Assessment of veterinarian interaction styles and the effect on dog reactions during two routine vet procedures

Research project Veterinary Medicine,
University of Utrecht

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1 Sept – 23 Dec 2011

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Prefatory note

Within the training of Veterinary Medicine at the University of Utrecht, all students fulfil a research project in one of the last years of the training. This paper is the final report of the research project carried out by S.K.J. Bosma at the department of Animals in Science and Society at the University of Utrecht.

This research project was performed to assess veterinarian interactions styles and to understand more about the influence of these interaction styles on dog reactions during routine procedures in the veterinary practice.

Abstract

The first aim of this study was to quantify veterinarian-dog interaction styles during a routine vet consult. Since petting and using comfort talk are known to be comforting to dogs, these parameters were used to determine if different veterinarians used different interaction styles towards dogs. The hypothesis was that the amount of petting and comfort talk directed at the dogs would differ among the veterinarians involved in this study. The results showed that the amount of petting and using comfort talk indeed differs between veterinarians, but the differences in the amount of petting seem to be clearer than in the amount of comfort talk. The second aim of the study was to determine if the veterinarian interaction style had an effect on dogs' behavioural responses to two routine vet procedures; giving an injection and taking the rectal body temperature. The hypothesis was that the veterinarian interaction style would affect the dogs' behavioural responses during the two routine procedures. Dogs examined by a veterinarian with a high petting or high comfort talk interaction style would exhibit lower duration or frequencies of behavioural indicators of 'stress' pre- and post-vaccination and pre-, during- and post-temperature than dogs who were examined by vets with a low petting or low comfort talk interaction style. The results suggest that this was true for some behaviours, however for other behaviours it seemed that dogs couldn't cope with the situation very well. The clearest difference was with hiding with the owner; this was much more common with dogs that were high petted, compared to low petted dogs. In the future, for all 37 dogs the amount of petting and comfort talk should be determined, instead of using three dogs per veterinarian and assume that the amount of petting will be the same for the other dogs. Furthermore, the study should include more veterinarians, but especially more dogs per veterinarian have to be included in this study.

Contents

1. Introduction

1.1. Animal welfare

Over the years, animal welfare became a more important subject with the public, in the veterinary profession and in politics.[11, 12] It's hard to objectively define the concept of animal welfare, because scientists are influenced by moral and ethical standards of society and interpretation and moral evaluation differs between cultures, regions, time and individuals. The general concept of animal welfare is the balance between negative/bad welfare and positive/good welfare. Early approaches to the interpretation of positive welfare were mainly based on the exclusion of negative attributes and states, so positive welfare was defined as the absence of negative stimuli; in other words, the absence of suffering.[12] For example, the Brambell Committee[1] first suggested that (positive) animal welfare is protected if the animals are kept from negative states like hunger, thirst of inadequate food, thermal and physical discomfort, injuries or disease, fear and chronic stress, and were free to display normal, species-specific behavioural patterns. Later, this was formulated as the five freedoms, which is now broadly used as a guideline for welfare assessment protocols.[11, 12] In order to assess the welfare status of an animal, a difference has to be made between the acute situation and the long term situation of an individual. The five freedoms can be used for the acute situation, but for the long term situation there has to be at least a balance between positive and negative stimuli and the animal has to adjust to the situation.[11] Several attempts to modify the five freedoms of the Brambell Committee in a more positive approach, led to the final one [12]: An individual is in a positive welfare state when it has the freedom adequately to react to:

- Hunger, thirst or incorrect food;
- Thermal and physical discomfort;
- Injuries or disease;
- Fear and chronic stress, and thus,
- The freedom to display normal behaviour patterns that allow the animal to adapt to the demands of the prevailing environmental circumstances and enable it to reach a state that it perceives as positive.

To find out if an animal can react adequately to these stimuli, it's important to obtain information about the internal state of an animal. This information can only be obtained by observing the animal itself, in terms of parameters that reflect the aspects of the internal state of the animal, like physiological and behavioural parameters.[14] For example, heart rate and cortisol levels measure the activity of two physiological systems that respond to acute stress, namely the sympathetic nervous system and the hypothalamic pituitary adrenal (HPA) axis, respectively.[4] Behavioural responses which can occur as a result of the presence of stressors, and may indicate a state of acute stress, are for example panting, vocalizing, paw lifting, snout licking and lowering of the posture.[3] Behaviours indicating anxiety are thought to be for example salivating, vocalizing, hiding, panting, remaining near the owner and trembling.[6] A lowered tail position may be a neutral signal or may reflect fear and/or submission.[6,8] Also dogs who keep their tail between the hind legs and avoid being looked at show submission.[6] Also arousal has been suggested to be manifested by specific behaviours such as increased frequency of oral behaviours, vocalisation, body shaking, yawning, crouching,

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[1] Brambell Committee: a technical committee set up by the UK Government in 1965 to inquire into the welfare of animals kept under intensive livestock husbandry systems.

increased/repetitive movements, increased auto-grooming and paw-lifting.[13] Higher tail positions are associated with confidence and /or aggression, while wagging the tail may show excitement, comfort and relaxation, or submission if the tail is also lowered.[8] Looking at the environment and looking at other people are signs of attentiveness and struggling can mean a quite active state of the dog.[5] There is a lot of ethological literature on dog behaviour, so this are only some examples of interpretations of dog behaviours. Also the interpretations in literature can be quite different, so depending on the literature, different behaviours are thought to have different meanings. Therefore it's difficult to distinguish between those meanings.

1.2. Animal welfare project

In 2007 the ministry of Economics, Agriculture and Innovation started a research program, called 'Welfare of individually kept animals'. The aim of this research program was to eventually provide owners of individually kept animals and their organisations from useful knowledge and views to improve the welfare of individually kept animals in the practice. Commissioned by the ministry, the Department of Animals in Science and Society of the Faculty of Veterinary Medicine, University of Utrecht, started one part of the research project; 'The dog welfare project'. The main aim of this part of the project is to develop an objective method to determine animal welfare, which is scientifically sound, widely accepted in the society and can be used in the veterinary practice. The project will combine quantitative and qualitative assessment methods, which will be developed, validated, applied and evaluated within the project. Considering that individually kept dogs are never housed under comparable conditions, the project will take place on a universal similar location, the veterinary practice, so the behavioural observations can be compared between dogs. The intention is that this method could eventually be used to gain insight into the internal state and thus assess the welfare condition of pet dogs in the veterinarian practice.[14]

1.3. The influence of the veterinarian

Since the society expects the veterinarian to take care of the health and welfare of animals, a point of interest is to determine which characteristics are important to veterinarians, according to clients who visit the veterinary practice. In the United Kingdom, a study [10] has been performed in order to examine what small animal veterinarians and their clients think is a 'good veterinarian'. They where asked to fill in a questionnaire which consisted of 20 attributes. The veterinarians and clients had to choose which of these attributes they considered to be the most important for a veterinary surgeon. Clients considered for example 'knowledge of veterinary medicine and surgery', 'good with animals' and 'compassion for patients' to be an important skill of a veterinarian. In Norway and Iceland, a study [9] has been performed in which was examined what the expectations of the dog owners towards their veterinarians were. They had different opinions about this than did the other clients. 31 percent of the owners felt that the veterinarians' schedule was too tight. Trust worthiness and communication skills of the veterinarian were also important characteristics, according to the clients.

Besides that it's important to know what owners think are important characteristics of a veterinarian, it's also interesting to find out how the dog can be influenced by these characteristics. A study was performed[7] in which dogs in a public animal shelter were exposed to a venipuncture procedure, in which it's expected the cortisol levels would rise. After the procedure, the dogs were divided into two groups; one group of dogs was petted, the other group wasn't. After twenty minutes, another blood sample was collected, which showed that there was a clear increase in cortisol levels in dogs that were not petted, but this wasn't

present in dogs that were petted, so petting may be an effective way of reducing the cortisol responses of dogs after other stressful situations, like routine veterinary consults at clinics as well as in shelters.

Apart from the effect of petting on the cortisol status of the dog, it's also very interesting to assess if interactions with veterinarians can also influence the dog's behavioural variables. For example, petting the dog and talking to the dog is known to be comforting towards the dog, [1, 6] but since there has been little research about this subject, this research project will be about gaining more information about this.

1.4. Objectives and hypotheses

This pilot study is part of the dog welfare project. The objective of this study was first to quantify veterinarian-dog interaction styles during a routine vet consult and second to determine if the vet interaction style has an effect on dogs' behavioural responses to two routine vet procedures; giving an injection, which was most of the time a vaccination (hence injection) and taking the rectal body temperature with a digital thermometer (hence temperature). Veterinarian-dog interaction styles were assessed in terms of the amount of petting and comfort talk the veterinarian directed towards the dog during a routine consult. First, the hypothesis that the amount of petting and comfort talk directed to the dogs differed between veterinarians involved in this study was tested. Second, predicted was that the veterinarian-dog interaction style would affect the dogs' behavioural responses during the two routine procedures (i.e. injection and temperature). Dog behaviours were scored before (pre-) and after (post-) each procedure, as well as during for the temperature. We then tested the following hypotheses with respect to vet-dog interaction style:

A. H0: Dogs that were examined by veterinarians who displayed a 'high' petting and/or 'high' comfort talk interaction style and dogs who were examined by veterinarians with a 'low' petting and/or 'low' comfort talk interaction style show no difference in duration or frequencies of behavioural indicators of 'stress' pre- and post-injection procedure.
H1: Dogs that were examined by veterinarians who displayed a 'high' petting and/or 'high' comfort talk interaction style exhibit lower duration, or frequencies, of behavioural indicators of 'stress' pre- and post-injection procedure than dogs who were examined by veterinarians with a 'low' petting and/or 'low' comfort talk interaction style.

B. H0: Dogs that were examined by veterinarians who displayed a 'high' petting and/or 'high' comfort talk interaction style and dogs who were examined by veterinarians with a 'low' petting and/or 'low' comfort talk interaction style show no difference in duration or frequencies of behavioural indicators of 'stress' pre-, during- and post-temperature procedure.
H1: Dogs that were examined by vets who displayed a 'high' petting and/or 'high' comfort talk interaction style exhibit lower duration, or frequencies, of behavioural indicators of 'stress' pre-, during- and post-temperature procedure than dogs who were examined by vets with a 'low' petting and/or 'low' comfort talk interaction style.

2. Materials and Methods

2.1. Subjects

Data for this research were based on video recordings of 105 privately owned dogs. The recordings were made in eleven different veterinary practices. These practices near Utrecht volunteered to participate in the study. Eventually, sixteen veterinarians from these eleven practices participated in the project. The dogs' ages ranged from 11 month to 16,5 years of age, and the breeds also differed. 41 dogs were male, from which 46% was castrated, and 64 dogs were female, in which 72% was spayed. The owners were asked to participate in the research project and to fill in a questionnaire. The inclusion criteria were that the dogs were ≥11 months and that they had been to the vet once before.

2.2. Data collection

2.2.1. Dog behaviour data

All data were collected in the eleven veterinary practices. To standardize the conditions for the dogs as much as possible, all dogs were put on the table in the consulting room, since the tables are quite the same in every practice, in terms of for example size and height. From the moment the dog and their owner were walking into the consultation room until the moment the dog was lifted from the table, the reactions of the dogs were recorded. The dog's fur was wetted, so the dogs could be equipped with a heart rate monitor (polar), which was strapped around the thorax of the dog and stayed this way for the entire recording time. Data collection started almost immediately after strapping the polar on. The first period of the recording was a habituation period, which lasted for five minutes. After five minutes the consult, for which the owner came to the clinic, started and data collection continued. During the consult, the veterinarians could follow their own routine, but furthermore they were asked to take the rectal temperature of each dog included in the research project. Less than half of the dogs also received an injection/vaccination. In Fig. 1 this time distribution is presented. At the end of the consult, saliva was collected in order to measure cortisol concentrations, since salivary cortisol concentrations have been used to assess stress in dogs and this is a non-invasive way of measuring the cortisol level.[2, 15]
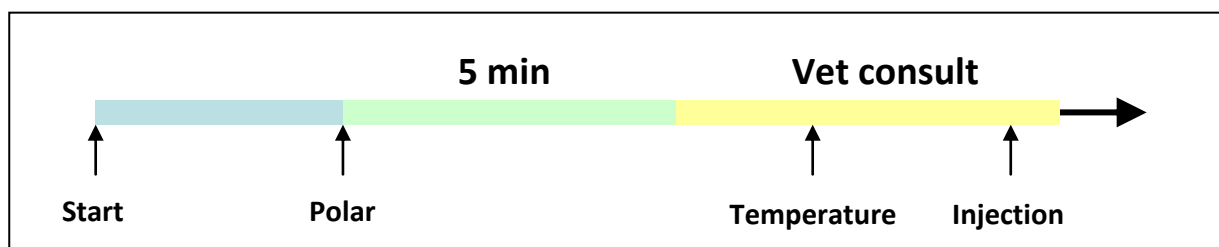
Fig. 1. Reactions of the dogs were recorded from the moment the dog was entering the consultation room, until the moment the dog was lifted from the table. This entire time is divided into three periods; the period in which the dog enters the consultation room (blue), after which the polar is strapped on, the habituation period (green) and the veterinary consult (yellow), in which the temperature is always taken and some dogs also received an injection. This research project is only focused on the veterinary consult.

Subjects were divided into those who also got an injection and those who didn't, but in which only the temperature was taken. Of all 105 dogs, 44 dogs received an injection/vaccination. To make a selection of all dogs in which the temperature was taken, these 44 dogs were excluded for the temperature data. Of 61 dogs who remained usable, dogs who were out of

sight of the camera for a some time were eliminated and the remaining selection was performed randomly, with eventually 44 dogs for each groups. All 88 dogs were scored during the 60 seconds before giving the injection or taking the temperature and 60 seconds from the moment the veterinarian gave the injection or took the temperature, since the behaviours had to be recorded around giving an injection and taking the temperature two minutes, to determine what effect giving an injection or taking the temperature had on the behaviours of the dog. The time before and after the injection and temperature had to be enough to establish this and in addition a selection could eventually be made of the scored two minutes. After elimination of some other dogs that were out of sight of the camera for some of this time, eventually 33 dogs remained usable for the injection and 43 dogs remained usable for taking the temperature. Since the veterinarian also conducted other procedures in these 120 seconds, which could influence the behaviour of the dog, after analysing the 120 seconds, the time that the veterinarian didn't conduct another procedure was determined. From this, there was established that a lot of dogs were unusable for the analyses of the time round about the injection or taking temperature, since the time between two procedures was too short, and the ones who were usable had a period of more or less fifteen seconds before and after giving vaccination and taking temperature. Since the procedure of taking the temperature alone already took more than fifteen seconds, for temperature the behaviours had to be recorded fifteen seconds before, after, but also during the procedure. Eventually fifteen dog videos remained usable for analysing the behaviours before and after giving the injection and 22 dogs were used to analyse their behaviours before, during and after taking the temperature. In Fig. 2 the time distribution before and after the injection is presented, while in Fig. 3 the time distribution before, during and after the taking the temperature is presented. Unfortunately, behaviours of the tail weren't usable during taking the temperature, since the veterinarian most of the time held the dog's tail, which influenced the tail movements.
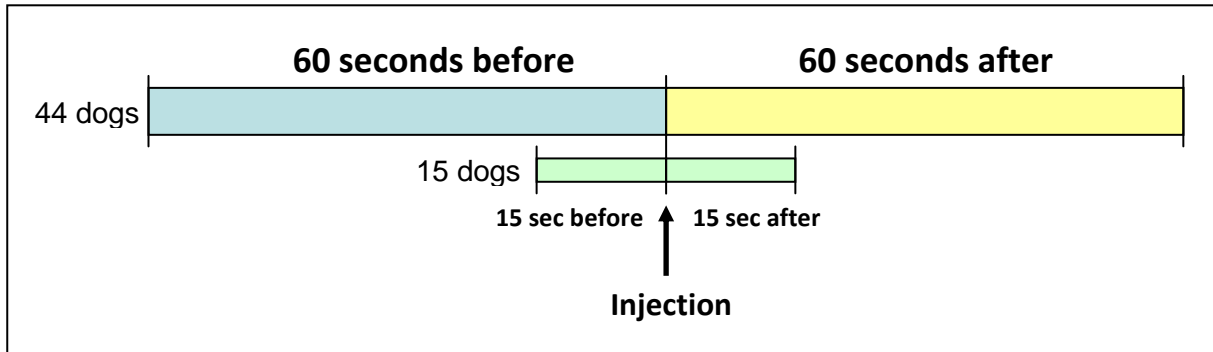

Fig. 2. Reactions of 44 dogs were recorded 60 seconds before (blue) and after (yellow) the injection. After elimination of dogs who were out of sight of the camera and dogs who didn't have fifteen seconds before and after the injection without the veterinarian conducting other procedures, fifteen dogs remained usable for fifteen seconds before and after the injection (green).
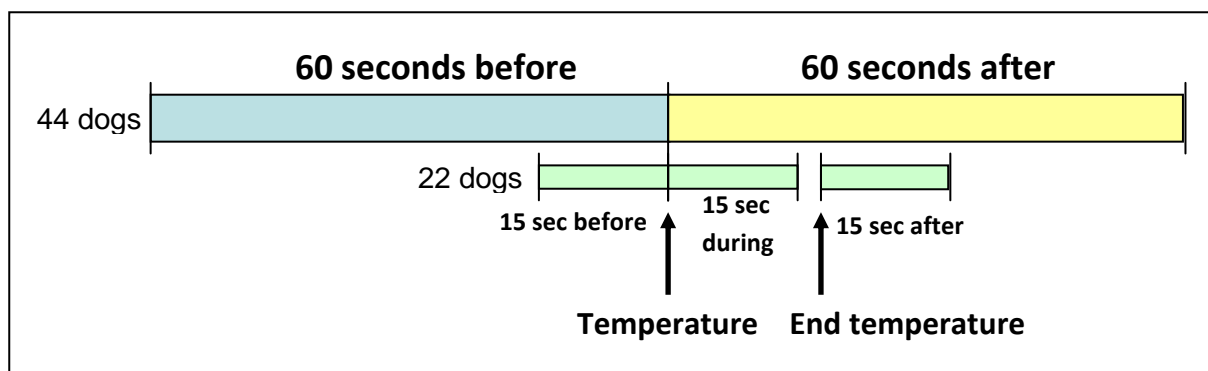
Fig. 3. Reactions of 44 dogs were recorded 60 seconds before (blue) and after (green) taking the temperature. After elimination of dogs who were out of sight of the camera and dogs who didn't have fifteen seconds before, during and after taking the temperature without conducting other procedures, 22 dogs remained usable for fifteen seconds before, during and after taking the temperature (green).

2.2.2. Data of interaction between the veterinarians and dogs

Besides the scoring of the dogs' behaviour, there were also data collected of the vet's interaction with the dog. First, all 104 dogs were classified per vet. Every first dog of the day was dropped, because the changed situation (e.g. presence of the camera and researcher) could have an effect on the behaviour of the vet, since he or she wasn't for example used to the presence of the camera and researcher yet. After this selection, the amount of dogs presented in Table 1 remained usable. Data collection occurred during the entire consult, which ranged from three minutes and 44 seconds to fifteen minutes and 43 seconds.

Table. 1.

All 16 veterinarians presented with the number of videos scored, with a total amount of 37 dog videos.

Vet nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Nr. of videos	3	3	3	3	3	3	3	3	3	3	2	1	1	1	1	1	Total: 37

2.3. Behaviour variables

Observations of the behaviour of the dog and the behaviour of the veterinarian were made from the video-recordings.

2.3.1. Behavioural variables of the dog

2.3.1.1. Categories and changes

In a former research project, regarding the five minutes, an ethogram is established during viewing of the videos. This ethogram could also be used in this research project, but since there was no interaction with the veterinarian in the first five minutes and the dog displayed less different behaviours, this first ethogram had to be supplemented. Throughout watching the videos, behaviours have been added and scoring rules have been determined. Examples per category are presented in Table 2. The detailed ethogram used in this study is presented in the appendix, table 1.

Table 2.

Summary of the recorded categories and examples of dogs' behaviours.

Scored behavioural categories	Examples
Body posture/movement	Standing, sitting, shifting posture, struggle
Tail position and movements	Tail high, middle, low and with or without wagging
Head orientation	Head directed to owner, vet, environment, hiding
Mouth	Panting, licking lips, vocalisations
Restrain	Restrain body, head, legs, leash, collar

In the ethogram, the dogs' behaviours were classified over 5 categories; body, tail, head, mouth and restrain. In order to understand how the scoring occurred, from each category some behaviours have to be explained.

Body positions
In this category multiple behavioural variables had to be added to the ethogram, for example 'leaning against the owner', in which the dog is leaning against the owner for support and thus shifts its weight partially onto the owner. Since it's difficult to determine when a dog shifts its weight partially onto the owner, it's only scored as 'leaning against the owner' if not all paws were on the table. However, sometimes a dog also has three paws on the table and one on the owner, but is not shifting its weight onto the owner. In that case there should be looked at the body position of the dog; is the dog really leaning against the owner or is it just sitting with one paw on the owner. If the dog has two paws on the owner, this is always classified as leaning, since this can't happen without shifting part of the body weight onto the owner.
Other behavioural variables that have been added to the ethogram are 'climbing on the owner' and 'lying in owners arms', which sometimes happened after another. The difference between 'leaning against the owner' and 'lying in owner arms' is that with lying, the dog has no paws standing on the table and the body weight thus rests completely on the arms of the owner. Furthermore, 'head jerk' has been added to the ethogram. This occurred merely during the administration of the nasal vaccine and sometimes it was accompanied by a jerk back of the whole body. However, it also occurred that dogs would jerk back their leg during clipping of the nails, so therefore jerk back has two different modifiers; jerk back of the body and jerk back of the leg.
Some dogs also struggled during the consult, which didn't happen during the five minute habituation period, so this behavioural variable was also added to the ethogram with the following definition: struggling in random movements, directed at breaking restrain.

In the same category, also multiple scoring rules had to be modified. An example of this is 'shifting posture'. During the five minute habituation period, there were no clear scoring rules determined for 'shifting posture'. However, during the consult, the dogs were moving quite a lot and a rule had to be added from which could be determined when an event, in which multiple movement were done, was scored as one and when as multiple different events. Therefore, the following rule has been added regarding shifting posture; a behaviour is counted as one event, unless the dogs stands noticeably still (~2 sec.) in between two separate bouts of motion, also if the dog moves continuously for many seconds. In this rule, two seconds was used, since one second in between two motions will not always be detected by different people. However, because of this rule, the duration of 'shifting posture' is very important to record.
Another behaviour of which rules had to be determined was 'paw lift'. If was difficult to determine when a dog performed a paw lift and when it couldn't be counted as one (if it was part of for example shifting posture). Therefore, there was agreed that if the paw lift was part of shifting posture, it wasn't scored as 'paw lift'. However, if the paw was lifted for more than one second, it was scored as a 'paw lift', since a real paw lift usually is a longer event than a paw lifted as part of 'shifting posture'.

Tail position
For tail position, a clear agreement has been made, based on a vertical line throughout the tail. On this line, a high tail position has been labelled as 0° and a low tail position has been labelled as 180°. In Fig. 4 this principle has been presented.
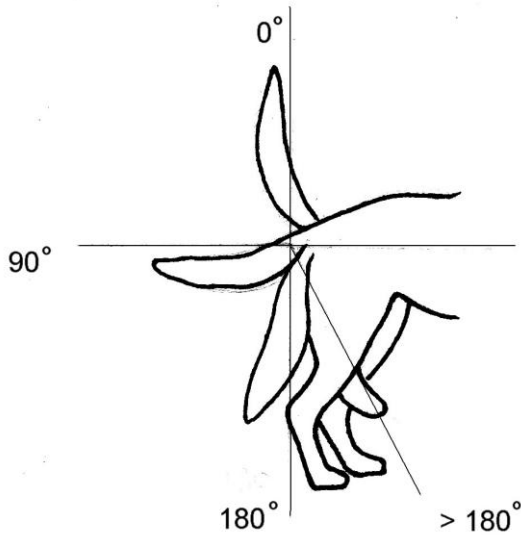
Fig 4. Classifications of tail positions.

A tail position has been scored as 'high', if the tail was directed between 0 and 45°, 'middle' if the tail was directed between 45 and 135° and 'low' if the tail was directed between 135 and 180°. If the tail was positioned at more than 180°, this was defined as 'tail between legs'.

Head orientation
Only one behavioural variable has been added to this category of the existing ethogram. The one that has been added is 'head jerk'. This occurred especially during administration of a nasal vaccine. The head of the dog was jerked back in a swift, powerful motion, following the spray.

In this category, some behaviours were difficult to score, so clear rules had to be made to make sure that different people would score the same. Head directed to the body of face of the owner, to the vet, to another person and to the environment was based on the direction of the axis of the nose, since this is the most objective way to define. This is the same for 'head high' and 'head down'. In order to score head high and down, a classification has been made regarding the amount of degrees the dog's head is moved relative to the vertical plane. This method is presented in Fig. 5.
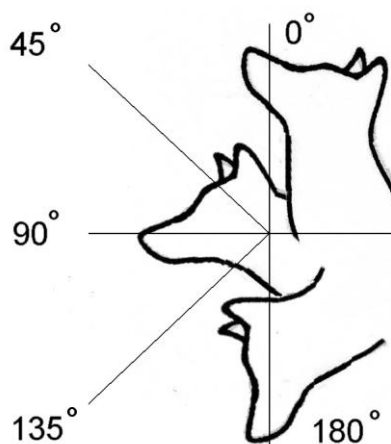
Fig. 5. Classification of head directions

First, a vertical line has been drawn. Then, the point in which the dog's head was highest was labelled as 0° and the point in which the head was lowest was labelled as 180°. All head

directions less than 45° are scored as 'head high' and all head directions more than 135° are scored as 'high down'. For some dogs, the direction of the head wasn't quite clear, so in that case the position of the neck could also be used. Furthermore, there were some breeds in which the neck was very short, so the position of the neck couldn't be used, and they had short legs, so the head of the dog was always relatively close to the table. For these dogs there was a new rule added; if the nose of one of these dogs was on the table, this was always counted as 'head down'.

Mouth
In this category some behaviours have been added, since in addition to the five minute habituation period, now the vet came near the dog and made contact with the dog. These are 'sniffing the vet' and 'licking the vet'.

The only behaviour for which a new definition has been made is 'licking lips'. Since sometimes it was difficult to distinguish between licking lips and smacking (with smacking, licking lips is sometimes a part of it), there was determined that a behaviour would only be scored as licking lips if the tongue was visible.

Restrain
In the previous ethogram, restrain by tail and legs weren't there, since this didn't happen during the five minute habituation period. However, this occurred during the consult, so these were added to the ethogram.

Since the definition of restrain wasn't very clear, this has been changed. An action could now be counted as restrain when the dog is inhibited in its motions, either by the owner inhibiting the dog's ability to walk forward or backward, or by inhibiting the dog from turning its head (and neck). In order to use this rule, it was sometimes helpful to watch the dog a little bit longer than just the moment of possible restrain. If the dog could move, it wasn't restrain and if it couldn't, it was scored as restrain.

Out of sight
In the previous ethogram the dog or a body part were scored 'out of sight' if it wasn't in sight of the camera for 5 seconds. Since it thus wasn't recorded if the dog was out of sight for two seconds for instance, a lot of information could be lost during these seconds. For example, a dog could lick its lips, then be out of sight for two seconds but still lick its lips and then lick its lips again, but nothing is recorded for the two second in between. Therefore a new scoring rule has been added; if the dog or part of its body is out of sight of the camera for two seconds or more, this is scored as 'out of sight'.

2.3.1.2. Scoring

Regarding all behavioural variables, for states, which are behavioural patterns of relatively long duration, the duration was recorded in seconds. The duration is the length of time for which a single occurrence of the behaviour pattern lasts. However, for some behavioural variables, events, which are behavioural patterns of relatively short duration, the frequency (measured in reciprocal units of time) was also recorded. Frequency is a measure of the rate of occurrence, which for some behaviours is more suited to score that behaviour. Examples for which frequency in stead of duration has been used are head jerk, attempt to jump of the table, licking lips and vocalisations. For these, the frequency contains more information than the duration.
Since the behaviours were scored by two people, and both people had to score the same way, first the inter-observer reliability had to be determined. To assess this inter-observer

reliability, some videos were selected and all occurring behaviours were scored by both observers. The results were compared between both observers and the total number of agreements and disagreements was compared. Then, the index of concordance was determined, which is the total number of agreements divided by the sum of agreements and disagreements. This method was repeated with different videos until all behaviours were scored with an index of concordance of 0,8.

After that, all videos were watched and each occurrence of a particular type of behaviour was recorded, together with information about its time of occurrence (continues recording), since this preserves a lot of information about a given category of behaviour. The behaviours were recorded in an excel sheet, from which an example is given in the appendix, table 2. In the first column all 120 seconds are stated and in the second column the video times have been specified, in order to have the possibility to easily revise some seconds. All 88 videos were viewed without sound for approximately five times, to score al different categories. This means, that 880 minutes of videos have been scored. Furthermore, all videos had to be paused several times, in order to record all behaviours.

The durations conducted this way, were first summed per behavioural variable for every dog (total duration), for both fifteen and 60 seconds. For behaviours scored in frequencies, the total number of occurrences was determined for both fifteen and 60 seconds, per dog.

2.3.2. Behavioural variables of the vet

The veterinarian behaviours towards the dog weren't scored in the former research project regarding the five minute habituation period. However, they did score owner behaviour towards the dog and made an ethogram for that. Therefore this existing ethogram was the basis of the ethogram used to score behavioural variables of the veterinarian. Since the veterinarians and owner didn't use exactly the same behaviours towards the dogs, behaviours have been added and scoring rules have been determined throughout watching the videos, which eventually led to a complete ethogram to score the behaviours of the veterinarian towards the dog. An abridged version of the ethogram is presented in Table 3. The detailed ethogram used in this study is presented in the appendix, Table 3.

Table 3.
Recorded veterinarian behaviour towards the dog

Scored behaviour	Definition
Non-verbal interaction	
Touching (duration)	The vet touches the head, body or legs of the dog
Petting (duration)	The vet pets the dog on his/her head / body / legs / tail
Move (duration)	The vet moves the dog's head / body / legs
Examine (duration)	The vet examines the head, body, legs of the dog
Restrain (duration)	The dog is kept in place by the vet, who is restraining the dog by the head, body, legs, tail, collar, leash, both collar and leash or no restrain.
No contact (duration)	The vet is out of sight or stands near the dog, and makes no contact
Verbal interaction	
Talking to dog (duration)	The vet talks to the dog: comfort talk, control talk, other talk
Talking to owner (duration)	The vet talks to the owner about veterinary topics (about the dog or other topics) or about non-veterinary topics (about the dog, owner or other topics)
Talking to researcher (duration)	The vet is talking to the researcher
Talking to assistant (duration)	The vet is talking to the vet assistant
The vet doesn't talk (duration)	The vet doesn't talk; it's quite or the owner, researcher or assistant talks
Unknown (duration)	The vet mumbles, says something to him/herself or is otherwise not comprehensible

2.3.2.1. Categories

The veterinarian non-verbal behaviours were classified within five categories; touching, petting, move, examine and restrain. Touching has been defined as touching the dog without a clear reason. Moving the dog can be done in order to get a better look on or to examine one body part. Examples of examine are ear check, eye check, teeth check, pulse check, checking lymph nodes, checking mucous membranes, clipping nails, palpation, auscultation, taking the temperature and giving an injection. Restraining the dog is recorded if the dog is inhibited in its motions, either by the veterinarian inhibiting the dog's ability to walk forward or backward, or by inhibiting the dog from turning its head (and neck). Also if the dog tries to sit and the veterinarian holds the dog in standing position, it's recorded as restrain. If the vet only keeps his/her hand on the dog, this is not recorded as a form of restrain. Since sometimes there was no non-verbal interaction between the veterinarian and the dog, this is also recorded.

Besides the non-verbal interactions with the dog, the vocal interaction was also scored. This is classified as talking to the dog, to the owner, to the researcher and to the assistant. Talking to the dog can be subdivided into comfort talk, control talk and other talk. With recording this vocal interaction, there should be listened to what is being said by the veterinarian, but if there is any doubt about what the veterinarian wants to accomplish with the dog, the focus has to be primarily on the intonation. Talking to the owner can be subdivided into talking about veterinary topics and about non-veterinary topics (about the dog, the owner or other topics). Veterinary topics can be subdivided into veterinary topics regarding this particular dog and veterinary topics regarding for example some medical problem in general.

2.3.2.2. Scoring

For all behaviours the duration was scored in seconds, since the behaviours listed in the ethogram are states, which are behavioural patterns of relatively long duration.
In order to score the same for both observers, the inter-observer reliability was determined the same way as with the dogs' behaviours. After that, all videos were watched and each occurrence of a particular type of behaviour was recorded, together with information about its time of occurrence (continues recording), since this preserves a lot of information about a given category of behaviour. The behaviours were recorded in an excel sheet, from which an example is given in the appendix, table 4. Unlike the behaviour of the dog, the sheet for recording the behaviour of the vet had no pre-printed times, since sometimes the consults lasted a long time and the veterinarian didn't conduct as much different behaviours as the dogs. Every time the veterinarian conducted something with the dog, the starting time, ending time and type of behaviour were recorded. All 37 videos had to be viewed without sound for approximately three times and with sound one time, in order to score all different categories. This took approximately 850 minutes. Furthermore, all videos had to be paused several times, in order to record all behaviours, so eventually it took more time to record all behavioural variables of the veterinarian.
First, the durations were summed per behavioural variable for every dog (total duration). Second, all data were corrected for the time the dog or veterinarian was out of sight of the camera or for the time the vocal interaction wasn't comprehensible. After that, the proportion of time spent performing that behaviour was determined by dividing the corrected total durations by the total observation period; the time from which the real consult started until almost the end of the consult; the moment the kong was presented in order to get a saliva sample. Since for most of the veterinarians three videos were scored, the mean of this duration per behavioural variable was determined per veterinarian. Considering especially 'petting' and

'comfort talk' to have a comforting effect on the behaviour of the dog, [1, 6] these two were used to check whether different veterinarians differed in interaction style towards the dog.

2.4. Statistical analyses

The amount of petting and using comfort talk (in mean proportion per behavioural variable) has been compared between veterinarians and there has been examined if these amounts have an effect on the dogs' behavioural variables (in seconds or frequencies per behavioural variable), using descriptive statistics.

3. Results

3.1. Dog behaviour

When interested in the results of the first part of the research project, it's recommended to read the research paper carried out by B.A. Barelds, who also fulfilled her research project at the department of Animals in Science and Society at the University of Utrecht.

3.2. Veterinarian interaction with the dogs

3.2.1. Differences in veterinarians

3.2.1.1. Petting

The differences in the amount of petting between all sixteen veterinarians, number one to ten based on the data of three consults, number eleven based on the data of two consults, number twelve to sixteen based on the data of one consult, are presented in Fig. 6.
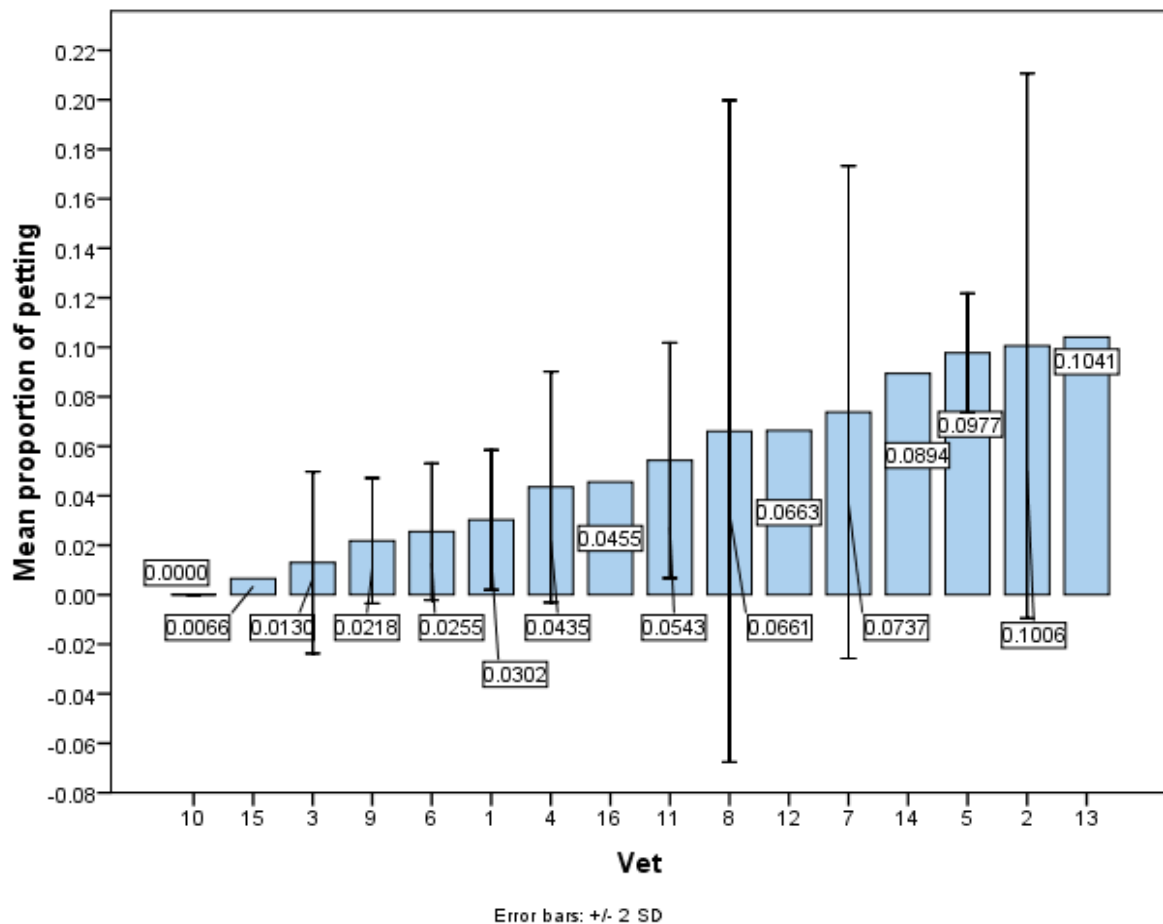
Fig. 6. The distribution of petting between all sixteen veterinarians. Presented are the mean proportions of petting of all consults per veterinarian. The numbers on the x-axis indicate different veterinarians. The data for veterinarian number one to ten in this graph are based on three consults, the data for number eleven were based on two consults and number twelve till sixteen had only one consult.

Since the intention was to divide the veterinarians into groups based on the amount of petting and the groups had to be of roughly equal size, Table 4 has been proposed, using the distribution in the graph presented in Fig. 6.

Table 4.
Distribution of veterinarians regarding the mean amount of petting in veterinary consults.

Amount of petting	Low	Middle	High
Distribution of groups in percentages (%)	$0 < 4$	$4 < 7$	≥ 7
Veterinarian numbers	10, 15, 3, 9, 6, 1	4, 16, 11, 8, 12	7, 14, 5, 2, 13

3.2.1.2. Comfort talk

The differences in the amount of comfort talk between the same sixteen veterinarians are presented in Fig. 7.
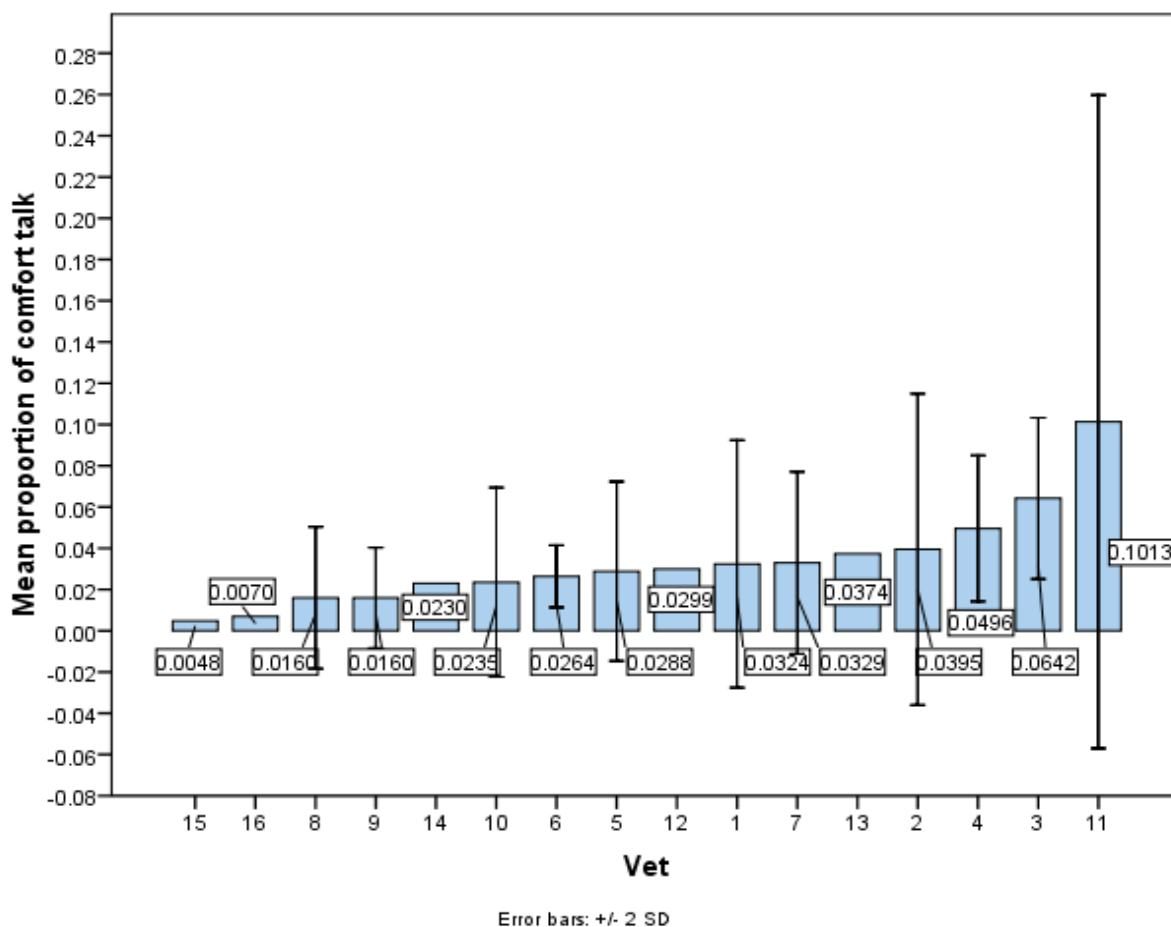
Fig. 7. The distribution of the amount of comfort talk towards the dog between all sixteen veterinarians. Presented are the mean proportions of using comfort talk of all consults per veterinarian. The numbers indicate different veterinarians. The data for veterinarian number one to ten in this graph are based on three consults, the data for number eleven were based on two consults and number twelve to sixteen had only one consult.

Since the amount of comfort talk could also be a behavioural variable which could be different between veterinarians and the groups again had to be similar size, Table 5 has been proposed, using the distribution in the graph presented in Fig. 7.

Table 5.
Distribution of veterinarians regarding the mean amount of using comfort talk in veterinary consults.

Amount of petting	Low	Middle	High
Distribution in groups	$0 < 2,5$	$2,5 < 3,5$	$\geq 3,5$
Veterinarian numbers	15, 16, 8, 9, 14, 10	6, 5, 12, 1, 7	13, 2, 4, 3, 11

3.2.1.3. Interaction styles

When comparing Fig. 6 and 7, it's clear that the veterinarians seem to differ for the amount of petting clearer than for the amount of comfort talk. Also, the veterinarians using high petting don't necessarily also use a high amount of comfort talk. Conversely this is also apparent.

3.2.2. Effect of petting on dog behaviour

3.2.2.1. Fifteen seconds before and from the moment of the injection

Based on graphs of all different dog behaviours, five behavioural variables showed obvious differences between high and low petted dogs. These results are presented in Table 6.

Table 6.
Mean percentages of observed behaviours for variables head directed to owner body, head directed to vet, head directed to environment, licking lips and panting before and from the moment of the injection. The difference in number of dogs is due to the time the dogs were out of sight of the camera.

Variable	Moment	Nr. of dogs	Low petting	Middle petting	High petting
Head to owner body	Pre	15	1,125	3,500	2,718
	Post	15	2,307	0,750	0,333
Head to vet	Pre	15	2,375	6,250	4,872
	Post	15	2,023	2,250	2,452
Head to environment	Pre	15	9,000	5,250	6,026
	Post	15	7,670	8,500	11,881
Licking lips	Pre	8	1,800	1,500	1,000
	Post	8	3,600	6,000	0,000
Panting	Pre	8	6,800	6,000	0,000
	Post	8	2,800	2,500	0,000

3.2.2.2. Fifteen seconds before, during and after taking the temperature

Judging on graphs of all different dog behaviours, nine behavioural variables showed tolerable differences between high and low petted dogs. Of these variables, hiding with the owner showed the most obvious difference.

Following the hypotheses, during and post taking the temperature there was a clear difference in hiding with the owner between dogs that were little petted and dogs that were petted a lot. The difference in hiding with the owner is presented in Fig. 8. However, this difference was in the opposite direction than hypothesised. Dogs that were petted a lot showed more hiding with the owner during and after taking the temperature than dogs that were only petted a little.
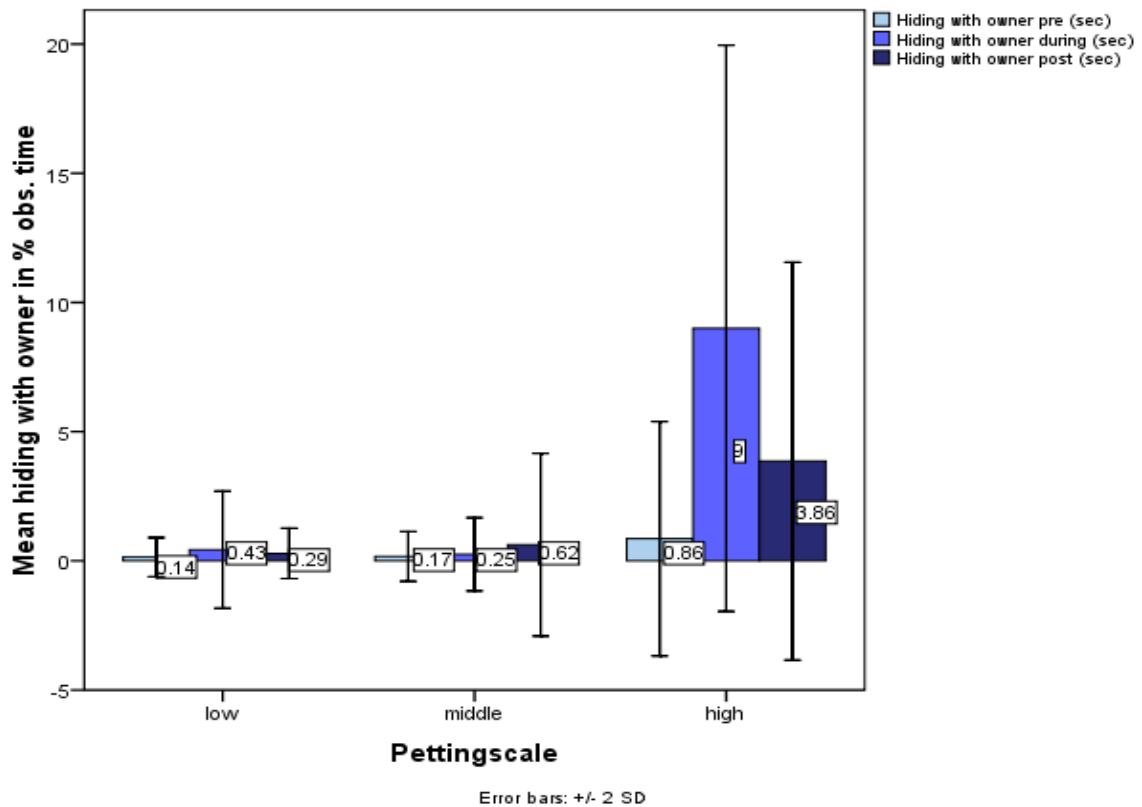
Fig. 8. The distribution of the dog hiding with the owner over the amount of petting through the veterinarian. Presented are the percentages of the fifteen seconds before, during and after taking the temperature during which the dogs were hiding with the owner. During and after taking the temperature, the differences are more obvious than before taking the temperature.

The other four behavioural variables tested for these 15 seconds before, during and after taking the temperature were less different between low and high petted dogs. The behaviours regarding the tail position are only tested for fifteen seconds before and fifteen seconds after taking the temperature, since the veterinarian manipulated the tail position during taking the temperature. These were also not very different between low and high petted dogs. All results are presented in Table 7.

Table 7.
Mean percentages of observed behaviours for variables shifting posture, struggle, panting and licking lips before, during and after taking the temperature and for tail middle, tail between legs, tail between legs plus low and total wagging of the tail before and after taking the temperature. The difference in number of dogs is due to the time the dogs were out of sight of the camera.

Variable	Moment	Nr. of dogs	Low petting	Middle petting	High petting
Shifting posture	Pre	22	2,571	1,143	2,000
	During	22	1,572	2,714	1,000
	Post	22	2,571	2,857	2,167
Struggle	Pre	22	0,000	0,000	0,000
	During	22	1,286	0,714	0,833
	Post	22	1,571	0,000	0,167
Tail middle	Pre	12	1,500	0,000	0,000
	Post	12	2,250	2,900	1,000
Tail between legs	Pre	12	3,750	4,877	15,000
	Post	12	0,000	0,000	5,333
Tail between legs + low	Pre	12	10,500	8,800	15,000
	Post	12	8,500	3,686	8,000
Total tail wagging	Pre	12	3,000	0,200	0,000
	Post	12	3,250	3,271	0,000
Panting	Pre	13	6,000	0,000	7,000
	During	13	3,250	0,000	3,667
	Post	13	6,000	1,833	7,000
Licking lips	Pre	13	2,000	1,833	1,000
	During	13	3,000	1,833	1,000
	Post	13	2,250	1,833	2,000

3.2.3. Effect of using comfort talk on dog behaviour

3.2.3.1. Fifteen seconds before and from the moment of the injection

Out of all scored behaviours, five behavioural variables showed some differences between dogs that received high comfort talk and dog that received low comfort talk. These results are presented in Table 8.

Table 8.
Mean percentages of observed behaviours for variables head directed to owner body, head directed to vet, head directed to environment, licking lips and panting before and from the moment of the injection. The difference in number of dogs is due to the time the dog was out of sight of the camera.

Variable	Moment	Nr. of dogs	Low comfort talk	Middle comfort talk	High comfort talk
Head to owner body	Pre	15	0,250	2,573	3,500
	Post	15	0,000	2,495	0,000
Head to vet	Pre	15	4,500	2,735	8,000
	Post	15	1,750	2,838	0,000
Head to environment	Pre	15	10,250	7,009	3,500
	Post	15	10,250	6,676	15,000
Licking lips	Pre	8	2,000	2,000	0,500
	Post	8	3,000	4,200	3,000
Panting	Pre	8	0,000	9,200	0,000
	Post	8	0,000	3,800	0,000

3.2.3.2. Fifteen seconds before, during and after taking the temperature

Out of all scored behaviours, nine behavioural variables showed tolerable differences between high and low petted dogs. The behaviours regarding the tail position are only listed for fifteen seconds before and fifteen seconds after taking the temperature, since the veterinarian

manipulated the tail position during taking the temperature. All results are presented in Table 9.

Table 9.
Mean percentages of observed behaviours for variables shifting posture, struggle, tail middle, tail between legs, tail between legs plus low, total wagging of the tail, panting and licking lips before, during and after taking the temperature. The difference in number of dogs is due to the time the dog was out of sight of the camera.

Variable	Moment	Nr. of dogs	Low comfort talk	Middle comfort talk	High comfort talk
Shifting posture	Pre	22	2,444	1,600	1,333
	During	22	2,222	1,000	1,833
	Post	22	3,444	2,800	1,000
Struggle	Pre	22	0,000	0,000	0,000
	During	22	1,000	1,000	0,833
	Post	22	1,222	0,200	0,000
Tail middle	Pre	12	1,200	0,000	0,000
	Post	12	1,600	1,667	3,375
Tail between legs	Pre	12	4,877	15,000	3,750
	Post	12	0,000	0,333	3,750
Tail low + between legs	Pre	12	11,200	15,000	7,500
	Post	12	6,086	7,333	6,000
Tot tail wagging	Pre	12	2,600	0,000	0,000
	Post	12	4,800	0,000	1,339
Hiding with owner	Pre	13	0,263	1,000	0,000
	During	13	2,222	3,167	4,143
	Post	13	0,444	1,333	3,143
Panting	Pre	13	3,750	6,000	0,000
	During	13	0,500	4,400	0,000
	Post	13	5,750	6,600	0,000
Licking lips	Pre	13	2,000	1,200	2,000
	During	13	3,750	0,600	2,000
	Post	13	2,250	0,800	2,500

4. Discussion

In this study we assessed differences in veterinary interaction styles with dogs, based on the amount of petting and using comfort talk towards the dog during two routine procedures. Furthermore, we wanted to assess if the different interaction styles, or eventually the amount of petting and comfort talk, influenced the dog reactions. However, the video material used wasn't originally meant for this purpose. It was made to enable it to analyse the reactions of the dogs during the five minutes habituation period, mentioned in paragraph 2.2.1. That's why some dogs weren't quite visible on the tape made during the real consult. Furthermore, the veterinarians followed their own routine, so the order in which different procedures were conducted was different every time. Since these procedures were performed with little time in between, there was little time left in which to score the dogs' behaviour due to receiving the injection and taking the temperature.

5.1. Differences in veterinarians

One hypothesis tested was that different veterinarians use a different amount of petting and comfort talk towards dogs. Clear differences between veterinarians were observed in amounts of petting the dogs. In the graph made, there is also a difference between the amounts of comfort talk towards the dogs, but the difference isn't as clear as with petting. Since both graphs seem to show a difference in amount of petting and usage of comfort talk, it could be possible to make one scale of veterinarian interaction towards the dogs, ranging from involved to detached. However, since the results of this study are based on only sixteen veterinarians and three, two or one dog per veterinarian, the study should be repeated, using more participating veterinarians and more dogs per veterinarian, and based on those results may be one interaction scale can be composed.

5.2. Effect of petting on dog behaviour

We hypothesised high petted dogs to show less stress-, fear-, arousal- and submission-indicating behaviours when these dogs could cope with the stressful situation. In addition to this, we hypothesised that these dogs would display more exploratory and excitement behaviours. Our results show that this isn't the case for all behaviours. In fact, there is only one behavioural variable which shows a clear variability between the values for high and low petted dogs, which is hiding with the owner before, during and after taking the temperature. All other behaviours show less variability. Below, some possible explanations will be suggested to explain the behavioural variables.

5.2.1. Fifteen seconds before and from the moment of injection

We hypothesised was that head directed to the owner, panting and licking lips would decrease as well before as after receiving the injection with dogs that were high petted compared to dogs that were low petted.

For head directed to owner this is only true for the time after the injection, but before the injection the high petted dogs seem to direct their heads more towards the owner than high petted dogs did. After looking at the high petted dogs before the injection, it seems that only one of these dogs had her head directed towards the owner searching for support for a long time, so the mean is increased because of this dog. In the habituation period it was also noticed that this dog had her tail between legs for the whole time. Therefore it could be that the fact that this dog still had her head directed towards the owner, despite the fact that she

was high petted, was due to the fact that before the procedures, the dog may have not known what to expect and was more nervous. Possibly the situation was to stressful for her so she couldn't cope with the situation and the petting had a negative effect on the behaviour of the dog. After the injection, she showed relaxed behaviour, like for example directing the head to the environment for the whole time.

For licking lips and panting the results show that the hypotheses seem to be right. For licking lips there is almost no variability before the injection and after the variability is also quite small. For panting, both before as after the injection the variability isn't quite clear. This could be due to the fact that there were only eight dogs in which the amount of licking lips and panting could be determined, because the mouth of the other seven dogs was out of sight of the camera the whole time. It's possible that this difference might become increased with a greater number of dogs being assessed. One point of interest is that dogs that pant a lot before the injection also lick their lips the most, apart from one dog, which does pant a lot before the injection, but doesn't lick her lips. Remarkable is that all these dogs, with much licking lips and panting, are from the groups of low or middle petted dogs, so non of these were high petted. From all eight dogs, there is only one dog which is high petted, but this dog doesn't pant and only ones lick her lips before the injection. The results for the high petted dogs are thus based on only one dog, so if we want to say more about these variables, the study should be repeated, using more dogs and an equal amount of dogs in both groups.

Furthermore, we hypothesised that dogs who could cope with the situation and who were high petted would display more head directed to vet and head directed to the environment, since this are examples of exploratory behaviour. If the dogs couldn't cope with the situation, may be the amount of petting then wouldn't have the effect we hypothesised.

For head directed to vet our hypothesis seemed to fit the data before the injection. However, after the injection, the difference is very small between high and low petted dogs, so after the injection the amount of petting seems to have no influence on the behaviour of the dog. One possibility is that this is because the dogs just had their injection, so they are a little bit stressed by that and were able to cope with the situation before but not very good after.

For head directing to environment, our hypothesis could be correct, but only after the injection. Before the injection, with high petted dogs this behavioural variable occurred less than with low petted dogs. Before compared to after the injection, five of all fifteen dogs decreased in their amount of head directed to environment and thus ten increased. All three high petted dogs showed an increase before compared to after the injection in this behaviour.

For all behavioural variables discussed for the fifteen seconds before and from the moment of the vaccination, it strikes that the group with high petted dogs was a lot smaller than the group with the low petted dogs. It would be interesting to expand the research with more veterinarians and thus more dogs, so more equal groups can be used to further assess this.

5.2.2. Fifteen seconds before, during and after taking the temperature

Hypothesised was that dogs who could cope with the situation and who were high petted would display less hiding with the owner, especially during and after taking the temperature, less struggling, especially during, less shifting posture, especially after, less tail between legs, especially before, and less panting and licking lips before and after taking the temperature.

Hiding with the owner is the only behavioural variable that seems to differ clearly when comparing low with high petted dogs, during and after taking the temperature. However, this doesn't fit our hypothesis, since it's just the opposite as we hypothesised; after but especially during, high petted dogs show more hiding with the owner compared to low petted dogs.

Maybe this is different from what we hypothesised because these high petted dogs are all quite tense before going into the consultation room, and thus can't cope with the situation very well. Since, at the moment the dogs were walking into the consultation room, there is determined how tense the dogs were, this can be compared to the amount of hiding with the owner. This amount of tension has been estimated based on the amount of 'stress'-related behaviours shown by each dog. It could be that tense dogs don't experience petting as positive, but rather negative, especially because the veterinarian is more or less a stranger to the dogs.

During temperature taking, the three dogs with the highest score of hiding with the owner are all high petted. The high petted group contains six dogs, from which 5 show quite a lot hiding with the owner during temperature taking. Out of these five though, two seemed to be very tense in the waiting room and one was only a little bit tense, but had three puppies with her in the consultation room. The two other dogs weren't tense, but one visited the veterinarian for neck and spinal pain and one suffered from dyspnoea and ascites.

After taking the temperature, the dog showing the most hiding belongs to the low petted group, but from the six dogs which are high petted, only two show no hiding at all after taking the temperature. From the four who are high petted but did hide with the owner, three were very tense at the beginning of the consult and one was only a little bit tense but had three puppies with her, so that can also influence her behaviour.

For struggling, the results show indeed that high petted dogs struggle less, so this seems to be consistent with our hypothesis, but the total number of dogs that do struggle is only five of twenty-two dogs in total. The two dogs that show the highest amount of struggling both seemed to be very tense when they came into the consultation room, so probably they were to tense to cope with the situation.

For shifting posture, our hypothesis seems to be also right. However, we especially expected high petted dogs to show less shifting posture after taking the temperature, but the results show that this is true as well before and during taking the temperature. The differences are very small, but the high and low petted groups consist of an equal amount of dogs, so therefore the distribution is good, but since we are now talking about seven dogs per group, it would be interesting to make the groups bigger, so maybe then the high and low petted dogs would differ more in the amount of shifting posture.

For tail between legs, the results show that high petted dogs have an increases amount of tail between legs, compared to low petted dogs, which suggests that they probably can't cope with the situation. The results are based on twelve dogs, from which six dogs had their tail between legs before the veterinarian was taking the temperature, and two of them also did this after. Of these six, four were quite tense, one was a little, but had three puppies with her and one wasn't tense at all. This strengthens our previous conclusion that the petting could affect already stressed dogs negatively.

For panting, the results show that high petted dogs panted more, before and after taking the temperature, than low petted dogs. That means that probably these dogs couldn't cope with the situation, since our hypothesis was that they would pant less compared to low petted dogs. For licking lips, the results showed that high petted dogs lick their lips less than low petted dogs, so these dogs respond the same at petting as was hypothesised. For both panting and licking lips, the results are based on thirteen dogs, from which only two had a veterinarian who petted a lot. Since these two dogs also panted a lot, maybe the high and low petted dogs would differ more if there would have been more high petted dogs included in this part of the study.

Furthermore, we hypothesised that dogs who could cope with the situation and who were high petted would display more tail wagging and tail middle. If the dogs couldn't cope with the situation, the amount of petting would have no effect.

For the total amount of wagging with the tail, it could be quite interesting to know if dogs wag their tail more often when the are high petted, compared to dogs that are low petted, but the results shown in this paper are based on only twelve dogs and only three of these were wagging their tail. Since none of those three dogs was high petted by the veterinarian, it is possible that those dogs couldn't cope very well, but all in all there have to be more dogs to compare, in order to get reliable results.
For tail middle, only one of three high petted dogs showed tail middle after taking the temperature so the amount of dogs is to low to draw conclusions.

5.3. Effect of using comfort talk on dog behaviour

Since the amount of comfort talk usage between veterinarians doesn't seem to differ very much, it isn't possible to draw conclusions from the results based on the effects of comfort talk to dog behaviour. However, it could be useful to compare the results of using comfort talk between dogs who received high comfort talk and those who received low comfort talk. The results can also be compared to the results of petting.

5.3.1. Fifteen seconds before and from the moment of injection

For vaccination, hypotheses were the same as for petting; the amount of head to owner body, licking lips and panting would be lower with dogs who received high comfort talk and for the variables head to vet and head to environment we hypothesised that the amount would be higher with dogs who received a lot of comfort talk.
For the behavioural variables head to owner body, licking lips and head to environment, the result aren't the same as hypothesised; moreover they are the same as shown with petting. However, the amount of panting was zero for both dogs who received a lot of comfort talk and dogs who didn't. This is based on only eight dogs, from which only two received a lot of comfort talk, so the groups aren't quite equal and the results can't really be compared.
The amount of directing the head to the veterinarian before giving the vaccination was indeed higher with dogs that got high comfort talk, but after the vaccination the amount was lower with dogs that got a lot of comfort talk compared to dogs that received little comfort talk. This could mean that these dogs couldn't cope with the situation very well after receiving the injection.

5.3.2. Fifteen seconds before, during and after taking the temperature

For taking the temperature, our hypothesis was that dogs with high comfort talk would show less struggling, shifting posture, tail between legs, panting and licking lips. Tail wagging and tail middle would be higher with dogs who received a lot of comfort talk.
For the behavioural variables struggle, shifting posture and tail wagging the results aren't the same as hypothesised, but they are the same as with petting.
For tail between legs, our hypothesis fits before taking the temperature. However, after taking the temperature, the amount of tail between legs was higher for dogs who received a lot of comfort talk compared to dogs that didn't. Probably the procedure taking the temperature was so stressful that they couldn't cope with the situation. For licking lips and tail middle it's just the other way around; the hypothesis fits only after taking the temperature. Before, the amount of licking lips was the same and the amount of tail middle was less for dogs who received much and little comfort talk. Probably these dogs didn't know what to expect before taking the temperature. For panting, the hypotheses fit the results regarding comfort talk. However,

for panting and licking lips only thirteen dogs were scored, from which four received high comfort talk. Since the groups of dogs who received little comfort talk contained also four dogs, the groups were equal, but the numbers are quite low.

5. Future directions

If we wanted to use the data available, our next step could be to score the behaviour of the veterinarian towards the dogs for all other dogs that we used for temperature or injection. Then the amount of petting and usage of comfort talk towards the dog can be determined per dog in stead of taking the mean per veterinarian and assume that this mean would also count for other dogs treated by the same veterinarian.

In the future it would also be interesting to start another project in which new videos could be recorded, with the main aim to look at the consult in stead of looking at the first five minutes. The most important difference will be that the dogs can be recorded without being out of sight of the camera for extended periods, since the owner can be told not to stand in front of the camera. The procedures can stay the same as with this project (i.e. giving an injection and taking the temperature), since these procedures are common in the veterinary practice, and the results based on this procedures can be widely used in the veterinary practice. However, it could be relevant to use one order of procedures during the consult for each veterinarian in stead of letting veterinarians follow their own routine. If all veterinarians also have the same amount of time in between different procedures, the time to score dog behaviours will also be the same and the behaviours should not be influenced by other procedures. Also, the number of veterinarians participating in the study has to be increased. Than the amount of dogs per veterinarian has to be determined, which should be higher compared to this study. If the mean amounts of petting and comfort talk than will be based upon this larger amount of dogs (the same amount for every veterinarian), these means should be more reliable. Based on he amounts of petting and using comfort talk, a scale can be made. I will suggest the scale presented in Table 10.

Table 10.
Suggestion for distribution of veterinarian interaction categories.

Scale		Definition
1	Involved	Petting high + comfort talk high
2	Slightly involved	Petting high + comfort talk medium or low *or* petting medium or low + comfort talk high
3	Neutral	Petting medium + comfort talk medium
4	Slightly detached	Petting medium + comfort talk low *or* petting low + comfort talk medium
5	Detached	Petting low + comfort talk low

Using this scale, equal groups of veterinarians should be made and the interaction scale can be compared to the dogs' behaviours to find out if this amount of what is suggested as comforting behaviour has an influence on the behaviours of the dog and if veterinarians can therefore influence the 'stress'-level of the dogs. This could be very useful in the small animal veterinary practice. The hypotheses of this potential project can remain the same as with this project.

6. Acknowledgement

I want to thank my supervisor Dr. A. Ortolani for supporting me with this research project. I also want to thank Brigit Barelds for the good cooperation during the project.

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8. Appendix

Table 1.
Ethogram used to score the dogs' behaviours

Behaviours	Code	Score as:	Definition	Scoring rules
Body postures/ movement				
Standing / leaning	S/T,L	Duration	The dog is standing still on all four paws, or leaning against owner body	S/L: not all paws are on the table, the dog is resting on the owner for support: therefore not all W/O is necessarily S/L as well!
Sitting	I/T	Duration	The dog is sitting on the table with front legs extended and hind legs flexed	
Lying	Y/T,O	Duration	The dog is lying on the table; head may or may not be in contact with the table, lying in owner's arms (while no paws are on the table)	
Shifting posture	P	Duration, frequency	The dog changes its body posture by lifting its feet and displacing its body	counted as one event, unless the dog stands noticeably (~2 sec.) still in between (more bouts visible), also if dog moves continuously for many sec.
Running	N	Duration	The dog tries to run away (other than attempt to jump off the table)	
Attempt to jump of the table	A	Frequency	The dog tries to jump off the table	
Body shake	B	Duration	The dog moves its whole body from side to side with short, quick movements	
Moved by vet or owner	M /V. O	Duration, frequency	The dog's body position is changed by the vet or the owner	
Paw (owner/ vet/ lifting)	W/ O,V,L	Duration, frequency	The dog raises a single front paw and holds it above the ground/on the owner/ on the vet	W/L is not a component of shifting posture (usually >1 sec.)
Jumping (owner/ vet)	J/ O,V	Frequency	The dog raises both front paws and puts them on the owner/ on the vet while its hinds legs are kept on the table	
Climbing (owner)	C/O	Duration	The dog climbs on the owner's body, none of its legs are on the table	
Struggling	R	Duration	The dog struggles in random movements, directed at breaking restraint	
Jerk back	G/B,L	Frequency	The dog jerks itself (of its leg) back in a swift, powerful motion	
Stretch	T	Duration	The dog stretches (usually: front legs extended forward, back curved)	
Leg twitch	L	Duration	The dog twitches with its (hind)leg	
Out of sight	u	Duration	The dog's body is out of sight and can't be seen on the camera, for at least 2 seconds	

Behaviours	Code	Score as:	Definition	Scoring rules
Tail position				
Low 180 (wagging)	L/ W	Duration	The dog's tail is into a position of approximately 180 degrees (between >135° to 180°)	
High 0 (wagging)	H/ W	Duration	The dog's tail is into a position of approximately 0 degrees (between <45° to 0°)	
Middle 90 (wagging)	M/ W	Duration	The dog's tail is into a position of approximately 90 degrees (between 45° to 135°)	
Between legs 270 (wagging)	B/ W	Duration	The dog's tail is between the legs into a position of approximately 270 degrees (between >180° and 270°), with or without sitting	
Tail on Table (wagging)	T/W	Duration	The dog's tail is lying on the table, when the dog is sitting or lying on the table	
Out of sight	u	Duration	The dog's tail is out of sight and can't be seen on the camera for at least 2 seconds	
(wagging)			Note: Wagging: Repetitive side to side movements of the tail; if present specified as modifier	

Behaviours	Code	Score as:	Definition	Scoring rules
Head orientation				
Head directed to owner body	B	Duration	The dog's head is oriented to any part of the owner's body (except the face)	
Head directed to vet	V	Duration	The dog's head is oriented in the direction of the vet's body	
Head directed to camera	C	Duration	The dog's head is directed to the camera for at least 2 seconds	
Head directed to other person	P	Duration	The dog's head is directed at another person, other than the vet or owner(s)	
Head directed to environment	E	Duration	The dog's head is directed to the environment, the dog's attention is directed to something in the consulting room, apart from the owner, camera or vet	
Head directed to owner face	F	Duration	The dog's head is directed to the owner's face	Based on the direction of the nose
Head directed to researcher	R	Duration	The dog's head is directed at the researcher	Based on the direction of the nose
Hiding head/ with owner, vet assistant	H/O,A	Duration	The dog is hiding its head in the owners, or vet assistant's coat or arms and the head is (partly) out of sight	
Head out of sight	u	Duration	The dog's head is out of sight and can't be seen on the camera, for at least 2 seconds	
Head high	L	Duration	The dog's head is high and directed to the ceiling	Direction of nose: 45° and less
Head low	D	Duration	The dog's head and part of the body is low and directed to the table or sniffing its legs	Head and neck: 135° and more
Head shake	S	Duration	The dog shakes its head from side to side	Also as part of body shake
Head jerk	G	Frequency	The dog jerks its head back in a swift, powerful motion	

Behaviours	Code	Score as:	Definition	Scoring rules
Mouth				
Licking lips	L	Frequency	Number of times dog extrudes its tongue from its mouth and runs it over its lips, with or without smacking (each time this occurs, counted as a separate event)	When tongue is visible
Panting	P	Duration	An increased frequency of inhalation and exhalation in combination with the opening of the mouth, also when the mouth is out of sight, but frequent rib excursions and or/panting sound are seen/heard.	
Smacking	M	Frequency	The dog presses its lips together and then opens the mouth quickly and noisily, without licking lips. Nothing (so no licking lips) occurring in 2 sec before and after	
Chewing	K	Duration	The dog opens and closes its mouth in a chewing motion	
Vocalizations (Yelp, Whine, Bark, Growl, Grunt)	V/ Y,W,B,G, R	Frequency	The dog produces sounds such as barks, whines, yelps or growls. See definitions.	Barking; growling: low frequency vocalizations; whining: soft, high pitched vocalizations with raised frequency; yelping: Loud (relative to whining), high pitched vocalizations
Yawning	Y	Frequency	The dog opens its mouth wide, gaping.	
Bare teeth	B	Frequency	The dog pulls its upper lips upwards, and lower lips downwards, revealing its teeth.	
Licking (table/ self/ owner/ vet)	I/T,S,O,V, K	Frequency/ duration	The dog licks the table, itself, the owner or the vet with its tongue	
Sneezing	Z	Frequency	The dog expels air forcibly from the mouth and nose	
Sniffing (table/ self/ owner/ vet/ other person)	F/ T,S,O, V,K,P	Duration	The dog moves its nose along objects, such as the table, its own body or owner; clear sniffing movements are exhibited	
Mouth closed	C	Duration	The mouth is closed and none of the aforementioned behaviours are visible/audible	
Opens mouth	O	Duration	The dog opens its mouth, none of the above categories apply	
Out of sight	u	Duration	The dog's mouth is out of sight and cannot be seen for at least 2 sec.	

Behaviours	Code	Score as:	Definition	Scoring rules
Restrain dog (owner)				
Collar	C	Duration	The dog is kept in place by the owner, who is restraining the dog by the collar	
Leash	L	Duration	The dog is kept in place by the owner, who is restraining the dog by the leash	
Body	B	Duration	The dog is kept in place by the owner, who is restraining the dog by its body	An action can be counted as restraint when the dog is **inhibited in its motions**, either by the owner inhibiting the dog's ability to walk forward or backward, or by inhibiting the dog from turning its head (and neck)
Tail	S	Duration	The dog is kept in place by the owner, who is restraining the dog by its tail	
Legs	F	Duration	The dog is kept in place by the owner, who is restraining the dog by its legs	
Head	H	Duration	The dog is kept in place by the owner, who is restraining the dog by its head	
Both collar and leash	T	Duration	The dog is kept in place by the owner, who is restraining the dog both by the collar and the leash	
No restraint	X	Duration	The dog is not kept in place by the owner: there is no restraint	
Out of sight	u	Duration	The restraint is out of sight and cannot be seen for at least 2 seconds	

Table 2.
Ethogram used to score the behaviours of the veterinarian towards the dog.

Vet interaction			Definition	Scoring rules
Touch dog	T/H,B, L	Frequency/ duration	The vet touches the head, body or legs of the dog	
Petting dog (head/body/leg/tail)	P/ H,B,L, T	Frequency/ duration	The vet pets the dog on his/ her head/ body/ legs/tail	
Moves dog (head/ body/ legs)	M/ H,B,L	Frequency/ duration	The vet moves the dog's head/body/legs	
Examines dog	E/H,B, L	Frequency/ duration	The examines the head, body, legs of the dog	Examples: ear check, eye check, teeth check, pulse check, checking lymph nodes, checking mucous membranes, cutting nails, palpation, auscultation, taking temperature, giving injection.
Kiss	K	Frequency	The vet kisses the dog on its head	
No contact	X	Duration	The vet is out of sight of the camera or stands near the dog, and makes no contact	If one hand can be seen, the action of that hand will be recorded.

Restrain dog (vet)				
Collar	C	Duration	The dog is kept in place by the vet who is restraining the dog by the collar	
Leash	L	Duration	The dog is kept in place by the vet who is restraining the dog by the leash	
Body	B	Duration	The dog is kept in place by the vet who is restraining the dog by its body	An action can be counted as restrain when the dog is **inhibited in its motions**, either by the vet inhibiting the dog's ability to walk forward or backward, or by inhibiting the dog from turning its head (and neck). Also if the dog tries to sit and vet holds it in standing position.
Tail	S	Duration	The dog is kept in place by the vet who is restraining the dog by its tail	
Legs	F	Duration	The dog is kept in place by the vet who is restraining the dog by its legs	
Head	H	Duration	The dog is kept in place by the vet who is restraining the dog by its head	
Both collar and leash	T	Duration	The dog is kept in place by the vet who is restraining the dog both by the collar and the leash	
No restrain	X	Duration	The dog is not kept in place by the vet: there is no restraint	
Out of sight	u	Duration	The restrain cannot be seen for at least 2 sec.	If one hand can be seen, the action of that hand will be recorded.

Vet interaction vocal				
Talking to the dog	D/C,N,T, O	Duration	The vet talks to the dog: comfort talk ('Goed zo', 'rustig', niets aan de hand'; D/C), control ('Nee', 'Blijf'; D/N), or talks to dog (other than control/comfort talk; D/T). When the vet talks with intonation of comfort talk to dog but for behalf of the owner (saying for instance which procedures will follow, with intonation of comfort talk), D/C,O, D/N,O and D,T,O will be used.	Comfort talk: usually high-pitched, soft intonation; control: short, low-pitched and firm intonation; other: neutral intonation, no exceptional pitch or volume. If the duration will eventually be summed, D/C,O will be counted as D/C, D/N,O will be counted as D/N, D/T,O will be counted as D/T.
Talking to the owner about veterinary related topics	V/D, T	Duration	The vet talks to the owner about the dog in veterinary terms (V/D), or about other topics (V/T).	Example V/D: the vet talks about the dog's medical problem. Example V/T: the vet talks about medical problems, but not related to this dog.
Talking to the owner about non-veterinary topics	N/D, O, T	Duration	The vet talks to the owner about the dog in non-veterinary terms (N/D), about the owner (N/O), or other topics (N/T).	Example N/D: how the dog plays with other animals. Example N/O: how the owner is doing. Example N/T: about the weather.
Talking to the researcher	R	Duration	The vet talks to the researcher.	
Talking to the vet assistant	A	Duration	The vet talks to the assistant.	
The vet doesn't talk	X	Duration	The vet doesn't talk.	X will be recorded if the vet doesn't talk but if instead the owner, assistant or researcher talks, or if nobody talks.
Unknown	?	Duration	The vet mumbles, says something to him/herself or is otherwise not comprehensible.	

Table 3. Excel sheet used to score the dogs' behaviours

Dog nr.   Dog name   Clinic   Place

Pre-inj/temp

Time (sec)	Consult time	Body	Tail	Head	Mouth	Restr.	Comment
1	7:03						
2	4						
3	5						
4	6						
5	7						
6	8						
7	9						
8	10						
9	11						
10	12						
11	13						
12	14						
13	15						
14	16						
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46	48						
47	49						
48	50						
49	51						
50	52						
51	53						
52	54						
53	55						
54	56						
55	57						
56	58						
57	59						
58	8:00						
59	1						
60	2						

Post-inj/temp

Time (sec)	Consult time	Body	Tail	Head	Mouth	Restr.	Comment
1	7:03						
2	4						
3	5						
4	6						
5	7						
6	8						
7	9						
8	10						
9	11						
10	12						
11	13						
12	14						
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48	50						
49	51						
50	52						
51	53						
52	54						
53	55						
54	56						
55	57						
56	58						
57	59						
58	8:00						
59	1						
60	2						

Table. 4. Excel sheet used to score the veterinarian behaviours towards the dog

Dog nr.   Dog name   Vet name   Clinic   Place

Whole consult

Consult time	Vet restrain	Vet non-verbal	Vet verbal	Comment
Dog nr.	Dog name	Vet name	Clinic	Place