment are assumed to work in a similar way (King et al., 2014; Lloyd, 2017), but as reviewed by Buckley (2018) at the moment there is lack of reliable evidence to verify beneficial effects. Calming caps, semitransparent eye-masks, are another kind of equipment suggested to be helpful to ease anxiety by reducing (potentially frightening) visual stimuli (Lloyd, 2017). Also the olfactory sense can possibly be used to help dogs to relax. Studies which investigated the effect of essential oils of camomile or lavender for example indicated that aromatherapy could possibly reduce anxiety in rescue shelters (Graham et al.,

2005) or travel-induced excitement in dogs (Wells, 2006). Some studies also suggest pheromones like the Dog Appeasing Pheromone (DAP) to be potentially fear-reductive (Denenberg & Landsberg, 2008; Mills et al., 2006), but there is insufficient high-quality evidence as reviewed by Frank et al. (2010).

There is also a lack of controlled studies investigating behavioural techniques to reduce fear in veterinary context. One approach would be to offer food or toys for distraction during veterinary visits, or use them for classical or operant conditioning (Hammerle et al., 2015). Classical conditioning means that an animal learns about the relationship of two stimuli: A conditioned stimulus (CS) predicts an unconditioned stimulus (US) which evokes an unconditioned response (UR) (Chance, 2008). The occurrence of the stimuli cannot be influenced by the animal's behaviour. Behaviours involved to classical conditioning are innate reflex responses (Chance, 2008). In contrast to this, operant conditioning includes an animal's behaviour that acts on the environment. The resulting change in the environment strengthens (rewarding change in the environment) or weakens (punishing change in the environment) the behaviour for the next time (Chance, 2008).

In a study at the Vetmeduni Vienna food rewards were used to train cats to use a carrier voluntarily (Pratsch et al., 2018). Thereby the travel related stress was improved and a positive effect on the time needed for the examinations following the journey was found (Pratsch et al., 2018). A recent study at the University of Bern has found a positive effect on the dog's affective state by classical conditioning with high value food during pressure-free visits (Grieder, 2018). However, operant conditioning of handling for veterinary procedures was not addressed in these studies and to date there is a lack of controlled studies on the efficacy of behavioural management techniques for increasing well-being in cats and dogs during veterinary examinations.

In captive wild animals it is becoming increasingly common to use positive reinforcement training to motivate the animal to cooperate and actively take part in medical procedures (e.g. Behringer et al., 2014; Broder et al., 2008; Joyce-Zuniga et al., 2016; Laule et al., 1996, 2003; McKinley et al., 2003; Videan et al., 2005; Weiss & Wilson, 2003; Whittaker & Laule, 1998). This way of cooperative veterinary care enables veterinarians to perform diagnostic testing or medical treatments on wild animals without the need for sedation or anaesthesia. By the use of positive reinforcement training animals learn to present their body in a specific way or to place the concerning body part onto a provided target location and maintain this position until the procedure is over (Whittaker & Laule, 1998). Such target behaviours could for example be to put a limb through a hole in a training wall or cage (Whittaker & Laule, 1998) or to keep touching a ball with the snout (Weiss & Wilson, 2003).

These target-behaviours can additionally be used as so-called "cooperation signal". This means that the target behaviour indicates the readiness of the animal to participate in the concerning veterinary or husbandry activity (Coleman et al., 2008; Laule et al., 2003). If the animal wants a human to stop an action, it can communicate this by breaking off the target-behaviour. Coleman et al. (2008) for example trained rhesus macaques to put their arm into a blood sleeve, thus signalling that they were ready for venipuncture. Cooperative veterinary care training built on positive reinforcement enables the animals to choose whether they want to cooperate or not (Coleman et al., 2008) – if an animal breaks off the cooperation signal, the procedure is immediately stopped. The possibility of choice the animals gain during this kind cooperative veterinary care training, hits the biological need of having the ability to influence and control the environment (Leotti et al., 2010). Choice means that the animal has some control over the environment, being able to decide which behaviour to use to avoid unpleasant consequences and to increase the probability of desired change in the environment (Leotti et al., 2010). But the possibility of choice was even found to be rewarding itself, apart from the desired outcome (Leotti et al., 2010). Leotti et al.(2010) named choice as "essential for an individual’s general wellbeing", and several studies with different animal species showed that the ability to exert control leads to a reduction of stress and to improved welfare (Bandura et al., 1985; Buchanan-Smith & Badihi, 2012; reviewed in Leotti et al., 2010; Taylor et al., 2001).

In the context of cooperative care training, communication via target-behaviour during veterinary examinations and treatments enables the animal to make an active response and control the human's actions (Bassett & Buchanan-Smith, 2007). Besides those positive effects, trained animals seldom refuse or stop taking part in veterinary procedures but are highly reliable in participating (Laule et al., 2003). By reducing the need for physical restraint and fixation, animals experience better welfare (Glavin et al., 1994; Laule et al., 2003; Leotti et al., 2010). Moreover, since the animals have the possibility to control (potential) threats by simply terminating the cooperation signal, they are less likely to show aggressive behaviour, improving safety for the veterinary team (Laule et al., 2003).

Besides the effect of operant conditioning, the rewards used for the positive reinforcement training can also change the animal’s emotional state via classical conditioning (Chance, 2008; Wright et al., 2005). An initially unpleasant stimulus (for example a medical procedure) can become associated with the pleasant stimulus (for example food) that follows it (Chance, 2008; Wright et al., 2005). A very common method is to complement counterconditioning with desensitization, which means the unpleasant stimulus is presented in a weak form at the beginning and only slowly increased, to make sure the subject stays relaxed throughout the training (Wright et al., 2005). This technique of desensitization and counterconditioning (DSCC) keeps the animal's arousal low and thereby lays the foundation for habituation, while at the same time a second pleasurable stimuli evokes a response which is incompatible with anxiety (Wright et al., 2005). The same is true for cooperative veterinary care training, where each manipulation and each procedure is divided into small steps which represent preliminary stages or weak forms of the final action and distress responses are inhibited by conditioning with food rewards. Savage (2010) showed that classical conditioning with food rewards can also be used to reduce aggressive behaviour in dogs. In the case of veterinary examinations, this could reduce the risk for veterinary staff and for pets, and it could mean that animals will feel more comfortable in these situations and thus willingly participate in veterinary care.

Accordingly, food rewards are most often used to reward the animals for cooperative behaviour in a husbandry or veterinary context (e.g. Laule et al., 1996, 2003; McKinley et al., 2003; Weiss & Wilson, 2003; Whittaker & Laule, 1998). Food is a primary reinforcer (Chance, 2008), and several studies with different species showed that animals often prefer earning food rewards by showing operant responses over eating from continuously and behaviour-independent available food-sources (Inglis et al., 1997; Osborne, 1977). One possible explanation for this contrafreeloading phenomenon is the advantage of learning how to act on and to control the environment (Inglis et al., 1997). Additionally stimuli paired with the food reward during training can become secondary reinforcers, which maintains the occurrence of contrafreeloading behaviour (Inglis et al., 1997; Osborne, 1977). Further the animals' operant response initiates changes in the environment. Those environmental changes cause sensory enrichment and this kind of enrichment was found to be rewarding enough (also without earned food) to reinforce the preceded behaviour (reviewed in Inglis et al., 1997). The knowledge about contrafreeloading explains why teaching animals via positive reinforcement training does not require food deprivation. The opposite is the case: Food deprivation reduces the probability of contrafreeloading (Inglis et al., 1997). Positive reinforcement training can be seen as pleasant enrichment, which improves the trained animal's well-being (Laule & Desmond, 1998).

The effectiveness of cooperative care training in enhancing welfare in the context of veterinary and husbandry activities has been demonstrated in a variety of species ((Whittaker & Laule, 1998), e.g. *bonobos* and *orangutans* (Behringer et al., 2014), *rhesus macaques* (Coleman et al., 2008; Reinhardt, 2003), *chimpanzees* (Videan et al., 2005), *chimpanzees* and other primates (Laule et al., 1996, 2003), *snow leopards* (Broder et al., 2008) and *grizzly bears* (Joyce-Zuniga et al., 2016)) and *Aldabra tortoises* (Weiss & Wilson, 2003). This training can even make it possible to monitor pregnancy via ultrasound examination without using anaesthesia in snow leopards (*Uncia uncia*) or to take blood samples of grizzly bears (*Ursus arctos horribilis*), which also participate voluntarily in this procedure (Broder et al., 2008; Joyce-Zuniga et al., 2016).

If wild species can be trained to cooperate in their own veterinary care, we suggest that this should also work for dogs, a species that has been selected for their cooperativeness with humans over many millennia (Range & Virányi, 2015).

The aim of our study was to test whether pet dog owners can teach a cooperation signal to their dogs and prepare them for a voluntary veterinary examination with guidance and help of an experienced dog trainer. Thus, in contrast to existing studies with captive wild animals (e.g. Behringer et al., 2014; Broder et al., 2008; Coleman et al., 2008; Joyce-Zuniga et al., 2016; Laule et al., 1996, 2003; Reinhardt, 2003; Videan et al., 2005; Weiss & Wilson, 2003; Whittaker & Laule, 1998) or with domestic cats (Pratsch et al., 2018), our study focused on testing whether instructed but "non-expert" persons (i.e. the dogs' owners) were able to carry out the training with their own dogs.

Another novelty of this study was that the cooperation signal was used with a veterinarian not involved into or experienced with the training, to mimic the real-life situation. Due to being blinded to the group allocation, the veterinarians did not directly take the target-(off)-behaviour into consideration, so the dog owners had to translate their own dog's target-behaviour-based communication to a veterinarian and ask the veterinarian for stops if needed.

Thus, one key issue was whether the learned skills can be transferred from the training situation to the veterinary examination by the dogs and also by their owners. Both the dogs and the owners had to transfer the trained skills from the training location to the veterinary practice and from the people involved to the training sessions to the veterinarians carrying out the examination. The dog owners had to read their dogs' communication (based on the dog's performance or interruption of the 'cooperation signal') and request interruptions of the examination if needed as described above.

We predicted that 8 to 12 training sessions, with additional instructions for continuing training at home, are sufficient for the dog-owner-teams to reach the training goal that the dog stays voluntary on the target mat while an unfamiliar person performs a veterinarian-like training examination. We also expected the transfer from the training situation to the veterinary examination situation to be successful and hypothesised that the trained dogs would be less stressed during the second veterinary examination, compared to a control group that has received no such training, and compared to the first (baseline) examination (prior to cooperative care training). Specifically, we expected so-called 'stress-related behaviours', including lip licking, yawning, low ear and tail position, low body posture or the fear-related behaviour "freeze" (Beerda et al., 1998, 2000; Tod et al., 2005; Walker et al., 1997), to decrease and tail wagging, suggested as an indicator of a positive affective state (McGowan et al., 2014) to increase in the training group compared to the control group that had not experienced any such training.

Methods

This study was discussed and approved by the institutional ethics and animal welfare committee in accordance with GSP guidelines and national legislation (ETK-05/01/2019). During the course of the study the participating, privately owned dogs underwent two standardized veterinary examinations. During those examinations behavioural and physiological data were collected. After the first examination, dog-owner-teams were semi-randomly allocated to the training group and took part in 8 to 12 training sessions, with a maximum of one session per week, and were also instructed to practice at home. The dogs learned to step onto a target mat with their front paws to communicate when they were ready for manipulation and were systematically trained to tolerate manipulations included in the veterinary examinations. After the second examination the behavioural and physiological results of both veterinary examinations of the training and the control group were compared statistically.

Subjects

The subjects of the study were privately owned pet dogs of both sexes (neutered and unneutered) of different breeds and crosses, between 1 and 10 years of age (Appendix 1). Dog owners were recruited via advertisements on social media and printed flyers. Participating owners were asked to answer a questionnaire concerning their dogs' experiences and behaviour in general and in veterinary examination situations (Appendix 2). Dogs with generalised fear of humans (beyond the veterinary context) and dogs which had ever shown aggressive behaviour against humans within the veterinary context (snapping towards a person or biting) were excluded for dog welfare and safety reasons.

A "pre-visit" with the trainer at the training facility served to get to know the dogs, check for inclusion and exclusion criteria and the dogs' vaccination status. The pre-visit was also used to familiarise all participating dogs with the polar heart rate monitor (RS800CX, Polar Electro Oy, Finland). 47 dogs, which met all criteria, attended the first veterinary examination with their owners. None of them was excluded during the first examination, but seven of the 47 dogs taking part at the first veterinary examination dropped out until the second examination due to private reasons of the dog owners. The final sample included 40 dogs (training n=22; control n=18), but the video-recording of one dog of the training group failed during the first veterinary examination. Consequently for the analysis of the behavioural data based on video recordings of both examinations there were only data of 39 dogs (training n=21; control n=18) available.

After the first veterinary examination, the participating dogs were semi-randomly allocated into the training and the control group. The allocation was on fear level of the dogs as reported by the owners, age, sex, dogs' and owners' training experience (Table 1), the owners' group preferences and the dogs' intraspecific social behaviour. Dogs described as showing aggressive or fearful behaviour against other dogs were allocated into the control group in view of the feasibility of the training sessions in small groups. For data collection during the first and the second veterinary examination, dogs' intraspecific social behaviour was expected not to be decisive, because social contacts were prevented from happening during the whole veterinary visit. The balance of the groups with regard to age, sex, dogs' and owners' training experience, the fear behaviour of each dog at the veterinarian, and the dogs' stress level during travelling to the Vetmeduni Vienna, where the study was conducted, were also considered (Table 1). Therefore data, based on the owners' assessments when answering the questionnaire (Appendix 2) at the begin of the study, were statically compared for the two groups (Appendix 3). According to the dog owners' self-assessment their mean own dog training experience was 3.64 (SE=0.25) in the training group and 3.71 (SE=0.19) in the control group on a scale from 1 (little training experience) to 5 (very experienced) (Table 1). The mean training experience of the dogs, which was assessed on the same scale, was 3.95 (SE=0.18) for the dogs of the training group and 3.53 (SE=0.24) for the control group (Table 1). The data concerning the fear aspect of each dog at the vet included the owners' appraisal about their dog's fear-level as well as the information about the previous frequency of occurrence of following behaviours in veterinary practices: freezing, trembling, panting, hiding, comfort seeking at the owner, growling, showing teeth, snapping towards a person and biting. These behaviours plus the owners assessment about previous frequency of occurrence of unintentional loss of faeces were rated on a scale from 1 to 5 (1=does occur often; 2=sometimes; 3=seldom; 4=did occur once;

5=never;). The ratings of those 10 fear related behaviours were then used to calculate a fear score for each dog by summing up the occurrence-score (1-5) of all those behaviours and dividing it by 10 (Appendix 1). The mean fear score was calculated to be 3.99 (SE=0.12) in the training group and 4.18 (SE=0.16) in the control group (Table 1). According to the dog owners' assessment in the questionnaire the mean stress exposure during travelling to the Vetmeduni Vienna was just above 4 in both of the groups on a scale where 5 was defined as a case where the dog is totally relaxed during travelling (Table 1). The mean age of the participating dogs was 4.8 years (TG: 5.00 years; CG: 4.91 years;). The proportion of female and male dogs was nearly the same in both groups (TG: 14♀:8♂; CG: 12♀:6♂). All parameters (age, fear- and stress score, training experience, ...) were kept balanced while group allocation and also in the final sample between the training group and control group no difference in any allocation variable was found (p>0.05, Appendix 3).

Table 1: *Details of the training group and the control group of the finial sample (training group n = 22; control group n= 18)*

	Training group	**Control group**
Mean age	5.00 years	4.91 years
Sex ratio (♀ : ♂)	14♀:8♂	12♀:6♂
Mean training experience dogs *(1=little experience; 5=very experienced;)*	3,95 (SE=0.18)	3,53 (SE=0.24)
Mean training experience dog owners *(1=little experience; 5=very experienced;)*	3,64 (SE=0.25)	3,71 (SE=0.19)
Mean fear score *(fear and/or stress behaviours occurring 1=often; 2=sometimes; 3=seldom; 4=once only; 5=never;)*	3.99 (SE=0.12)	4.18 (SE=0.16)
Mean stress exposure during travelling to the Vetmeduni Vienna *(1=very stressed; 5=totally relaxed)*	4,02 (SE=0.23)	4,24 (SE=0.19

Veterinary examinations

Both groups underwent two standardized veterinary examinations. The first examination served to establish a baseline of physiological and behavioural data for all the dogs, the second examination, at least 13 weeks later, to assess physiological and/or behavioural differences between the two groups and visits.

Both veterinary examinations were carried out by the same veterinarian and the same helper in an examination room at the Vetmeduni Vienna. The dog owners stayed with their dogs all the time and the examination proceeded always in the same way. After arrival, the dogs were immediately fitted with a Polar® belt to allow habituation. The heart rate was from then on recorded during the whole stay (not analysed for this Master thesis).

After a 20-minute stay in the waiting room, the dogs got 3 minutes to acclimate and explore the examination room and got three treats tossed on the floor by the veterinarian. After that acclimatisation time, the dogs were lifted onto the examination table if possible by the owner. If the owner was not able to lift his/her dog onto the table, the helper and/or the veterinarian supported the owner or lifted the dog themselves. For being lifted and staying on the examination table the dogs were rewarded with three treats. Then the standardized veterinary exam was performed (Table 2). The dogs were held by a helper with one hand at the collar/front part of the harness and the second hand beneath the thorax. The owners were standing in view of the dog at the right side at about one meter distance from the examination table. The amount of treats in each examination step was scheduled the same for all dogs and the dog owners were instructed by the helper to offer their dogs one treat every time a reward was scheduled. Feeding points are listed in Table 2. In some cases dogs refused to eat the offered treats. Those treats remained in the treat-container in the end but although a dog was refusing a treat the owner was asked to continue offering his/her dog a treat at each of the following feeding points.

To make the veterinary examination as pleasant as possible for the dogs, ‘low stress handling’ techniques (Yin, 2009) were applied throughout the entire experiment. If any dog showed clear avoidance behaviour such as struggling more than three times during the same step of the veterinary examination, attempting to leave the examination table more than three times or attempting to jump off the table, the veterinary examination was stopped. Furthermore, the dog owners were instructed that they could request the examination to be stopped or interrupted at any point.

Table 2: *Order of standardized veterinary examination*

Examination	Specific part	Duration	Instruction
Auscultation left lung	left thorax	15 seconds	1. show stethoscope & hands (let dog sniff)
			2. pet from neck to thorax
			3. put on stethoscope
			4. put second hand on dog's back
Auscultation heart	left thorax	30 seconds	1. move stethoscope from thorax to heart
Treat (+ switch sides)			
Auscultation right lung	right thorax	15 seconds	1. show stethoscope & hands (let dog sniff)
			2. pet from neck to thorax
			3. put on stethoscope
			4. put second hand on dog's back
Treat			
Adspection ears	head both sides	1 second/ ear	1. first hand under chin
			2. second hand moves ears
Treat			
Adspection conjunctivae	head both sides	2 seconds/ eye	1. first hand under chin
			2. second hand opens eyes
Treat			
Adspection oral mucosa/teeth	head both sides	1 second/ side	1. first hand under chin
			2. second hand elevates upper lip
Capillary refill time	head one side	3 seconds	fluent transition from second oral mucosa
Treat			
Palpation abdomen	abdomen	30 seconds	1. show hands (let dog sniff)
			2. pet from neck to abdomen two times
			3. apply soft pressure on abdomen three times
			4. start deep palpation
Treat			
Feel femoral pulse	both hind legs	15 seconds	fluent transition from abdomen to hind legs
Rectal temperature	rectum	until signal given	1. pet from neck to flank
			2. pet over tail root
			3. elevate tail
			4. insert thermometer

The veterinary examination was followed by measurement of the tympanal temperature two times in both ears (Pet-Temp PT-300, Advanced Monitors, San Diego, USA). After that, each dog got a five minute period where he/she was allowed to move freely in the exam room. Afterwards the dog and the owner were asked to remain in the waiting room for a further ten minutes during which the dog was leashed to continue the heart rate measurements. Finally, the Polar system was removed.

The veterinary examination was always carried out by the same persons, who were not involved in the training sessions. This enabled blinding to the group allocation and assured a similar degree of familiarity of the veterinarian and the helper for both groups during the first and the second veterinary examination. The target mat for the front paw target was positioned on the table during every examination – both during first and second examinations and independent of the dogs' group allocation. To reduce external influences to a minimum, it was ensured that after entering the waiting room there was no contact to unfamiliar dogs or humans except the veterinarian and the helper. The glass door and windows rendered opaque.

Training

Between the two examinations the training-group-dogs and their owners took part in the training at the Clever Dog Lab Vienna. Each dog-owner-team participated 8 to maximum 12 times - depending on the dog's training progress and owner's time resources - in one-hour training lessons distributed over two to four months depending on owner's time schedule. The training lessons were organized as group-training sessions with one to a maximum of five dogs per group. In those training sessions the owners were instructed and helped to train their dogs by the use of food rewards to perform a cooperation signal (standing on a target mat), and to gradually familiarise their dogs with different manipulations that form part of the veterinary examinations (Table 3). In line with the use of the target behavior as a cooperation signal, manipulations were stopped when the dog stepped off the target. Additionally, the dog owners were introduced to perceiving more subtle signs of discomfort such as subtle avoidance movements, signs of fear-, stress or appeasement signals. These are parts of dog body language which are used during social interactions between dogs or between dogs and humans to deescalate a situation and prevent aggressive behaviour (Firnkes et al., 2017; Gazzano et al., 2014). They include body gestures and muzzle expression such as lip licks, panting, head turns, avoiding gaze, shift weight backwards, ears oriented backwards, lowered tail, low and quick tail wagging or freezing (Firnkes et al., 2017; Hecht & Horowitz, 2015; Siniscalchi et al., 2018). The owners were instructed how to adapt the training in order to reduce those signs of discomfort. Manipulations were only recommenced when the dog indicated its readiness by returning to the target mat or (if it had not left the target mat) into a neutral body or facial posture as judged by the trainer and/or owner. To transfer this possibility of communication to the veterinary test setting, owners were instructed to ask the blinded veterinarian to stop the veterinary examination when their dogs terminated the cooperation signal.

Positive reinforcement with food rewards was used to motivate the animals to participate in the examination. When the dogs ended the cooperation signal they were generally negatively punished by the absence of a food reward, but also negative reinforcement came into effect, because the unpleasant manipulation stopped, hands were taken off. To ensure that the dogs were mostly trained with positive reinforcement training accompanied by pleasant emotions, the training was always adapted to the individual dog and situation. Difficulty and duration were increased only in very small steps, and if a difficulty or a duration was increased, the next repetition was again made easier and/ or shorter. In order to make the manipulations the least intrusive as possible, dogs were prepared for the planned actions or manipulations by showing them first the acting hand(s) or the equipment to use and by stroking and/or touching the concerning body region prior to performing the actual examination.

Table 3*: Training steps to prepare dogs for the veterinary examination*

Training phases	**Intermediate training steps**	**Criterion of success**
Pretraining phase	Introduction of a marker word as a secondary reinforcer by classical conditioning – pairing a word with food, "delivered" to the mouth of the dog: At first the marker word is given, 1 to 2 seconds later the process of food reinforcement starts (= hand starts moving towards food source).	Dog expects (visible reaction on body surface like looking towards food source, salivating, etc.) owner to offer treat after hearing marker word and before the start of food reinforcement process, and stays in position until the treat is delivered.
1. Introducing Target	Step 1.1. By the use of treats the dog is lured with its front paws onto the target and fed there several treats, one after each other. Then it is lured off again with only one treat. This procedure is repeated until the dog step onto the target immediately when it is available. Step 1.2. The duration of the target behaviour is increased to a minimum of 5 seconds, by	Every time the target is present, the dog steps with his/her front paws onto it voluntarily and stays there for at least 5 seconds, independent of owner's orientation, owner's distance (within 2m) or location.

	variable intervals of reinforcement. Distance and varying position of the owner to the dog is also introduced by increasing each in small approximations (only changing one criterion at a time). The owner is also introduced to asking for (and rewarding) easier repetitions again after increasing the level of difficulty. Step 1.3. The last step of this phase is the generalization of the target-behaviour to different locations. *The quality and/or quantity of food reward is high at the beginning to build a strong motivation and slowly reduced by increasing the time intervals between the food rewards until there is about one reward per 5 second stay on the target.*	
2.	Step 2. The dog is regularly rewarded with treats when staying on the target while increasing distractions/while manipulations are introduced step by step. If necessary, repeat or take one training step back and continue with smaller approximations until the dog shows no indicators of stress such as avoidance behaviours, frequent lip licks or blinking, looking elsewhere, or stepping of the front-paw-target. If a dog stops the cooperation signal or shows any indicators of stress as mentioned above, the action ends and the next training step will again be an easier one. The dog is always informed about the next step by showing him/her the objects which are going to be used, or the empty hands which will touch him/her and/or by stroking towards the part of the body where the manipulation should take place. *Initially, each of the following steps is followed by a food reward. As training progresses, several steps*	Dog stays voluntarily on target despite different kinds of manipulations and being rewarded when doing so.

	can be performed before the reward is given. Handling only proceeds to the next step when the dog remains relaxed during a given step.	
2. a. 1. Handling Abdomen	• Reach with one hand in direction of dog without touching (if necessary: approach can be split up into smaller approximations and direction of hand movement can be adapted to the dog's comfort-level at the beginning) • Touch and stroke dog along its lateral thorax with one hand (if necessary: use at first stroking-movement without touching dog and increase duration of touch slowly) • Touch dog's abdomen with one hand • Use second hand - placing hand on dog's dorsum (if necessary: second hand is placed at chest or thorax first and slowly moves to the dorsum) • Habituate dog to arm moving over its back to reach the other side of the body • Touch dog's abdomen with both hands • Increase duration irregularly • Palpate abdomen with both hands with very slight pressure • Increase pressure irregularly (repetitions with increased pressure are mixed with repetitions with slight pressure)	Dog stays voluntarily on target despite palpation of its abdomen with medium pressure for 30 seconds.
2. a. 2. Stranger handling abdomen	• Approach of stranger (if necessary: can be divided into many small steps; stranger's orientation and gaze is also taken into account) • Unfamiliar person touches dog on chest • Unfamiliar person touches dog on different parts of body • Handling of the abdomen by a stranger can now be introduced as described in 2. a. 1.	Dog stays voluntarily on target while a stranger palpates its abdomen with medium pressure for 30 seconds.
2. b. 1. Pulse measurement	• Handler is positioned caudolateral to the dog • Show empty hands which will touch dog and stroke towards dog's tights, to prepare for being	Inner thighs can be touched on both sides at the same time for up to 15 seconds with enough pressure to feel the pulse.

	touched there • Stroke inner thighs on both sides (if necessary: start with one hand at one side first) • Touch thighs at the groin-region • Increase duration of touch irregularly • Increase pressure of touch over short time periods • Combine duration and pressure	
2. b. 2. Pulse measurement by stranger	• Approach of stranger as described in 2. a. 2. • Introduce stroking thighs as described in 2.b.	Inner thighs can be touched by a stranger on both sides at the same time for up to 15 seconds with enough pressure to feel the pulse.
2. c. + d. + e. handling head	• Prepare dog for one hand holding its lower jaw by training one of the following two training options (for every dog the option which seems the most efficient is used, depending for example on prior experience or sensitivity to touches in the jaw region): *1. in dogs with low sensitivity to touches in the mouth and head region version 1 is trained:* Approaching hand in small approximations (and rewarding after each step) until touching the lower jaw is possible without the dog showing any avoidance movements **OR** 2. in dogs showing strong avoidance and stress when the hand approached the jaw and progressing only little in the first training session, a chin target is additionally trained to increase efficiency: Dog is trained to voluntarily place its lower jaw/chin into the approaching hand by o Luring the dog with treats in one hand into the position several times o Luring dog's head into the position with the hand without treats; marker signal is given when dog moves its chin into the hand; o Increasing duration by delaying the marker signal in very small steps - always rewarding the rest-in-hand	Dog stays calm and relaxed although left or right hand is placed around the dog's lower jaw for several seconds and although the second hand is moved in the airspace around the dog's head. Or: Dog puts his/her chin voluntarily into the offered hand (left and right) and stays in this position for several seconds, also while the second hand moves in the airspace around the dog's head.

	behaviour
	
	• If the dog accepts one hand holding the lower jaw: generalize for both hands
	  ○ With one hand on the lower jaw: start moving second hand with very small movements
	  ○ Increase the movements of the second hand as described in steps 2. c. and following	

2. c. 1. handling ears	• As long as the dog does not show any avoidance behaviour, the second hand can be moved towards the ear (increase approach and speed irregularly and one after the other and only in small steps) • Touch the ear at the outside • Take the ear with the thumb and index finger • Take ear and lift it for a moment • Increase duration of holding up the ear in small steps (duration should be at least 3 to 5 seconds) • Approach dog's head with own head look into the ear while ear is lifted (increase in small steps again) • Generalize to both ears	Dog does not show any avoidance movement and keeps head still while the second hand lifts up the ear and the handler's head approaches to take a look into the ear. The dog is able to do this for at least 5 seconds and on both sides.
2. c. 2. Stranger handling ears	• Generalize the chin-target or the passive chin-holding behaviour with stranger(s) • Proceed like in 2.c.	Like 2. c but with a stranger
2. d. 1. handling eyes	• Put hand around dog's lower jaw/ offer hand for chin-target • The thumb of the "chin-target-hand" approaches the region beneath the eye. • Approach second hand to dog's eye • Touch dog underneath its eye • Touch dog's eyelid • Lift eyelid • Increase duration to 2 seconds • Generalize with second eye	Dog does not show any avoidance movement and keeps head still while the second hand lifts up the eyelid.
2. d. 2. Stranger handling eyes	• Proceed with a stranger like in 2. d	Like 2. d but with a stranger
2. e. 1. handling mouth	• Put hand around dog's lower jaw/ offer hand for chin-target • Use second hand to touch the upper lip • Touch upper lip at different	Dog does not show any avoidance movement and keeps head still while the second hand raises lip for about two seconds on both sides of the mouth and

	positions • Lift lip • Increase duration of lip-lift to at least 2 seconds • Approach head to check teeth • Touch mucous membrane with thumb • Generalize procedure to both sides	handler approaches head to check teeth and touches mucous membrane with the thumb.
2. e. 2. Stranger handling moth	• Proceed with a stranger like described in 2.d	Like 2.e but with a stranger
2. f. 1. thorax auscultation	• Habituate dog to being stroked on his/her thorax • Rest hand at different positions on the thorax • Increase duration of touch irregularly and in small steps to up to 10 seconds • Use a stethoscope or similar utensil such as lids of jam jars to touch dog at his/her thorax • Increase duration to up to 30 seconds • Generalize to both sides of the thorax	Dog stay's voluntarily on the target during the auscultation.
2. f. 2. stranger auscultates thorax	• Proceed with a stranger like described in 2.f	Like 2. f but with a stranger
2. g. 1. measuring rectal temperature	• Start with stroking the dog along its body to its croup • Lengthen the stroking movement from the croup to the mid of the tail (no grabbing, only flat-hand-stroking) • Start putting the fingers around the tail while stroking it, without lifting the tail • Lift tail a little bit while stroking from the basis to the middle of the tail • Lift tail as much as necessary to have access to anus later on (little bit above horizontal line) while stroking from the basis to the middle of the tail • Stop stroking movement at the first third/maximum the mid of the tail and hold it for one second before giving the marker and reward and dropping the tail again • Increase the duration of holding the tail up (at least to 10 seconds; small training-steps and irregular increase as usual) • Use second hand to stroke the	Dog stays voluntarily on the target without showing any signs of stress while a thermometer is introduced and while the rectal temperature is measured (about 10 seconds). *Due to practical reasons this training step was done by a second person (not the dog owner) in almost all of the dogs.*

	dog's thighs • Use a cotton swab to stroke the dog's thighs • Use the cotton swab to touch the dog in the surrounding of its anus (furry regions) • Get closer to the anus, and touch anus itself - marker comes in the moment when touching the anus • Slowly increase the duration of touching the anus (up to 10 seconds) – marker at the end • Use a thermometer and start again with stroking the thighs • Touch surrounding of anus with thermometer (without duration) - the tip of the thermometer should not be in anterior but in lateral direction • Touch anus - the tip of the thermometer should still not be in anterior but in lateral direction • Increase duration to up to 10 seconds • Change the angle of the thermometer - tip gets more and more into "anterior-direction" (so that introducing the thermometer would be possible) - start with very short duration and quick reward again • Use lubricant gel on the tip of the thermometer and touch the anus - start with very short duration and quick reward again • Increase duration of touching the anus with the thermometer-tip (+ lubricant gel) to up to 10 seconds again • Introduce the thermometer for a second • increase duration irregularly to up to 10 seconds • Turn on the thermometer (including audible beep-sound), introduce it into the anus and remove after the second beep sounds	
2. g. 2. stranger measuring rectal temperature	• Introduce different strangers measuring the rectal temperature	Like in 2.g.
3. table training	• Ask dog to jump onto the table OR Lift dog onto the table – for very	Dog feels comfortable on the table and is able to show the target behaviour and tolerate

	frightened dogs start with an object lower than a table & train lifting before: announce the action, bow over the dog and reward, put arms around the dog and reward, lift dog up only a few centimetres, put him/her down again and reward, lift dog up higher, lift him/her up and put him/her onto a low platform, increase height until it is possible to lift him/her onto a table As soon as dog is on the table: • Feed treats in a way that animates the dog to move around on the table (toss treats in different directions to activate movement and to reduce tension this way); motivate the dog to stay on the table by offering big amounts of treats in high frequency; if he/she feels insecure and looks downwards while refusing treats, put him/her on the floor again and start again with an object lower than a table as described above; to prevent jumping off the table, one hand can be kept on the dog's harness or a lead can be attached to it; • Repeat until dog shows no indicators of stress when on the table • Ask for target behaviour on the table, reward repeatedly on the target but also use treats to lure and feed the dog off the target mat to show him/her the possibility and train the movement of leaving the target even on the table • Introduce the manipulations from 2. step by step - with the owner and also with strangers	the different manipulations introduced in 3.

After the training phase, all subjects of both groups underwent the second standardized veterinary examination. The veterinarians carrying out the examinations were blinded to the dogs' group allocation.

Data collection and analyses

Influence of training on stress related behaviours during the veterinary examination

In order to detect effects of cooperative care training on the dogs' stress level during the clinical examination, behavioural and physiological stress parameters were measured and compared between the two groups and the two veterinary visits.

The veterinary examinations were video recorded with cameras from three different positions, to enable evaluation of behavioural parameters. The videos were coded by an external, blinded person using Solomon Coder with regard to the ethogram in Table 4. The variables "Lip licks", "Wagging", "Avoid" and "Freeze" were coded with a one-zero sampling method with 5 seconds time intervals. Ear and tail posture were coded with instantaneous sampling methods with coding points every 5 seconds. To reduce the number of variables, only data of those occurring in more than 10% of the coding points were used for statistical analyses. Enough data points and adequate inter-rater-reliability were given in the following variables: ear posture, tail posture, wagging, avoid, freeze and lip licks.

Table 4*: coded variables and their definitions*

Variables	Explanations
Ear posture	*0 = lowered or backward ear positions* *1 = neutral or forward ear positions*
Tail posture	*0 = proximal half of the tail is between hind legs or closer to the belly* *1 = proximal half of the tail has any position from behind hind legs up to raised position*
Wagging	*Any movement of tail, also when swinging loosely while body movement*
Avoid	*Any kind of avoidance behaviour; moving backwards, moving away from the veterinarian, moving away from owner, trying to leave table*
Freeze	*Body remains absolutely still for at least two seconds before coding point*
Lip lick	*Tongue is extended from the front or side of the mouth; also slight protrusion of tongue*

By using R software, the 1/0 data for all variables were converted into proportions, and the mean of each variable was analysed for each dog and each visit. Generalized linear mixed Models (GLMM) were calculated by the use of the R package "glmmTMB" with a beta error distribution, and the analyses of variance was done by the use of R "car" package. In the GLMM the group (training group, control group) and the visit (first visit, second visit), as well as the interaction between group and visit were used as fixed effects and the dogs' ID was determined as random effect. Confidence intervals were calculated by bootstrapping the estimated and fitted values.

Influence of training to physiological parameters

In addition to the behavioural parameters, physiological parameters (heart rate and heart rate variability, recorded with a Polar® belt, and tympanic temperature of both ears) were collected. These physiological data form the topic of another Master thesis (Wess, in prep. 2020) and will not be discussed further in the current manuscript.

Any somatic stress signs recognised by the veterinarian were noted. They included sweaty paws, secretion of the anal glands or excessive salivation. Due to the very rare occurrence, those somatic stress signs were not statistically analysed.

Assessment of training success

For the assessment of the question whether instructed but "non-expert" persons (i.e. the dogs' owners) were able to carry out the training with their own dogs, the documentation of each dog's training progress based on reaching predefined criteria was evaluated (Table 3). Furthermore, the dog trainer and the dog owners scored training success at the end of the training (trainer) or after the second veterinary examination (owners), respectively.

Assessment of training documentation

The documentation of the training was continuously done by the trainer throughout the training phase for each of the participating dog from the training group. This documentation included which dog started and reached which training sub goal in which training session. Consequently, this documentation also provides information about how many dogs finished all of the training goals and how many weeks it took them.

Trainer's assessment of training success

The trainer’s assessment of the training baseline and of the final training results for each dog of the training group was based on subjective valuation. Each dog's baseline and final training results were rated from 1 (examination by unfamiliar person not possible) to 5 (examination by unfamiliar person possible with the dog fully cooperating voluntarily). The trainer's assessments were done after the concerning dog had ended the training phase but before his/her second veterinary examination was carried out.

Owner's assessment of training success

The dog owners' assessments of training progress were gathered by a questionnaire by Schützinger (in prep. 2020). While the trainer's assessment was done immediately after the training phase, the dog owners answered the questionnaire after the second veterinary examination. The questionnaire included firstly the question, how successful the owners rated the training in general (i.e. ease of handling their dogs in various situations) and secondly, how they rated the success with regard to the second veterinary examination. The answer scale for both questions reached again from 1 to 5 with 1 meaning "not successful" and 5 standing for "very successful". The questionnaire also included questions concerning the feasibility of the training from the dog owners' perspective and the owners were asked how they rated the comprehensibility of the verbal and written training instructions and whether the training situations were appropriate for their dogs. Detailed content and results of the owners' questionnaire as well as a training documentation of the dog owners will be described in Schützinger (in prep. 2020).

Evaluation of owners' and dogs' transfer skills

To investigate whether the dogs and the dog owners of the training group transferred the learned from the training lessons to the veterinary examination situation, videos of the second veterinary examination were analysed by the trainer. Data about the dogs' front paw target behaviour and the owners' reaction when their dog did not step onto the target or left the target during the examination were collected. It was analysed how many dogs left the target mat at least once during the course of examination and how many owners translated their dog's target off behaviour by asking the veterinarian to interrupt/stop the examination. Asked stops were defined as situations where the owners were visibly talking directed to the veterinarian, whereby a conversation was initiated by the owner and the result was an interruption of the examination at a point where no pause was scheduled, without visible avoidance or aggressive behaviour of the dog being the reason (no sound was available on the videos). Directionality of speaking towards the veterinarian was defined to be given as the veterinarian showed a reaction (interruption of the examination) after the owner talked to him. The analysis regarding the transfer skills from the training situation to the veterinary examination situation also included how many dogs showed avoidance or aggressive behaviour without showing target off behaviour just beforehand, during which part of the examination they did so and whether a target off behaviour was already ignored during the preceding examination.

Indirect communication - "translated" asks for stop

During the veterinary examinations, the dogs' behaviour such as stepping on or leaving the target did not cause a direct response of the veterinarians who were blinded to treatment, but - as mentioned above - the owners were asked to translate their dogs' behaviour and ask for stops if needed. Due to the fact that hardly any asked stops occurred (only one owner translated the target off behaviour of her dog by asking the veterinarian for interruption and only a second owner did so when her dog showed avoidance behaviours without leaving the target several times), no in-depth analyses were possible, but the frequency of target off behaviour in those two cases were evaluated.

Results

Influence of training to stress related behaviours during a veterinary examination

Binominal models indicated that there was no significant Group*Visit interaction for any of the six investigated variables "ear posture", "tail posture", "wagging", "avoid", "freeze" and "lip licks" (Table 5).

Table 5: *Results of binomial models evaluating the effect of visit, group and the visit*group interaction on behavioural parameters.*

variables		Chi^2	Df	Estimate	SE	Z	CI		P
							2.5%	97.5%	
Neutral/for-ward oriented ear position	**Group: Visit**	76.00	72	0.93	0.52	1.80	-0.11	1.98	0.35
Neutral/high tail position	**Group: Visit**	82.96	71	0.51	0.58	0.88	-0.61	1.66	0.16
Wagging	**Group: Visit**	78.60	71	0.40	0.51	0.78	-0.58	1.43	0.25
Avoidance behaviour	**Group: Visit**	59.35	72	0.41	0.27	1.54	-0.14	0.96	0.86
Freeze	**Group: Visit**	49.89	72	-0.47	0.39	-1.19	-1.26	0.26	0.98
Lip licks	**Group: Visit**	47.24	72	0.10	0.25	0.39	-0.40	0.60	0.99

Figures 1-5 depict values for each individual on the first and the second visit. These show that there were big individual differences in the change of proportional occurrence of each of the variables from the first to the second veterinary examination in both of the groups. In both groups there were several individuals who had a very clear decrease, but also several who had a very clear increase in the frequency of a neutral or forward oriented ear position (as opposed to backwards-oriented ears, Figure 1). In the training group the proportion of occurrence of neutral or high oriented ear posture decreased in nearly as many dogs (N=10) as it increased (N=11). In the control group it decreased in 11 dogs while only 6 dogs showed an increase of the frequency of neutral or forward oriented ear position

(Figure 1). The proportion of a neutral/high tail position increased in 9 dogs and decreased in the same number of dogs from the first to the second veterinary examination in the training group (Figure 2). In three dogs of the training group the proportion of a neutral/high tail position did not change from the fist to the second veterinary examination (Figure 2). In the control group 6 dogs showed an increase of the neutral/high tail position ratio and nearly twice as many (11 dogs) showed a decrease (Figure 2). For one dog of the control group there are no data for the tail posture and also for the tail wagging behaviour during the second veterinary examination available (Figure 2, Figure 3). For the remaining dogs, big individual differences were found in the occurrence of wagging behaviour (Figure 3). In the training group, 11 out of 21 dogs showed an increase of wagging behaviour in the second veterinary examination, while 10 dogs showed a decrease (Figure 3). In the control group the proportion of wagging behaviour increased in 6 dogs and decrease in 11 dogs from the first veterinary examination to the second (Figure 3). Compared to the other variables the proportion of occurrence of "avoid" was very low in all of the dogs and in both groups the avoidance behaviour decreased during the second veterinary examination in a higher number of dogs than it increased. In the training group there was a decline of avoidance behaviour in 12 of 21 dogs and in the control group in 13 of 18 dogs (Figure 4). For the variable "freeze" it was the opposite change detectable: The proportion of freeze behaviour increased in 12 of 21 dogs of the training group and increased in 13 of 18 dogs of the control group (Figure 5). The number of lip licks declined in 12 and increased in 9 of 21 trained dogs. In the control group 9 dogs showed a decline and 7 an increase of lip licks during the second examination (Figure 6). In two dogs of the control group the percentage of lip licks did not change from the first to the second veterinary examination (Figure 6).

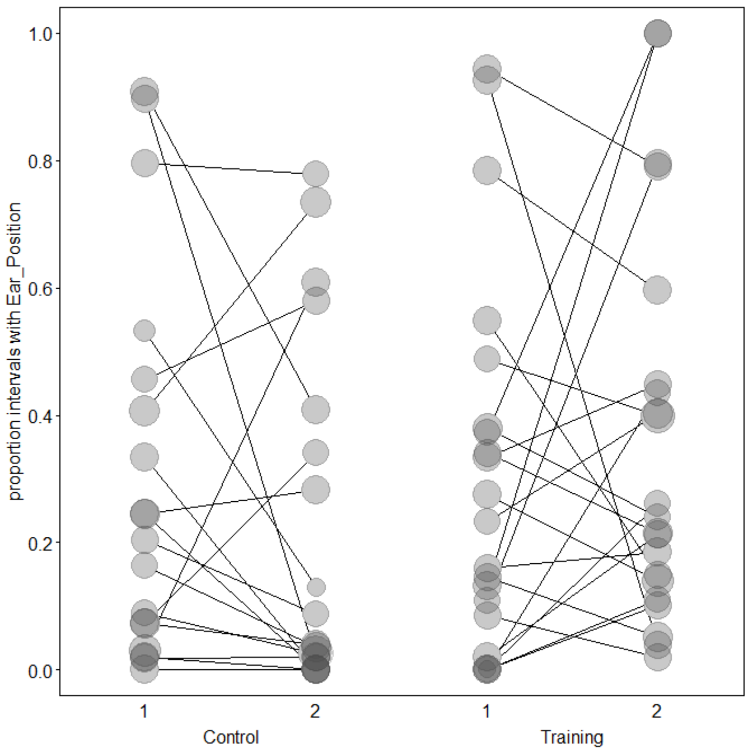

Figure 1: *Proportion of occurrence of a neutral/forward-oriented to backwards-oriented ear position in each dog of the control and the training group, respectively, during the first (1) and the second (2) veterinary examination. The higher the value on the y-axis, the more often the ears were in a neutral or forward-oriented position; the lower the value, the more frequent the ears were backwards-oriented.*

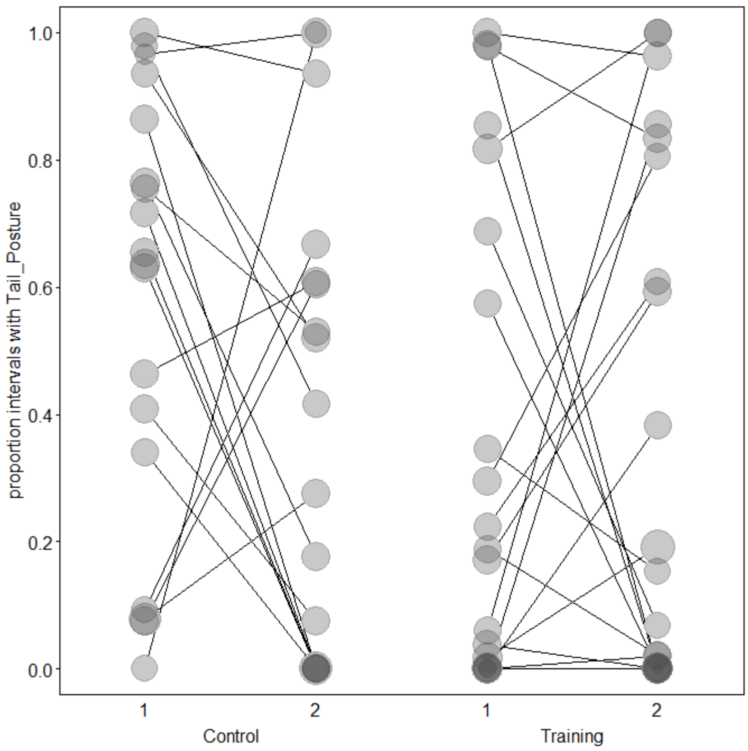

Figure 2: *Proportion of occurrence of a neutral /high to lowered tail position in each dog of the control and the training group, respectively, during the first (1) and the second (2) veterinary examination. The higher the value on the y-axis, the more often the tail was in a neutral or raised position; the lower the value, the more frequent the tail was positioned between the dog's legs or close to the belly.*

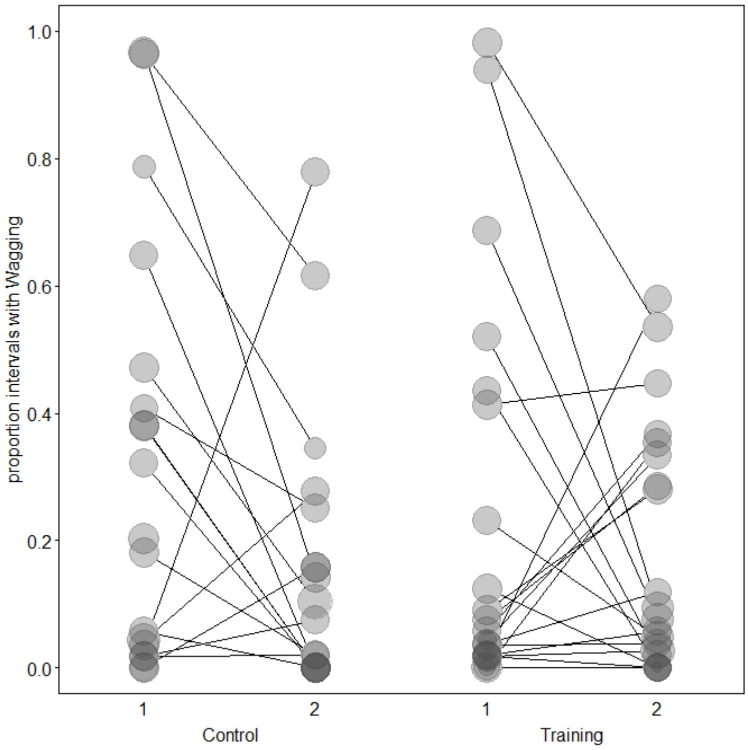

Figure 3: *Proportion of occurrence of tail "wagging" in each dog of the control and the training group, respectively, during the first (1) and the second (2) veterinary examination. The higher the value on the y-axis, the more frequent wagging occurred.*

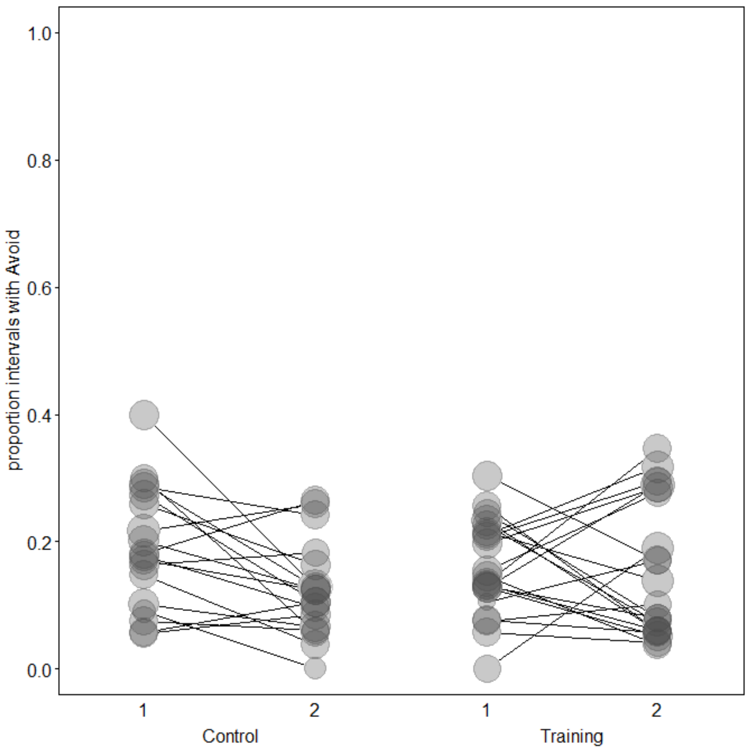

Figure 4: *Proportion of occurrence of avoidance behaviour in each dog of the control and the training group, respectively, during the first (1) and the second (2) veterinary examination. The higher the value on the y-axis, the more frequent avoidance behaviour occurred.*

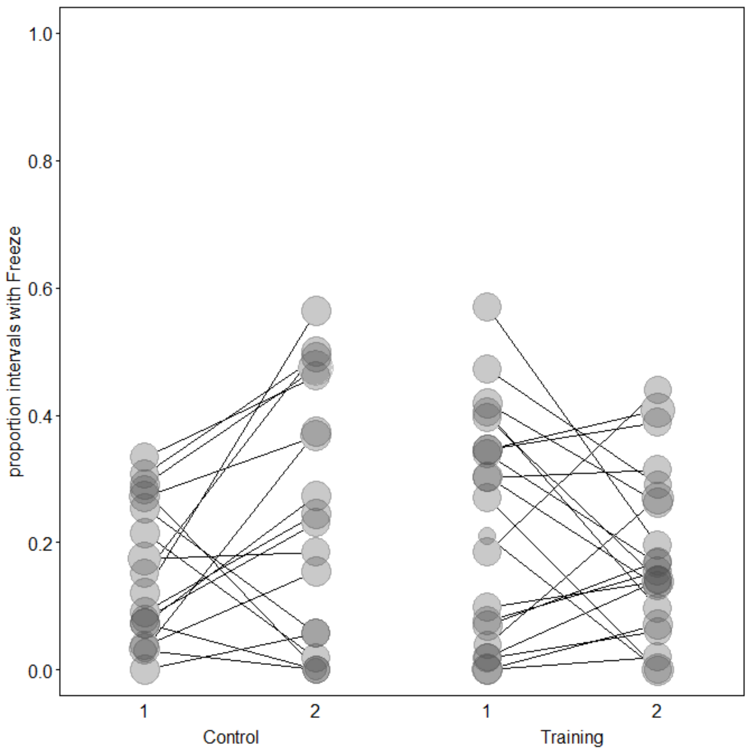

Figure 5: *Proportion of occurrence of "Freeze" in each dog of the control and the training group, respectively, during the first (1) and the second (2) veterinary examination. The higher the value on the y-axis, the more frequent "Freeze" occurred.*

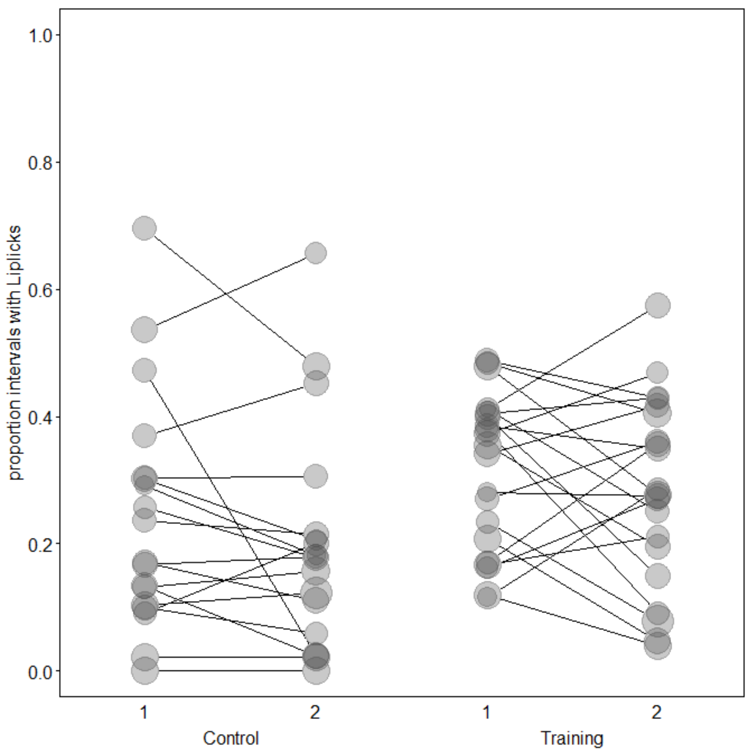

Figure 6: *Proportion of occurrence of lip licks in each dog of the control and the training group, respectively, during the first (1) and the second (2) veterinary examination. The higher the value on the y-axis, the more frequent lip licks occurred.*

Evaluation of owners' and dogs' transfer skills

The video coding with regard to the evaluation of owners' and dogs' ability to transfer the learned from the training lessons to the veterinary examination situation showed that 5 of the 22 dogs stayed on the target mat with at least one of their front paws during the whole examination and did not show any avoidance or struggling behaviour (Table 6, column 1 & 3). Eight dogs stepped off the target mat with both front paws and in the later course 3 of them interrupted the examination by showing avoidance behaviour without using target off behaviour beforehand in this situation. The same is true for two further dogs who did not step onto the target from the beginning, but only in the later course of the examination. Both of them interrupted the examination by showing avoidance or struggling behaviour. In the remaining 7 dogs of the training group, avoidance or struggling behaviour occurred at least once during the examination but target off behaviour did not (at least not without being paired with avoidance or struggling behaviour) (Table 6, column 1 & 3). In all of the 7 dogs, the examination was early terminated due to struggling behaviour (Table 6, column 4). In 11 of those 12 dogs who showed avoidance or struggling behaviour the examination was early terminated during the last part - the measurement of the rectal temperature. In 4 of those dogs the training for measuring the rectal temperature could not be finished in the training phase. In one dog, the examination was terminated in the end of the second last part of the examination. So in all of those 12 cases where dogs avoided or struggled, the examination was terminated early (c.f. only 5 early terminations during the first examination (Wess, 2020)). In those dogs who did not show target off behaviour without being paired with struggling or avoidance behaviour, the number dogs with early terminations increased from 2 on the first visit to 7 on the second visit (Table 6, column 4 & 5). In the group of those dogs who showed target off behaviour the number of early terminations increased from 3 to 5 from the first to the second visit (Table 6, column 4 & 5).

Indirect communication - "translated" asks for stop

In the training group one early termination was requested by the dog owner, after her dog showed avoidance behaviour the second time. Two further dog owners of the training group made use of the possibility to ask the veterinarian to pause the examination (Table 6, column 2). One owner asked to pause the examination several times when the dog showed avoidance behaviours without leaving the target and after an interruption due to clear avoidance and struggling behaviour including target off behaviour she took care that the examination was only continued when her dog showed the target behaviour again. The second owner made use of the possibility to ask the veterinarians to stop after her dog left the target without showing any further avoidance behaviours. Six dog owners did not react although their dogs left the front paw target during the examination and so the examination was carried on. Two other dog owners did not interfere although their dogs did not start the target behaviour. So those two examinations were partly carried out with the dog standing besides the target mat.

In those two cases where the dog owners translated their dogs' target or avoidance behaviour and asked the veterinarians for stops, the further course of the examination was different. The one dog, who had several "asked" stops during the examination, showed avoidance and struggling behaviours in the last examination step (measurement of the rectal temperature, which could not be successfully finished in the training phase) and the examination was stopped by the veterinarian (Table 6, column 4). The second dog only had one stop after leaving the target and then stayed there for rest of the veterinary examination. Of those remaining 8 dogs who stepped off the target or did not step onto the target without the owners interfering, 4 dogs terminated the second veterinary examination early (Table 6). The remaining 7 early terminations can be found in dogs who did not show any target off behaviour beforehand during the examination, but directly terminated by showing avoidance or struggling behaviour (Table 6).

While the number of early terminated examinations in the treatment group thus increased from 5 to 12 dogs from the first to the second visit (Wess, in prep. 2020), in the control group, the number of terminations decreased from 4 to 2 (Wess, in prep. 2020). None of the dog owners of the control group asked the veterinarians to stop the examination (Wess, in prep. 2020).

Table 6: *overview of dogs' and owners' usage of target behaviour on the 2^{nd} visit and number of dogs (in brackets) showing struggling/avoidance behaviour and early terminations.*

Number of dogs that stepped off the target or did not step on the target on the 2^{nd} visit*	Pause due to target off behaviour on the 2^{nd} visit	Struggling/ avoidance on the 2^{nd} visit	Early termination on the 2^{nd} visit	Early termination on the 1^{st} visit
Yes (10)	Yes (2)	Yes (1)	Yes (1)	Yes (1)
		No (1)	No (1)	Yes (0)
	No (8)	Yes (4)	Yes (4)	Yes (1)
		No (4)	No (4)	Yes (1)
No (12) **	NA	Yes (7) No (5)	Yes (7) No (5)	Yes (2) No (5)

* Two dogs did not step on the target at the start of the examination, but stepped on it at a later point.
** Seven dogs left the target while struggling or avoiding, but they did not leave the target without showing struggling or avoidance behaviour.

Assessment of training documentation

The analyses of the trainer's training documentation showed that 68% (N = 15) finished training by reaching all training goals, while 32% (N = 7) finished after 8 - 12 training lessons without completing the last training step, which was the measurement of the rectal temperature. Three of those dog-owner teams which did not succeed with finishing all training goals took part in 8 training lessons, one in 9 lessons and three of those dogs took part in 12 training lessons. (Table 7, column 2 & 3)

Trainer's assessment of training success

The trainer’s assessment of the final training results indicated that 12 out of 22 dogs were very good and 7 were very good at being examined/manipulated by a unfamiliar person by the end of the training phase (Table 7, column 5). The final training results of the remaining three dogs were rated as moderate (Table 7, column 5). The data about the rating of the training baseline showed that 8 out of 22 dogs were evaluated as "good to handle by unfamiliar person at the beginning of the training phase". To each of the two remaining categories ("poor" and "moderate" to handle) 7 dogs were allocated (Table 7, column 4).

Owner's assessment of training success

A further appraisal of the training success was enabled by the evaluation of a questionnaire answered by the dog owners after the second veterinary examination. This questionnaire was developed and analysed by another student in context of her thesis (Schützinger, in prep. 2020). The question concerning the success regarding second veterinary examination was answered by 20 dog owners. Only two of them rated their dogs' training success as "not very successful" while 40% of the dog owners chose "partly successful". The remaining 50% ticked either "quite successful" or "very successful" as the appropriate answer. When rating the training success in general (not only with regard to the second veterinary examination) 77% of the dog owners assessed it as "quite" or "very successful" and the remaining 23% rated it as "partly successful" (Table 7, column 6 & 7).

Comparison of trainer's and dog owners' assessment of training success

When comparing the assessment of the trainer (regarding the dogs' final training results) and the assessment of the dog owners (concerning general training success) it gets visible that they matched in 41% (N = 9). The same amount of dog owners rated the general training success lower than the trainer assessed the final training results. - Six of them rated the success one point lower, 3 of them 2 points lower. The remaining 4 dog owners assessed the general training success one point higher than the trainer rated the dogs' final results (Table 7, column 5 & 7). While both the trainer and the majority of owner considered the training to be successful (scores of 3 or higher), the agreement in the ratings by the trainer and the owners was poor (Cohen’s weighted kappa: 0.13).

Table 7 *shows the data for each dog of the training group concerning whether they had finished all training goals; the number of attended training lessons; the trainer's assessment of improvement from the beginning of the training to the last training session and of the final training results; how the owners rated the training success concerning the second veterinary examination.*

	Training documentation		Trainer's rating of ...		Owner's rating of...	
Dog ID	All training goals finished (1=yes; 0=no)	Number of attended training lessons	training baseline (ability to be handled by an unfamiliar person prior to training is poor (1),moderate (2), good (3) to handle by unfamiliar person at the beginning of the training phase)	final training results (examination by unfamiliar person not possible (1), hardly possi ble (2), moderate (3), good (4), very good (5))	success regarding 2nd vet exam (not (1), not very (2), partly (3), quite (4), very (5) successful)	general training success (not (1), not very (2), partly (3), quite (4), very (5) successful)
T1	0	8	1	4	3	3
T2	0	12	1	4	3	4
T3	1	8	3	5	3	3
T4	1	12	1	4	2	4
T5	1	8	3	5	5	5
T6	1	11	3	5	3	5
T7	1	8	3	5	na	4
T8	1	8	3	5	na	4
T9	0	12	2	5	3	3
T10	0	8	1	3	4	4
T11	1	10	3	4	5	5
T12	0	12	1	5	2	4
T13	1	8	3	5	4	4
T14	1	12	2	4	5	5
T15	1	9	2	5	3	3
T16	1	11	1	5	4	5
T17	1	12	2	4	4	4
T18	0	9	2	4	4	4
T19	1	11	1	5	4	4
T20	1	8	3	5	5	5
T21	1	12	2	3	3	4
T22	0	8	2	3	3	3

Discussion

This study was designed to detect if cooperative veterinary care training can be performed by dog owners and transferred to a veterinary setting and how such training influences the dogs' stress related behaviour at veterinary examinations. The results indicate that although the percentage of dogs showing an improvement in 5 of the 6 parameters (ear posture, Tail posture, wagging, freeze and lip licks) was higher in the training group compared to the control group, none of the Group*Visit interactions were significant.

When taking a look at the target behaviour, which can be described as the core part of the cooperative veterinary care training, it became clear that 20 of 22 dogs performed the target behaviour for at least some of the time. This fact indicates that they were able to transfer the learned to the veterinary situation to some extent. However, while 10 of the dogs in the training group showed target off behaviour (including those dogs which did not step onto the target), thus communicating the need for a break, only 2 of their owners asked the veterinarian for stops as introduced during training. This suggests that the transfer to the veterinary situation, also from the owners' side, proved to be a major challenge (since the veterinarians were blinded with regard to treatment group, they were dependent on the owners communicating the need for a break). Nonetheless, in training 15 of 22 dogs reached all training goals and the remaining 7 dogs reached all goals except the last one, temperature taking. This, as well as the subjective assessments by the trainer and the dog owners, suggests that the training was successful in increasing the acceptance of handling for the majority of dogs, although it could not be successfully be transferred to the veterinary situation.

Influence of training on stress related behaviours during the veterinary examination

According to the results concerning occurrence of stress related behaviours there were no significant visit-related changes in neither of the two groups, but partly big individual differences and also individual changes from the first to the second veterinary visit were detected in both groups. Although the baseline measures according the owners' assessments such as the dogs' and owners' prior training experience or the fear behaviour of each dog at the vet did not significantly differ between the two groups, it is obvious that there have been individually different starting conditions for each dog. Detectable differences can be found in the training baseline within the training group. - The trainer rated the dog's ability to be handled by an unfamiliar person prior to training as "good" in 8 of 22 dogs. These good abilities at the beginning could be one reason for little training progress in those 36% and could therefore diminish the training effect.

As discussed below, the results were also dependent on the success of the training carried out by the owner with instructions and help of a trainer, and on the dogs' and owners' skills to transfer the learned from the training situation to the veterinary examination situation. Another factor that could have influenced the outcome could be that the dogs in this study probably started off with a negative experience when being examined during the first examination without any preparation and with little possibility to control the situation (Laule et al., 2003). Therefore it is not unlikely that the dogs faced the second veterinary examination situation already a priori with a negative attitude. Garelick & Storm (2005) described that due to memory retrieval fear memory is activated when exposed to an aversive context a second time. A primary exposure to the context without being paired with fear provoking stimuli could ease the fear response to aversive stimuli during the second exposure by latent inhibition (Garelick & Storm, 2005). Beyond the study situation, this principle of latent inhibition could be applied by pet owners and veterinarians by designing a setting to make the pet experience only positive emotions during the first visit.

Assessment of training success

Depending on who (trainer or owners) answered the question, the training success was rated differently. The trainer attributed 86% dogs a "good or very good training result", while 77% of the owners rated the general training success as "quite or very successful" (Schützinger, in prep. 2020). This difference could be due to the fact, that the trainer's and the owners' questions differed. - While the trainer answered this question with no regard to the training baseline situation, it is not clear whether the owners include the progress or only rated the end results of the training. A second possible reason that the owners rated the general training success lower than the trainer rated the training results, is the time the questions were answered. While the trainer assessed the results after the training phase, the owners answered the question after the second veterinary examination. This could have biased the results, because the success concerning the second veterinary examination was rated lower (only 50% were rated as "quite or very successful"). So the outcome of the second veterinary examination has possibly caused a more pessimistic approach when rating the general training success.

Clark et al. (2020) on the other hand described that dog owners tend to rate their own dogs better than an expert or other dog owners do. According to Clark et al. (2020) the concern to diminish on one's own performance, the "loyalty" towards the own dog, or the influence of prior better experienced performances could be named as reasons for this lenient or favourable scoring. It is imaginable that in our study the same positive bias could be true not only for the dog owners' ratings but also for the assessment done by the trainer involved in the training. Nevertheless, it seems to be unlikely that the assessment diverges a lot from the real training success, because the training documentation, based on objective criteria, indicates good training results as well. -The training documentations makes visible, that the majority also reached all of the defined training goals. Only 32% could not finish the last training goal, the measurement of the rectal temperature. It could be suggested that the training progress was dependent of the starting conditions of each dog and the time investment of the dog owners, which will be analysed and discussed in Schützinger (in prep. 2020).

To quantify the training success, video analysis would be helpful, but this is not possible because video recordings of the training situation were not standardised, and therefore there is a lack of comparability.

It can be summed up that the available results suggest that instructed dog owners can successfully train their dogs to take part in cooperative veterinary care and that 8-12 training lessons are for the majority of dogs sufficient to reach the goal of showing target behaviour and staying calm while being handled and examined by a unfamiliar person - at least in the training situation. Compared to the veterinary examination situation, the training situation was a familiar environment, associated with training and without prior negative exposure to the context. Despite the people handling were unfamiliar in the end of the training phase (other dog owners), all of them were instructed to cooperative veterinary care training. Therefore it is probable that throughout the whole training phase already small signs of discomfort were noticed and the behaviour was adjusted accordingly.

Evaluation of dogs' transfer skills

Since the assessment of the training results were rated positively for the majority of dogs by both the trainer, the owners and the training documentation, and assuming that training success also implies a reduction of stress related behaviours, it seems to be probable that the missing/unsuccessful transfer of the learned to the veterinary situation (by the owners and/or the dogs) could be the reason for absence of significant changes in stress related behaviours.

The results concerning the dogs' use of the target behaviour during the second veterinary examination show that 8 dogs stepped off the target at least once during the examination, two did not step onto the target and another 5 dogs stayed on target throughout the whole examination. However 7 dogs did directly show avoidance or struggling behaviour without showing target-off-behaviour first. Possibly this results from a lack of generalisation of the learned to the veterinary examination situation. Generalisation describes the "tendency for behaviour to occur in situations different from the one in which the behaviour was learned" (Chance, 2008). Learned behaviour can most likely be recalled in situations similar to the learning situation (Chance, 2008), but due to standardised conditions throughout our study, in order to keep the training and the control group comparable, neither additional training in the examination room was carried out, nor were the veterinarians included in the training process. Instead, the last training phase was performed in different rooms of the clever dog lab and, as far as possible, with different unfamiliar persons (other dog owners) in order to support the dogs in generalizing the learned to new situations by providing a diverse variety of settings (Chance, 2008). But not only the training situation has an influence on the success or failure of generalisation. Dandolo and Schwabe (2016) described the phenomenon that stress-induced cortisol release can impair the ability to transfer learned to novel situations. Assuming that the dogs might have been stressed during the second veterinary examination due to fear experience during the first one and memory retrieval mentioned above, this could also have affected the generalisation.

Another issue which could influence the success of cooperative veterinary care training, is the choice of target behaviour(s). One essential part of cooperative veterinary care is the interruption which can be initiated by the animal showing a target-off-behaviour at any time. Animals learn via negative reinforcement training, that an aversive stimulus can be stopped/removed by showing a certain (target-off) behaviour (Chance, 2008). There are target behaviours which can be stopped by fine movements and little effort (like for example a chin-rest) and such ones which require a little bit more action to stop (like for example a front paw target). One could assume that target behaviours which can be broken off faster / easier than showing avoidance or aggressive behaviour, are more likely used to initiate a interruption of the ongoing manipulation. Although we decided to train and to use a front paw target behaviour for this study, because it was usable for all of the scheduled examination steps and mainly because of the possibility to keep the veterinarians blinded to group allocation (target mat was available in both examinations for all of the dogs of both groups) and because it allowed better measurement of the so called stress related behaviours. In contrast to the standardised study, the appropriate choice of target behaviour in daily life situations can be done dependent on the individual dog, situation and the planned treatments or manipulations. In trainings with captive wild animals often target behaviours which include the treatment-concerned part of the body are used (e.g. (Coleman et al., 2008; Reinhardt, 2003; Videan et al., 2005;). It is imaginable that specific target behaviours which include the treated part of the body have the additional effect of predictability to the animal. An increase of predictability could thereby reduce stress responses (reviewed in Bassett & Buchanan-Smith, 2007).

Evaluation of owners' transfer skills

Besides the data of trained dogs showing target(-off-)behaviour, the video analyses of the second veterinary examination showed that 80% of those dog owners with dogs who stepped off or did not step onto the target mat failed to ask the veterinarian to pause or stop the examination. The dog owners were instructed to translate their dogs' target behaviour to the examining person throughout the training phase. It could be speculated about different reasons that could have caused the owners not to apply the learned. Maybe the "white coat effect", which explains the phenomenon of medical environment causing alarm reactions (Parati & Mancia, 2003), occurred in the dog owners and caused a stress-induced generalisation problem as described above (Dandolo & Schwabe, 2016). Another explanation could be that veterinarians are widely seen as authority figure which the owners did not want to instruct or (and) the owners brought along the popular daily life attitude that the dog "has to get through it", because examinations are necessary to be done. However, these results indicate that it is recommendable to involve the veterinarians to the training in view of supporting the owners' confidence and encourage them to ask for stops if their dogs seem to need them. Alternatively, the veterinarians could also be instructed to perceive the dogs' asks for stops, in order to detach the success of cooperative veterinary care from the owners' ability to translate their dogs' needs.

This appears particularly important in context with the findings that indicate that the loss of control over aversive events is even more stressful and causes greater fear than never having had the possibility to control the stimuli (reviewed in Bassett & Buchanan-Smith, 2007; Leotti et al., 2010). During the training phase, the dogs of the training group were able to learn that they can control the humans actions by their (target) behaviour and during the second veterinary examination the majority of those dogs showing target-off behaviour lost this controllability because their owners did not request for stops. Crombez et al. (2008) describes that humans who lose control over a painful stimulus show higher effort to regain the control. If the same was true for dogs it could be a possible explanation for the increase of cancellations during the second veterinary examination within the training group.

Additionally it would be interesting to do further investigations whether the indirect communication, as it was planned in our study, could be successful although the dogs' behaviour does not have direct control over the veterinarian's actions but has firstly to be translated to the veterinarian and thereof consequences will be time delayed.

Conclusion

Against the predictions, the occurrence of stress related behaviours did not decline from the first to the second veterinary examination in the training group compared to the control group, but the good ratings concerning the training results indicate that cooperative veterinary care has potential to ease veterinary care not only in captive wild animals but also in private owned pets and that it is possible to successfully instruct and help dog owners to train their own dogs even in group training settings. The results also show that there should be special attention on the transfer of the learned to the situation at the veterinary practice. Feasible possibilities to increase the transfer skills of the dogs as well as of the owners should be investigated. Further studies are needed to investigate whether a "smooth" transfer could then also reduce the occurrence of stress related behaviours, which, with regard to the studies showing positive effects in captive wild animals, would be to be expected. This topic is worth to undergo further investigations in order to check for further possibilities to reduce fear, stress and risk at veterinary practices.

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Appendix

Appendix 1 - Individual details of final sample

Llist of subjects with detailed information for each dog based on owners' information

Subjects treatment group	Sex/ neutered	Breed/ crossbreed	Age	Fear-score	Travel-score
T1	FM/C	Australian Kelpie	9,24	5	4,5
T2	FM/C	Crossbreed	2,96	3,4	4
T3	FM/C	French Bulldog	7,79	3,4	5
T4	M	Crossbreed	4,75	3,1	1
T5	FM	American Staffordshire Terrier	3,55	3,7	5
T6	FM/C	Crossbreed	4,53	4,3	4
T7	FM	Labrador Retriever	4,06	4,4	5
T8	FM/C	Havanese	3,06	4	4
T9	M/C	Shetland Sheepdog	5,98	4,7	5
T10	M/C	Crossbreed (Border Collie X?)	4,38	3,7	4
T11	FM	Crossbreed	1,67	3,8	2
T12	M/C	MalteseXPekinese	5,88	3	4
T13	FM	Portuguese Water Dog	1,04	5	4,5
T14	M/C	Crossbreed (Podenco?)	4,26	4,6	2
T15	FM/C	Crossbreed (Malinois X?)	4,00	4	4
T16	FM	Labrador Retriever	4,82	3,3	4,5
T17	FM/C	Crossbreed	5,50	3,7	4
T18	FM/C	Crossbreed (Border Collie X?)	6,44	3,9	4
T19	M	Petit Brabançon	2,84	4,4	4
T20	FM/C	Whippet	8,46	3,8	5
T21	M	Border Collie	9,59	4,6	4
T22	M/C	Crossbreed	5,09	3,9	5
Subjects control group	**Sex/ neutered**	**Breed/ crossbreed**	**Age**	**Fear-score**	**Travel-score**
C1	M	Pug	2,13	3,4	5
C2	M/C	Greyhound	4,33	4,7	4,5
C3	FM/C	Crossbreed	3,05	2,8	4,5
C4	FM	Border Collie	4,05	3,9	4
C5	FM	Labrador Retriever	8,68	5	5
C6	M/C	Dutch Shepherd	4,48	4,7	5
C7	FM/C	Crossbreed	7,57	3,4	4,5
C8	FM	Crossbreed (Border Collie X ?)	3,76	4,4	4
C9	M/Na	Na	Na	Na	Na
C10	FM	Border Collie	2,41	5	3
C11	FM/C	Crossbreed (AmStaff X ?)	4,55	3,5	4,5
C12	FM/C	Crossbreed	5,67	3,8	5
C13	FM/C	Yorkshire Terrier	5,08	4,5	4
C14	FM/C	Greyhound	1,92	4	4,5
C15	M/C	Crossbreed	4,42	4,8	4
C16	FM/C	Crossbreed	7,84	4,2	2
C17	M/C	Crossbreed (Dachshund X ?)	6,99	5	4,5
C18	FM/C	Crossbreed	6,63	4	4

Appendix 2 - Questionnaire for the dog owners

E-Mailadresse*

Ihr Name*

<u>ALLGEMEINE ANGABEN ZUM HUND</u>

Wie viele Hunde besitzen Sie?*
- 1 Hund
- 2 Hunde
- 3 Hunde
- 4 Hunde
- mehr als 4 Hunde

Name des teilnehmenden Hundes*

Geschlecht des Hundes*
- weiblich
- männlich

Ist Ihr Hund kastriert?*
- Ja
- Nein
- Sonstiges: _______________

Geburtsdatum Ihres Hundes laut Impfpass (falls nur der Geburtsmonat bekannt ist, geben Sie den 1. dieses Monats an) Bitte vergessen Sie nicht, das Geburtsjahr anzupassen, welches automatisch auf 2019 steht!*

Rasse/Mischlung*

Schulterhöhe (am Widerrist gemessen)*

Brustumfang des Hundes (gemessen direkt hinter den Vorderbeinen)*

Seit welchem Alter ist Ihr Hund bei Ihnen
- <3 Monate
- 3-6 Monate
- 7-11 Monate
- 1-3 Jahre
- 4-6 Jahre
- 7-9 Jahre
- > 9 Jahre

ANREISE

Wie lange beträgt Ihre Anfahrtszeit zur Veterinärmedizinischen Universität Wien?*

Mit welchem Verkehrsmittel würden Sie anreisen?*

Welches Verhalten zeigt Ihr Hund bei der Verwendung dieses Verkehrsmittels? (Mehrfachauswahl möglich)*

Mein Hund schläft die meiste Zeit
Mein Hund verhält sich ruhig, ist aber wach
Mein Hund ist aktiv
Mein Hund hechelt häufig (auch bei niedrigeren Temperaturen)
Mein Hund speichelt vermehrt
Mein Hund zeigt Lautäußerungen (wie z.B. Winseln, Bellen)
Mein Hund übergibt sich häufig
Sonstiges:

TRAINING

Wie intensiv beschäftigen Sie sich Ihrer Einschätzung nach mit Hundetraining?*

gar nicht 0 1 2 3 4 5 sehr intensiv

Verwenden Sie im Training ein Markersignal wie z.B. einen Klicker?*

Ja
Nein

Wie trainingserfahren schätzen Sie Ihren Hund ein?*

wenig 1 2 3 4 5 sehr intensiv

Welche/Wie viele Übungen oder Tricks kennt Ihr Hund bereits? *

Kann Ihr Hund in einem Raum mit 3-5 weiteren Hunden konzentriert trainieren? *

Ja
Nein
weiß ich nicht
Sonstiges:

VERHALTEN BEI FREMDEN PERSONEN UND TIERARZT

Zeigt Ihr Hund im Zusammenhang mit fremden Personen eine der folgenden Verhaltensweisen? *
Bitte wählen Sie in allen Zeilen eine Antwortmöglichkeit aus!

	noch nie	einmal	selten	manchmal	oft
"Einfrieren"					
Zittern					
Hecheln					
Verstecken (z.B. unter Stühlen)					
Ihre Nähe suchen					
Knurren					
Lefzen hochziehen					
In die Luft schnappen					
Person schnappen/beißen					
Unfreiwilliger Harn- oder Kotabsatz					

Zeigt Ihr Hund Angstverhalten beim Tierarzt? (z.B. dem Tierarzt ausweichen, angespannte Körperhaltung, eingeklemmte Rute, starkes Hecheln, ...) *

sehr unzutreffend
eher unzutreffend
teils-teils
eher zutreffend
sehr zutreffend
weiss nicht

Hatte Ihr Hund schon immer Angst beim Tierarzt? *

Ja seit dem ersten Tierarzt-Besuch
Mein Hund hat seit einem bestimmten Erlebnis Angst beim Tierarzt.
Er hat keine Angst beim Tierarzt
Sonstiges:

Falls die Angst Ihres Hundes vor dem Tierarzt auf ein bestimmtes Erlebnis zurückzuführen ist, welches Erlebnis war ausschlaggebend für die Angst Ihres Hundes?

Hat Ihr Hund vor dem Tierarzt als Person Angst? *

Mein Hund hat keine Angst vor dem Tierarzt als Person (außerhalb der Situation in der Praxis, mag er den Tierarzt)
Mein Hund hat vor dem Tierarzt als Person Angst.

Mein Hund hat keine Angst vor dem Tierarzt
Weiss nicht
Sonstiges:

Hat Ihr Hund allgemein Angst vor Fremden (von Fremden festgehalten zu werden)? *
sehr unzutreffend
eher unzutreffend
teils-teils
eher zutreffend
sehr zutreffend
weiß nicht

Zeigt Ihr Hund bereits vor dem Gebäude Ihres Tierarztes Anzeichen von Angst? *
sehr unzutreffend
eher unzutreffend
teils-teils
eher zutreffend
sehr zutreffend
weiß nicht

Zeigt Ihr Hund bereits im Wartezimmer Ihres Tierarztes Anzeichen von Angst? *
sehr unzutreffend
eher unzutreffend
teils-teils
eher zutreffend
sehr zutreffend
weiß nicht

Zeigt Ihr Hund im Untersuchungsraum Anzeichen von Angst? *
sehr unzutreffend
eher unzutreffend
teils-teils
eher zutreffend
sehr zutreffend
weiß nicht

Zeigt Ihr Hund auf dem Tisch Anzeichen von Angst? *
sehr unzutreffend
eher unzutreffend
teils-teils
eher zutreffend
sehr zutreffend
weiß nicht

Trägt Ihr Hund beim Tierarzt einen Maulkorb? *
Ja, immer
Manchmal
Selten

Nie

Zeigt Ihr Hund beim Tierarzt eine der folgenden Verhaltensweisen? *
Bitte wählen Sie in allen Zeilen eine Antwortmöglichkeit aus!

	noch nie	einmal	selten	manchmal	oft
"Einfrieren"					
Zittern					
Hecheln					
Verstecken (z.B. unter Stühlen)					
Ihre Nähe suchen					
Knurren					
Lefzen hochziehen					
In die Luft schnappen					
Person schnappen/beißen					
Unfreiwilliger Harn- oder Kotabsatz					

Wenn Sie Ihren Hund auf dem Tisch beim Tierarzt ansprechen, reagiert er dann noch auf Sie? *

sehr unzutreffend
eher unzutreffend
teils-teils
eher zutreffend
sehr zutreffend
weiss nicht

Nimmt Ihr Hund in folgenden Situationen noch Futter an? *
Bitte wählen Sie in allen Zeilen eine Antwortmöglichkeit aus!

	Ja, immer	Eher ja	Teils-teils	Eher nein	Nein, nie	weiß nicht
Im Wartezimmer						
Auf dem Boden im Sprechzimmer (Untersuchungsraum)						
Auf dem Tisch im Sprechzimmer (Untersuchungsraum)						

Auf dem Tisch, während er untersucht wird						

Von wem nimmt Ihr Hund beim Tierarzt Futter an? *
Bitte wählen Sie in allen Zeilen eine Antwortmöglichkeit aus!

	Ja	Nein	Weiß nicht
Besitzer/ Besitzerin			
TierarztpraxisassistentIn			
Tierarzt/Tierärztin			

Welches Futter nimmt Ihr Hund in folgenden Situationen an? (Mehrfachauswahl pro Zeile möglich) *
Bitte wählen Sie in allen Zeilen eine Antwortmöglichkeit aus!

	normales Trockenfutter	Nassfutter	hochwertige Leckerlie (z.B. Käse, Wurst, getrocknetes Fleisch usw.)	Futterpaste aus einer Tube	gar keines	weiß nicht
Zu Hause						
In einer fremden, neutralen Umgebung						
Beim Tierarzt						

ANGABEN ZU TIERARZT(erfahrungen)

Welches Geschlecht hat Ihr Tierarzt, den sie normalerweise besuchen? *
Weiblich
Männlich
Unterschiedlich (z.B. in einer Praxisgemeinschaft)

Haben Sie aufgrund des Verhaltens Ihres Hundes schon einmal den Tierarzt gewechselt? *
Nein
Ja
Sonstiges:

Wie oft pro Jahr gehen Sie mit Ihrem Hund zum Tierarzt? *
Kein fester Rhythmus, nur wenn nötig
1x pro Jahr
2-3x pro Jahr
4x oder mehr pro Jahr

Hatte Ihr Hund schon einen der folgenden Eingriffe beim Tierarzt? *
Bitte wählen Sie in allen Zeilen eine Antwortmöglichkeit aus!

	Ja	Nein
Impfung		
Kastration		
Andere Operationen als Kastration		

Hatte Ihr Hund bereits einmal eine Verletzung und/oder litt an einer Erkrankung, die tierärztliche Behandlung erforderte? *
Bitte wählen Sie in allen Zeilen eine Antwortmöglichkeit aus!

	Ja	Nein
Verletzung		
Erkrankung		

ERKRANKUNGEN & MEDIKAMENTE

Leidet Ihr Hund aktuell unter einer Erkrankung? *
Ja
Nein

Falls Ihr Hund unter einer Erkrankung leidet, unter welcher?

Ist bei Ihrem Hund eine (chronische) Ohrenentzündung bekannt? *
Ja
Nein
weiß nicht

Hat Ihr Hund momentan an einer bestimmten Körperstelle Schmerzen, meidet Berührungen an einer bestimmten Stelle oder zeigt Unregelmäßigkeiten im Bewegungsablauf? *
Ja
Nein

Falls Ihr Hund Schmerzen hat, Berührungen an bestimmten Stellen meidet, oder Unregelmäßigkeiten im Bewegungsablauf zeigt: an welcher/n Stelle/n?

Bekommt Ihr Hund Medikamente? Wenn ja, welche? *

FUTTERBELOHNUNG

Frisst Ihr Hund gerne Leckerchen und "arbeitet" auch gerne für Futter? *
sehr unzutreffend
eher unzutreffend
teils-teils
eher zutreffend
sehr zutreffend

Informationen zu Futterunverträglichkeiten: *
Bei den Besuchen für die Studie werden die Hunde Futter erhalten. Bitte geben Sie uns an, ob dies für Sie in Ordnung geht.

Mein Hund verträgt alles, darf alles fressen.
Mein Hund darf etwas Bestimmtes nicht fressen, aber alles andere ist erlaubt.
Mein Hund darf, für die Studie, kein Futter erhalten.
Sonstiges:

Wenn Futterunverträglichkeiten vorhanden sind, welche genau?

TRAINING

Haben Sie/Ihr Tierarzt schon daran gearbeitet, Tierarztbesuche für Ihren Hund angenehm(er) zu gestalten? *
immer
manchmal
seit einem bestimmten Ereignis
selten
einmal
noch nie

Wenn ja, welche Methoden? (Mehrfachauswahl möglich)
Beruhigend zureden
Futter geben
Streicheln
Rückzugsort mitnehmen (Decke, Box von Zuhause)
Hund im Auto warten gelassen, um Wartezimmer zu vermeiden
Termin vereinbaren um Situation im Wartezimmer zu vermeiden
Maulkorb
Beruhigende Produkte z.B. Pheromonprodukte, Notfalltropfen oder ähnliches
Sedierung durch den Tierarzt
Tierarztbesuch zur Gewöhnung (ohne Untersuchung)
Training zur Duldung der Berührung jeglicher Körperteile
"Medical Training"
Sonstiges:

Trainieren Sie mit Ihrem Hund eine Hundesportart? (Mehrfachauswahl möglich) *

Nein
Familienhundegruppe/Plauschtraining
Agility

Dogdance, Tricktraining
Obedience
Schutzdienst
Rettungshund
Sonstiges:

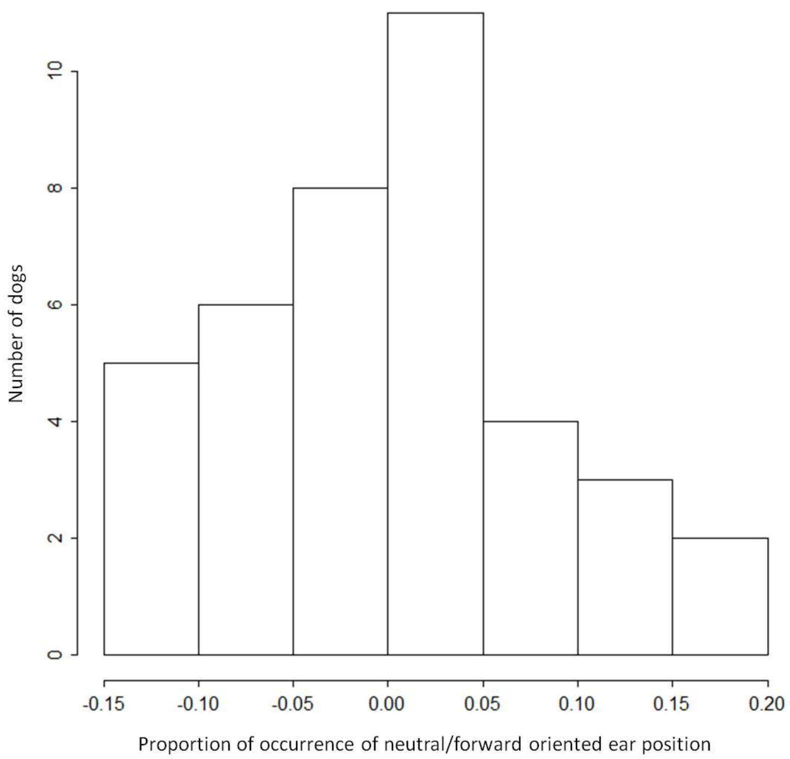
Vielen Dank für Ihre Teilnehme am Fragebogen! Sie können uns hier eine Nachricht oder einen Kommentar zum Fragebogen hinterlassen:

Appendix 3 - Statistical group comparison

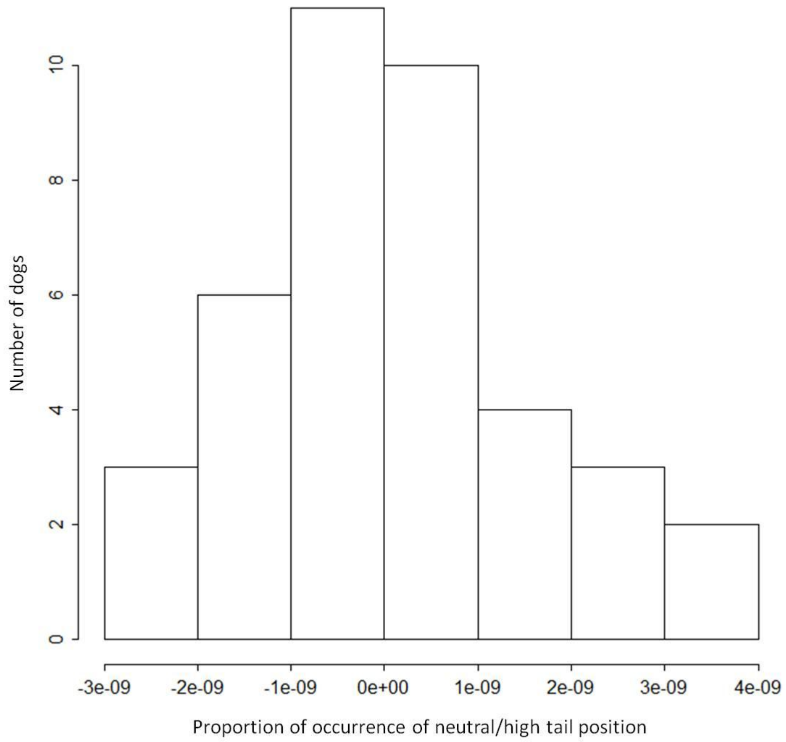
Statistical output of final group comparison with Man-Whitney-U / Wilcoxon-W test based on data of the owners' assessments when answering the questionnaire of Appendix 2.

Variable	Z	asymptotic significance (2-sided)
Age	-0,114	0,909
Fear score	-1,165	0,244
Travel score	-0,622	0,534
Training experience owners	-0,015	0,988
Training experience dogs	-1,138	0,255
Freeze	-0,280	0,779
Tremble	-1,362	0,173
Pant	-1,137	0,256
Hide	-0,285	0,775
Seek for comfort	-1,020	0,308
Growl	-0,222	0,824
Showing teeth	0,000	1,000
Snapping towards a person	-0,161	0,872
Snapping a person	0,000	1,000
Unintentional loss of faeces	-0,879	0,379

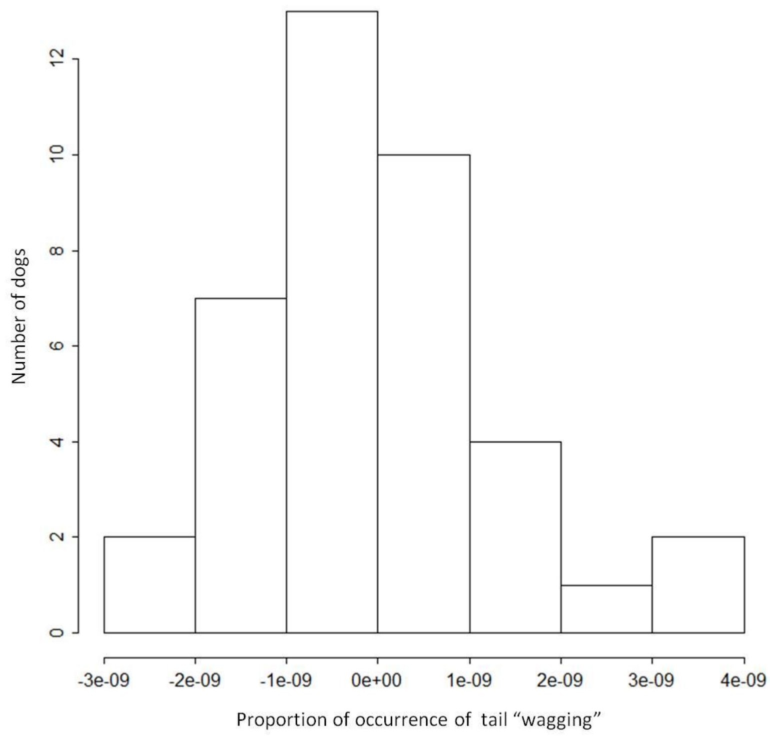
Appendix 4 - Statistical evaluation - diagnostic plots



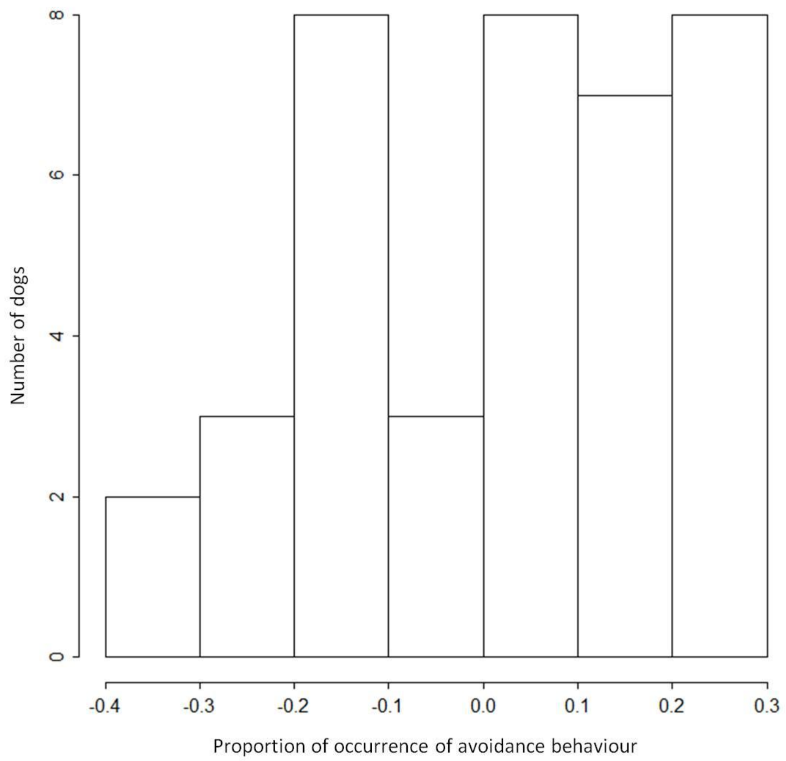
Distribution of proportional occurrence of a neutral/forward-oriented ear position in the participating dogs of both groups.



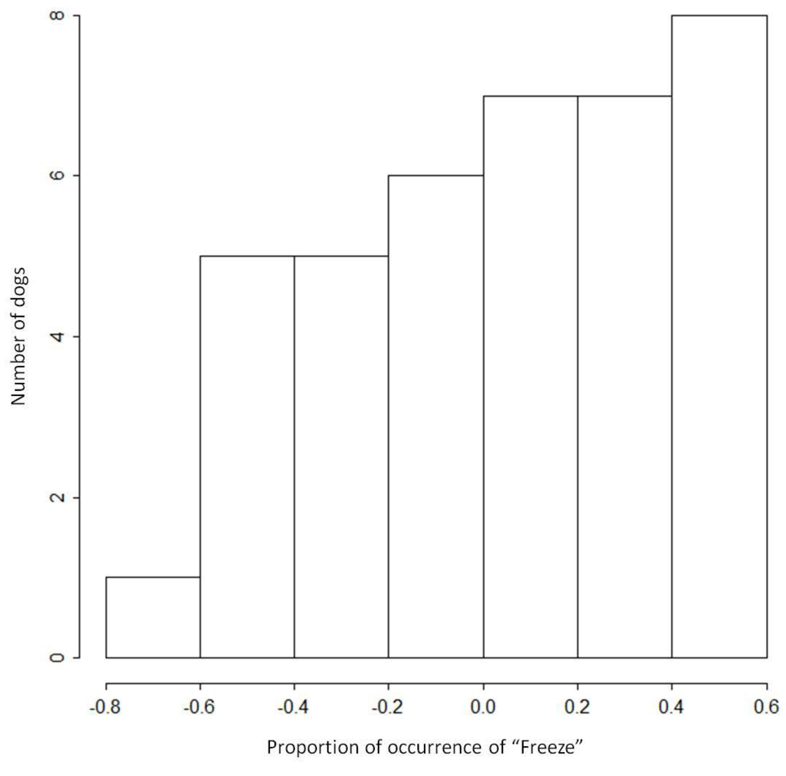
Distribution of proportional occurrence of a neutral/high tail position in the participating dogs of both groups.



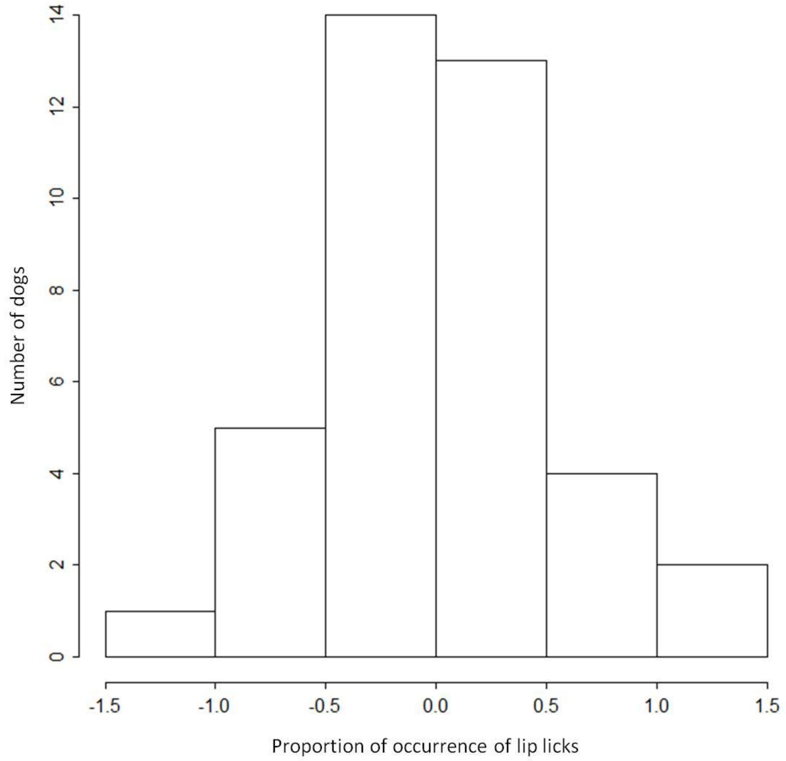
Distribution of proportional occurrence of tail "wagging" in the participating dogs of both groups.



Distribution of proportional occurrence of avoidance behaviour in the participating dogs of both groups.



Distribution of proportional occurrence of "Freeze" in the participating dogs of both groups.



Distribution of proportional occurrence of lip licks in the participating dogs of both groups.

Appendix 5 - Zusammenfassung

Die veterinärmedizinische Versorgung leistet einen wichtigen Beitrag für das Wohlergehen von Tieren. Gleichzeitig lösen Untersuchungen und Behandlungen oftmals Angstreaktionen aus und wirken sich so negativ auf das Wohlbefinden aus. In vielen Zoos wird deshalb bereits Training auf Basis positiver Verstärkung genutzt, um die Tiere für eine freiwillige Zusammenarbeit bei Behandlungs- und Pflegemaßnahmen zu motivieren. In der vorliegenden Studie wurde untersucht, ob diese Art von Training unter Anleitung einer Trainerin auch von HundehalterInnen an ihren eigenen Hunden durchführbar ist und ob eine Übertragung des Gelernten auf die veterinärmedizinische Situation möglich ist.

An der Studie nahmen 40 Hunde teil, die nach einer ersten standardisierten Untersuchung in eine Trainings- und eine Kontrollgruppe eingeteilt wurden. Bei der Zuteilung wurden das Alter, das Geschlecht, die Einschätzung der Besitzer bezüglich Ängstlichkeit beim Tierarzt, sowie die Trainingserfahrung von Hund und Halter berücksichtigt. Die Hunde der Trainingsgruppe (N=22) nahmen zwischen erster und zweiter Untersuchung an 8-12 Trainingsstunden teil, in denen mit ihnen ein Kooperationssignal (Stehen auf einer Schaumstoffplatte (Target) mit den Vorderpfoten) sowie die einzelnen Untersuchungsschritte trainiert wurden. Die Hunde der Kontrollgruppe wurden nicht trainiert. Eine zweite standardisierte Untersuchung fand frühestens 13 Wochen nach der ersten Untersuchung statt. Danach wurden Videos der Untersuchungen aller Hunde von einer außenstehenden Person in 5-Sekunden-Intervallen codiert, um Daten zu den Verhaltensweisen Ohr- und Rutenhaltung, Schwanzwedeln, Meideverhalten, "Einfrieren" und Lippenschlecken zu erheben. Die 1/0-Daten wurden in Folge in Proportionen umgewandelt und der Mittelwert jeder Variable wurde für jeden Hund und beide Untersuchungen erhoben. Mithilfe statistischer Modelle wurden die ausgewerteten Variablen auf eine Gruppen*Besuch-Interaktion geprüft. Gruppe und Besuch wurden dabei als fixe Faktoren und die ID der Hunde als Zufallsfaktor festgelegt. Die Übertragbarkeit des Gelernten auf die veterinärmedizinische Situation durch Hund und Hundehalter wurde ebenfalls durch Videoauswertung überprüft. Es wurden das Targetverhalten der Hunde und die Reaktionen der Besitzer auf das Verhalten ihrer Hunde erhoben. Außerdem wurden zur Ermittlung des Trainingserfolges, Einschätzungen der Trainerin und der Hundehalter, sowie die Trainingsdokumentation herangezogen.

Die Ergebnisse der Auswertungen haben gezeigt, dass es keine signifikanten Veränderungen in den sogenannten stressbezogenen Verhaltensweisen gab. Dennoch deuten sowohl die Einschätzung der Trainerin und der Hundebesitzer, als auch die Ergebnisse betreffend dem Erreichen vordefinierter Trainingskriterien darauf hin, dass das angeleitete Training der HundehalterInnen für den Großteil der Hunde erfolgreich war. Die Übertragung des Gelernten auf die veterinärmedizinische Situation hingegen war laut unserer Ergebnisse (vor allem bei den HundehalterInnen) weniger erfolgreich. Die fehlende Generalisierung des Gelernten könnte eine mögliche Ursache für das Ausbleiben der erwarteten signifikanten Reduktion von Stressanzeichen in der Trainingsgruppe sein.