Measuring stress in patients at veterinary practices - a business feasibility study

- Master's thesis -

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Abstract:

This business feasibility study seeks to measure the stress patients experience at veterinary practices such as Odder veterinary clinic, who has been a collaborative and essential partner for this study. Furthermore, it aims to provide a procedure that can help veterinary clinics optimise their infrastructure and reduce stress for their patients, as well as being a potentially viable business model. The study focuses on dogs and the stress they are exposed to during appointments at veterinary practices. This study is vital because there is a distinct lack of current and contemporary knowledge in this field and in the particular context of veterinary practices. Furthermore, the empiricism gathered highlighted that the stress patients are exposed to is a business-wide problem. The subjects were equipped with a Polar H10 Heart rate monitor and wore it for 10-30 minutes, depending on the length of their appointment. The experiment results showed that all the subjects were exposed to stress. This is evident from their increased Heart rate and decreased heart rate variability compared to their respective relaxed and active baselines that were recorded. Observations of the subject's behaviour were correlated with the data to ensure the validity of the results, and the results were validated by a veterinary nurse.

Summary

Denne speciale afhandling har til formål at undersøge og måle patienters stress hos dyreklinikker såsom Odder dyreklinik. Dette gøres ved hjælp af Polars EKG teknologi fra deres H10 Hjerte måler og pulsvariations analyse (HRV). Et besøg på en dyreklinik kan for mange hunde være en stor byrde, hvor mange udefrakommende indtryk forekommer under besøget. Ud fra observationer af hundens adfærd ses venterummet som en afgørende faktor, for om dyret får en god oplevelse på klinikken eller ej. Dyrelægerne oplever generelt, at konsultationerne bliver længere med et dyr der er stressede under dens besøg, hvilket gør det besværligt for dyrlægen at foretage eksaminationen som planlagt. Dyreklinikkerne har i sinde at danne et miljø for dyrene på klinikken, hvor det er muligt at få den bedst mulige oplevelse. Dette gøres gennem forskellige tiltag, som alternative konsultationsrum og forebyggende kommunikative redskaber før, under og efter besøget.

Dette speciale tager udgangspunkt i Design Science Research med udgangspunkt i identifikation af problemområde og ligeledes et litteraturstudie der skal være med til, at danne rammerne for rapportens artefakt. Artefaktet er et eksperiment med Odder dyreklinik som samarbejdspartner. Eksperimentet bygger på hundens forløb fra parkeringspladsen ind i venterummet og til konsultation i eksaminations rummet. Hundene er blevet udstyret med den før nævnte H10 Polar hjerte måler, der har til formål at måle hundenes puls og puls variation. For at analysere hundens puls variation anvender man *Time domain methods* som eksempelvis, gennemsnitlig længde af R-R intervaller, RMSSD, NN50 og PNN50. Ud fra disse parametre vil hundens tilstand under besøget hos dyreklinikken blive målt og analyseret. Derudover er der under eksperimentet foretaget en observation af hundens adfærd, som til sammen skal give en overordnet vurdering af om hunden har været stresset under besøget.

Resultaterne af eksperimentet tyder på at hundene har været underlagt stress under deres besøg på klinikken, som fremgår af deres forhøjede puls og puls variabilitet. Observationerne viser ligeledes en tendens til, at hundene har svært ved

at finde sig tilpas i venteværelset og ligeledes i eksaminationsrummet. Dette kan for nogle, være forårsaget af venterummets miljø forinden. Derudover ses eksaminationsbordet i rummet som en stor stressfaktor for hundene, da man igennem pulsgraferne kan se adskillige hunde med forhøjede puls under netop denne del af eksperimentet. Tiltag som alternativ konsultationsrum har en positiv indvirkning på hundene, hvor man kan se hundens puls og puls variability bliver påvirket positivt ved denne konsultationsform.

Contents

List of Figures

Chapter 1

Design Science Research

Design science research is described as a legitimate research paradigm in information systems. Contributing to science is the primary perspective of the research paradigm. G.H. Hardy (Gregor and Hevner 2013) describes three essential questions concerning the contribution of relevant scientific input, which are:

1. Is it true?
2. Is it new?
3. Is it interesting?

Interest is the most important prior question for research. Wilson poses four questions in terms of assessing whether something is interesting.

1. Is the problem interesting? Would solutions help develop scientific theory, method or application (Gregor and Hevner 2013, 338).
2. Has the author prepared a solution or proposal for developing prior knowledge in the field (Gregor and Hevner 2013, 338).
3. Is the method of solving the problem new? Can the same method be used to solve other problems (Gregor and Hevner 2013, 338)?
4. Does the description help to clarify the area of research or application (Gregor and Hevner 2013, 338)?

Gregor and Hevner (Gregor and Hevner 2013) propose that contributions to science can be partial theory, incomplete theory or surprising and interesting empirical generalisations in the form of design artefacts. To elaborate on the above

description, knowledge is divided into different categories. One form of knowledge is theory. The theory describes an abstract entity, a complex set of statements that describe the relationship between constructions that try to describe, explain, predict or improve our understanding of the future. In design science research, design theory is used to formalise knowledge. This is the fifth taxonomic level in Gregor's taxonomy (Gregor and Hevner 2013, 339). This theory describes formalising design and action and how to do something. Merton describes design theory as the middle range, which lies between the least compelling hypotheses and the unified theory, which describes all observed relationships between social behaviour, organisation and change (Gregor and Hevner 2013, 339). This is described as grand theory. It is not certain that they exist within Information Systems, nor whether it would be helpful if they did. Within the subject of Information Systems / Information Technology or sociology, Mertons describes that there should be a focus on the middle range, but not exclusively (Gregor and Hevner 2013, 339).

In addition to design theory, kernel theory is also relevant to Design science research. *Kernel theory* is a descriptive theory that informs the construction of an artefact and thereby explains why the design works (Gregor and Hevner 2013, 340).

1.1 An artifact as a Design science research knowledge outcome

There is not necessarily any connection between an artefact and the contribution to science that a design science study focuses on. However, an artefact may well be a product of a Design science study. An artefact is a thing that either is or can be materially existing as an artificially made object or process. In contrast to an artefact, a theory is not materially existing but one which contains knowledge about the existing artefact. Gregor and Hevner (2013) visualise a table that has been prepared based on a framework from Purao (Gregor and Hevner 2013, 341). The table describes different outputs in DSR. This is unlike the fundamental framework from Purao, which focuses exclusively on describing how abstract the contribution

Table 1. Design Science Research Contribution Types		
	Contribution Types	**Example Artifacts**
More abstract, complete, and mature knowledge	Level 3. Well-developed design theory about embedded phenomena	Design theories (mid-range and grand theories)
↕ ↕ ↕ ↕	Level 2. Nascent design theory—knowledge as operational principles/architecture	Constructs, methods, models, design principles, technological rules.
More specific, limited, and less mature knowledge	Level 1. Situated implementation of artifact	Instantiations (software products or implemented processes)

Figure 1.1: Contribution types in Design Science Research

has been to science. A Design science research project can deliver artefacts at different levels. Level 1 is specific instantiation that can occur as a product or process. Level 2 is a more general contribution in the form of a design theory which can occur as design principles, models or technological rules, et cetera. Level 3 are more well-defined design theories around the phenomenon (Gregor and Hevner 2013, 345).

1.2 Demonstration of contribution

There is, to a lesser extent, literature demonstrating a contribution to a design science research project in the field of Information Systems. In (Gregor and Hevner 2013) design science research is described as research that addresses critical unresolved problems in unique and innovative methods. However, it can also be problems which are already solved, but there can potentially be a more efficient way of doing so. Davis presents that contribution is if the project develops or demonstrates new or improved design on a conceptual or physical artefact (Gregor and Hevner 2013, 342). This contribution can either be demonstrated with a rational explanation, proof of concept, proof of value-added or proof of acceptance and use.

However, there is a difficult depiction of when a development project does not contribute. This can for instance be in a business or trade where the results were not useful. This was because they do not contribute to science beyond doing something everyone knows can be done or at least conceptually knows. It is therefore difficult to determine (Gregor and Hevner 2013, 342).

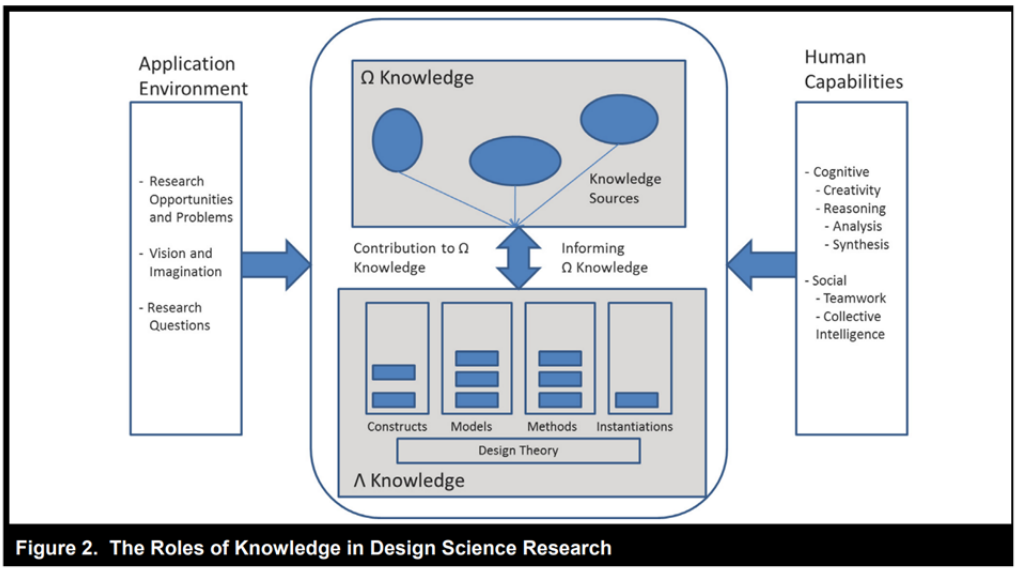


Figure 1.2: Design science research roles of knowledge

In addition to contributing to science, design science research focuses on creating a clear contribution to actual areas of an application domain from which the research problem originated. It is, therefore, tethered to reality. Relevant research for the application domain in business sets design science research apart (Gregor and Hevner 2013, 342).

1.3 Consuming and producing knowledge

Design science research knowledge can be divided into two types. Descriptive knowledge is categorised as "what" knowledge, and prescriptive knowledge is categorised as "how" knowledge (Gregor and Hevner 2013, 346). Design science research begins by looking for a meaningful and challenging problem in the application domain.

The contribution of knowledge depends mainly on the starting point of a research project. It depends significantly on two starting points in problem maturity and solution maturity (Gregor and Hevner 2013, 344).

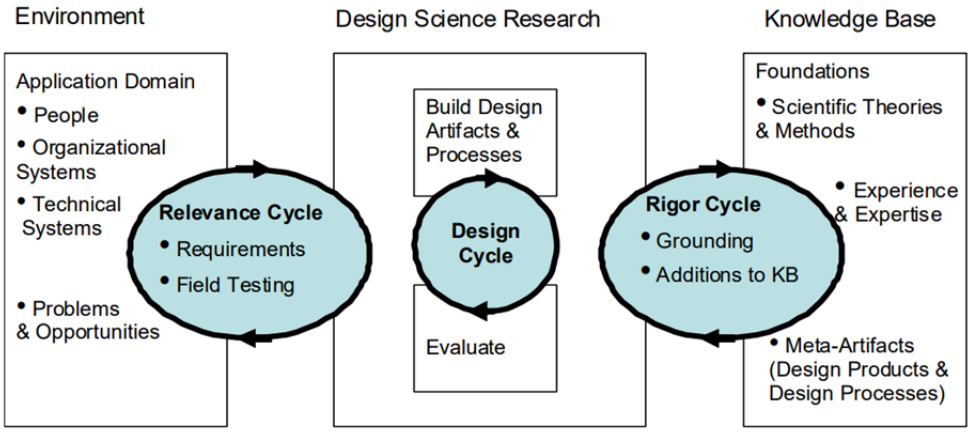


Figure 1. Design Science Research Cycles

Figure 1.3: Design science research three cycle view

1.4 A three cycle view of design science research

Design science research is equivalent to natural science in the field of information systems research.

1.5 Relevance cycle

Design science aims to improve the environment by introducing new artefacts and processes for building artefacts. Good design science often begins with identifying and representing opportunities and problems in a particular environment (Hevner Alan 2007, 89). In addition to identifying requirements for the project, the criteria for acceptance of the finished project are also defined. These criteria can focus on topics such as: Improvement of an artefact environment and how can it be measured (Hevner Alan 2007, 89)?

The output from design science research intends to be delivered back to the environment, where it can be studied and evaluated. This evaluation will assess how there is a need to work with multiple iterations in the relevance cycle (Hevner Alan 2007, 89).

1.6 Rigor cycle

In addition to design science research dealing with the inclusion of scientific theories, the rigor cycle also contains elements from the knowledge gained through experience and expertise, defined by state-of-the-art environments and technologies. It can also be existing artefacts and processes in the application area (Hevner Alan 2007, 89).

The purpose of the rigor cycle is to provide already acquired knowledge for the research project and thereby ensure that what one already knows can form the basis for innovation. It is thus an important task to ensure a thorough search and reference to the existing knowledge base in order to avoid a contribution to the existing knowledge base. Additions to the knowledge base may include an extension to original theories or methods or other experiences connected with testing or carrying out a research project (Hevner Alan 2007, 90).

1.7 Design cycle

The design element is the heart of a design science research project. Construction, evaluations and feedback allow for many iterations in the design. It is important to understand the design cycles' dependence on the other two cycles while understanding the relative independence during the execution of one's research. It is important to remember that the balance between rigor and relevance is consistent. It is important that it is relevant to both views (Hevner Alan 2007, 90–91).

1.8 Design as a pragmatic paradigm

Design science is a pragmatic philosophy based on the fact that practical consequences and natural effects are vital to meaning, creation and truth (Hevner Alan 2007, 91). Design science is pragmatic in that it involves the field of the application domain. However, it can not stand alone as a good design science project just as well involves a contribution to the rigor area as well (Hevner Alan 2007, 91).

1.9 A design science research methodology for information system research

1. Activity: The first activity is about focusing on a definition of the specific research problem. Then the value of a solution must be argued. It is important to atomise the problem to understand its complexity as the problem is the starting point for an artefact that must solve it (Peffers et al. 2007, 52).

2. Activity: The second activity is about defining the objectives of a solution. Assess what is possible and what can be used. The objectives can be either qualitative or quantitative. One must know the problem's extent and current solutions (Peffers et al. 2007, 55).

3. Activity: The third activity deals with the Design and Development of an artefact. A design science research artefact can be any object where a contribution to research is included. Resources needed to carry out this activity are to know which theory can be included to work out a solution (Peffers et al. 2007, 55).

4. Activity: The use of the artefact must be demonstrated. This can be the use of the artefact during experimentation, case study, proof or other activities. It requires knowing how the artefact works to solve the problem (Peffers et al. 2007, 55).

5. Activity: Observation and evaluation of how the artefact solves the problem. Compare the objectives to the observed values during the demonstration. Evaluation is very dependent on the objectives. After an evaluation, one also assesses how to return to activity three or continue to activity six (Peffers et al. 2007, 56).

6. Activity: The last activity is about communicating the problem and its importance. Arguments for the innovation and usefulness of the artefact, what knowledge has been applied. All activities are an iterative process. Problem-centred approaches start with activity one, whereas a design and development-centred approach will start with activity three. This may be due to an artefact that has not been formally thought out as a solution to the problem to be solved (Peffers et al. 2007, 56).

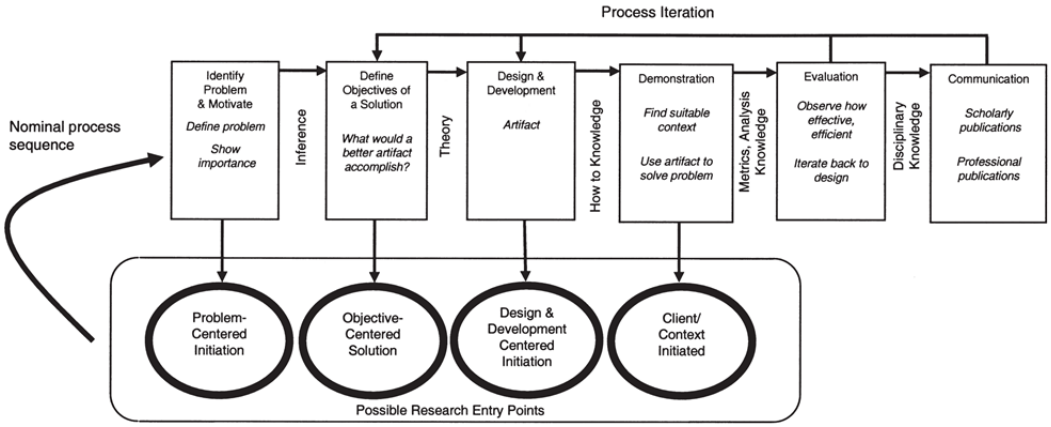


Figure 1. DSRM Process Model

Figure 1.4: Design science research Process model

Chapter 2

Introduction

This Master's thesis aims to study the stress that patients experience at veterinary practices utilising Polar ECG technology from their H10 heart rate monitor. Appointments at veterinary clinics can be a heavy burden for dogs because the environment at veterinary clinics often includes several external stressors and interference that can affect the dogs negatively. Heart rate and heart rate variance have long been used as indicators for stress in animals in studies such as (Borell et al. 2007), (Jonckheer-Sheehy, Vinke, and Ortolani 2012), (Shaffer and Ginsberg 2017) and (Manzo et al. 2009). However, there is a lack of studies in the context of veterinary practices. The current knowledge is limited to only observation studies and therefore lacks the raw data that can directly nuance the implications of stress. The current situation is that veterinary practices do not have a sufficient and accurate way of measuring the stress their patients are exposed to outside of observations. This study provides methods and procedures for how to do so.

The scope of this Master's thesis is to make a business feasibility study that aims to investigate future opportunities for a more standardised way of measuring animals at veterinary clinics or other related customer segments. The meaning of standardising the data collection process is that it can potentially be a service that can be used by specific trades and business', which could make use of an analysis of their environment to consider new initiatives to improve the environment (Arain et al. 2010).

The thesis also takes effectuation into account by making solutions based on the resources that are available at the time. This is reflected in how the project is formed and is based on uncertainties and risks during the process, where new opportunities have arisen, and new points of view have been considered (Sarasvathy

2001). This is seen from an analysis of the application domain and a review of relevant theoretical perspectives attained via a literature review. A combination of these two elements has helped to design the artefact. The artefact is based on the theory of the Build-measure-learn loop, where the loop has been utilised to design the framework of the artefact based on ideas from the elements mentioned above (Ries 2020). Due to time constraints, the loop has been completed once, which has opened up new ideas for improvement on how measurements through an ECG technology can be utilised for further development of standardising data for animal welfare in situated circumstances.

Chapter 3

Relevance cycle

This chapter defines the specific search problem and highlights the most common problem within the trade. The problem will be deconstructed in order to understand its complexity and depth better. The problem is the starting point of building an artefact that aims to solve the difficulties presented by the problem. The following sections will elaborate upon the environment and illustrate the different means the veterinary clinic uses to embrace the problem.

3.1 Application-Domain

The application domain will contribute to the initial understanding of the people affected by the problem and how they act in the environment. The application domain is the veterinary clinic represented by a veterinarian (respondent 'J') and a veterinary nurse (respondent 'V') who is specialised in animal behaviour. Both have experienced the problem of dogs being exposed to stress during appointments at the clinic. To investigate the challenges that the veterinary clinic experience, we opted to utilise the qualitative data collection method of semi-structured interviews. The rationale of this was to gain knowledge of the experiences and difficulties that veterinarians and veterinary nurses face during a day at the clinic (Brinkmann 2015, 13). The qualitative approach is utilised to examine the application domain in-depth and elicit essential information from the participants.

3.2 Qualitative methods

This study seeks to investigate the obstacles and adversities related to the stress of patients that veterinarians and veterinary nurses face at veterinary practices such as Odder veterinary clinic. We opted to utilise qualitative research methods because they aim to elicit and deduce information and knowledge in order to answer a research question. Furthermore, the resources made available to us from our collaboration with Odder veterinary clinic meant that qualitative methods were best suited to aid the process of understanding the context. Qualitative research methods are particularly intrigued with how something is said, experienced and how it appears (Brinkmann 2015, p. 13) (Andreasen et al. 2021).

Our close collaboration with Odder veterinary clinic meant they were willing and motivated to participate in our interviews. The intent was to form a focus group discussion with the Odder veterinary clinic staff, other veterinary nurses, and experts on the subject of stress in veterinary practices. However, we were unable to complete this in due time and gather the necessary members and, therefore, ultimately decided to interview smaller groups via a semi-structured interview format.

The semi-structured interview provides the opportunity to have an interchange where the interviewer attempts to elicit information from the participant (Brinkmann 2015, p. 37)(Andreasen et al. 2021). The semi-structured interview is a blend of open and closed-ended questions with the possibility of following up on the participants' comments. A semi-structured interview allows the interviewer to gather answers to specific questions, which have been written in an interview guide, as well as ad-lib questions during the interview. The benefit of conducting a semi-structured interview is that it allows for the subject to be creatively explored and is not contained to the rigidness of structured interviews. Furthermore, the interviewer can change the sequence of the questions, which allows for the exploration of new aspects, based on the participant's answers (Brinkmann 2015, p. 38)(Andreasen et al. 2021).

3.2.1 Interview guide

An interview guide was made for the purpose of having prepared questions that would explore the subject. The interview guide used in this study can be found in appendix A.5. The interview guide acts as a common thread that should keep the interview on the intended path.

All three interviews were held at Odder Veterinary clinic as it was also necessary for us to experience the environment, as well as being guided around to see the various rooms and areas of the clinic.

3.3 Identify problem and motivate

The following section will elaborate upon the findings of the three interviews with the respondents. The framework is built upon quotes from the transcription of the interviews. It will be utilised throughout the problem identification to manifest the importance of illuminating their concerns about the business problem.

In a liberal trade such as the veterinary business, many animals in need of care pass through veterinary practices of various sizes, be it hospitals or smaller clinics, every day. This can be anything from a completely ordinary consultation about the dog's behaviour with advice and guidance on how to best raise your dog. However, in some cases, it can also be significant interventions that have to be made (appendix A.1)(Andreasen and Pedersen 2022a, 28–37). A visit to a veterinary clinic can often be a heavy burden for the dogs because they have to be present in a place where many external disturbances and impressions can affect dogs negatively. Most commonly, illness and pain for dogs are associated with something negative, and dogs will naturally react to this by acting defensively against any outside impressions. As a dog owner, an appointment at a veterinary clinic can feel like something that has to be overcome, to which Respondent 'V' responds:

"*as soon as the owner has discovered something or it has a stomach ache or something like that, then we will inflict on the animal a pain and all pain is associated with something bad, so it is something all veterinarian clinics have problems with. Some are good at taking action and reducing it(veterinarian clinics). It has become more and more, I think I hear around, but there are also some(pet owner) who think - it just has to be overcome, but in the dog world so that just getting over it is understood as something negative*" (appendix A.2)(Andreasen and Pedersen 2022b, 521).

This kind of attitude is something many owners have, and it tends to affect their pet negatively by, for instance, creating a sense of insecurity which makes the task of veterinarians much harder. Veterinary clinics attempt at great length to ensure that their patients feel at home through various initiatives and methods whereby they try to create a safe atmosphere at the clinic as respondent 'V' says:

"*of course, if we can fill them with as much positive as at all possible. If they have 10 good experiences, then it is the best and it lasts the longest. We know from experience that one*

bad experience means that it takes 20 good experiences for them to relax in it again. So that's important" (appendix A.2)(Andreasen and Pedersen 2022b, 500).

It is evident that emphasis is placed on giving patients as many positive experiences as possible at the clinic. Likewise, respondent 'V' describes one of the initiatives they have, which is a particular room in the clinic which they refer to as the "stress-less" room, where it is possible to host the consultations in a more comfortable and relaxed way. The stress-less room aims to be familiar and reminiscent of a typical living room at home. Additionally, at the clinic, they have a monthly event exclusively for puppies. This enables owners to have their puppies socialised with other puppies, as well as making them feel comfortable and at home at the clinic and also helps them associate with the clinic positively rather than negatively. Respondent 'V' adds the following:

"*We hold lectures at the dog events and such, so we tell them what to do and we spend a really long time on their first vaccination as a puppy, we have an evening where it can play together down here, so I think we do a lot to tell people that they should come down here with them and come and borrow the weight-scale*" (appendix A.2)(Andreasen and Pedersen 2022b, 492).

In addition to 'V's' response to which initiatives are being used, respondent 'J' highlights that the dogs who have been attending the puppy events at the clinic often are those dogs who revisit the clinic and are thrilled to do so. It greatly impacts the dog's perception of the clinic in general (appendix A.3)(Andreasen and Pedersen 2022c, 1261). This is in accordance with a statement from respondent 'V', who states that if the dog owners often show up at the clinic with their dog from the early stage of their lives, it will affect the dog's perception of the clinic. An example of a visit without intentions would be as respondent 'V' describes: *"If you from the beginning, when it is a puppy, get it used to coming to the clinic. Have it go on the weight scale, get some treats and walk round without anything negative happening. And everyone who sees the puppy make sure to pat it and make it feel at home, then it will remember that profoundly. So that's really what you need them to come and do. For instance. Have them come in and get a treat and then go again. The dogs who have done this as puppies, are the ones you will see feel good and be excited about being at the clinic"* (appendix A.3)(Andreasen and Pedersen 2022c, 1246).

3.3.1 Where does stress occur?

During the interview, we asked the respondents where in the clinic the patients appeared to be stressed the most, to which respondent 'V' stated that:

"Arriving at the clinic and if there are many in the waiting room then there is a lot of them (the dogs) that gets stressed particularly if they have to be close. We attempt to divide them or direct some of them outside to avoid congestion. For a lot of them it is also stressful When they have to enter the examination room with the veterinarian present" (appendix A.3)(Andreasen and Pedersen 2022c, 744).

It is evident from this that the waiting room and the examination room are the two largest stress triggers. Although the examination room is inevitable, the clinic has taken measures in the shape of a stress-less room. However, preemptive measures have not been taken in regard to the waiting room. Differences in the size of dogs can have a tremendous impact, as well as respondent 'V' elaborates: *"I actually think more than small dogs bark easier and often feels threatened by other dogs, particularly bigger ones. But it could also be that a larger dog has had a bad experience which in turn makes them run a little high and easy to feel unsafe and insecure"* (appendix A.2)(Andreasen and Pedersen 2022b, 462). The above is an observation made by respondent 'V', however, it is not to say that if two dogs of the same size meet that they will not act in a similar way. However, it highlights what is a regular occurrence at the clinic and that size differences may amplify the stress of the waiting room. In addition to this, respondent 'V' also states: "*But I think that most places are inside the waiting room, where you can see, among other things the dogs emitting stress hormones that other animals can smell. So the next dog or cat can smell that there have been something unpleasant and it will spread throughout*" (appendix A.3)(Andreasen and Pedersen 2022c, 744). This signifies that stress breeds stress and can cascade and affect other patients and owners. Furthermore, it also highlights that many negative experiences occur in the waiting room before the dog has entered the examination room due to dogs secreting stress hormones that other dogs can smell (Moffat, Landsberg, and Beaudet 2003, 4). For many dogs, then, the waiting room becomes a place they associate with negativity and consequently affects their entire experience at the clinic. Despite their best efforts with initiatives and preemptive measures, respondent 'V' reluctantly accepts that stress in patients is a significant business problem that must be dealt with, as she states *"it's a problem we see everywhere. It's a business problem that has to be solved"* (appendix A.2)(Andreasen and Pedersen 2022b, 542).

In some cases, the frustrations and worries arise even before the dog arrives at the clinic. Dog owners can sometimes create an atmosphere of fear and uneasiness, which the dog quickly identifies. Respondent 'V' elaborates: *"Most often depending on what is to be examined, then the owner can already from their home create a stressful situation. Because in their mind they have already concluded that the dog does not like it"* (appendix A.2)(Andreasen and Pedersen 2022b, 521). This highlights the owner's role in making the dog feel unsafe. In many cases, it is also the owner's responsibility to make the dog feel safe in the situations it encounters. We also know from

(Sundman et al. 2019) that dogs, to a great extent, mirror the stress their owners' experience.

3.3.2 How is stress currently measured on the clinic

We asked the respondents how they currently measure or observe their patients' stress, to which respondent 'J' replied *"it is mainly based on observations of the animals behaviour, we can't really measure it. We look at the normal behaviour of the animal and compare it to the changes we see in that behaviour"* (appendix A.1)(Andreasen and Pedersen 2022a, 133). The findings of the literature review also suggest that the majority of available knowledge of the subject is based on observations. Furthermore, respondent 'J' added: *"One could say that a period of sickness, brings about a change in behaviour, because if the dog, for instance, is feeling sick in the abdominal area then the dog will behave differently"* (appendix A.1)(Andreasen and Pedersen 2022a, 138). It is the physiological parameters that can clearly be identified. However, at first glance, one can not assess the dog's psychological state, which can be hard to identify as respondent 'J' implies. In order to get a better understanding of each client, respondent 'J' opts to spend additional time talking with pet owners about how they should show up to the clinic - particularly if he recognises that their pet may be anxious at veterinary practices. Some owners may elect to utilise the backdoor to prevent their pet from having to be in the waiting room. This is done in order to reduce the number of stressors their pet is exposed to. Respondent 'J' says the following: *"Yes, it is getting more common to set up dialog with the owner of the pet in order to prevent stressful situations. likewise we are getting more inquiries from pet owners about how they should act when showing up at the veterinary clinic"* (appendix A.1)(Andreasen and Pedersen 2022a, 138).

3.3.3 Current value proposition

We asked the respondents about the value proposition that Odder veterinary clinic proposes to their customers, to which respondent 'J' replied:

"They bring their dearest belonging in the shape of their pet and they expect a service that we need to provide them in the best possible manner [...] That which is important for me is that we leave no stone unturned and that the customers feel safe with what is being examined, said and done and taken care of" (appendix A.1)(Andreasen and Pedersen 2022a, 9).

Evidently, the customers expect a high standard of service, knowing their beloved

pet is safe and secure and it receives the best possible care. Respondent 'J' elaborates: *"it is also important that they (the customers) feel that they come to a clinic where they can feel completely safe and relaxed about it. With a complete understanding that it is the owners that have a patient that we want to help the best we can"* (appendix A.1)(Andreasen and Pedersen 2022a, 23). There is significant emphasis on ensuring the customers that their pets will be treated in the best manner possible and that they will be safe and secure simultaneously. Respondent 'V' adds that because they have been successful in doing so, they have customers that travel long distances to get treated at their clinic because the owners feel their pets have an attachment to the clinic and they like it there. They have customers driving as much as 200 kilometres to get treated at Odder veterinary clinic because they feel the treatment is worth the drive (appendix A.3)(Andreasen and Pedersen 2022c, 1156–1158).

When asked about the services that the clinic offers, respondent 'J' replied:

"A treatment can be a vaccination but also a more all-around examination, a talk about how the pet fares, is there any need for dietary advice perhaps new feed for the pet, flea repellents, supplements. Sometimes it is not easy to know why your dog is reacting the way it is, and for me it is important to make a plan for the dog so the owner thinks it makes sense to follow and that don't just flick our finger and then we have a solution, so that's very important to me" (appendix A.1)(Andreasen and Pedersen 2022a, 28–33).

The staff of Odder veterinary clinic seem very aware of how important it is for the customers to be part of their pet's treatment so that both pet and owner feel safe about the entire ordeal.

Chapter 4

Rigor cycle

4.1 Literature review

4.1.1 What is a literature review?

A literature review is, as the name entails, a review of relevant literature in a particular field of study. Furthermore, the purpose of a literature review is to demonstrate the author(s) knowledge of the selected field of study, which entails the vocabulary used within the field, the theories, key variables, phenomena, as well as its methods and history (Rowley and Slack 2004, 2). There are many scientific reasons for conducting a literature review Gall and Borg (1996) argue that, among others literature plays an essential part in:

1. delimiting the research problem
2. seeking new lines of inquiry
3. avoiding fruitless approaches
4. gaining methodological insights
5. identifying recommendations for further research
6. seeking support for grounded theory

Hart (Hart 1998) furthers the reasons for reviewing literature by including:

1. distinguishing what has been done from what needs to be done
2. discovering important variables relevant to the topic
3. synthesising and gaining a new perspective identifying relationships between ideas and practices
4. establishing the context of the topic or problem
5. rationalising the significance of the problem
6. enhancing and acquiring the subject vocabulary
7. understanding the structure of the subject
8. relating ideas and theory to applications
9. identifying the main methodologies and research techniques that have been used and lastly
10. placing the research in a historical context to show familiarity with the state-of-the-art developments (Hart 1998, 27)

This does not mean that it is quintessential to achieve every bullet point; it merely guides reviewers toward a unified target goal and avoids the failure of the literature review.

This literature review aims to find existing knowledge and insights concerning what stress in dogs is and how it is measured. Furthermore, it should help to create the foundation for this study's theory and methodology section. The literature review is based on five steps that should be considered during the process (Harboe 2011, 139). The steps are the following:

1. Define The problem area
2. find and select relevant literature
3. critical reading and assess the purpose
4. organise and thematise
5. discuss outcome and present the following topics

The literature review procedure includes a preliminary where the group participates in a brainstorming session on the topic of stress in animals. The process is

non-linear, meaning that newly acquired insights about the main topic are continuously considered. Newly acquired knowledge prompts a new iteration between steps four and two. Numerous times it became apparent that it was necessary to examine relevant sub-topics that first came to light after acquiring new insights. The formal procedure for our iterative process is listed below:

1. Define the problem
    (a) Brainstorm
2. Find and select literature
    (a) Search strategy- and matrix construction
3. Organize and Thematize
    (a) Literature review table including critical reading
4. discussion of findings

4.1.2 Search strategy

Harboe argues that there will always be significant amounts of relevant literature on the topic one is trying to understand. Therefore, it is essential to have a search strategy that can help structure your search of the subject. Harboe argues that there are five different literature search initiatives one can do (Harboe 2011, 140). The initiatives are a collection of steps that can aid the process of finding relevant literature. Each of the initiatives are quite intuitive to use and has a framework that aims to clarify the whole area of research within the topic. The following initiatives are listed below:

- Let coincidences control in the start
- find the right databases and feel free to search in several different databases
- Check the bibliographies in the books (Chain search)
- Go to the library and see what is on the shelves
- Draw on your supervisor or other professionals

The beginning of the process prompts one to follow their intuition. This can be done by brainstorming relevant keywords using various search engines such as

Google. A search engine, such as Google, permits not only the search of random words but can also provide an overview so that a search strategy may be utilised. It is also essential to follow the citations and links one encounters during the process; a method also referred to as the snowball method (Harboe 2011, 140). It is important to use numerous databases and not permit oneself to rigidly adhere to the use of merely one in the search for relevant literature. In addition to using relevant databases, it is a good idea to search at the local library to find out which books may be relevant for your topic. Likewise, when finding a relevant book, one can use the book to look through the bibliography for relevant literature that can be used for the topic. This technique is called chain search and is, in essence, reminiscent of the snowball effect (Harboe 2011, 141).

4.1.3 Brainstorm

We opted to utilise the software named Miro to record our brainstorming session. Search words were listed and formed the categories with which the literature review should resonate with. Based on the keywords, we found various books, articles, websites and organisations that have contributed to a better understanding of the topic. In this way, the recommendations of others are drawn upon, and various forms of literature are found.

4.1.4 First search matrix iteration:

The next natural step in the literature review is by categorising and organising the brainstorm to the point where you have a set list of search words, so the literature search itself becomes more effective. Over two or more iterations, you input the brainstormed words into a search matrix where the words from the brainstorm are weighed and valued. Several words are discarded after thorough contemplation and discussion, and eventually, you end up with a list which is used in the initial search. Each row indicates a category within the overall subject. The relevant search words are sorted into the columns of the row that they are related to.

Figure 4.1: Brainstorm of the topic stress in animals

Stress-measurement	**Social environment**	**Veterinary clinics**	**Stress factors**
Electrocardiogram ECG	Comfortable	Veterinary hospitals	Other amimals
Heart-rate variability	Isolation – social context	Veterinarians	Calm techniques
Breathing patterns	Animal personalities	Veterinary nurses	Stress triggers
Sweat	Animal stress symptoms	Preliminary measures	anxiety
Long term effects	Insufficient stimulation	Responsibility	Barking dogs
Short term effects	Change in behavior	Treatment	Overcrowding areas
	Social dominance		Effect of noises
	Animal welfare		Stress signs
			Consequences
			Unfamiliar surroundings

4.1.5 second search matrix iteration:

The initial search of various literature intended to expand the keywords relative to the subject. At the conclusion of the first iteration, you initiate a second search matrix taking into account what you have learned from the first round and sorting out the search words which gave a less than desirable outcome and keeping those keywords that returned a significant number of relevant literature. During the transition and development of the second search matrix, we discovered that either two of the keywords 'animals' or 'dogs' were required in order to provide a desirable result. We also recognised that a significant amount of studies were done on the topic of heart rate variability and stress related to humans and that it was a growing subject in studies with animals.

Stress-measurement	**Social environment**	**Veterinary clinics**	**Stress factors**
ECG	Comfortable environment for dogs	Veterinary hospitals stress	Stress triggers for dogs
Heart-rate variability	Animal welfare	Responsibility of veterinary practices	Anxiety dogs
Breathing patterns	Animal personalities	Veterinary nurses	Stress triggers
Heart-rate variability dogs	Waiting room Veterinary clinics	Stress Treatment Veterinary practice	Barking dogs
Long term effects of stress dogs	Research on Veterinary waiting rooms	Veterinary clinics environment	Effect of noises on dogs
Short term effects dogs	Examination room fear dogs	Parameters for examination of dogs	Stressor effect on dogs

4.1.6 Literature review table:

Harboe suggests searching through various online databases in order to get a more significant and deeper understanding of the subject (Harboe 2011, 140). Most commonly used were the Aalborg University online library (aub) and Google Scholar, as well as Aarhus University's library. This was in accordance with Harboe's rec-

ommendations of using both online and offline databases.(Harboe 2011, 142)

Table 4.1: Literature Review

Beginning of Table			
Reference	Research Question	Results & own comments	Keyword & database used
Vincent, I. C., A. R. Michell, and R. A. Leahy. "Non-invasive measurement of arterial blood pressure in dogs: a potential indicator for the identification of stress." Research in veterinary science 54, no. 2 (1993): 195-201.	Elevated measurements of arterial blood pressure when visiting a veterinary clinic using Dinamap 1846 sx oscillometric monitor and tail cuffs as monitor device.	Exposure of a dog to a known stressor for that individual (sound) raised systolic and diastolic pressure as well as heart rate; diastolic pressure was the fastest to recover, heart rate the slowest. Remeasurement in the veterinary clinic, rather than 'neutral territory' showed significant increases in pressure but not heart rate. Exposure of a dog to a known stressor for that individual (sound) raised systolic and diastolic pressure as well as heart rate. Diastolic pressure was the fastest to recover, heart rate the slowest.	Google scholar, Article / Stress triggers dogs

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Scholz, Martina, and Clarissa Von Reinhardt. Stress in Dogs: learn how dogs show stress and what you can do to help. Dogwise Publishing, 2006.	A dog book, talking about how dogs show stress physiological and psychological.	The book is presenting both the physiological and the psychological aspects of stress symptoms in dogs. Additionally, the book improves the understanding of the various stress symptoms and how to handle specific situations.	Google scholar, Book / stress triggers dogs
Moffat, Kelly S., Gary M. Landsberg, and Richard Beaudet. "Effectiveness and comparison of citronella and scentless spray bark collars for the control of barking in a veterinary hospital setting." Journal of the American Animal Hospital Association 39, no. 4 (2003): 343-348.	This study was designed to evaluate the efficacy of a citronella bark collar and a new, scentless spray bark collar in a veterinary hospital or a similar kennel-type environment .	Thirty of the dogs were evaluated with the citronella collar, with 76.7 percentage showing a reduction in barking. Twenty-nine dogs were evaluated with the scentless collar, with 58.6 percentage showing a reduction in barking. The improvement over the control collars was statistically significant with both the citronella and scentless collars.	Europe PMC, Article / Barking dogs

Continuation of Table 4.1.6			
Reference	Research Question	Results & own comments	Keyword & database used
Jonckheer-Sheehy, Valerie SM, Claudia M. Vinke, and Alessia Ortolani. "Validation of a Polar® human heart rate monitor for measuring heart rate and heart rate variability in adult dogs under stationary conditions." Journal of Veterinary Behavior 7, no. 4 (2012): 205-212.	Heart rate variability (HRV) is considered to be a measure of cardiac activity for assessing stress and welfare in animals. Polar Heart rate monitors have been validated for use in horses, pigs, cows.	They conclude that the ECG technology used in Polar products such as the RS800CX digital R-R heart rate monitor can reliably monitor HRV in dogs under stationary conditions. Own Comments: The validation of Polar technology is essential for our research to optimally work as that is the technology that has been available for our study. Furthermore, that HRV is a verified parameter for measuring stress is also key as that is one of the key data points we will be able to gather through the use of the ECG technology.	Google Scholar / Article, Heart-rate variability

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Mandigers, Paul. (2005). Non-invasive blood pressure measurement in dogs and cats. Tijdschrift voor diergeneeskunde. 130. 198-201. Authors: I.C.VincentA. R.MichellR. A.Leahy	Elevated measurements of arterial blood pressure when visiting a veterinary clinic using Dinamap 1846 sx oscillometric monitor and tail cuffs as monitor device.	Exposure of a dog to a known stressor for that individual (sound) raised systolic and diastolic pressure as well as heart rate; diastolic pressure was the fastest to recover, heart rate the slowest. Own comments Remeasurement in the veterinary clinic, rather than 'neutral territory' showed significant increases in pressure but not heart rate. Exposure of a dog to a known stressor for that individual (sound) raised systolic and diastolic pressure as well as heart rate diastolic pressure was the fastest to recover, heart rate the slowest	Google scholar, Article / Stress triggers dogs

Continuation of Table 4.1.6			
Reference	Research Question	Results & own comments	Keyword & database used
Baisan, Radu Andrei, Eusebiu Ionuț Condurachi, and Vasile Vulpe. "Short-term heart-rate variability in healthy small and medium-sized dogs over a five-minute measuring period." Journal of Veterinary Research 64, no. 1 (2020): 161.	Tests HRV measurements on 79 small to medium sized dogs. They test whether age, sex, breed has any affect on their HRV. Five-minute heart-rate variability (HRV) measurement is a useful tool for assessing the autonomic nervous system (ANS) balance in humans, but there are no studies on healthy dogs. The aim of the study was, therefore, to provide the reference ranges in small and medium-sized breeds for short-term HRV time and frequency domain (TFD) analyses.	They argue that five-minute heart-rate variability measurements is a valid tool for measuring the autonomic nervous system of dogs. Own Comments: provides a format for how to conduct our tests.	Google Scholar / Article, Heart-rate variability dogs
Lloyd, Janice KF. "Minimising stress for patients in the veterinary hospital: Why it is important and what can be done about it." Veterinary Sciences 4, no. 2 (2017): 22.	Minimising stress patients should always be a priority in veterinary hospitals and clinics. Many veterinary practitioners believe creating a low stress environment is too difficult and time consuming. This article provides a background for why minimising stress is important and outlines practical steps that can be taken by the clinics and hospitals to reduce this.	Provides a scale for measuring stress according to the behaviour and appearance of the dog a so called 'stress value'. Furthermore, it provides and an overview of measures that can be taken to create a low stress environment.	Google scholar / Comfortable environment dogs

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Rajendra Acharya, U., Paul Joseph, K., Kannathal, N., Lim, C. M., - Suri, J. S. (2006). Heart rate variability: a review. Medical and biological engineering and computing, 44(12), 1031-1051.	Emphasises the use of Heart rate variability as a reliable reflection of physiological factors modulating the normal rhythm of the heart.	Provides an introduction of overview of the benefits of measuring HRV and HR what the differences are between the two and how they are measured. own comments: This can provide knowledge for a general knowledge paragraph of what HRV and HR is and why its important. Own Comments: provides a format for how to conduct our tests.	Aalborg University / Heart rate variability
Stellato, A. C., Hoffman, H., Gowland, S., Dewey, C. E., Widowski, T. M., Niel, L. (2019). Effect of high levels of background noise on dog responses to a routine physical examination in a veterinary setting. Applied Animal Behaviour Science, 214, 64-71.	Veterinary visits results in behavioural and physiological signs of fear and stress for many companion dogs. The aim of this study was to assess the effect of elevated levels of common veterinary background noises on fear-related responses in dogs during a routine physical examination in a veterinary setting.	Only respiratory rate was increased with exposure to background noise. No other responses were affected. However, - lip licking, - avoidance - posture reductions Were increased during some exam phases. Background noise only affected a single, physiological measure during a routine exam, while exam phase seemed to have a larger influence, affecting various behavioral measures.	Google scholar / Effect of noises dogs clinics

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Stellato, A. C., Flint, H. E., Dewey, C. E., Widowski, T. M., - Niel, L. (2021). Risk-factors associated with veterinary-related fear and aggression in owned domestic dogs. Applied Animal Behaviour Science, 241, 105374.	Fear and aggression in dogs within veterinary clinics can lead to canine welfare impairments and pose a safety concern for veterinary staff.	These results suggest that both fear and aggression within veterinary clinics are related to dog personality, previous early experiences and veterinary clinic experiences, and owner experiences during veterinary visits. They used cross-sectional survey to examine risk factors associated with fear and aggression within veterinary clinics, from a dog owners' perspective.	Google scholar / Effect of noises dogs clinics
Edwards, P. T., Hazel, S. J., Browne, M., Serpell, J. A., McArthur, M. L., Smith, B. P. 2019. Investigating risk factors that predict a dog's fear during veterinary consultations. PLoS One, 14, e0215416.	Attending the veterinary clinic is an integral part of the physical welfare of every companion dog. However, some dogs experience their veterinary visits negatively, which poses a risk of injury to the veterinary staff, their guardian (owner) and themselves. It may also influence the regularity of non-urgent veterinary appointments.	In this study, we explored the risk factors associated with fear during veterinary examination and in novel situations (including first time at the veterinary clinic) from 26,555 responses in the Canine Behavioral Assessment and Research Questionnaire database.	Google scholar / Effect of noises dogs clinics

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Mariti, C., Raspanti, E., Zilocchi, M., Carlone, B., Gazzano, A. 2015. The assessment of dog welfare in the waiting room of a veterinary clinic. Anim. Welf, 24, 299-305.	his study was aimed at assessing dog welfare in the waiting room of the veterinary clinic through a multi-modal, non-invasive approach. The sample was formed by dogs, videoed for 3 minutes in the waiting room of a veterinary clinic where they went for scheduled visits. .	Results of this pilot study show that dog welfare in the veterinary waiting room is often impaired, and behaviourists should educate owners, veterinarians and their staff to properly assess dog welfare. Two-thirds of dogs spent more than 20 percentage of time displaying at least one sign of stress, and 53.3 percentage of dogs showed or more behavioural signs of stress. According to the behaviourist, the level of stress felt by dogs in the waiting room was high in 28.9 percentage of cases. The most frequent stimuli inducing stress, reported in an open question, were the veterinary clinic (13.3 percentage)	Google scholar / Stress in dogs clinics

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Hernander, L. 2009. Factors influencing dogs' stress level in the waiting room at a veterinary clinic.	A number of 110 dogs were observed during their whole time in the waiting room at a veterinary clinic and the dogs' stress level was recorded in three different events; entrance, wait and weighing	The result showed that dogs who is accompanied by a female and a male owner as a couple were more likely to have a higher stress level when entering the clinic than dogs accompanied by a single person, and a similar result was found with regard to the time in the waiting room It also suggests that it would be preferable to weigh the dogs right after the registration at the reception desk and then let the dog sit down and wait continuously until it is called up, instead of the current proceeding where the dogs is weighed just before it is time to meet the veterinarian	Google scholar / stress in waiting room dogs

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Lind, A. K., Hydbring-Sandberg, E., Forkman, B., and Keeling, L. J. 2017. Assessing stress in dogs during a visit to the veterinary clinic: Correlations between dog behavior in standardized tests and assessments by veterinary staff and owners. Journal of Veterinary Behavior, 17, 24-31.	The aim of this study was to observe the behavior of dogs in a veterinary clinic and to correlate it with subjective stress assessments by different persons	They were significantly more willing to play and eat a treat outside the veterinary clinic compared to inside the clinic ($P < 0.001$), implying that the dogs themselves experienced inside the clinic as being more negative. The results also indicated that the type of relationship the owner has with the dog may influence the dog's behavior during the clinical examination.	Google scholar / stress waiting room dogs

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Williams, T., Carroll, A., Montrose, V. T. 2019. Environmental methods used by veterinary centres to reduce stress of cats and dogs during practice visits. The Veterinary Nurse, 10, 47-52.	The aim of this study was to determine what methods veterinary practices in the UK use to try to reduce stress in animals during veterinary visits, and gather the views of veterinary staff on the efficacy of these practices.	Greater consideration of methods to facilitate separation of species where distinct waiting rooms are not feasible, for example via implementing appointments for cats and dogs on different days and times, would be beneficial. In addition, veterinary staff should consider utilising classical or specially designed species-specific music in the veterinary practice as this may help mitigate the stress of cats and dogs visiting the practice.	Google scholar / stress waiting room dogs

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Sundman, A. S., Van Poucke, E., Svensson Holm, A. C., Faresjö, Å., Theodorsson, E., Jensen, P., and Roth, L. S. 2019. Long-term stress levels are synchronized in dogs and their owners. Scientific reports, 9, 1-7.	This study reveals, for the first-time, an interspecific synchronization in long-term stress levels. Previously, acute stress, has been shown to be highly contagious both among humans and between individuals of other species. Here, long-term stress synchronization in dogs and their owners was investigated.	Interestingly, the dogs' activity levels did not affect HCC, nor did the amount of training sessions per week, showing that the HCC levels were not related to general physical activity. Additionally, there was a seasonal effecting HCC. However, although dogs' personalities had little effects on their HCC, the human personality traits neuroticism, conscientiousness, and openness significantly affected dog HCC. Hence, we suggest that dogs, to a great extent, mirror the stress level of their owners	Google Scholar / Long-term effects stress dogs

Continuation of Table 4.1.6			
Reference	Research Question	Results & own comments	Keyword & database used
Mariti, C., Gazzano, A., Moore, J. L., Baragli, P., Chelli, L., and Sighieri, C. 2012. Perception of dogs' stress by their owners. Journal of Veterinary Behavior, 7, 213-219.	Questionnaires potentially have a broad applicability in measuring stress levels in dogs, as owners know their dogs' behaviour and personality better than anyone else. The aim of this research was to evaluate how owners perceive stress in their dogs through understanding of displayed behaviours. The survey was carried out using 1,190 questionnaires completed by dog owners.	The vast majority of respondents indicated that dogs were stressed seldom or only in specific situations. Men generally considered their dogs as experiencing low stress more often than did women, whereas women considered their dogs as being moderately stressed more often than did men. The behavioural indicators of stress most frequently identified by owners were trembling and whining, followed by aggressiveness, excessive barking, and panting.	Google Scholar / Short term effects dogs

Continuation of Table 4.1.6

Reference	Research Question	Results & own comments	Keyword & database used
Stilwell, Natalie. "Reducing stress in hospitalized patients." 2019.	In her article series, Dr. Hewson offered many physiologic and ethologic reasons for stress in small animal patients. Hospitalization involves removing the pet from its territory and social group, including the owner; housing it in an unfamiliar environment; and potentially exposing it to pain and fear during treatment.	Stress can elevate certain physiologic parameters, including heart rate, respiratory rate, body temperature, and blood pressure. Neutrophilia may reflect stress but is easily mistaken for an inflammatory response, particularly in an ill or injured patient.6 Results of several studies demonstrate that salivary cortisol level or urinary cortisol-to-creatinine ratio may increase during kennelling or hospitalization and correlate with anxious behaviour. Ultimately, impaired immune function impedes the patient's recovery.	Google Scholar / Article, Veterinary hospitals stress

Continuation of Table 4.1.6			
Reference	Research Question	Results & own comments	Keyword & database used
Herron, M. E., and Shreyer, T. 2014. The pet-friendly veterinary practice: a guide for practitioners. Veterinary Clinics: Small Animal Practice, 44, 451-481.	Low-stress handling is important for the safety of the veterinary staff and for the welfare of the patient. The commitment to ensuring the emotional well-being of the patient should be equal to that shown toward the physical well-being of the animals under a veterinarian's care. Before handling animals it is essential to assess the environment and the patient's response to it	Taking the time to create a behaviour handling plan makes future visits easier and bonds clients to the practice. Understanding how and when to use handling tools is key to making patient visits safer, more humane, and more efficient. Own Comments: the literature gives insight into common preventive measures taken to ensure a low-stress visit at the practice	Europepmc / Stress treatment veterinary practice
End of Table			

4.1.7 Conclusion of the literature review

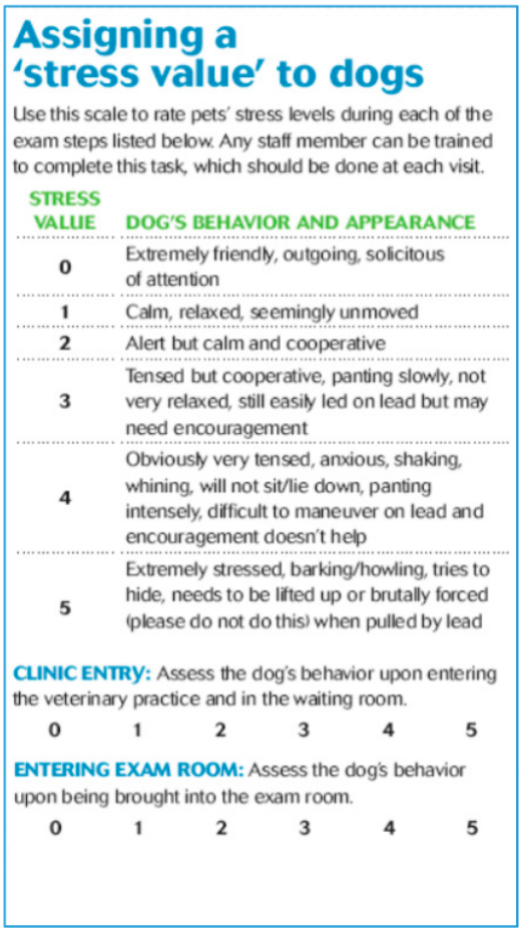
The critical reading, along with the structuring and thematisation of the literature, is two parallel processes in the literature review. This is necessary in order to find the most relevant and fitting literature. During the critical reading, there is a particular focus on the literature which enlightens stress in animals during consultations at veterinary practices and how it is possible to measure and reduce said stress. There is a particular focus on dogs; however, it is not exclusively on dogs as the literature is limited. Other relevant studies have been conducted on animals such as cattle, horses and pigs. Not all of the literature has been read entirely from start to finish. The critical reading of the literature always begins with a thorough read-through of the abstract and conclusion. This is done to ensure that the literature is relevant in accordance with the problem domain. If the article is deemed relevant, it warrants a thorough examination of its contents. This would be but is not limited to the introduction, bibliography, methods, data gathered,

results and ultimately, the conclusion. In this phase of the read-through, there is a particular focus on finding important terms, theories, methods, and quotes. The most vital information from the articles is then inputted into the literature table. Several of the articles warrant a second reading which entails a focus on analysis and reflection whose purpose is to further ensure the literature's relevance in accordance with the problem domain – it is essential to describe what can be utilised accurately and in what context.

Discussion of findings

The findings of the literature review suggest that there is a distinct lack of research done regarding stress in animals at veterinary practices, specifically with HRV and HR as parameters. Although they are valid ways of measuring stress in animals, and they have been used in relevant research in the field for a significant amount of time. This seen in studies such as (Borell et al. 2007), (Shaffer and Ginsberg 2017), (Jonckheer-Sheehy, Vinke, and Ortolani 2012) and (Manzo et al. 2009). The only closely related research was conducted with blood pressure as the indicator for stress (Vincent, Michell, and Leahy 1993). Furthermore, the literature suggests, as confirmed in our interview with respondent 'V', a veterinary nurse at Odder Veterinary clinic, that consultations at veterinary clinics are a highly stressful experience for the patients, particularly dogs and cats (appendix A.3)(Andreasen and Pedersen 2022c).

Literature such as (Lloyd 2017) provides preventive measures that veterinary practices can take in order to minimise the impact stress has on their patients. Additionally, they attempt to ensure a low-stress environment highlighting the acknowledgement that consultations are never entirely stress-free due to the nature of the context (Lloyd 2017). In the context of veterinary practices, the most commonly proposed way to measure stress, according to the literature, is by way of behavioural observation (Lloyd 2017). Janice Lloyd presents a stress value scale from one through five, where one is the lowest level of stress sign, and five is the highest. It proposes behavioural patterns that commonly indicate stress, such as whining, shaking and barking, which, if a dog exhibited those behavioural patterns, would be assigned a stress value of 3.



Assigning a 'stress value' to dogs

Use this scale to rate pets' stress levels during each of the exam steps listed below. Any staff member can be trained to complete this task, which should be done at each visit.

STRESS VALUE	DOG'S BEHAVIOR AND APPEARANCE
0	Extremely friendly, outgoing, solicitous of attention
1	Calm, relaxed, seemingly unmoved
2	Alert but calm and cooperative
3	Tensed but cooperative, panting slowly, not very relaxed, still easily led on lead but may need encouragement
4	Obviously very tensed, anxious, shaking, whining, will not sit/lie down, panting intensely, difficult to maneuver on lead and encouragement doesn't help
5	Extremely stressed, barking/howling, tries to hide, needs to be lifted up or brutally forced (please do not do this) when pulled by lead

CLINIC ENTRY: Assess the dog's behavior upon entering the veterinary practice and in the waiting room.

0 1 2 3 4 5

ENTERING EXAM ROOM: Assess the dog's behavior upon being brought into the exam room.

0 1 2 3 4 5

Figure 4.2: Janice F.K Lloyd's stress scale

The article "Heart rate variability predicts the emotional state in dogs" (Katayama et al. 2016) suggests a procedure for the experiment using ECG technology and Heart rate monitors and accompanying that data with a behavioural analysis of the dogs simultaneously. This study intends to structure the research and tests similarly. However, it will also include the expert opinion on how to structure the procedure of the experiment by respondent 'J', the owner of Odder veterinary clinic and a veterinarian, as well as respondent 'V', who is a veterinary nurse at Odder Veterinary clinic and has expertise in the animal behaviour. Furthermore, literature such as (Jonckheer-Sheehy, Vinke, and Ortolani 2012) validates the use of Polar ECG technology for accurately measuring HR and HRV in dogs. This is useful as it provides verification and validity to a cheap obtainable technology for use in the experiment and artefact.

4.2 What is stress in dogs, and how can it be measured?

4.2.1 Physiology of stress in dogs

To further analyse the stress the dogs are exposed to; it is essential to define precisely what that stress is. When a dog is exposed to a stressed situation from external phenomena, various hormones in the body are released. The hormones that are released during an exogenous threat alter numerous physical functions. When a dog reaches a certain level of concentrated hormones in the body, the hormone will start reproducing itself, ensuring that the hormone concentration is regulated at a constant level. A specific hormone called **cortisol** is increasingly being released during these external encounters. it is under the control of the **hypothalamus**, which is a part of the **diencephalon** thus is referred as the **interbrain**. The interbrain is an important part of the brain that regulates basic bodily functions such as warmth, sleep patterns, blood pressure, food intake and water balance.

In the hypothalamus, transmitters called **hypothalamic** hormones are produced and released. **hypothalmic** has an direct transmission of **Corticotropin-releasing hormones (CRH)** to the hypophysis. The **hypophysis** has another transmitter, **Adrenocorticoltropic hormones (ACTH)** which is released into circulation of the body. Through the blood veins, the ACTH hormones reach for the Adrenal cortex and stimulate three hormones **Aldosterone**, **Cortisol** and **sex hormones** (Scholz and Reinhardt 2006, 12). When cortisol is reproduced at a constant level in the blood, the dog experiences a large amount of aggressiveness and increased sex hormones. In addition to having outward-reacting effects, cortisol affects the immune system by inhibiting protein synthesis, which builds a protein in the lymphocytes. The protein's production results in a reduced number of defence cells during its production time. Furthermore, increased aldosterone poses the danger of reduced water balance, making the dog think unclear. Sex hormones stimulate anabolic effects such as readiness and aggression for male dogs (Scholz and Reinhardt 2006, 14–17). The dog's heart rate triggers faster transportation of hormones down to the 'Adrenal cortex', which secretes the three harmful hormones Cortisol, Aldosterone and Sex hormones (Scholz and Reinhardt 2006).

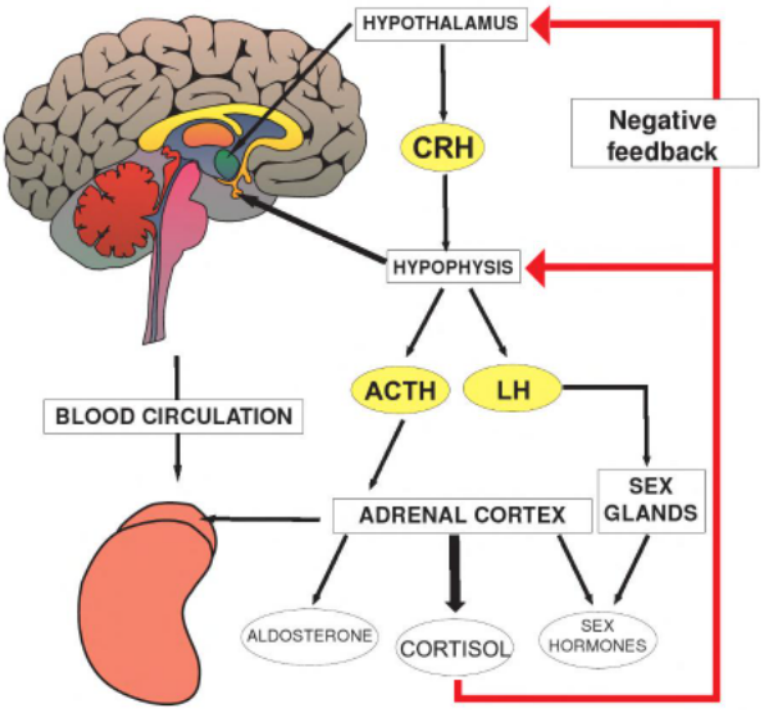


Figure 4.3: Illustration of a dog's brain

The following description takes a medical approach to what it means to be stressed as a dog:

"Stress (pressure, strain, tension) means a state of the organism which is defined by a specific syndrome (increased activity of the sympathetic nervous system, increased release of catecholamines, increased blood pressure etc.), yet can be caused by various non-specific stimuli (infections, injuries, burns, radiation exposure, but also by anger, joy, pressure to perform and other stress factors). Stress can also mean the exogenous influences themselves to which the body is not sufficiently adapted. Psychological stress is a consequence of the discrepancy between specific demands and subjective coping. Continuous stress can lead to general reactions in terms of a general adaption syndrome" (Scholz and Reinhardt 2006, 8).

In other words, this means that stress can occur from several different situations where hormones in the body respond to external phenomena, increasing the activity of hormones in the body. The body responds to endogenous and exogenous threats in which the adrenal cortex copes by distributing ACTH hormones in the

blood throughout the system and stimulating each of the three hormones that the Adrenal cortex emits.(Scholz and Reinhardt 2006, 8).

4.2.2 Heart rate Variability and Heart rate as indicators of stress

This study has opted to focus on heart rate variability and heart rate as parameters for measuring stress. The reasoning stems from the knowledge and empiricism acquired through the aforementioned combination of literature review and semi-structured interviews. The literature review revealed that several studies such as (Cook 2012) used minimally invasive methods to sample corticosteroids because it was frequently used as a biomarker for stress in animals (Cook 2012). However, this requires taking blood samples in order to analyse, which requires equipment and expertise that we do not have access to. When we questioned respondent 'V' about the parameters we should use to measure stress, she replied, *"Yeah I think think Heart Rate Variability is easier (to measure compared to saliva, hormones or other stress measures)"* (appendixA.3)(Andreasen and Pedersen 2022c, 628). The Respondent also added, *"I also think you should include the heart rate (of the subject)"* (appendix A.3)(Andreasen and Pedersen 2022c, 632). Furthermore, Heart rate variability (HRV) has long been considered to be a measure of autonomic regulation of cardiac activity for assessing stress and welfare in animals (Jonckheer-Sheehy, Vinke, and Ortolani 2012, 205).

Measuring heart rate variability is a non-invasive technique which means it does not involve the introduction of any instruments into the body of the subject. Measuring a subject's HRV can be utilised to investigate the functioning of the autonomic nervous system (ANS), particularly the balance between sympathetic and vagal activity (Borell et al. 2007). It has long been proven useful in studies of humans for research, as well as clinical studies concerned with cardiovascular diseases, diabetic autonomic dysfunction, hypertension and psychiatric and psychological disorder (Borell et al. 2007). In the past decade, HRV has seen an increase in its use for animal research to analyse changes in sympathovagal balance related to diseases and psychological and environmental stressors. (Borell et al. 2007). HRV is an exceptionally good indicator for the non-invasive assessment of ANS activity in response to psycho-physiological stress, which implies that the stress experienced has an effect both emotionally and physically (Borell et al. 2007, 296).

The respondents were questioned whether it would be ideal for the experiment's procedure if we correlated the data captured from the heart rate monitor with observations of the subjects' behaviour and emotional state. Respondent 'V' replied: *"I think that would be a great idea"* (appendix A.3)(Andreasen and Pedersen 2022c,

777). The rationale for this was to add the expertise of respondent 'V' about what stress is concerning the behavioural patterns of dogs. Furthermore, we argue that the value of having observations correlated with the HR and HRV data will add validity to the results. It also ensures that the data we are recording is indeed negative stress, as positive stress measures similarly to negative stress (appendix A.3)(Andreasen and Pedersen 2022c). Respondent 'V' also highlights the importance of differentiating between positive and negative stress. She states, *"you also need to consider if you need to sort them (the subjects) after whether they are scared of coming in here and that is what stresses them. Or they are stressed simply because they are happy to come in here"* (appendix A.3)(Andreasen and Pedersen 2022c, 1104).

4.2.3 What is the difference between Heart rate and heart rate variability

Heart rate (HR) is measured in beats per minute, and it only requires the average of the beats over a given period (*Heart Rate Variability vs. Heart Rate - Elite HRV*). Generally, a low HR indicates that one is at rest, whereas a high HR corresponds to exercise, exertion or stress (*Heart Rate Variability vs. Heart Rate - Elite HRV*). While heart rate is focused on the average of beats per minute, heart rate variability (HRV) measures the specific changes in time between successive heartbeats. The time between heartbeats is measured in milliseconds (ms) and is referred to as an **R-R interval, N-N Interval or Inter-beat interval (IBI)**.

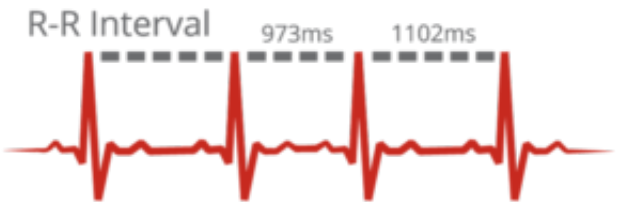


Figure 4.4: R-R interval

Figure 4.4 is a simple illustration of what is produced from an electrocardiogram (ECG) and highlights the R-R intervals and the variance in their length.

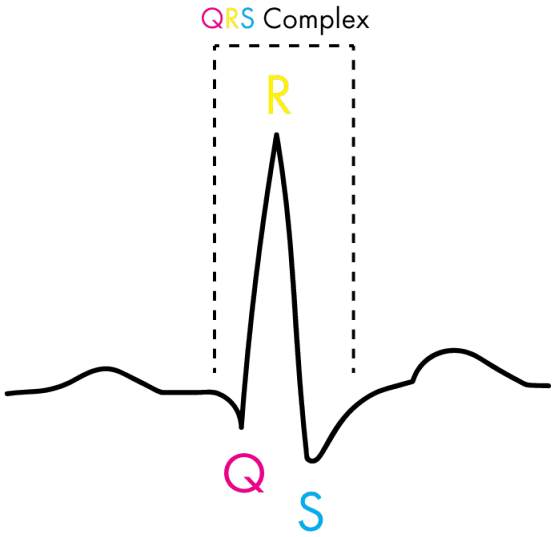


Figure 4.5: QRS Complex

Figure 4.5 portrays what is referred to as the **QRS complex**. It is these various complexes that ECGs capture consecutively throughout recordings. Figure 4.5 visually highlights the approximate nature of the QRS complex.

Generally, a low HRV meaning less variability in the heartbeats, indicates that the body is under stress from a host of various sources such as exercise, psychological events, or other internal or external stress triggers (*Heart Rate Variability vs. Heart Rate - Elite HRV*). Furthermore, at rest, it is generally favourable to have a high HRV, while a low HRV is undesirable. Healthy cardiac function is characterised by irregular time intervals between consecutive heartbeats (Borell et al. 2007, 295). Furthermore, greater variability between the heartbeats commonly suggests that the body is more capable of handling stress or is better at recovering from prior accumulated stress (*Heart Rate Variability vs. Heart Rate - Elite HRV*). The relation between HR and HRV can then certainly be viewed as inverse - when the HR increases, the HRV generally decreases and vice versa.

Heart rate variability is a result of rhythmic oscillation of the regulatory components of cardiac activity that essentially function to maintain cardiovascular homeostasis (Borell et al. 2007, 295). HRV emerges primarily through the additive activity that stems from the various branches of the autonomic nervous system (ANS), as seen in figure 4.6. The central nervous system (CNS) also participates in all

levels of cardiovascular regulation. An oscillatory curve, as seen in figure 4.6 is produced when consecutive R-R intervals or IBIs are plotted on a time scale (Borell et al. 2007, 295). The variance in the oscillation of the curve is the result of the rhythmic pulse of the various regulatory components, such as the Parasympathetic nervous system (PNS) and Sympathetic nervous system (SNS). The sinoatrial node (SN) is considered the pacemaker of the heart, meaning that it is the primary pulse generator for the heartbeats, which it does through electronic impulses in order to stimulate contractions in the heart. (Borell et al. 2007, 295).

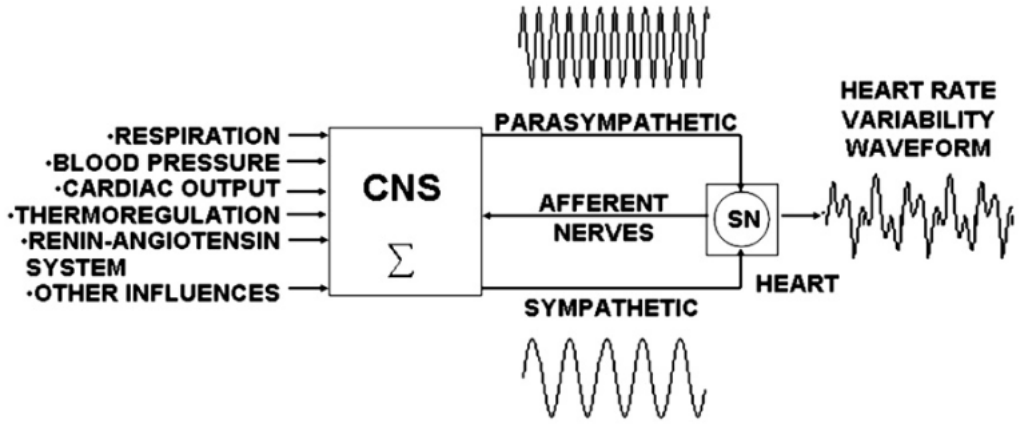


Figure 4.6: Model for the formation of HRV and the structure of cardiovascular control

The SN is under the control of the PNS and the SNS (Borell et al. 2007, 295). The relation between the various regulatory components can be seen simplified in figure 4.6 above.

4.2.4 Measurement of heart rate variability

This paragraph will elaborate upon the methods of measurement and analysis of HRV. Similarly, it will introduce which parameters and methods this study have elected to focus on.

Time domain methods

Various methods are used to evaluate the variations in heart rate. Among the simplest to analyse are the time domain methods ("European Heart Journal" 1996, 355). With these methods, it is possible to determine the heart rate at any time,

as well as the intervals of the various QRS complexes. Table 4.2 below and the information within was created from knowledge gathered from literature such as ("European Heart Journal" 1996) and (Shaffer and Ginsberg 2017), and it will aim to elaborate the methods used during analysis.

Parameter	Unit	Description
Mean R-R Interval	ms	Mean distance of all successive R-R intervals recorded
Average Heart rate	bpm	Average heart rate of subject during recording
Minimum Heart rate	bpm	Minimum heart rate achieved during recording
Maximum Heart rate	bpm	Maximum heart rate achieved during recording
RMSSD	ms	Root mean square of successive R-R intervals
NN50	count	The number of interval differences of successive R-R intervals greater than 50ms
PNN50	%	The proportion derived by dividing NN50 by the total number of R-R intervals

Table 4.2: Table of time domain methods

RMSSD

The root mean square of successive differences between normal heartbeats is obtained by firstly calculating each successive time difference between heartbeats in ms. Afterwards, each value is squared, and the result is then averaged before the square root of the total is obtained (Shaffer and Ginsberg 2017, 4). Researchers

consider the conventional minimum recording time to be five minutes (Shaffer and Ginsberg 2017, 4).

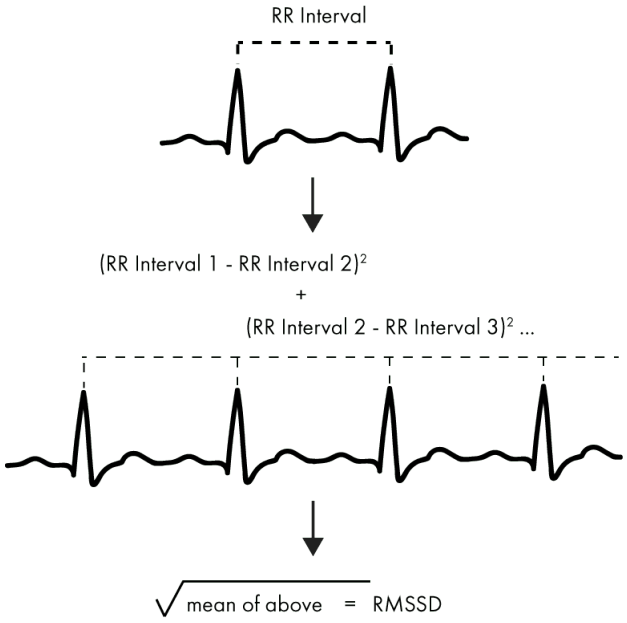


Figure 4.7: RMSSD walk-through

RMSSD reflects the beat-to-beat heart rate variance and is considered the primary time domain measure used to estimate the vagally mediated, which means changes associated with breathing and the PNS, reflected in HRV (Shaffer and Ginsberg 2017, 4).

Non-linear measurements

The complexity of the mechanics that manage and regulate HRV equates to a relationship between its variables that is non-linear in nature. Non-linearity essentially means that the relationship between variables cannot be plotted in a straight line - non-linear measurements attempt to index the unpredictability of a time series such as the one attained from measuring HRV (Shaffer and Ginsberg 2017, 6). A popular means of visualising non-linearity is the **Poincaré Plot**. The Poincaré plot is a geometric technique that is used to visualise the correlation between two successive and consecutive data points in a time series. It has been extensively used in the analysis of physiological fluctuations, such as heart rate variability analysis which has allowed its researchers to measure short- and long-term variability si-

multaneously yet separately (Struzik et al. 2019, 2). Furthermore, in the Poincaré plot, every R-R interval is visualised to the next adjacent R-R interval. The first RR interval (RR n) represents the x-coordinate, while the second interval (RR n+1) represents the y-coordinate (Mazhar B. Tayel 2015, 709). The rationale for using a Poincaré plot is that it allows researchers to visually search for patterns within a time series (Shaffer and Ginsberg 2017, 6). Below in figure 4.8 is an example of a Poincaré plot.

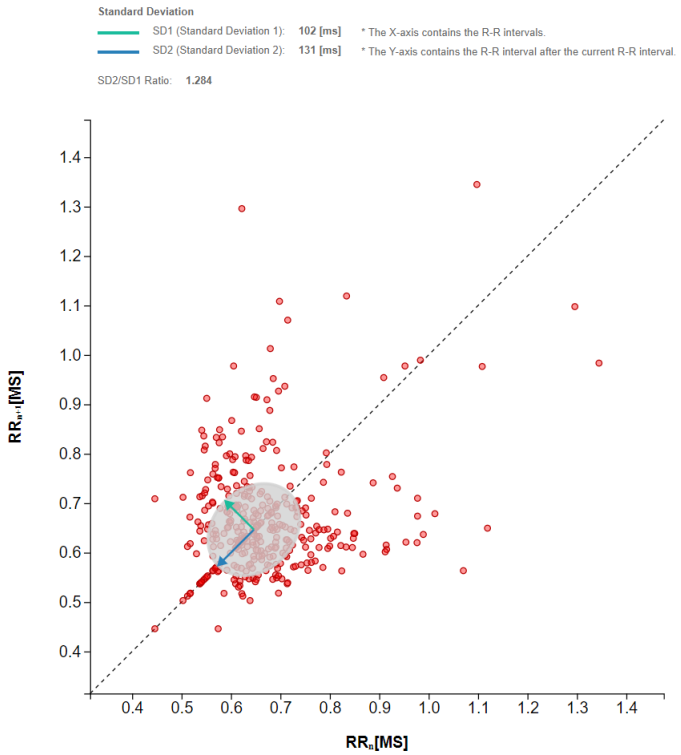


Figure 4.8: Poincaré of relaxed baseline

The Elite HRV web application, which will be elaborated on in further detail in the next chapter, can create a Poincaré plot from the recorded data as seen in figure 4.8. The red dots displayed in figure 4.8 represent the R-R intervals. An ellipse is fitted to the plotted points, which allows us to derive the following three non-linear measurements: S, SD1 and SD2 (Shaffer and Ginsberg 2017, 6).

Standard Deviation 1 (SD1)

SD1 is the standard deviation (SD) of the instantaneous beat-to-beat R-R interval variability (Mazhar B. Tayel 2015, 709). It represents the ellipse's width and is indicated in 4.8 with a green arrow. (Shaffer and Ginsberg 2017, 6). Furthermore, SD1 is identical to RMSSD in that it reflects short-term HRV. Short-term HRV refers to recordings of 30 minutes or less in contrast; long-term HRV is usually recorded over 24 hours. SD1 is the minor axis of the ellipse
it can be calculated as:

$$SD1 = \sqrt{var(x_1)}$$

Standard Deviation 2 (SD2)

SD2 is the standard deviation (SD) of the long term R-R interval variability (Mazhar B. Tayel 2015, 709). It represents the length of the ellipse and is indicated in 4.8 with a blue arrow (Shaffer and Ginsberg 2017, 6). SD2 is the major axis of the ellipse
It can be calculated as:

$$SD2 = \sqrt{var(x_2)}$$

Additionally, the ratio of SD1 and SD2 signifies the unpredictability of the R-R interval time set and is utilised to measure autonomic balance, which is the balance between the PNS and the SNS (Shaffer and Ginsberg 2017, 6). The total area of the ellipse represents the total HRV (S) which means that the larger the ellipse is, the higher HRV the subject has. It can be calculated as:

$$S = \pi * SD1 * SD2$$

Lastly, the X and Y-axis unit is milliseconds (ms). However, it can be unclear when, for instance, the x-axis ranges from 0.3ms to 0.8ms. We elected to contact the creators of the Elite HRV application, and they elaborated that "0.3 MS" should be understood as 300ms. So in figure 4.8 the X and Y-axis have a range upwards of 1300ms.

4.3 Data collection

This chapter will elaborate upon how we collected the data from the Polar H10 heart rate monitor (HRM) and which tools we used to analyse the data.

4.3.1 Technology applied

This section will briefly introduce the technology that this study has used, as well as the reason why the various technologies were deemed appropriate for use.

In order to gather the required HRV and HR data, we utilised the Polar H10 Heart-rate monitor (HRM) for Humans. However, the H10 HRM was not the first product we looked at. PetPace is a similar technology but made specifically for dogs. It would have been our preference to utilise this product; however, it was not available for European purchase for reasons unknown. The rationale for choosing a product which is meant for human use was due to the fact that Polar HRM products have previously been trialled and validated through numerous studies, which conclude that the products are accurately capturing HRV and HR measurements in dogs, pigs, horses and cows (Jonckheer-Sheehy, Vinke, and Ortolani 2012).

Furthermore, Polar advertise the H10 Heart-rate monitor for equestrian training, albeit with a larger strap than the one used for Humans due to the logical size difference; However, the technology remains the same. Additionally, as we deemed the choice of device for data gathering quintessential for the study, we contacted Polar to receive their input on the choice of device. During the correspondence, they suggested the H10 Heart-rate monitor would be the best available fit for the study; however, they noted that they themselves had not validated its use for dogs only for horses. External parties have used Polar's ECG technology in similar trials, such as in (Jonckheer-Sheehy, Vinke, and Ortolani 2012). Therefore we deem the technology appropriate for use in this study.

Figure 4.9: Polar H10 Heart rate monitor

In order to view the data collected by the Polar H10 Heart-rate monitor, there are several fitness applications, including their own Polar Flow and Polar Beat. However, those applications do not include functionality to analyse HRV; therefore, they do not fit the purpose of the study. Polar themselves suggested an application named Elite HRV, which is compatible with the H10 HRM. Elite HRV has a mobile app component along with a browser extension with additional analytical functionality included. The Elite HRV web application allows us to get an overview of the data the H10 HRM collects from the tests.

Chapter 5

Design Cycle

5.1 Experiment at Odder Veterinary Clinic

This section will briefly introduce Odder veterinary clinic and then elaborate on how and why we structured the experiment in the manner we did at Odder veterinary clinic.

Odder veterinary clinic dates back to the 1970s but only moved to the city of Odder in 1985, where it is also situated to this day. The clinic is contemporary and modern, and their equipment is always up to date. Their vision is to provide a holistic, attentive and safe treatment, as well as guidance for all their customers. The clinic values dialogue, comfort, care and professionalism to create the best possible foundation for the treatment of their patients. After completing our initial research and literature study, we looked for partners to collaborate with who could provide a platform for our experiment. Luckily, we made contact through a mutual relation with Odder veterinary clinic, who were thrilled to help and saw the value of this study by participating in interviews, as well as validating the results and the procedure of the experiment.

5.1.1 The nature of the experiment

This experiment aims to measure patients' stress at veterinary practices and clinics such as Odder veterinary clinic. Primarily, but not exclusively, it will focus on the stress patients are exposed to in the waiting room and during their time in the examination room. The experiment aims to reflect what a regular appointment at

a veterinary clinic looks like.

5.1.2 Gatherings from literature and expert assessments

The procedure for the experiment will be based on the knowledge gathered from the literature study, as well as the invaluable insight gained from the interviews with the staff and owner of Odder veterinary clinic through various interviews. Furthermore, it will also lend itself to the context of where the experiment is being conducted, which is at the veterinary clinic. The agenda of the experiment is twofold in that it aims to examine mainly two things. Primarily it is capturing and examining the stress that the patients at veterinary clinics are exposed to during their scheduled appointments. Secondarily, it also aims to measure some of the stress-reducing measures that the clinic has - mainly the stress-less room- to verify their effect.

5.1.3 What differentiates the stress-less room from a regular examination room?

While a typical examination room is very clinical and akin to what a regular hospital or clinic would look like, the stress-less room aims to be cosy and familiar by mirroring the appearance of a living room. In the examination room, the examination table is in the centre of the room, and the table itself can be a stressor for the patients if they have to be placed on it. Respondent 'V' also highlights this: *"yes it is often also the examination table they don't like"* (appendix A.3)(Andreasen and Pedersen 2022c, 707). In the stress-less room, the examination table is not the room's focal point; quite the contrary, it is hidden away in the corner of the room. Respondent 'V' elaborates: *"During consultations (in the examination room) the table is the focal point [...] in the stress-less room its all the way to the side so if there is a need for it you can pull it out otherwise during the examination the veterinarian sits on a pouffe stool and the owner sits in the couch with their pet"* (appendix A.3)(Andreasen and Pedersen 2022c, 700). The intent of the room is to change the setting of the examination from serious, formal and clinic - to something calm, relaxed and familiar it is not only aimed at the pet but also the owner as respondent 'V' adds: *"When the owner sits down in the couch their stress levels naturally decrease because its sort of homely and cozy [...] and that goes directly through the line down to their pet"* (appendix A.3)(Andreasen and Pedersen 2022c, 700). This correlates with what (Sundman et al. 2019) stated that dogs have a tendency to reflect their owners' levels of stress.

5.1.4 Duration of recordings

In order to capture the HRV of subjects optimally, specifically the short-term HRV, we have to record for at least five minutes and upwards of 30 minutes (Shaffer and Ginsberg 2017). However, because the study aims to record the full duration of an examination at the veterinary clinic, which also includes the time spent in the waiting room, the duration of each recording will vary in length. Some subjects spent less time in the waiting room than others, and others spent a longer time in the examination room. One of the main drawbacks of the varied duration of the recording is that one of the commonly used time-domain methods *the standard deviation of the RR interval* (**SDNN**), i.e. the square root of variance is not available for use("European Heart Journal" 1996, 355). This is due to SDNN not being a well-defined statistical quantity because of its inherent dependency on the length of the recording period ("European Heart Journal" 1996, 355). Therefore, it is generally deemed inappropriate to compare SDNN measures obtained from recordings of varying duration ("European Heart Journal" 1996, 355). Furthermore, the total variance of HRV generally increased with the length of the analysed recordings. ("European Heart Journal" 1996, 355).

5.1.5 What does a routine appointment look like at Odder Veterinary clinic?

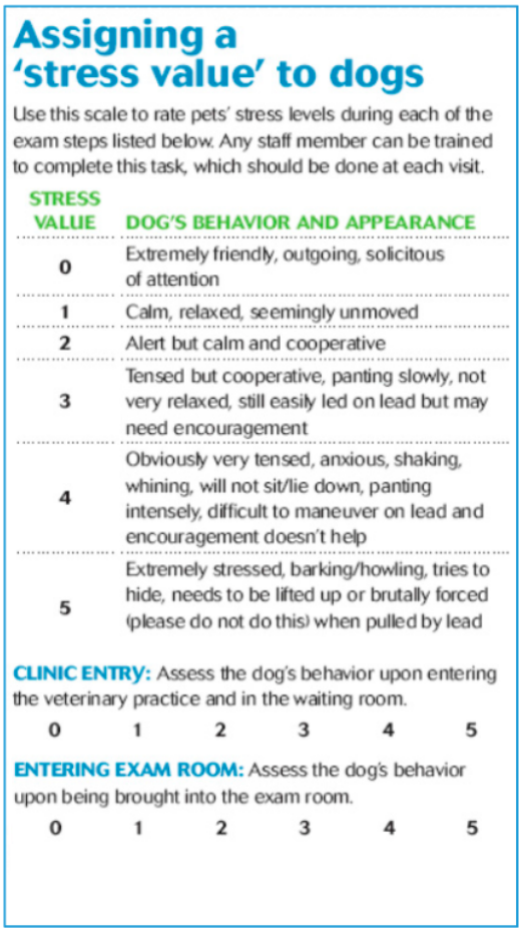
In order to accurately represent and simulate an entire appointment, we asked the respondents to walk us through the customer experience. Respondent 'J' responded: *"By far most customers have an appointment scheduled beforehand and then they bring their dog to when the appointment was scheduled. When they arrive (at the clinic) they go to the reception and check-in and afterwards they are directed by staff to wait in the waiting room until they are called upon"* (appendix A.3)(Andreasen and Pedersen 2022c, 662). This is the most common path for customers and, therefore, the approximate nature we desire to capture. However, respondent 'J' also mentions that if the owners have a particularly nervous or uneasy dog, they are allowed to wait outside in their cars until they are called in. Some patients may be redirected to the stress-less room rather than the standard examination room (appendix A.3)(Andreasen and Pedersen 2022c, 662).

5.1.6 Baseline recordings

In order to compare the data, we agreed with the expert opinion of respondent 'V' that it was essential to record the baselines of a dog that is relaxed and at home on the couch and one that is active, playing and running around (appendix A.3)(Andreasen and Pedersen 2022c, 978). Optimally, we would have been able to record a baseline for each subject; however, that would require a substantial amount of work, as well as having to enter the dog owners' home, which we could not do nor had the time for. Alternatively, we opted for recording baselines for a small dog (14 kgs or less) and a large dog (25kgs or more). The reasoning for this is due to our participants being of those sizes. The procedure for the baseline recordings will be elaborated in further detail in section 6.1.

5.1.7 Behavioural patterns related to stress

An important aspect of the experiment is correlating the HR and HRV data with the behavioural patterns that indicate stress. Respondent 'V' states: *"You should take note while your recording of the dog's behaviour when it is in the waiting room and during the consultation"* (appendix A.3)(Andreasen and Pedersen 2022c, 1111). In relation to this, we asked the respondents which behavioural patterns we should look out for the most, to which respondent 'V' replied: *"The dog will pant as in its breathing rapidly, it will be reluctant to accept treats and it can often drool substantially from the stress"* (appendixA.3)(Andreasen and Pedersen 2022c, 762). Furthermore, respondents 'J' and 'V' noted that the dogs could also have a tendency to tremble, seek out their owner, attempt to get away from the room, as well as cowering and whining (appendix A.3)(Andreasen and Pedersen 2022c, 764–769). (Lloyd 2017) which is mentioned in section 4.1.7 offers a dog stress scale where depending on the behaviour and appearance of the dog; it can be assigned a stress value from one-to-five



Assigning a 'stress value' to dogs

Use this scale to rate pets' stress levels during each of the exam steps listed below. Any staff member can be trained to complete this task, which should be done at each visit.

STRESS VALUE	DOG'S BEHAVIOR AND APPEARANCE
0	Extremely friendly, outgoing, solicitous of attention
1	Calm, relaxed, seemingly unmoved
2	Alert but calm and cooperative
3	Tensed but cooperative, panting slowly, not very relaxed, still easily led on lead but may need encouragement
4	Obviously very tensed, anxious, shaking, whining, will not sit/lie down, panting intensely, difficult to maneuver on lead and encouragement doesn't help
5	Extremely stressed, barking/howling, tries to hide, needs to be lifted up or brutally forced (please do not do this) when pulled by lead

CLINIC ENTRY: Assess the dog's behavior upon entering the veterinary practice and in the waiting room.

0 1 2 3 4 5

ENTERING EXAM ROOM: Assess the dog's behavior upon being brought into the exam room.

0 1 2 3 4 5

Figure 5.1: Janice K.F. Lloyd's Stress scale

Utilising the knowledge gained from the interviews and (Lloyd 2017) stress scale, we knew which behavioural patterns indicate stress and what to look out for during our observations. We wrote down the initial behaviour of the dog prior to clinic entry, and then per the stress scale, we noted the dog's behaviour upon entering the clinic and in the waiting room, as well as assessing the dog's behaviour when it was brought into the examination room. Per the stress scales advice, we then attributed a stress value to each subject according to their behaviour and appearance. Lastly, prior to clinic entry, we let the dogs acclimate to the Heart rate monitor and ensured they were not being harmed or impeded in any way by the equipment. Each subject was given a minimum of 30 seconds outside the clinic prior to entering.

5.1.8 How did we get participants?

In collaboration with Odder veterinary clinic, they made a post on their social media letting their customers know that this experiment was taking place, and if anyone wanted to participate, they were more than welcome. The social media post was met with great response from their customers, and many of them made themselves available for the experiment, indicating that the subject is intriguing for customers, as well as the clinic.

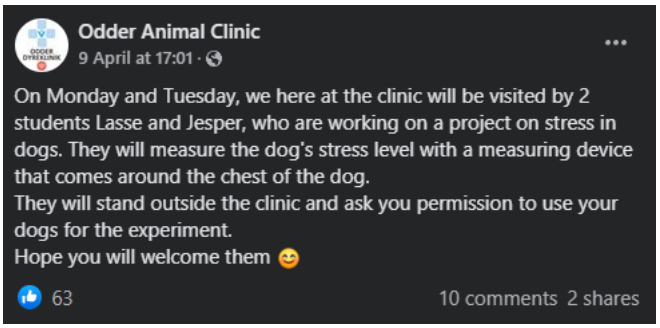


Figure 5.2: Social media post by Odder Veterinary Clinic

Furthermore, the owner of the clinic (respondent 'J') allowed and permitted us to ask any customers outside the clinic if they desired to participate in the experiment (appendix A.3)(Andreasen and Pedersen 2022c, 837). We did not exclude any particular breeds as we desired to get as many recordings as possible.

Chapter 6

Data Analysis

The following chapter will provide an overview of the data analysis conducted in this study. The data will be correlated with observations of the subject's behaviour during the consultations and their stay in the waiting room. All of the results have been validated and affirmed by a veterinary nurse with expertise in the field of animal behavioural science. Furthermore, the graphs generated are from the Elite HRV desktop application.

Abbreviation / Identifier	Elaboration
ER	A veterinary clinic examination room where the examination table is placed in the center of the room
SR	Stress-less room is also an examination room, however, it is created in a way that emulates a living room, which mimics the comfort of being at home. Here the examination table is not in the center of the room and examinations can occur in the couch of the room
M	Male Dog
F	Female Dog
Green Line	Illustrates the period of time the subject is in the waiting room in the HR graph
Blue line	Illustrates the period of time the subject is in examination room in the HR graph
Yellow line	Illustrates the period of time the subject is in the stress-less room in the HR graph
BSD	Small dog used for baseline (14kgs or less)
BLD	Large dog used for baseline (25kgs or more)
RBSD	Relaxed baseline for small dogs
ABSD	Active baseline for small dogs
RBLD	Relaxed baseline for large dogs
ABLD	Active baseline for large dogs

(1) Abbreviation / identifier

Parameter	Unit	Description
Mean R-R Interval	ms	Mean distance of all successive R-R intervals recorded
Average Heart rate	bpm	Average heart rate of subject during recording
Minimum Heart rate	bpm	Minimum heart rate achieved during recording
Maximum Heart rate	bpm	Maximum heart rate achieved during recording
RMSSD	ms	Root mean square of successive R-R intervals
NN50	count	The number of interval differences of successive R-R intervals greater than 50ms
PNN50	%	The proportion derived by dividing NN50 by the total number of R-R intervals

(2) Time-Domain parameters

Figure 6.1: Reading Guide for Data Analysis

Subject ID	Age	Breed	Sex	Breed Size	Examination room
BSD	1.5	Jack Russel terrier	M	Small	-
BLD	4	Golden retriever	F	Large	-
D6	0.67	Dalmatian	M	Large	SR
D10	1,5	Jack Russel Terrier	M	Small	ER
D7	2	Golden retriever	M	Large	SR
D5	3	Danish/swedish farmdog	M	Small	ER
D8	3	Bull Terrier	F	Small	ER
D9	3	Cocker spaniel	M	Small	ER
D4	5	Labrador	M	Large	ER
D1	7	Golden retriever	M	Large	ER
D3 *	10	Tibetan Spaniel	F	Small	ER
D2	11	Labrador F1	F	Large	ER

Table 6.1: Table of subjects information

6.1 Baseline measurements for small and large dogs in relaxed and active state

This section is utilised to create baseline data for dogs of various sizes. Since the subjects who participated in the experiment were either small breeds of dogs (14kgs or less) or larger breeds (25kgs or more), it was essential to create baselines for the two types of breed sizes because there is a generally a slight difference in HR and HRV parameters in relation to size. If any subjects were medium-sized breeds (More than 14kgs and less than 25kgs), there would have been recorded a baseline for that as well. Essentially, there are multiple reasons for creating the baselines. First and foremost, it provides insight into what the HR and HRV parameters look like in different emotional states, e.g. relaxed, calm at home in familiar settings and active, running around and playing with its owner. Secondly, it provides a reference point for comparison with the test subjects. For instance, a relaxed dog may have a mean R-R interval length of 700ms, an active dog may have a mean R-R interval length of 350ms and a test subject, in the context of being at a veterinary clinic, may have a mean R-R interval length of 400ms. It provides the possibility of comparing the various parameters with one another and enables us to find patterns. The thesis is that the subjects' HR, HRV parameters, et cetera will

*Subject D3 was ultimately a faulty reading, as the equipment could not be properly attached due to the size of the subject. Therefore, the heart-rate monitor disconnected several times during recording, hence the results could not be used for analysis.

mimic that of the active baselines more than the relaxed ones. This will provide evidence that suggests that the dogs are stressed during their visits to veterinary practices such as Odder veterinary clinic. Below in tables 6.2 and 6.3, it is possible to view and compare the results of the active and relaxed baseline to the results of the test subjects. In the following subsections 6.1.1, 6.1.2, 6.1.3 and 6.1.4 there is for each subsection a condensed page that summarises the various vital elements of the analysis. This format is consistent throughout the entirety of chapter 6. It is possible to see further details in the Appendix. Each page consists of the heart-rate graph for the recording, a table of the HRV parameters, a Poincaré plot and lastly, a textual description including observations of the subject's behaviour and comments about patterns seen in the HRV parameters and the Poincaré plot. In the test subject subsections, a stress value is also included based on the stress scale seen in figure 5.1. The subjects are attributed a stress value at three key points of the veterinary clinic. These three key points are:

1. Prior to clinic entry
2. Waiting room
3. Examination room

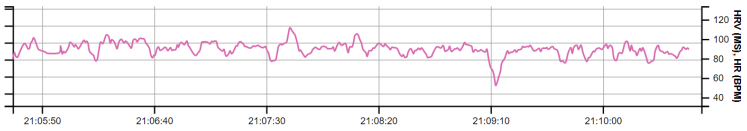
Subject ID	Age	Max HR	Average HR	Mean RR	RMSSD	NN50	PNN50
RBSD	1.5	135	89	670	127.78	256	63%
ABSD	1.5	235	173	346	79.32	116	18%
D10	1.5	236	152	395	31.28	198	10%
D5	3	236	119	583	142.5	1529	45%
D8	3	253	155	397	27.8	184	7%
D9	3	240	159	411	168.4	341	38%

Table 6.2: Table of results for small dogs

Subject ID	Age	Max HR	Average HR	Mean RR	RMSSD	NN50	PNN50
RBLD	4	145	86	697	79.74	239	55%
ABLD	4	185	130	460	20.31	20	4%
D6	0.67	235	145	442	154.7	419	12%
D7	2	235	104	610	187	505	25%
D4	5	237	139	495	224.5	167	55%
D1	7	235	116	578	258	352	34%
D2	11	225	114	539	38.49	116	13%

Table 6.3: Table of results for large dogs

6.1.1 Relaxed baseline recording for a small dog (RBSD)



(1) HR Graph for relaxed baseline

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	135
Average HR (BPM)	89
Mean RR (ms)	670
RMSSD (ms)	127.78
NN50 (count)	256
PNN50 (%)	63

(2) Time-domain parameters

Relaxed baseline recording for a small dog (RBSD)

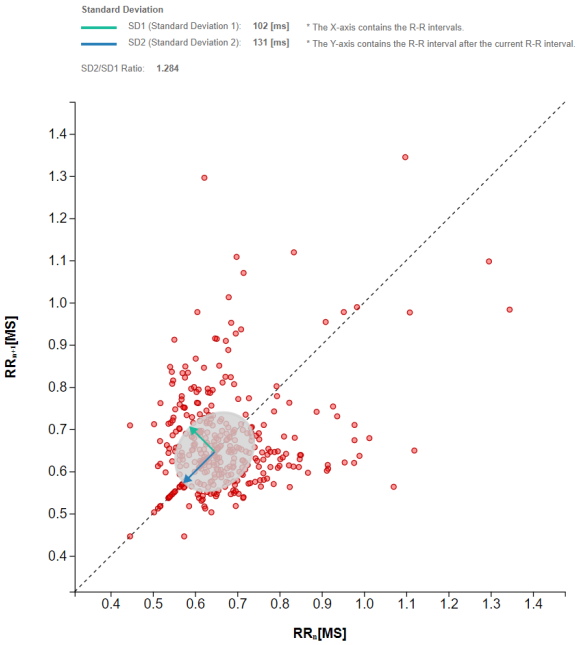
Recording duration:
5 minutes

Behaviour during recording
Recording is taken over a duration of 5 minutes, where the dog is sitting comfortably in a couch relaxing with its owner.

Measurements:
In a relaxed and calm state there are no major spikes in the heart rate and the maximum heart rate that the dog achieves during the recording is 135 BPM. Additionally, the average heart rate that was measured during the recording was 89 BPM. The mean R-R interval duration during the recording was 670ms. The count of NN50 is at 256 which highlights a large amount of successive R-R intervals with a length of over 50ms to the previous one. the subject's PNN50 value is at 63% furthering the indication that its HRV was high, due to there being a substantial proportion of successive R-R intervals with a length greater than 50ms to the previous one in the total amount of R-R intervals recorded.

Poincaré:
The Poincaré plot for the relaxed baseline for a small dog indicates great variance in the subjects HRV. This seen in how far apart the red dots are from one another. As previously mentioned in the subsection 4.2.3 the red dots represent the R-R intervals. The size of the ellipse which represents the total HRV is also very wide and long furthering the argument of great variance in the subjects HRV.

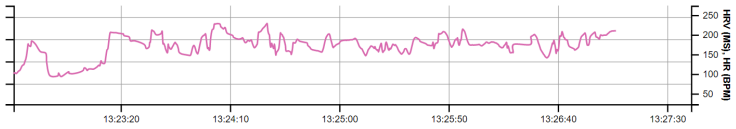
(3) Description of observations and values



(4) Poincaré plot

For further detail of the subject see Appendix A.6

6.1.2 Active baseline recording for a small dog (ABSD)



(5) HR Graph for Active baseline

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	235
Average HR (BPM)	173
Mean RR (ms)	346
RMSSD (ms)	79.32
NN50 (count)	116
PNN50 (%)	18

(6) Time-domain parameters

Active baseline recording for a small dog (ABSD)

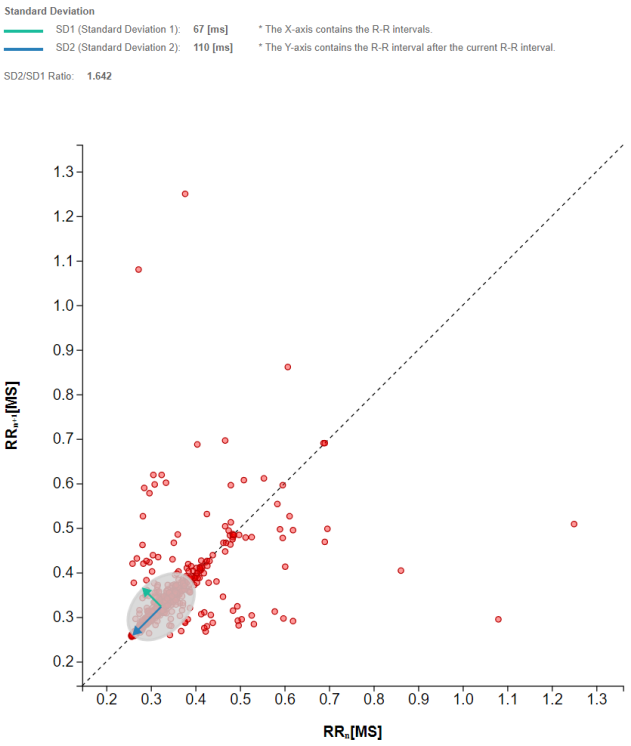
Recording duration:
5 minutes

Behaviour during recording
The active baseline recording is taken over a five minute duration and it establishes what the parameters look like when the dog is actively playing with its owner.

Measurements:
The max HR the Subject achieves during the recording is now 235 BPM which is 100 BPM more than the RBSD. Furthermore, the average HR is 173 BPM which amounts to a difference of 81 BPM. Additionally, the Mean R-R interval length is measured to be 346ms indicating that the subject is under stress. Stress on autonomic nervous system can also occur in the form of exercise this is similar to how other forms of stress are portrayed in the HRV recordings. The count of NN50 is 116 which is less than half of the NN50 count of the RBSD at 256. This indicates that there is less HRV with ABSD than the RBSD. This also points to the ABSD's ANS being exposed to stress. The PNN50 value of the subject is at 18% which is a substantially lower value than the RBSD PNN50 value which was at 63%. Furthering the indication that the ABSD has a substantially lower HRV than the RBSD.

Poincaré:
Figure 8 on the right shows the Poincaré plot for the active baseline for a small dog. It is evident that the red dots are far more closely connected than in the relaxed baseline for small dogs. It indicates that the subject's system is under some form of stress - in this context it is physical exertion.

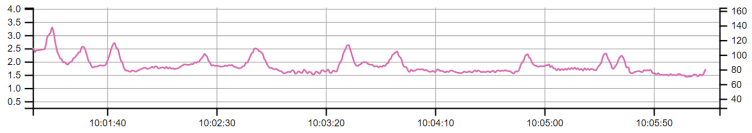
(7) Description of observations and values



(8) Poincaré plot

For further detail of the subject see Appendix A.7

6.1.3 Relaxed baseline recording for a large dog (RBLD)



(9) HR Graph for relaxed baseline

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	145
Average HR (BPM)	86
Mean RR (ms)	697
RMSSD (ms)	79.74
NN50 (count)	239
PNN50 (%)	55

(10) Time-domain parameters

Standard Deviation

SD1 (Standard Deviation 1): 57 [ms]

SD2 (Standard Deviation 2): 123 [ms]

SD2/SD1 Ratio: 2.158

* The X-axis contains the R-R intervals.

* The Y-axis contains the R-R interval after the current R-R interval.

Relaxed baseline recording for a large dog (RBLD)

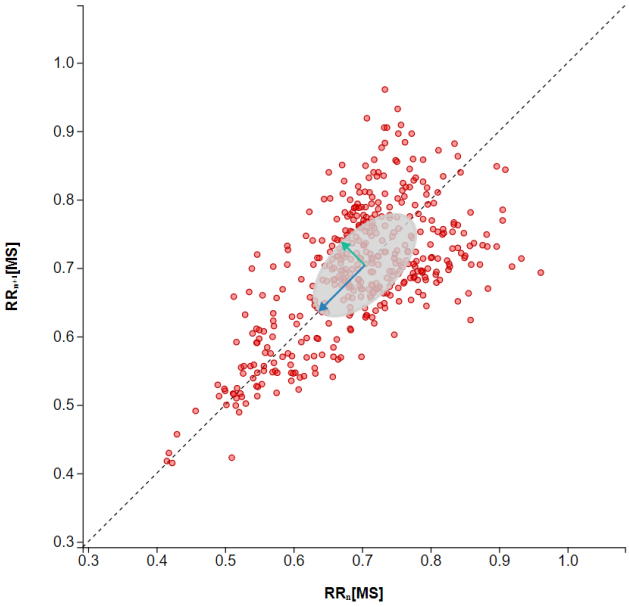
Recording duration:
5 minutes

Behaviour during recording
The active baseline recording is taken over a five minute duration and it establishes what the parameters look like when the dog is actively playing with its owner.

Measurements:
Recording for a large dog (RBLD) indicates that the subjects system was under no apparent stress. The subjects HR peaked at 145 BPM and it averaged 86 BPM during the recording. The mean R-R interval length was 697ms which was 27ms higher than the RBSD. The count of NN50 at 239 is similar to that of the RBSD at 256. The subjects PNN50 value was 55% slightly less than the RBSD's value at 63%. Nonetheless, it indicates great variance in its HR.

Poincaré:
Akin to the Poincaré plot for the small dogs relaxed baseline, the spread of the red dots indicates great variance in the subject and that the subject is in a relaxed state.

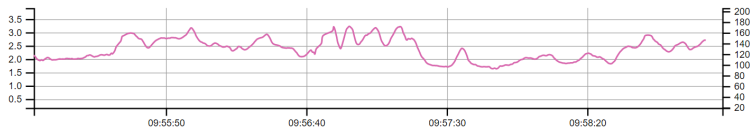
(11) Description of observations and values



(12) Poincaré plot

For further detail of the subject see Appendix A.8

6.1.4 Active baseline recording for a large dog (ABLD)



(13) HR Graph for active baseline

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	185
Average HR (BPM)	130
Mean RR (ms)	460
RMSSD (ms)	20.31
NN50 (count)	20
PNN50 (%)	4

(14) Time-domain parameters

Active baseline recording for a large dog (ABLD)

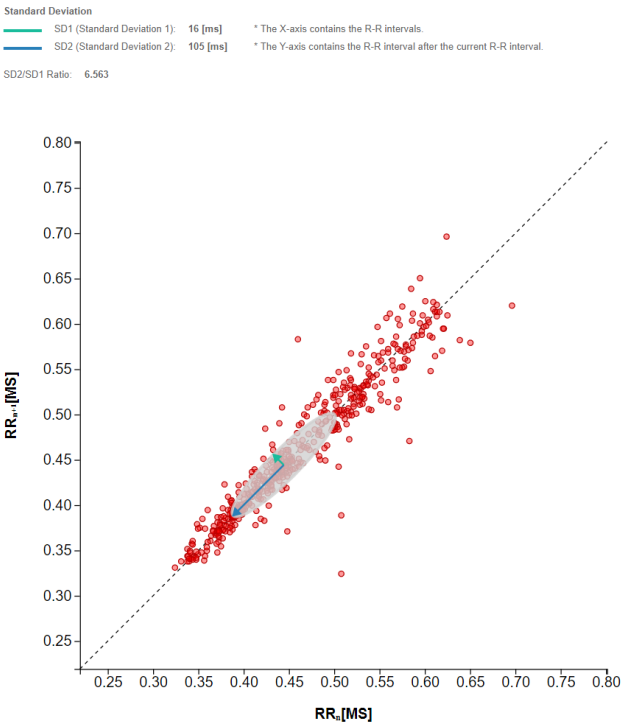
Recording duration:
5 minutes

Behaviour during recording
The active baseline recording is taken over a five-minute duration and it establishes what the parameters look like when the dog is actively playing with its owner.

Measurements:
The active baseline for a large dog (ABLD) shows an increase in max HR, average HR and the mean R-R length and a decrease in NN50 and PNN50 compared to the RBLD. The max HR is 185 BPM 40 BPM higher than the RBLD, the average HR is 130 BPM 44 BPM higher than the RBLD and the mean R-R length is 460ms 237ms less than the RBLD. There is a substantial difference in the NN50 count between the ABLD and the RBLD whereas the RBLD's count is at 239 the ABLD's count is merely at 20. This difference is further highlighted when looking at the PNN50 value where the difference is a staggering 41%. This underlines that the HRV of the ABLD is considerably lower than that of the RBLD and is an indicator of the ABLD's ANS being exposed to stress.

Poincaré:
Figure 16 on the right shows the Poincaré plot for the active baseline for a small dog. It is evident that the red dots are far more closely connected than in the relaxed baseline for small dogs. It indicates that the subject's system is under some form of stress - in this context it is physical exertion.

(15) Description of observations and values

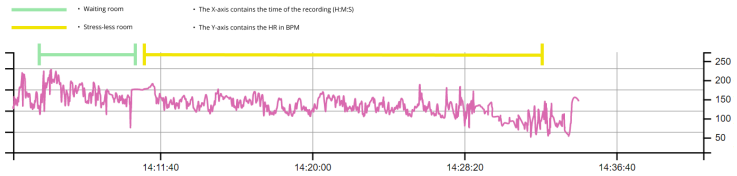


(16) Poincaré plot

For further detail of the subject see Appendix A.9

6.2 individual evaluation of all dogs

6.2.1 D6 - Dalmatian (Large dog) (Stress-less Room)



(17) HR Graph for D6

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	235
Average HR (BPM)	145
Mean RR (ms)	442
RMSSD (ms)	154.7
NN50 (count)	419
PNN50 (%)	12

(18) Time-domain parameters

D6 – Dalmatian

Subject information:
Subject D6 is a male Dalmatian and at the time of recording was merely eight months old. Puppies tend to have a higher average HR than older dogs (Ferasin, Ferasin, and Little 2010).

Observed Behaviour:

Prior to clinic entry
Prior to entering the clinic, the subject was extremely excited and it was difficult to keep the subject in place, mainly due to other dogs walking by which caused a reaction with the subject.

Waiting room
During the time in the waiting room the subject retained its excited nature, however, it also showed a modicum of panting. Furthermore, it was also barking at two other dogs. The time spent in the waiting room was five minutes, wherein the first two minutes the subject's demeanour had changed due to the interaction with the two other dogs which had required it to be kept still by its owner. This resulted in an increased level of anxiety and whining from the subject.

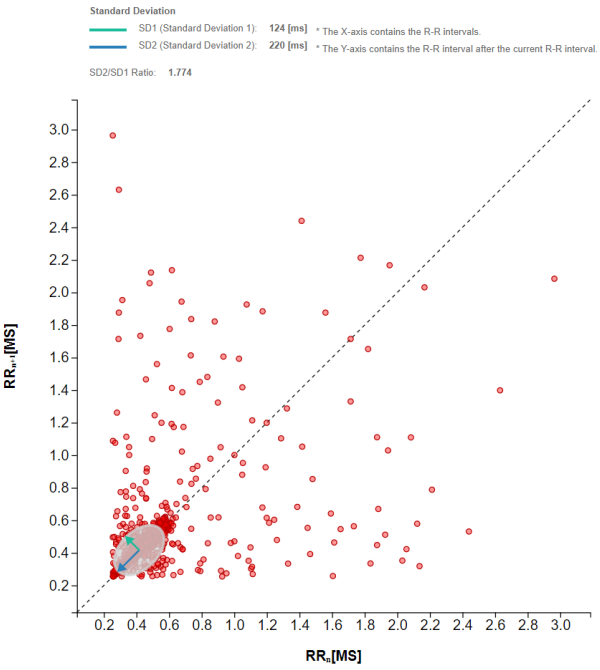
Stress-less room
The subject was under examination for 23 minutes in the stress-less examination room which had a significant effect on the behaviour of the subject, as well as the correlated data for that period of time. The subject appeared less anxious, and it was no longer whining. Furthermore, it accepted treats and both the owner and the subject appeared relaxed in the context of the SR.

Measurements:
Subject D6 was clearly stressed during its time in the waiting room with the data showing several spikes in heart reaching upwards to a maximum HR of 235 BPM. The average HR for the entirety of the recording was 145 BPM which differs from the relaxed baseline of 86 BPM. The mean R-R interval length of 442ms indicates that the subject was severely stressed as the variability of the heart rate is significantly lower than the relaxed baseline of 697ms constituting in a difference of 255ms.

Poincaré:
The Poincaré of D6 at face value looks peculiar. However, in actuality it displays that the subject had R-R intervals that were short in length likely from its time in the waiting room. It is evident from the HR graph, behaviour and HRV that it was relaxed when it was in the stress-less room.

Stress-value – Prior to clinic entry: 0-1
Stress-value – Waiting room: 3
Stress-value – Stress-less room: 1

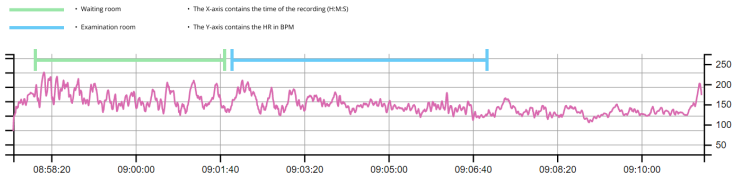
(19) Description of observations and values



(20) Poincaré plot

For further detail of the subject see Appendix A.15

6.2.2 D10 - Jack Russel Terrier (Small dog)



(21) HR Graph for D10

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	236
Average HR (BPM)	152
Mean RR (ms)	395
RMSSD (ms)	31.28
NN50 (count)	198
PNN50 (%)	10

(22) Time-domain parameters

D10 – Jack Russel Terrier

Subject information:
Subject D10 is a Jack Russel terrier and is a year and 6 months old.

Observed Behavior:

Prior to clinic entry
When equipping the heart rate monitor to the subject, it did not appear to show any signs of stress and was in a relaxed state prior entering the clinic

Waiting room
Upon entering the waiting room, the subject appeared reluctant, and the owner had to encourage it to move. This can be indicative of the subject being afraid of going into the waiting room. The subject was situated in the waiting room for approximately 3-4 minutes, where it was audibly panting, shaking and cowered close to its owner.

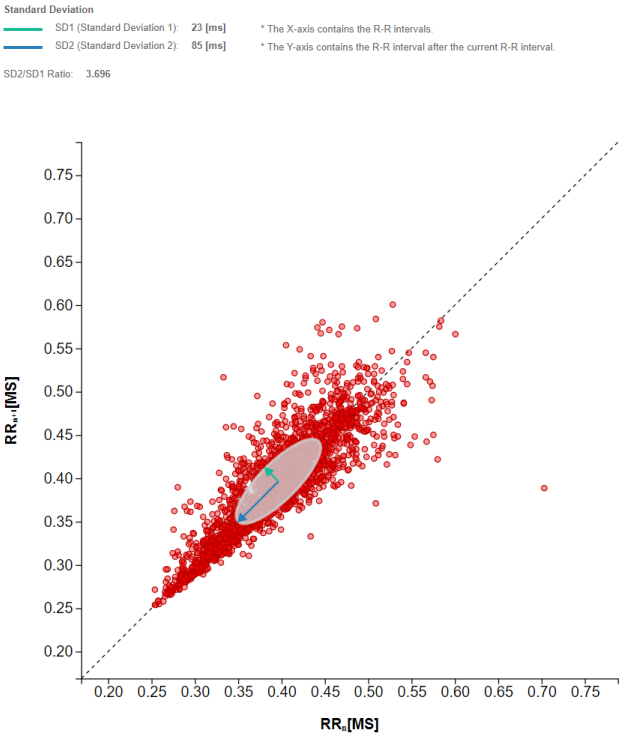
Examination room
During the examination, the subject's body was visibly shaking when it was to be put on the examination table. After the veterinarian had injected the subject with penicillin it began to relax.

Measurements:
The subject reached a maximum HR of 236 BPM a difference of 101 BPM from the RBSD at 135 BPM. Additionally, it was above the ABSD at 235 BPM during the time in the waiting room. Likewise, the data suggests that the examination table was a large stressor for the subject as it went above 230 BPM when put on it. It was also very reluctant to be placed on the examination table and it required the owner to lift it. The average HR during the whole recording was 152 BPM which is a substantial difference of 66 BPM on average compared to the RBSD at 89 BPM. The subjects Mean R-R interval length is 395ms, which indicates that the subject has been under a substantial amount of stress through various stressors during the recording. The length of the R-R intervals had a difference of 275ms compared to the RBSD at 670ms. the R-R interval is almost the same as ABSD at 346ms, which is indicating that the dog has been stressed during the whole recording.

Poincaré:
The Poincaré of D10 is similar to that of the ABSD seen in figure 8. The R-R intervals are closely knit together indicating less HRV. Furthermore, the X and Y axis values only go as far as 750ms with only very few R-R intervals in that range. Majority of the R-R intervals are in the range of 250ms to 550ms.

Stress value – Prior to clinic entry: 2
Stress value – Waiting room: 5
Stress value – Examination room: 4

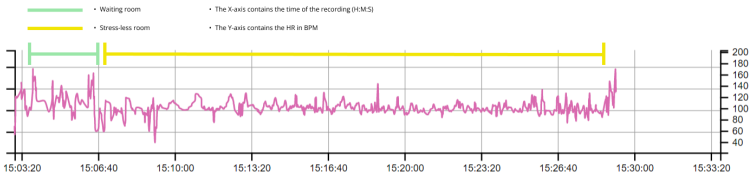
(23) Description of observations and values



(24) Poincaré plot

For further detail of the subject see Appendix A.19

6.2.3 D7 - Golden retriever (Large dog) (Stress-less room)



(25) HR Graph for D7

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	235
Average HR (BPM)	104
Mean RR (ms)	610
RMSSD (ms)	187
NN50 (count)	505
PNN50 (%)	25

(26) Time-domain parameters

D7 – Golden Retriever

Subject information:
Subject D7 is a male Golden Retriever at the age of two.

Observed Behaviour:

Prior to clinic entry
Before attaching the heart rate monitor to subject D7 it appeared excited and it was vocalising a substantial amount. The owner informed us that before attaching the equipment she was going to walk the dog around the place, because when the subject was a puppy, it was attacked so it had difficulties with other dogs. Prior to entering the waiting room, the subject was happily accepting treats which indicates the dog was comfortable outside

Waiting room
It was evident that the waiting room was a significant stress trigger for the subject as it spiked numerous times upwards of 200 BPM. It was also very close or behind the owner majority of the time in the waiting room which it was situated in for approximately three minutes.

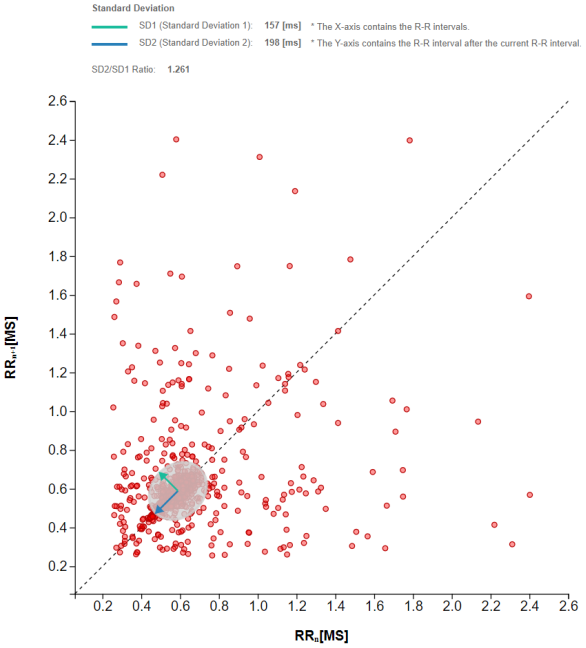
Stress-less room
The familiarity and calming atmosphere of the SR had a significant effect on the behaviour of the subject. it immediately jumped in the couch and laid down and began accepting treats again which it had been reluctant to accept in the waiting room. The data also suggests that the SR had a significant impact on the subject as its HR remained mostly within the range of 80-120 BPM.

Measurements:
Ultimately, the subject experienced periods of distress and stress but the SR helped considerably. This is reflected in the Mean R-R interval length of 610ms which is only 60ms less than the relaxed recording of 670ms. However, the recording suggests the subject achieved a peak HR of 235 BPM resulting in a difference of 90 BPM compared to the RBLD and 50 BPM above the ABLD.

Poincaré:
The Poincaré of D7 reflects the observations and analysis of the subject's behaviour and HR graph. Akin to the Poincaré of D6 seen in figure 36 it depicts a subject that was stressed initially but shows great variance towards the end.

Stress-value – Prior to clinic entry: 0-1
Stress-value – Waiting room: 3
Stress-value – Stressless room: 1

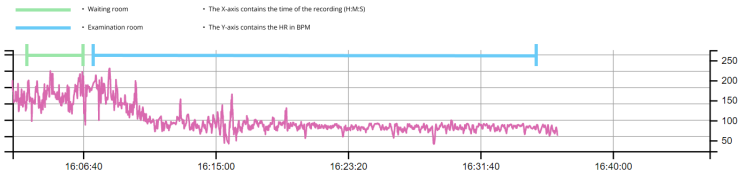
(27) Description of observations and values



(28) Poincaré plot

For further detail of the subject see Appendix A.16

6.2.4 D5 - Danish/Swedish Farmdog (Small dog)



(29) HR Graph for D5

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	236
Average HR (BPM)	119
Mean RR (ms)	583
RMSSD (ms)	142.5
NN50 (count)	1529
PNN50 (%)	45

(30) Time-domain parameters

D5 – Danish/Swedish Farmdog

Subject information:
Subject D5 is a male Danish/Swedish Farmdog at the age of three.

Observed Behaviour:
This recording is unique in that the subject was anaesthetised which is evident in the HR graph.

Prior to clinic entry
Prior to entering the clinic it was evident that the subject was uncomfortable, anxious, tense and shaking.

Waiting room
Upon entry to the clinic and into the waiting room it continued the behaviour observed outside of the clinic, however, it seemed increasingly anxious and tense. it was also visibly shaking and alternating between whining and barking, as well as attempting to hide and cower close to its owner. The subject attempted to stay as far away as it possibly could from the other dogs present in the waiting room.

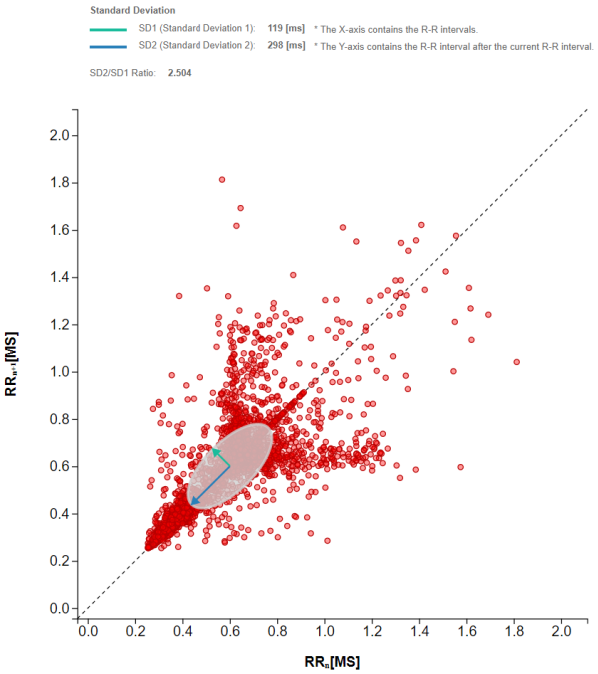
Examination room
When it was the turn of the owner and the subject to enter the examination room the owner was forced to lift the subject due to its reluctance to move on its own. The first few HR spikes during the examination room happens when the anaesthesia is applied whereby after its HR slowly reduces minute by minute. Subject D5 was evidently severely affected and stressed.

Measurements:
According to the data both the waiting room and the examination room were stressors. The maximum HR of 236 BPM is well above the RBSD at 135 BPM and almost equal to the ABSD at 235 BPM. The average HR of the recording was 119 BPM which on average is 27 BPM lower than the RBSD. The mean R-R interval length at 583ms suggests the subject over the full length of the recording was not overtly stressed. The difference in the length of the R-R intervals between the subject and the RBSD and ABSD was 87ms and 237ms respectively. the count of NN50 is an outlier in comparison to the rest of the subjects due to the length of the recording.

Poincaré:
The Poincaré plot for D5 is intriguing in the sense that it is evident that the subject was both stressed and relaxed due to the anaesthesia during the recording.

Stress-value – Prior to clinic entry: 4
Stress-value – Waiting room: 5
Stress-value – Examination room: 5

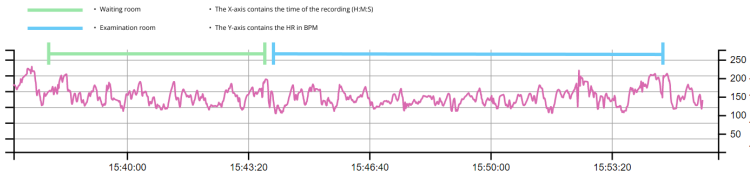
(31) Description of observations and values



(32) Poincaré plot

For further detail of the subject see Appendix A.14

6.2.5 D8 - Bull Terrier (Small dog)



(33) HR Graph for D8

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	253
Average HR (BPM)	155
Mean RR (ms)	397
RMSSD (ms)	27.8
NN50 (count)	184
PNN50 (%)	7

(34) Time-domain parameters

D8 – Bull Terrier

Subject information:
Subject D8 is a female Bull terrier at the age of three.

Observed Behaviour:

Prior to clinic entry
It was evident that the subject was particularly nervous heading into its appointment. Prior to entering the clinic, it was visibly drooling and panting audibly growling and vocalising.

Waiting room
The subject was given a couple of minutes before entering the waiting room to settle itself, but it was evident both from its behaviour and the data that the subject was very anxious. It was quickly searching for a corner to hide in. There were three other dogs present in the waiting room and it was frequently barked at causing it various difficulties in settling in and finding its own space in the waiting room. The subject endured a fairly long wait in the waiting room approximately five and a half minutes

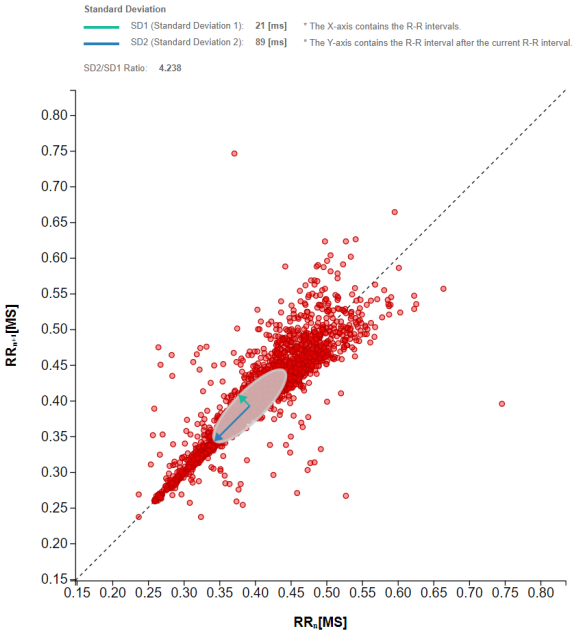
Examination room
The examination room appeared to be a similar experience for the subject as the waiting room was. It found it difficult to relax and keep calm throughout the entirety of the examination. It was shaking, drooling, and whining substantially. The examination lasted close to 13 minutes.

Measurements:
It is evident that the both the waiting room and the examination room were major stressors for the subject as its average heart rate was 155 BPM and it reached a peak of 253 BPM a difference compared to the RBSD of 63 BPM and 118 BPM, respectively. The subjects Mean R-R length of 397ms also underlines the considerable stress that it endured during the recording. The subjects mean R-R length of 397ms is also very close to the ABSD at 346ms and differentiates from the RBSD recording by 273ms. The subjects PNN50 at 7% also suggests very little variance in its HR which points to the subject being exposed to stress. The subject did not experience any singular stress trigger but experienced several throughout the recording. The waiting room, as well as the examination room appear to be triggers of stress.

Poincaré:
The Poincaré of D8 is very akin to what we see in the Poincaré for the ABSD seen in figure 8. The R-R intervals are intertwined and very closely situated in the plot except for a few outliers.

Stress-value – Prior to clinic entry: 4
Stress-value – Waiting room: 5
Stress-value – Examination room: 5

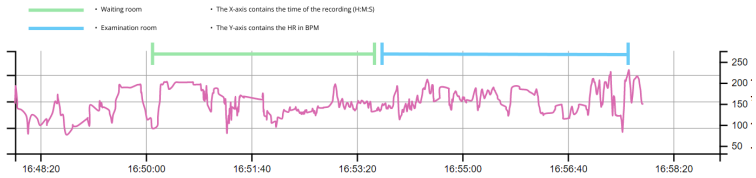
(35) Description of observations and values



(36) Poincaré plot

For further detail of the subject see Appendix A.17

6.2.6 D9 - Cocker Spaniel (Small dog)



(37) HR Graph for D9

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	240
Average HR (BPM)	159
Mean RR (ms)	411
RMSSD (ms)	168.4
NN50 (count)	341
PNN50 (%)	38

(38) Time-domain parameters

D9 – Cocker Spaniel

Subject information:
Subject D9 was a male cocker spaniel at the age of three.

Observed Behaviour:

Prior to clinic entry
The subject appeared content and it was accepting treats as it was being equipped with the Heart rate monitor. Due to the number of other patients and owners in the waiting room the owner elected to wait outside of the clinic for the waiting room to be less occupied by other occupants. They waited around two and a half minutes before entering the waiting room

Waiting room
Upon entering the waiting room, the demeanour of the subject changed drastically as there were still several dogs in the waiting room at the time which caused a commotion with barking, whining, and panting.

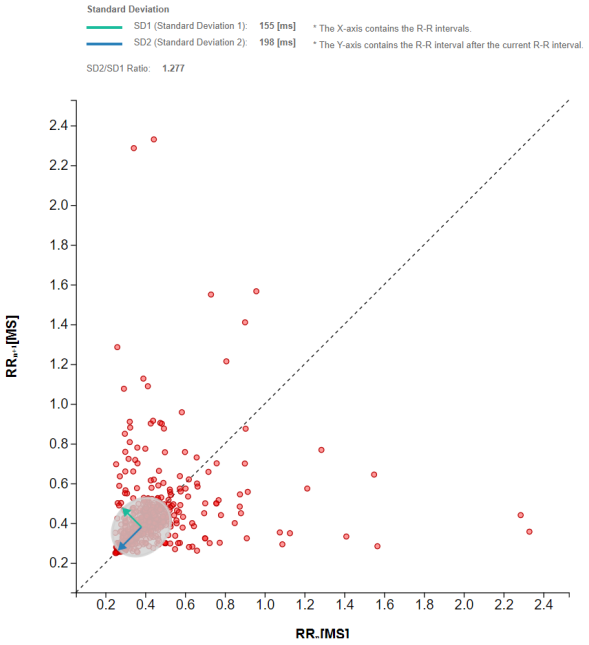
Examination room
The subject is placed on the examination table which it appears anxious to be placed on. The data also indicates that the subject operates in a heart rate range of 150-200 BPM while being in the examination room.

Measurements:
The data for subject D9 suggests that the waiting room and particularly the examination table in the examination room is a stressor. During the recording the subject reaches a maximum HR of 240 BPM a difference of 105 BPM from the RBSD at 135 and very close to the ABSD at 235 BPM. Additionally, it averages 159 BPM throughout the entire recording a substantial difference of 67 BPM on average compared to the RBSD at 89 BPM. The subjects Mean R-R interval length is 411ms indicating that the subject experienced a significant amount of stress during substantial portions of the recording. The length of the R-R interval recorded had a difference of 259ms compared to the RBSD at 670ms. Furthermore, the subjects R-R interval length was only 65ms from the ABSD at 346ms.

Poincaré:
The Poincaré plot for D9 has several R-R intervals in the range of 300ms to 600ms and a few outliers close to 2400ms. Generally, the R-R intervals are closely situated suggesting less HRV.

Stress-value – Prior to clinic entry: 1
Stress-value – Waiting room: 3
Stress-value – Examination room: 4

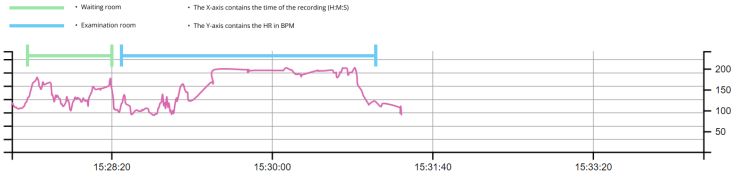
(39) Description of observations and values



(40) Poincaré plot

For further detail of the subject see Appendix A.18

6.2.7 D4 - Labrador (Large dog)



(41) HR Graph for D4

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	237
Average HR (BPM)	139
Mean RR (ms)	595
RMSSD (ms)	242.5
NN50 (count)	167
PNN50 (%)	55

(42) Time-domain parameters

D4 – Labrador

Subject information:
Subject D4 is a male Labrador at the age of five.

Observed Behaviour:

Prior to clinic entry
First observations prior to clinic entry indicate that the subject was effervescent and tense.

Waiting room
The subject had retained the behaviour observed prior to clinic entry as it went into the waiting room, where it sat with its owner for one and a half minutes. There were no other dogs present in the waiting room at the time, however, despite this the subject was still tense, it was panting, and alert and it required encouragement from its owner.

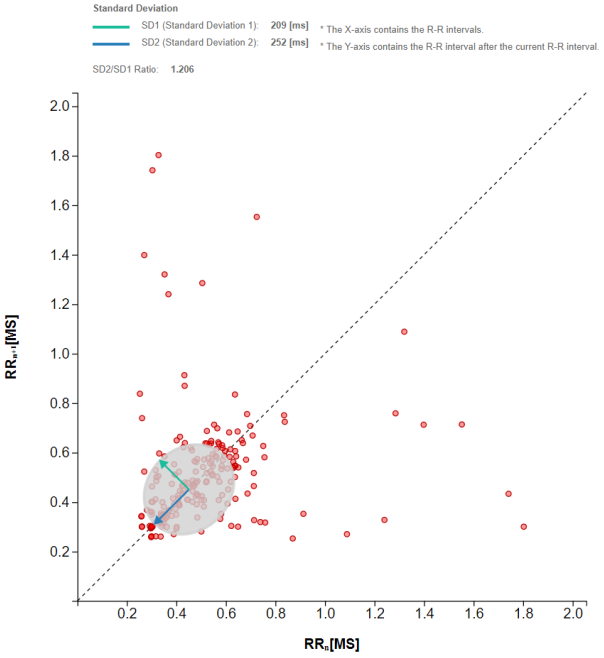
Examination room
When the owner and the subject was called into the examination room its heart rate spiked again, but subsequently lowered upon entering the examination room. Prior to the veterinarian joining them, the examination room itself did not appear to be stressful for the subject, however, when the veterinarian requested that the dog be put on the examination table the dog was reluctant to go. It began whining and it was difficult for the veterinarian to approach the subject.

Measurements:
The HR graph shows that during the majority of the examination its HR remained at 200 BPM or above. On average the subject's HR was 139 BPM 53 BPM higher on average than the RBLD and remarkably close to the average HR of the ABLD at 130 BPM. During its time in the examination room the subject's HR reached 237 BPM which amounts to 92 BPM higher than the maximum HR of the RBLD at 145 and 52 BPM higher than the ABLD at 185 BPM. The mean R-R interval length of 495ms suggests that the subject was under a substantial amount of stress during the recording. However, the PNN50 value of 55% is equal to that of the RBLD.

Poincaré:
The Poincaré plot for D4 suggests great variance in its HR. This is evident from the size of the ellipse which is akin to the RBSD seen in figure 4. Furthermore, the red dots are generally spread far apart some of them reaching as high as above 1800ms.

Stress-value – Prior to clinic entry: 3
Stress-value – Waiting room: 3
Stress-value – Examination room: 4

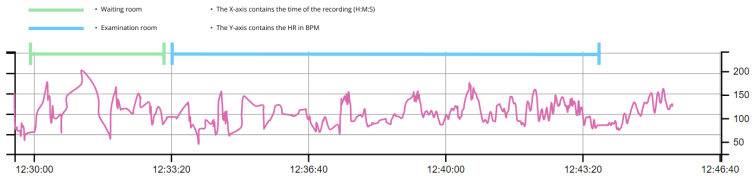
(43) Description of observations and values



(44) Poincaré plot

For further detail of the subject see Appendix A.13

6.2.8 D1 - Golden Retriever (Large dog)



(45) HR Graph for D1

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	235
Average HR (BPM)	116
Mean RR (ms)	578
RMSSD (ms)	258
NN50 (count)	352
PNN50 (%)	34

(46) Time-domain parameters

D1 – Golden Retriever

Subject information:
Subject D1 was a male Golden Retriever at the age of 7 years old.

Observed Behaviour:

Prior to clinic entry
Prior to equipping the heart rate monitor outside the clinic, the subject appeared relatively passive, slightly tense but still cooperative.

Waiting room
The subject was situated in the waiting room for approximately three minutes, during the time in the waiting room the dog appeared more nervous and started cowering behind its owner, as well as barking at another dog in the waiting room. The data also suggests that during the subject's time in the waiting room its HR spiked several times peaking over 200 BPM

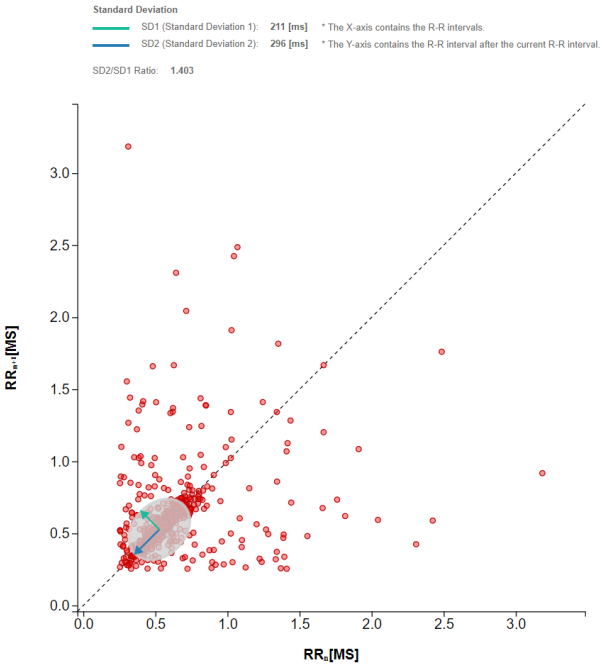
Examination room
Through its period in the examination room the subject appeared less nervous and tense. The data also indicates that the waiting room was a larger stress trigger than the examination itself according to the HR graph.

Measurements:
During the period of time the subject spent in the examination room it never reached above 180 BPM. During the period of time the subject spent in the waiting room its HR reached a peak of 235 BPM which corresponds to 50 BPM more than the relaxed baseline for a large dog (RBLD). The mean R-R interval of 578ms suggests that the subject was either capable of handling stress sufficiently or that it over the course of the recording was not under too much stress. The PNN50 value of 34% also suggests a decent HRV with the subject placing it close to the RBLD at 55%.

Poincaré:
The Poincaré of D1 looks like an intermediate between the RBLD and the ABLD seen in figures 12 & 16 respectively. This is due to the Poincaré of D1 portraying numerous R-R intervals close to one another but also some which have a great distance between them.

Stress-value – Prior to clinic entry: 3
Stress-value – Waiting room: 4
Stress-value – Examination room: 2-3

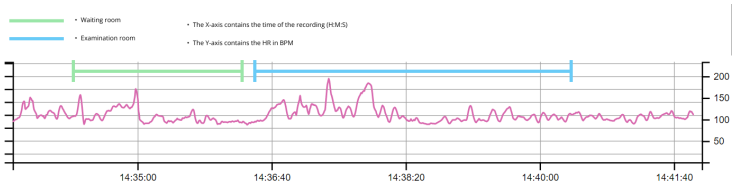
(47) Description of observations and values



(48) Poincaré plot

For further detail of the subject see Appendix A.11

6.2.9 D2 - Labrador Formula 1 (Large dog)



(49) HR Graph for D2

Time Domain Parameter	Result
Maximum Heart-rate (BPM)	225
Average HR (BPM)	114
Mean RR (ms)	539
RMSSD (ms)	38.49
NN50 (count)	116
PNN50 (%)	13

(50) Time-domain parameters

D2 – Labrador Formula 1

Subject information:
Subject D2 is a female Labrador Formula 1 at the age of 11.

Observed Behaviour:

Prior to clinic entry
At the time of equipping the dog with the heart rate monitor it portrayed a slightly uneasy and protective nature. The subject remained outside for a small span of time to ensure that it was ready to enter the clinic. Prior to entry, the subject's behaviour was akin to a stress value of 2.

Waiting room
The subject was situated in the waiting room, for approximately two minutes and during this period of time the subject showed to a lesser extent the protective and uneasy nature that it had previously exhibited.

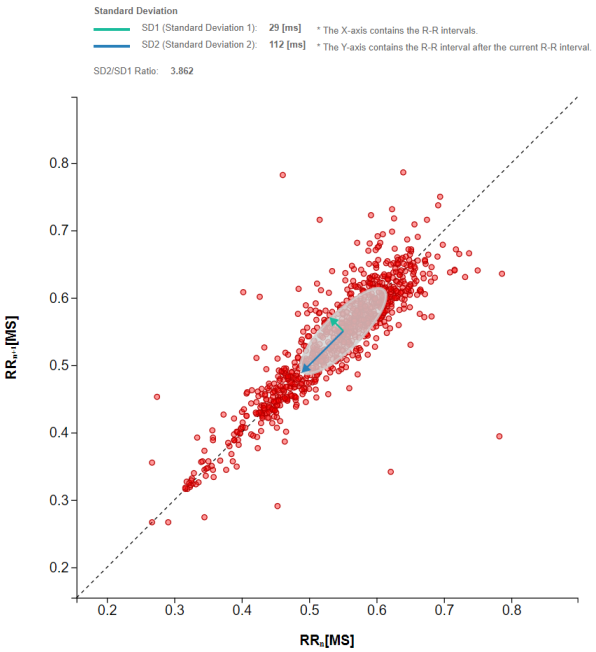
Examination room
As the subject entered the examination room it began exhibiting behavioural patterns related to stress such as heavy panting and whining. The examination lasted approximately five minutes and the veterinarian recognized that the subject was uneasy and anxious and, in an attempt, to remedy the situation he gave the subject treats which after some reluctance the subject accepted. This appeared to cause the subject to be more comfortable, less anxious and it was panting less.

Measurements:
The average HR throughout the recording was 114 BPM, which is 28 BPM on average higher than the RBLD and 16 BPM less on average than the ABLD. The Mean R-R interval of 539ms suggests. that the dog was subjected to a modicum of stress but nothing too severe as it felt increasingly comfortable as the examination progressed placing it somewhere between the mean R-R interval length of the RBLD and the ABLD which had values of 697ms and 460ms, respectively. The PNN50 value of 13% suggests that it did not have a high proportion of successive R-R intervals in the total amount of R-R intervals recorded with a length greater than 50ms.

Poincaré:
The Poincaré plot for D2 is similar to the Poincaré plot of the ABLD seen in figure 16. The ellipse is very narrow which is evident of a lower HRV. Furthermore, the red dots are closely spread between one another aside from a few outliers.

Stress-value – Prior to clinic entry: 2
Stress-value – Waiting room: 2
Stress-value – Examination room: 4

(51) Description of observations and values

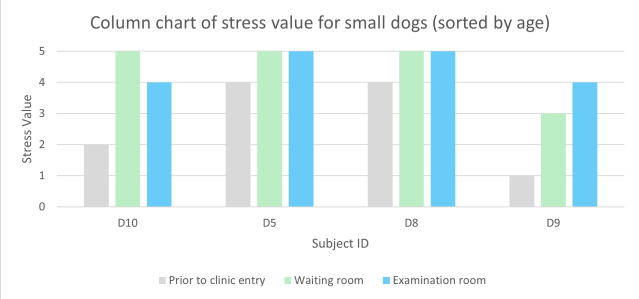


(52) Poincaré plot

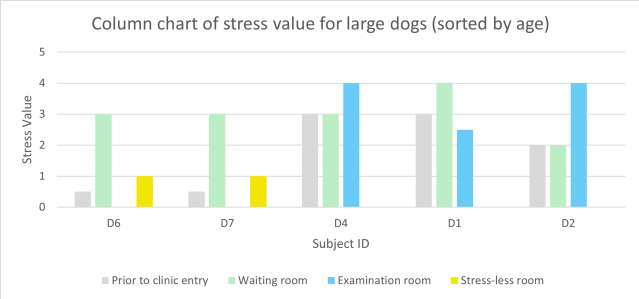
For further detail of the subject see Appendix A.12

6.2.10 Visualisation of data

This section aims to visualise the data that has been gathered, as well as comment on the outliers and trends that can be seen. In the various scatter plots, the relaxed and active baselines are indicated with a green and red colour, respectively. The subjects are indicated with a blue colour. Furthermore, a column chart of the stress values has been included to show at which stages the subjects appeared most stressed according to their behaviour.



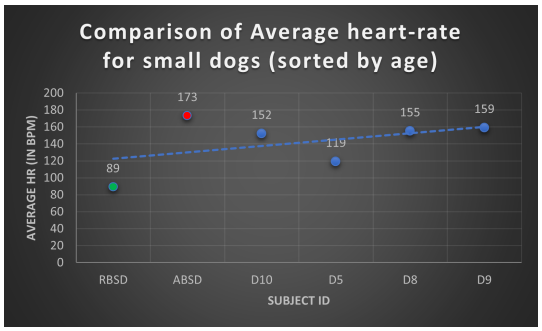
(53) Stress value for Small dogs



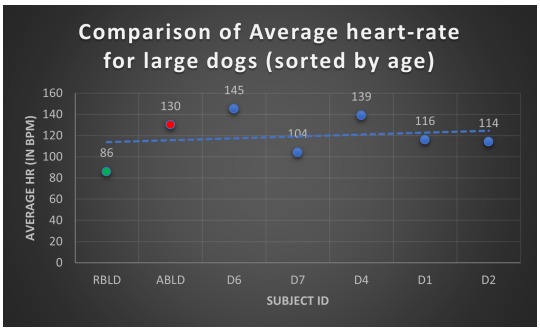
(54) Stress value for large dogs

Figure 6.2: Column charts of stress values

From the column chart above in figure 6.2 it is evident that all subjects experienced a stress value of at least 3 except for subject D2 who had a stress value of 2. Additionally, all subjects stress value increased from prior to clinic to entry to when they entered the waiting room. Only Subject D1 ended their examination with a stress value lower than what they initially had prior to clinic entry. Intriguingly, both subject D6 and D7 who were in the stress-less room had their stress value significantly decreased.



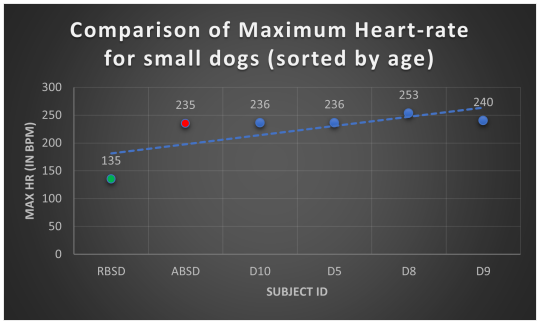
(1) Average HR for small dogs



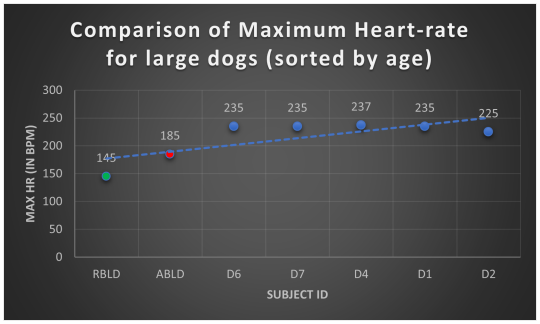
(2) Average HR for large dogs

Figure 6.3: Scatter plots of average Heart rate (HR)

The scatter-plot graph for the average HR seen above in figure 6.3 shows that every subject experienced a higher average HR than both the relaxed and active baselines regardless of the size. The average HR of all the large breed subjects (D1, D2, D4, D6, D7) was 123,6 BPM, almost equivalent to the ABLD at 130 BPM. The average HR of all the small breed subjects (D5, D8, D9, D10) was 146,25 BPM. A difference of 23,35 BPM on average is in accordance with the aforementioned fact that smaller dogs tend to have a higher average HR. Furthermore, the average HR of the smaller breeds also generally puts them closer to the ABSD except for subject D5, whose results were lower due to the effect of the anaesthesia. Subject D7 was the subject closest to its respective relaxed baseline; however, it was also in the Stress-less room, adding merit to completing the examinations in the SR. Subjects D4, D5, D7, and D8 are all considerably close to the average HR of their respective active baseline. In contrast, subjects D1, D2, D4, and D9 are all in the range of 30-40 BPM above their respective relaxed baseline and 20-60 BPM from their respective active baseline.



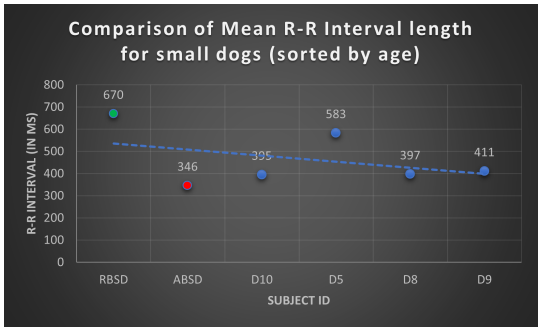
(1) Max HR for small dogs



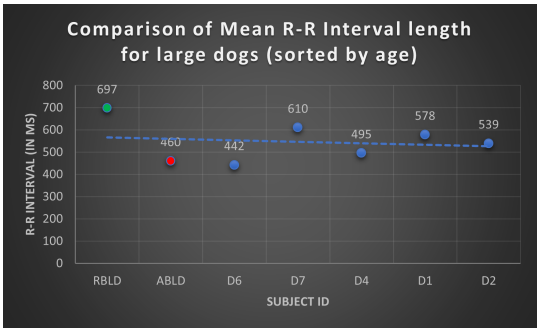
(2) Max HR for large dogs

Figure 6.4: Scatter plots of max Heart rate (HR)

The scatter-plot graph for the maximum HR recordings seen above in figure 6.4 indicates that every subject during their consultation at the veterinary clinic experienced a heart rate that peaked similarly to the ABSD regardless of the size of the breed. The large gap between the relaxed baselines and the rest of the recordings highlights the heightened heart rate and stress the subjects were exposed to at times during the consultations at the veterinary clinics. Furthermore, subjects D1, D6, and D7 all had maximum HR values equivalent to the ABSD, whilst subjects D4, D5, D5, D8, D9, and D10 were all above the ABSD and ABLD. Subject D8 was the one highest above the ABSD by 18 BPM. All the subjects were consequentially 90-100 BPM above the maximum heart rate achieved by the relaxed baselines regardless of the breed's size.



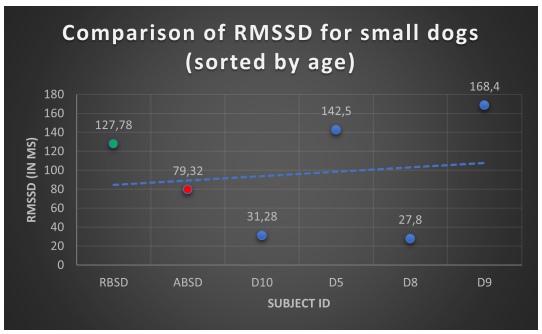
(1) Mean R-R for small dogs



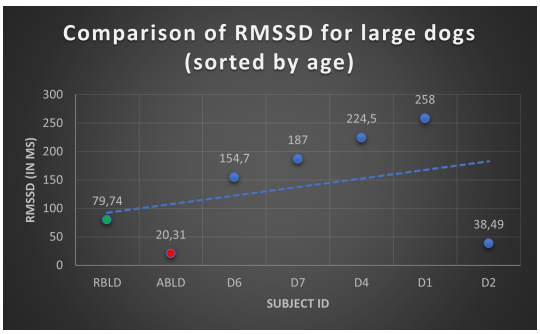
(2) Mean R-R for large dogs

Figure 6.5: Scatter plots of Mean R-R interval length

The scatter-plot for the Mean R-R interval graph seen above in figure 6.5 suggests that every subject had less HRV than their respective relaxed baselines. Additionally, The tendency lines downward trajectory furthers the indication that all subjects endured stress to varying degrees. Subjects D4 and D6 were considerably close to the mean R-R interval length of the ABLD at 460ms. Their mean R-R interval length was in the range of 495ms and 442ms, respectively. Subjects D8, D9 and D10 were considerably lower (difference of 300ms) than the RBSD and similar to the ABSD (difference of 50ms). Intriguingly, all subjects were below their respective relaxed baselines, which in a broad generalisation could indicate that all subjects were exposed to stress of varying degrees.



(1) RMSSD for small dogs

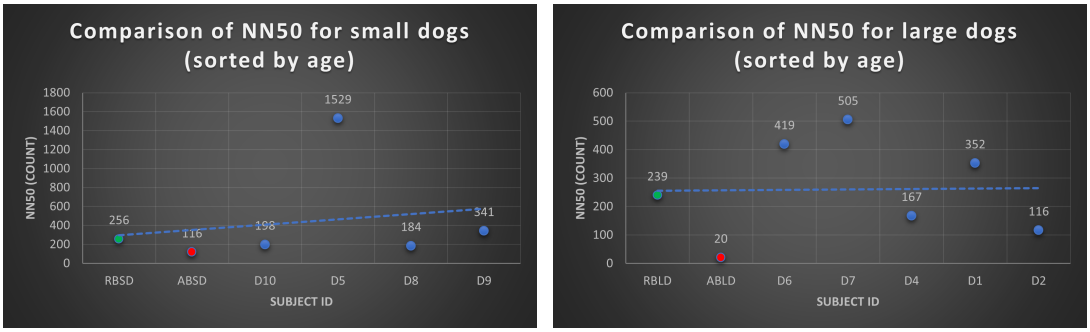


(2) RMSSD for large dogs

Figure 6.6: Scatter plots of the Root mean square of successive R-R intervals (RMSSD)

An increase in RMSSD is commonly associated with coping well with physical

training or other ANS stressors. It is important when analysing RMSSD always to consider the context of the recording. The scatter plot for RMSSD suggests that five out of nine subjects, namely D2, D6, D7, D8, and D10, were evidently exposed to stress during their time at the veterinary clinic. This can be seen in the subjects' low RMSSD, which indicates that they have not been coping well with the visit to the clinic. Another perspective of the RMSSD is that a low RMSSD can also be associated with being in good shape. This is referred to as Parasympathetic saturation and often occurs in humans who are at elite level conditions (Plews, Laursen, and Buchheit 2017). With this in mind, it could also mean that five out of nine dogs had been in excellent shape.

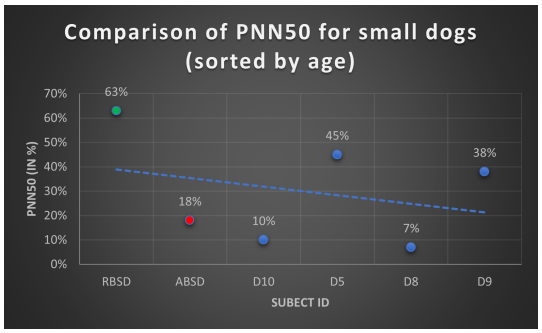


(1) NN50 for small dogs

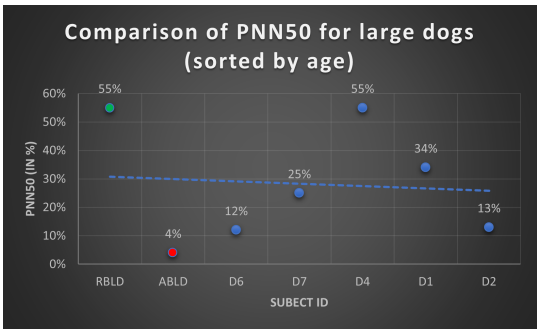
(2) NN50 for large dogs

Figure 6.7: Scatter plots of the count of successive R-R intervals above 50ms (NN50)

The number of interval differences of successive R-R intervals greater than 50ms increases by the length of the duration. Hence, subject D5, who was recorded for over 34 minutes, has a much larger count of NN50 than the other subjects. Additionally, as it was sedated, it would see its HRV increase as its HR slowly decreased, highlighting the inverse relation between HRV and HR. This is also why in figure 6.8 it has a PNN50 of 45%, meaning that almost half of its successive R-R intervals had a length greater than 50ms. If we were to compare the relaxed and active baseline recordings that were all of equal duration, we find that the relaxed baseline recordings have a far greater count of NN50.



(1) PNN50 for small dogs



(2) PNN50 for large dogs

Figure 6.8: Scatter plots of the proportion derived by dividing successive R-R intervals with the sum of R-R intervals (PNN50)

Figure 6.8 shows a tendency for the subjects to be more similar to the active baseline recordings than the relaxed baseline recordings. The greater the percentage, the more variance there is in the HR, as it is the proportion derived by dividing NN50 by the total number of R-R intervals recorded. Interestingly, subject D4 has a PNN50 of 55%. Which could indicate that the subject is great at handling stress.

6.2.11 Poincaré plot comparisons

The following section will allow for comparisons between the various Poincaré plots. The Poincaré plots are grouped together by small and large dogs and sorted by age. The respective relaxed and active baselines of the small and large dogs are situated at the top of each grouping. Generally, when the red dots (R-R intervals) are closely connected, it is a sign of low heart rate variance and vice versa; if the red dots are far apart, it is evidence of high heart rate variability. For instance, if we compare the RBSD seen in figure 6.9(1) and subject D10 seen in figure 6.9(3) on page 84, we see a stark difference. In the Poincaré plot for RBSD, the red dots are spread far apart, and the ellipse (S), which, as mentioned in section 4.2.4 is the total HRV of the subject, is wide. Inversely, in the Poincaré plot of subject D10 seen in 6.9(3) the red dots are are closely situated adjacent to one another. The ellipse is also very narrow, suggesting a lower HRV. In table 6.4 we have calculated S - the total HRV for each subject. The formula for calculating the area of the ellipse is as follows:

$$S = \pi * SD1 * SD2$$

As mentioned in section 4.2.4 SD1 is the standard deviation (SD) of the instanta-

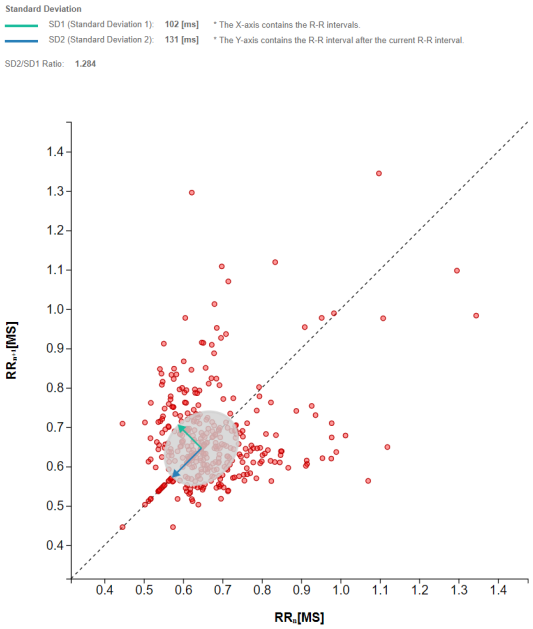
neous beat-to-beat R-R interval variability (Mazhar B. Tayel 2015, 709). It represents the width of the ellipse and the minor axis, as well as representing the subject's short-term HRV. It is indicated in 4.8 with a green arrow. SD2 is the standard deviation (SD) of the long-term R-R interval variability (Mazhar B. Tayel 2015, 709). It represents the length of the ellipse and is indicated in 4.8 with a blue arrow. Generally, a low value of SD1 and SD2 corresponds with the subject having lower HRV.

Comparison of small dogs

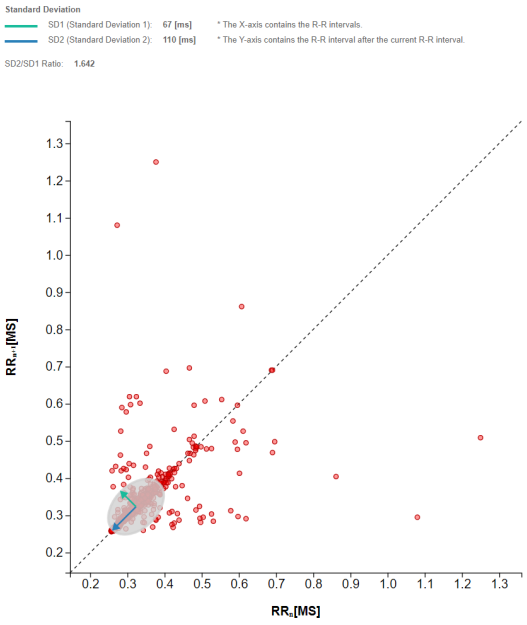
Subject ID	Age	SD1 (in ms)	SD2 (in ms)	S (Total HRV)
RBSD	1.5	102	131	41977.96
ABSD	1.5	67	110	23153.54
D10	1.5	23	85	6141.81
D5	3	119	298	111000
D8	3	21	89	5871.64
D9	3	155	198	96415.48

Table 6.4: Poincaré values for small dogs (sorted by age)

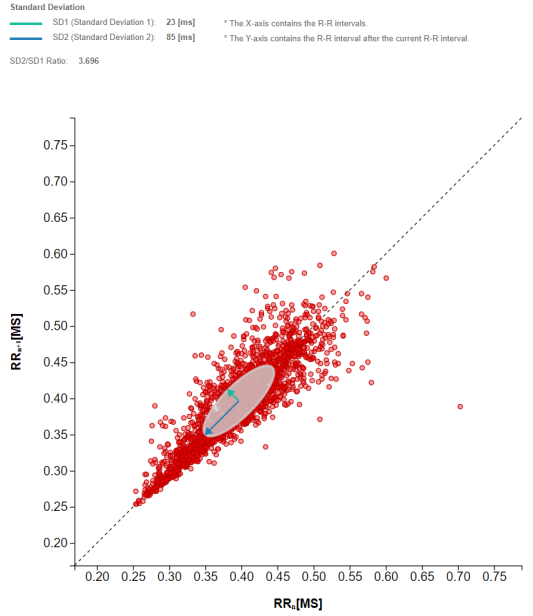
That which immediately stands out is that the S value of the ABSD is almost half the value of the RBSD. Subjects D10 and D8 have S values close to less than four times the value of the ABSD. This suggests that the subjects had low HRV. Subject D5 was anaesthetised and therefore had a more extended recording. The duration coupled with the anaesthesia is a contributing factor to its high S value. Subject D10 and D5 had very low SD1 and SD2 values at 23ms and 85ms and 21ms and 89ms, respectively. This is a sizeable difference from the RBSD SD1 and SD2 values at 102ms and 131ms, respectively. Both subjects are much closer to the ABSD SD1 and SD2 values at 67ms and 110ms, respectively. This clearly indicates that those subjects were exposed to external stressors resulting in a low HRV.



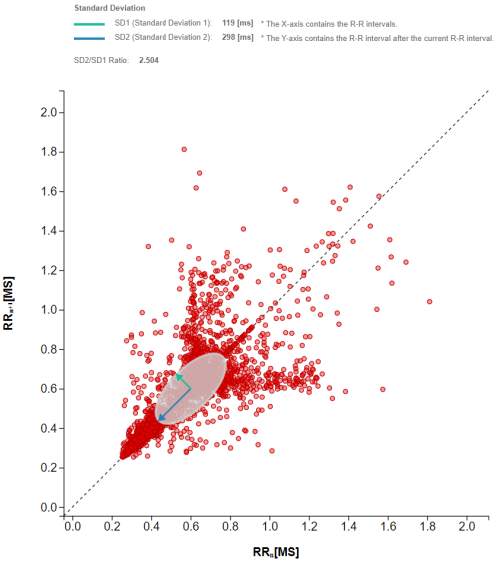
(1) RBSD



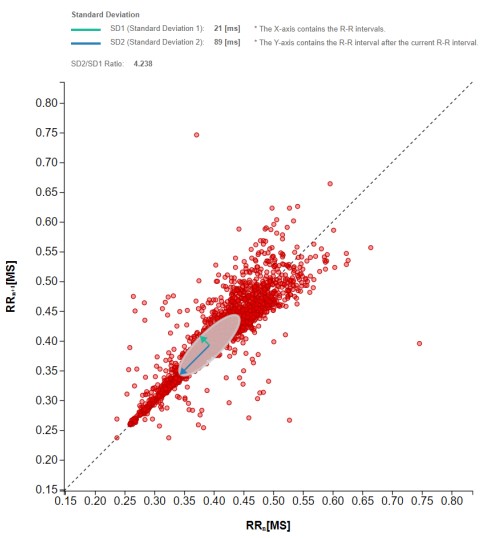
(2) ABSD



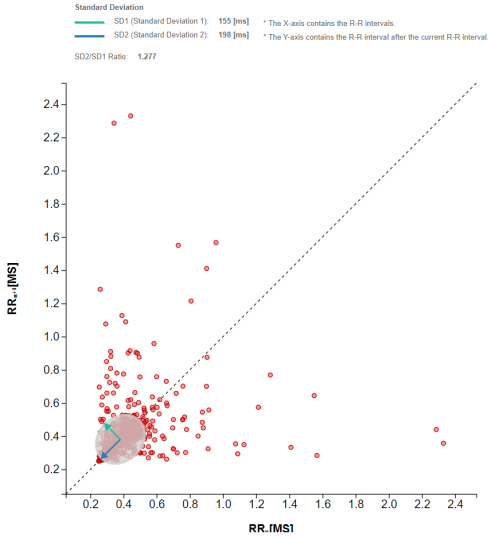
(3) D10 - Jack Russel Terrier



(4) D5 - Danish/Swedish Farmdog



(5) D8 - Bull Terrier



(6) D9 - FT Cocker Spaniel

Figure 6.9: Poincaré plots of small dogs (sorted by age)

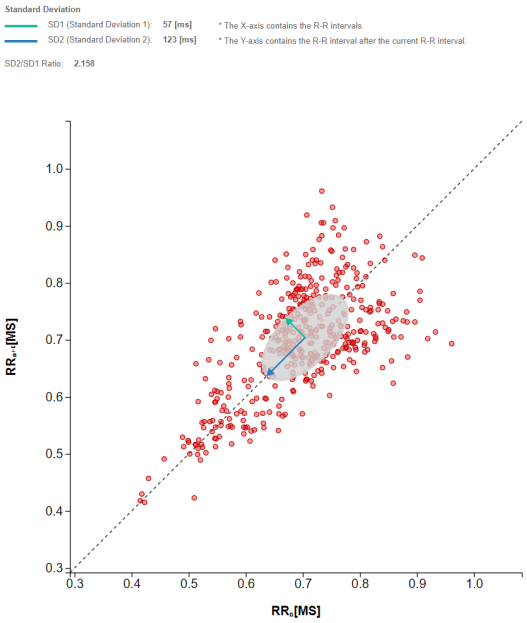
The patterns of the subject D10 and D8's Poincaré plot are very similar. The pattern is shaped a bit like a cone with the red dots closely situated to each other. The Poincaré of subject D5 has a pattern that is shaped like a 'Y'. The reason for the shape of D5's Poincaré plot is because subject D5 was immensely stressed prior to entering the clinic, in the waiting room and at the beginning of its consultation in the examination room. This is shown in the lower half of the Poincaré plot, where the red dots are spread narrowly to one another. However, subject D5 was anaesthetised, and therefore it naturally entered a state of relaxation. This is what creates the Y shape pattern. Without the anaesthesia, it would have looked akin to the Poincaré plots of D10 and D8. Due to this, the Poincaré of subject D5 is very intriguing as it portrays a very stressed dog with a low HRV while simultaneously portraying a dog that is relaxed with a high HRV.

Comparison of large dogs

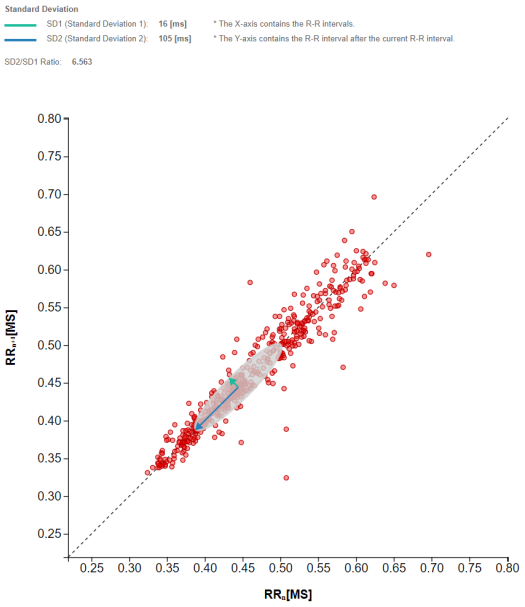
Subject ID	Age	SD1 (in ms)	SD2 (in ms)	S (Total HRV)
RBLD	4	57	123	22025.71
ABLD	4	16	105	5277.88
D6	0.67	124	220	41 000 000
D7	2	157	198	111 000
D4	5	209	252	165 000
D1	7	211	296	196 000
D2	11	29	112	10203.89

Table 6.5: Poincaré values for large dogs (sorted by age)

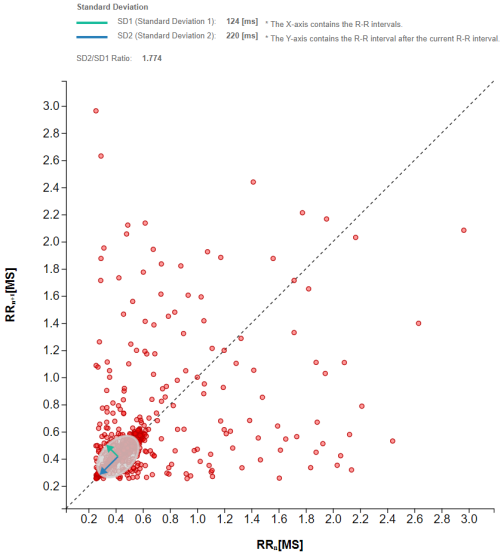
The ABLD's S value is 4 times less than the S value of the RBLD and subject D2's S value is in between the baselines. The remaining subjects'(D6, D7, D4 and D1) S value are far larger than the both the RBLD and ABLD. It seems hard to identify any patterns from this.



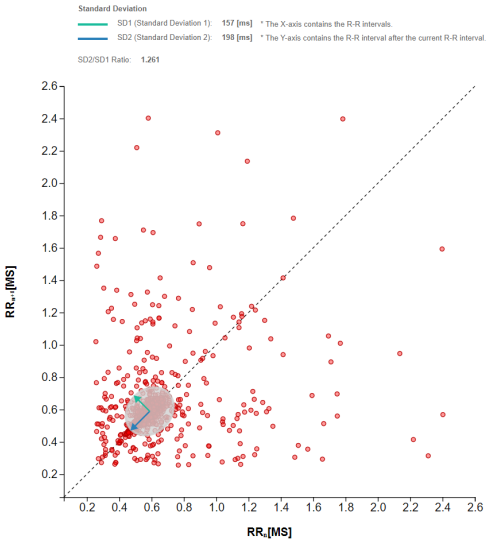
(1) RBLD



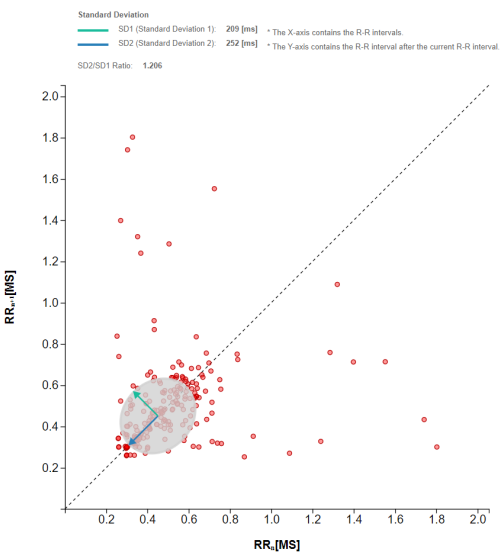
(2) ABLD



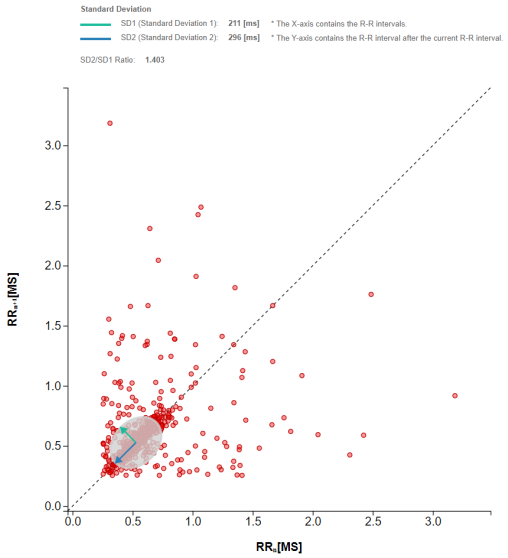
(3) D6 - Dalmatian



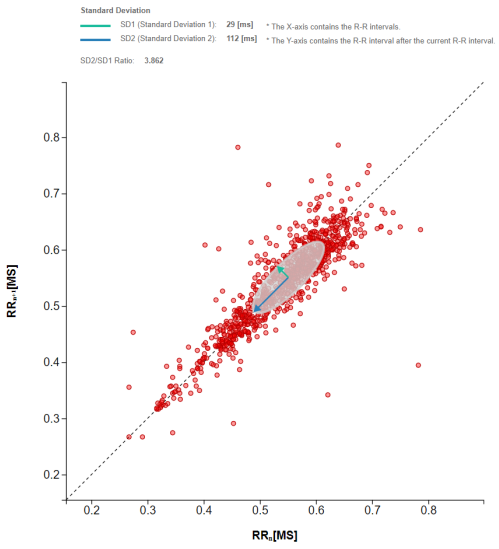
(4) D7 - Golden Retriever



(5) D4 - Labrador



(6) D1 - Golden Retriever



(7) D2 - Labrador Formula 1

Figure 6.10: Poincaré plots of large dogs (sorted by age)

The Poincaré plots for the large dogs are difficult to compare considering the x and y-axis ranges are vastly different to one another. Subject D6, D7, D4 and D1 all have x and y-axis that ranges upwards of 2000-3000ms. This is very different to the

Poncaré plots of both the RBLD and ABLD who have x and y-axis ranges of 1000 and 800ms, respectively. However, subject D2's Poincaré plot seen in figure 6.10(7) is very similar to the ABLD seen in figure 6.10(2). The pattern of their Poincaré plots is near identical which suggests that subject D2 had parameters reminiscent of the ABLD. Therefore, it is also fair to conclude that subject D2 was exposed to stress. The Poincaré plots of D6, D7, D4 and D1 seem to have been affected by a reduced signal quality when recording, this could explain the massive outliers of R-R intervals close to 3000ms.

6.2.12 Conclusion and evaluation of experiment

The Poincaré plots for the large dogs are difficult to compare, considering the x and y-axis ranges are vastly different to one another. Subject D6, D7, D4 and D1 all have x and y-axis that ranges upwards of 2000-3000ms. This is very different from the Poncaré plots of the RBLD and ABLD, which have x and y-axis ranges of 1000 and 800ms, respectively. However, subject D2's Poincaré plot seen in figure 6.10(7) is very similar to the ABLD seen in figure 6.10(2). The pattern of their Poincaré plots is near identical, suggesting that subject D2 had parameters reminiscent of the ABLD. Therefore, it is also fair to conclude that subject D2 was exposed to stress. The Poincaré plots of D6, D7, D4 and D1 seem to have been affected by a reduced signal quality when recording. This could explain the massive outliers of R-R intervals close to 3000ms.

6.2.13 Conclusion and evaluation of experiment

This section will conclude on the findings of the experiment, as well as evaluate the procedure of the experiment.

The findings of the experiment suggest that most of the recorded subjects were exposed to stress in the waiting room, as well as the examination room at the veterinary clinic. This is evident from the analysis of the subjects' HRV parameters, HR graphs, observations of the subjects' behaviour and the related stress value. The analysis concludes that the waiting room is a significant stressor for the subjects. Several factors impact the subjects' experience of the waiting room, such as other dogs and owners, an unfamiliar setting and veterinary nurses and veterinarians. All subjects showed signs of stress while in the waiting room, both behaviourally and according to the data. The examination room was also a significant stressor for the subjects. The observations of the subjects' behaviour in the examination room conclude that they were particularly anxious and reluctant when they had to be placed on the examination table.

One of the stress-reducing measures that veterinary clinics such as Odder veterinary clinic have is a stress-less room. The subjects examined in the stress-less rooms appear behaviourally to have been more relaxed than those in the regular examination rooms. The data also suggests that it positively affected the stress level, visually represented in the HR graph. Therefore, we can argue that it is beneficial for the veterinary clinic to utilise the stress-less room more often and also ensure that they communicate clearly to their customers that the room is available for insecure and anxious dogs.

The NN50 parameter has proven unsuccessful when comparing the data for different subjects to one another. This is mainly due to the fact that NN50, akin to HRV in general, increases with time. Therefore, as our recordings are of various sizes, it cannot contribute to comparisons between data. On the contrary, PNN50 appears not to be affected by time differences and clearly shows the differences between subjects who are exposed to stress and the respective relaxed and active baselines.

The RMSSD parameter is one of the most important parameters to consider when evaluating the subject's HRV. This is due to the data showing that the dogs have been physiologically exposed to external stressors during the recording. Furthermore, the average HR shows that every subject recorded a higher HR than both the relaxed and active baselines regardless of the size. Additionally, the data concludes that the subjects were exposed to several external stressors that caused a maximum HR of above 230 BPM. Every subject had a mean R-R interval length shorter than their respective relaxed baselines and closer to the R-R interval length

of their respective active baselines. This suggests that every subject was exposed to stress during their time at the veterinary clinic.

The median difference between the relaxed and active baselines for small and large dogs will be the guideline for what is considered the threshold in terms of whether a dog is considered to have been stressed or not when they have been at a veterinary clinic. The majority of the subjects were beneath this limit, which is calculated to be 508ms for small dogs and 578ms for large dogs. Based on the Mean R-R theory, six subjects were beneath the threshold, indicating that the subjects had been affected by external stressors during their respective recordings. Furthermore, the stress value attributed to each subject in accordance with their behaviour indicates that the subjects were particularly stressed in the waiting room and the examination room. It also provided validity to the use of the stress-less room, where it was evident that the subjects who were examined in the stress-less room appeared less stressed in their behaviour.

Chapter 7

Discussion

This chapter will discuss the procedure of the experiment in terms of what could be improved, what was learned and how we believe an experiment akin to this should be structured for future reference. Furthermore, we will expand on which direction this study and research could be taken next. In line with this, we will elaborate on which trades and businesses could take advantage of this study and why it would be beneficial to use the study in other contexts. Furthermore, we will evaluate the methodology and the methods chosen for gathering empiricism. Penultimately, we will evaluate the technology used, including the Polar H10 heart rate monitor and the Elite HRV application. Lastly, we will discuss whether we have achieved the value we proposed.

7.1 Collaboration with Odder veterinary clinic

Initially, the intention from the beginning was to collaborate with a start-up firm named Fauna, who mainly focuses on digitalising the animal's medical records book. However, due to Fauna being in a developmental phase, it was not possible to establish a case that was reasonable for both parties. Therefore, we were forced to think in different lanes, and through Fauna, we ended up connecting with Odder veterinary clinic. Through interviews with the owner of the veterinary clinic, we established some of the issues and pain points they experienced at the clinic, one of which was the stress their patients experienced, mainly dogs and cats. They had created stress-reducing measures based on observations they had made of their patients' behaviour; however, they had no practical way of measuring whether it had any effect. This made us particularly curious whether there was

a technology that allowed us to test this. This curiosity also helped create the foundation for the experiment, which we made in collaboration with Odder veterinary clinic. The experiment focuses on measuring the stress their patients are exposed to when at Odder veterinary clinic. This is done by equipping patients with ECG technology in the form of a heart rate monitor that enables us to see heart rate and heart rate variability parameters. The collaboration with Odder veterinary clinic has been fruitful for both parties. They helped us get participants for the experiment through their social network and provided the use of the clinic for the testing, as well as helped us verify the results of the experiment to ensure validity. Furthermore, we have been able to provide them value through the data we have recorded, which gives them a clear idea of where they can improve their services for their customers and affirms that some of the measures they have taken have a positive effect on their patients. The owner of the veterinary clinic, respondent 'J', has expressed a desire to continue the collaboration to optimise their infrastructure and innovate ways for them to further reduce stress for their patients. Likewise, he states that it benefits his value proposition for his customer segment, particularly the owners that are concerned for their pet's welfare. Additionally, respondent 'J' adds that having tested their stress reducing methods and validated their effect is something they would have on their website for advertisement (appendix A.3)(Andreasen and Pedersen 2022c, 1142–1155).

7.2 Experiment procedure

As mentioned in section 7.1, this study measures the stress patients are exposed to at veterinary clinics such as Odder veterinary clinic using ECG technology, HR and HRV parameters. Therefore, our approach to the experiment was also that it had to be organic and mimic an appointment accurately at the clinic. However, the various lengths of the appointments meant that some recordings were 10 minutes and others were upwards and beyond 30 minutes. Literature such as (Shaffer and Ginsberg 2017) and (Borell et al. 2007) suggests recording HR and HRV for at least 5 minutes and upwards of 24 hours in order to properly measure short-term and long-term HRV. However, comparing results of different lengths can be difficult and affect the comparisons. Some parameters do not work sufficiently when recordings have different durations from one another. Time-domain methods such as the standard deviation of R-R intervals (SDNN) and the number of interval differences of successive R-R intervals greater than 50ms (NN50) are inefficient in this sense. Generally, HRV also naturally increases over time.

Therefore, we propose changes that could provide a better yield of results and allow for better comparison between test subjects. While we opted for a continuous

recording of the test subjects throughout the entire appointment, we should have standardised the length of the recordings, as well as sectioning the recordings into the various stages of the appointments, e.g. prior to clinic entry, waiting room, examination room. We propose that the optimal way of conducting a study of this kind in a similar context would be to record the same length at each different stage of the appointment. For instance, five minutes outside of the clinic, five minutes in the waiting room and five minutes in the examination room. This would provide better grounds for comparison between test subjects, better HR and HRV data, and a clearer picture of when the test subjects were in which stage of their appointment. Furthermore, we should have better ensured the quality of the signal for the recordings. The signal quality refers to how true the R-R interval data that the heart rate monitor captures is. Signal quality issues often originate from biological sources (irregular heartbeats) or technological (electrodes inadequately damp, heart rate monitor inadequately equipped). These interference's are referred to as artifacts or false heartbeats, see Elite HRV *.

The Elite HRV application defines the signal quality as either poor, fair or good. The majority of our recordings had a good signal quality; however, a few had a signal quality that was fair, whilst only one had a poor signal quality which meant we could not use that test subject's data. This also means that some of the recordings may have had their numbers skewed slightly; however, the software (Elite HRV application) attempts to correct the anomalies it detects. It is still to be expected that there will be some inaccuracies compared to a signal quality that is good. Unfortunately, we only became aware of the signal quality aspect until the latter stages of the project, after all the data had been collected. Had we been aware of the signal quality earlier on, we would have ensured that every recording had good signal quality. In a better scenario, we would have liked at minimum five times as many participants, around 50 or more. However, we were only able to record 10, of which one was unusable. Additionally, we could have recorded twice as many if we had two heart rate monitors rather than one. Unfortunately, we missed out on quite a few who wanted to participate but could not wait for the heart rate monitor to become available when it was already equipped on another test subject.

*Elite HRV website, https://help.elitehrv.com/article/351-what-is-signal-quality#:~:text=Signal%20Quality%20refers%20to%20how,as%20artifacts%20or%20false%20heartbeats., [Accessed: 13-July-2022]

7.3 Which parameters are best for analysing stress

The parameters we found to yield the best results in the given circumstances were:

- RMSSD
- the mean length of the R-R intervals
- PNN50
- average heart rate
- maximum heart rate

The heart rate graph generated from the recordings in the Elite HRV application was effective in portraying the journey of the subject through the veterinary clinic, and it aids in identifying where in the journey the dog is exposed the most to stressors. The Poincaré plot is particularly useful in finding patterns from its visual representation of the R-R intervals signal quality to be good.

7.4 Business perspective

As mentioned previously in section 7.1 the purpose of the study is to measure the stress patients, specifically, dogs, are exposed to when they are at veterinary practices such as Odder veterinary clinic using ECG technology. It is evident from the experiment results that there are stress patterns that can be recognised and identified. With this data-performing strategy, it is possible to view the animal's emotional state simultaneously while it is being recorded. The data that is collected and the procedure of the experiment is the value proposition of the feasibility study, which indicates that a viable service can be established for various industries such as the meat, veterinary or horse trade. We propose that these different customer segments would utilise the service as a routine check of whether their environment, infrastructure and processes are optimised and ensure that their respective animals are exposed only to the most necessary external stressors. It is feasible to conduct this master thesis because of its various insights on how to measure animals and is considered a leap of faith assumption that would potentially discharge a business plan, where the study provides a proof of concept upon optimising environments in the respective industries (Ries 2020).

Initially, our thoughts were that the technology and procedure of the experiment could be utilised in several trades, as mentioned above, such as the meat and dairy trade, which could both see great value in animal welfare and handling the animals properly during transportation. We envisioned that it was possible to measure the stress the animals were exposed to during the various stages of their life, from farm to abattoir. This would provide an overview of the stress the animals are exposed to when they are being transported and inside the abattoir, et cetera. However, we had personal communication with a veterinarian who works at an abattoir, and she stated that the meat industry would most likely not see a monetary incentive in attempting such an experiment and using the procedure of this project (anonymous veterinarian, phone call with authors, June 3, 2022). Although stress is prevalent in the trade and abattoirs are aware that stress can affect the quality of the meat. The veterinarian stated that the dairy trade would be a direction better suited for an experiment akin to ours. The experiment could be used to verify the effect of the dairy trade's various measures and methods to reduce stress with their cattle, such as playing classical music for them in the stable (Kenison 2016). It is an opportunity to create awareness for animal welfare and an argument for the company's corporate social responsibility (CSR) values. CSR is essentially about companies showing societal responsibility and contributing to green and environment-friendly initiatives. It is about conducting their business in a manner that minimises degradation of nature and emphasises positive value for people, the environment and the economy. We propose that the procedure and

methods of this study can aid such industries in creating transparency and better welfare for animals, as well as sustainability. With the use of the ECG technology and procedure, it is possible for companies to create marketing strategies that will convince the consumer that the company is doing its utmost for their animals. CSR values are an essential part of the majority of large companies. They have a responsibility to society to innovate and experiment to figure out new solutions that can further sustainability for society (Lindgreen and Swaen 2010).

Chapter 8

Conclusion

In the final chapter, we will conclude on the findings of the project, their significance and key takeaways.

The thesis for this Master's project is as follows:
Measuring stress in patients at veterinary practices - a business feasibility study.

We aimed to explore the possibility of using ECG technology from a heart rate monitor to measure the stress patients are exposed to at veterinary practices. Additionally, we opted for this due to its non-invasive nature and accessible data. We used Heart rate and heart rate variance to analyse the data and look for patterns that indicate stress. Our initial review of the contemporary and relevant literature on the subject made it apparent that there was a lack of concise knowledge of this particular context. The veterinary practices lacked a way of measuring the stress their patients were exposed to and had no feasible way outside of observations to verify the measures they were taken to combat this business-wide issue (appendix A.3)(Andreasen and Pedersen 2022c). We are testing the business feasibility of a procedure that can potentially benefit and optimise the infrastructure of a veterinary clinic such as Odder veterinary clinic. This is done by measuring the stress their patients are exposed to and relaying that information to them so that they can make informed decisions about their processes and infrastructure and ultimately reduce their patients' stress in their clinic. Furthermore, the procedure could also be utilised in other trades or similar businesses.

Through a collaboration with Odder veterinary clinic, we have managed to test the stress dogs are exposed to at veterinary clinics such as Odder veterinary clinic. The idea of the experiment and procedure for measuring stress was based on the veterinarian's (respondent 'J') desire to be able to prevent stressful situations for

their clients at the clinic. Veterinary practices utilise various stress-reducing measures in order to remedy stressful situations, such as citronella sprays 4.1 to lower stress in the waiting room and stress-less examinations rooms that are arranged as a living room. However, the effect of such measures has not been verified by data only from observation studies4.1.

With this in mind, the thesis is based on a procedure that can test an environment, e.g. the veterinary trade, through a feasibility study focusing on measuring dog's stress levels through ECG technology and subsequent analysis of HR and HRV data.

Based on the results, we can conclude that our artefact is viable for measuring the stress dogs are exposed to at a veterinary clinic. Several patterns can be identified that indicate that the dogs were stressed and negatively affected at the veterinary clinic. The observations and data from the experiment suggest that the waiting room and the examination room are significant stressors for the dogs. In comparison, the dogs who had their examination in the stress-less room were exposed to less stress than their regular examination room counterparts. This is evident from their behaviour and according to their respective data.

The hypothesis of the feasibility study is to create a new service that can provide an insight into data that illustrates the environment in the veterinary trade. It is a leap of faith assumption that it can be utilised in various trades and businesses (Ries 2020). The idea of creating a service where data can help make informed decisions about animal welfare is the key takeaway of what the service can provide (Ries 2020).

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Appendix A

Appendix

A.1 Interview 1

Formalia	**information**
Navn på fil	Jan Dyrlæge.
Dato	24 Februar 2022
Varighed	45 minutter
Koder	**Beskrivelse**
Uforståelige ord	[. . . + tidskode]
Ved usikkerhed	[ordet + tidskode]
ved overlap	[overlap]
Afbrudt sætning	. . .
Interviewer	**Navne**
M	Mikkel
L	Lasse
Respondenter	**Navne**
J	Jan

1 00:00-02:50

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2 M: Skal jeg føre ordet?

3 L: Ja du kan bare start.

M:Så tror jeg at jeg vil grundlæggende som vi snakkede om så kunne vi godt tænke os at høre noget omkring, hvordan man som dyreklinik i dag og i danmark, hvordan er det man skaber værdi for kunder og hvad er det som... hvad er det kunderne, altså alle de værditilbud man har som klinik, hvad er det så for nogen forventninger man opløfter os kunderne

J: altså værditilbud er jo omdrejningspunktet med deres kæledyr. Altså de kommer med deres kæreste eje og de forventer en ydelse, som vi så skal forsøge at give dem, på den bedst mulige måde. Mange af de ydelser man starter med er den basale hvor man for en lille hund og den skal vaccineres. Og få lavet nogen tjek af de ting der. Og der må man sige det der er vigtigt for os, det var at vi føler vi kommer omkring alle de ting problematikker eller spørgsmål der er omkring den givne situation og det jo så et helhedsbillede. Og nogengange kommer folk jo med specifikke problem som skal afklares. Og der er det jo øøh. Det der er vigtigt for mig det er jo at vi kommer omkring, altså folk føler nu er de trygge ved det der bliver gjort, sagt, udført og taget hånd om, så det er i hvert fald

L: er det sådan en følelse af at de skal føle sig værdsat, når de kommer her?

J: også det, men både det at de er hjertelig velkommen i kraft af det er en butik

M: mmh

L: Jaa, hehe

J: men også det at de føler at de kommer et sted hvor de kan føle sig trygge omkring det. Men klart værdsat i at, det er jo dem der står med en patient som vi gerne vil hjælpe i det.

M: når du siger hjælpe, hvad er det så for nogen ting i hjælper dem med? Jeg tænker behandlingen er meget åbenlyst

J: ja, men hjælpe er også en eller anden form for behandling og en behandling kan jo være en vaccination som ikke er en sygdomstilstand, men mere en all-round tjek og en snak om hvordan er situationen og var det noget med et behov med foder, loppemidler, kosttilskud eller et eller andet, hvor behandlingen går jo mere på den specfikke område, er det operationskrævende eller er det noget som kan løses medicinsk og nogengange er det også ikke nødvendigvis lige spot on, hvorfor ens dyr reagerer som den gør, er der en plan for hunden. For mig er det meget vigtigt at få lagt en plan for hunden, så folk også synes det giver mening og følge og vi ikke bare lige knipser med fingrene, så har vi løsningen. Så det er vigtigt

L: Ja okay.

02:50:07:45

M: hvad er det for nogen problemer der typisk. Hvad kan man sige, nu har i en masse værditilbud til hunden og kunden, hvad er det så nogen problemer i typisk oplever kunderne har udover selvfølgeligt et syg kæledyr.

J: jamen øøh, der er jo mange, næsten alle problematikker både såvel som sygdommæssigt og andre ting, men det har jo en lille adfærdsmæssig aspekt og det betyder jo at mit dyr reagerer jo anderledes er det kun på grund af maven eller er det bla bla bla. Hvad er årsagen i det her tilfælde, hvordan oplever jeg så mit kæledyr.

L: Så i bidrager rigitg meget med råd og vejledning, men så i forhold til det og i ift. Det det her med at have den her fysiske sundhedsbog og give dem de her dokumenter. I princippet hvor meget sætter de pris på at få de her dokumenter med hjem?

J: Jamen det gør de, en stor del af dem kommer jo med deres sundhedsbog og siger har du brug for at skrive i den, og det jo – der ligger jo noget implicit i at man har fået barnet bog, der skal noteres og det er jo rigtig fin, men der er også rigtig mange der er sådan "åårh, det fik jeg ikke lige med herned, havde du brug for det?" nej i princippet ikke, for jeg skriver det i journalen, men jeg synes jo den ville give en ekstra ydelse fra min side, kunne jo være det at sige, jamen nu får du det her stykke papir, hvor der står præcis hvad der er gjort + så har vi en plan for hvordan vi løser det her, så kommer den også til at fremgå af, og jeg vil også sige den vil give en øjenåbner i, jamen hvis vi har allerede nu har påtænkt nogen kontroller at man vægvarigt husker det at det står et sted. Frem for man sådan kommer hjem og nu med ebbe må jeg jo sige, jamen uuh hvor var der bare tryk på og travlt og det glemte jeg jo lige, jamen popper den lige op og jeg kan se aftalen, så det synes jeg det kan give noget.

L: hvis man tager udgangspunkt i det med vi har sundhedsbogen derhjemme og det er at vi vitterligt aldrig tager den frem, ved mindre vi skal herned fordi vi har en lille tanke om at vi vil naturligvis tage den med herned, som en del af konsultationen, men ellers bruger vi jo den ikke rigtig, men jeg kan godt forestille mig hvis man har en hund der er rigtig syg, at man gerne vil have en vejledning eller et eller andet standpunkt for hvornår er det vi sådan skal give de her journaler og de her ting til folk, så de ved helt præcis hvad det er der sker med det bagben på ebbe for eksempel, så man kan se forløbet, er det det du efterspørger?

J: ja det + vi har altså efter en operation de har været indlagt, der er en lille beskrivelse om hvad der egentlig er sket og hvad er medicinering og planen og der skal tages tråde og hvornår skal vi ikke. Der synes jeg jo det er rart at sætte det dokument ud til folk, så de har det på telefonen.

M: hvordan kommunikerer i med dem ellers?

J: jamen nu har vi jo seddeler og telefon eller en mail og nogen sender sms. Det er sådan den måde. Det er heller ikke de afløser hinanden, men nu her fra marts der er vores plan at ville, inden operation, der sender vi den digitalt så de ligesom har noget at tage stilling til inden, de kommer op med dyret til operationen og så inden de går hjem at det så bliver sendt, det vi vil kalde en hjemsendelses papir til folk, så de kan ligesom gå det igennem og så de små spørgsmål der ligger, kan man få afklaret. Fordi når de er hernede, der sker så mange ting her at det er svær tfor folk at have overblikket. Det er for eksempel svært at huske var det 3 dage, var det 15 dage, hvaaae hvornår skulle vi bla bla bla. Man bliver nemt hylet ud af den, fordi man er et fremmed sted og ens hund er måske fuldstændig dvask eller modsat den slet ikke snakker. Fokus flytter sig så hurtigt, som de der praktiske ting fortoner sig lidt. Så der vil jeg synes det giver enorm værdiskabende ting i at kunne sende det til folk og sige det står faktisk herinde nu, så du skal ikke, det er fint at få det gjort nu og nu har du det, er der nogen spørgsmål så send en sms eller skriv, vi tager den til kontrol eller et eller andet.

M: så der er et problem fra klinikken i de arbejdsgange der sådan, på nuværende tidspunkt fungerer i forhold til at skulle varetage.

J: nå men, jeg synes altså det er optimering af værdiskabelsen i at give vejledning digitalt.

M: ja bestemt L: er det noget som kunden kan tilgå nu, altså kan de gå ind og kigge på. Altså jeg kan ikke gå ind og kigge på ebbe journaler, når vi har været ved konsultationen nu?

J: Nej

M: er det noget i har eller er det noget i ringer ud med?

J: Ja vi ringer ud hvis det er

07:45:10:19

M: så det er den måde det fungerer på. Nu snakkede vi også på et tidspunkt med

stres hos dyrlægen, det var en af de emner der poppede op, ved du om dyrs adfærd ændrer sig når de kommer ind på klinikken?

J: altså der er jo mange, og det er også en bekymring jeg ejer, hvordan tackler min hund det. Hund er ikke helt så alvorlig som katte. Katte er enorm stressede ved at blive flyttet, men af sagens natur, hvis man har en kat så er den derhjemme og kan gå ind og ud af et vindue og det er det. Den er ikke med ved moster [navn] hehe

M: de er meget territorielle

J: ja de bliver bare der og når de så skal flyttes ud af det der, det er både ejer og kattens comfort zone der berøres

M: ja bestemt, jeg har en kat og jeg har da også haft den med til dyrlæge og ved også det ikke er nemt

J: ja det er ikke nemt.

M: det stresser dem meget, det virker til at være en form for ubehag

J: det er så stor en oplevelse for dem at de er " puha hvad er det der sker" hehe

M: så det er et problem for dyrejeren tit, men er det kun omkring katte eller er der andre dyr der også er.

J: ja der er mange dyr der stresser af det, så det er en grundlæggende måde at man skal håndtere det på, det er også derfor man kan sige, hvor jeg synes at man kunne sende de der papirer digitalt, altså folk. Man kan slappe lidt bedre af i at vi får ordnet situationen, men det er indenfor at man tilgår dem ved siden af. Husk nu hvad jeg har sagt, samtidig med at man står og kæmper med at få sin hund til at stå stille.

L: jamen jeg kan tydelig relaterer til det

J: og det er jo klart det flytter, man lytter ikke helt så godt som hvis man

M: Hvordan dokumenter man sådan nogen stres situationer, hvor man kan kalde det det, sådan ift hvordan vurderer man om dyrene har stres på nuværende tidspunkt, er det noget man har nogen måler til eller er det ud fra viden omkring dyreadfærd.

J: det er lidt udfra dyreadfærd man har ikke rigtig måling på. Altså dyreadfærd fra det normale til at det er ændret. Hvis man kan sige, så pejler man sig ind på det.

M: er det noget i får at vide af kunderne, at de virkelig kan mærke det er et problem?

J: ja det bliver mere og mere sådan sat op til drøftelse når folk er her og også at få flere henvendelser ind og grundlæggende er det jo helt basal. Man kan sige enhver sygdoms situation, det er jo en adfærdsændring, fordi har man nu ondt i maven, så opfører min hund sig også anderledes, men der kan man jo sige, det er måske knap så meget det psykiske, som det fysiske. Det psykiske, det er sådan sværere lurere når hunden skifter karakter.

10:19-14:25

M: hvis nu man tager en vaccination, så der ikke nødvendigvis noget fysisk galt, men oplever i stadig stres fra dyr, når de kommer ind til dyrelægen?

J: ja det gør vi. De kan godt synes det er ubehagelig og skal være i den situation.

M: nu siger du primært det er katte. Hvis man nu tager en hundesituation, er der så nogen hunde, hvor det har noget med at gøre med de forskellige racer, der måske ville – altså hvis der nu var en eksisterende hund på dyreklinikken til konsultation, kan det så have noget med samspillet af de forskellige konsultationer. Vi har snakket om hvis man f.eks. kigger på sekvenser på en konsultationer og man kunne kigge på dem ift. At forbedre eller i hvert fald reducere hos dyret?

J: Altså det kan man jo. Der er jo klinikken der signalerer meget det sådan udadtil og gør det simpelthen også. Men vi har jo gjort det, at hvis folk i forvejen ved at det her et problem, så har vi sådan et specielt lokale vi bruger til, hvor vi sådan har sat en sofa op og stole osv, så det rigtig føles som noget klinisk + så synes jeg det er vigtigt – det er ikke hver gang det er nødvendigt at sættes dyret op på et bord, jeg kan da stadig godt bøje mig ned, så det går haha og lave en konsultation, så det bruger jeg meget det rum. Og det er i hvert fald en måde og prøve og imødekomme både ejer men også dyrene sådan man ikke (laver armbevægelse "stå her, nu skal du kigges på").

M: hvis man nu tager nogen af de problemstillinger og tager fauna, hvad er det for nogen præcise værditilbud som fauna vil kunne skabe for at imødekomme nogen af de problemstillinger der nu er?

J: ja altså, for mig at se så skal fauna jo rumme kæledyrsejerens bog det er sådan set hele omdrejningspunktet jeg håber jo på sigt at den, godt nok får nogen

dyrelæge dokumenter ind i fauna, men du kunne jo også prøve at tilgå dokumenter andre steder fra. Men fauna bliver et begreb af det er det man har som kæledyrsejer. Jeg har brug for et login der, der kan jeg lige taste det ind der og så har jeg det der arkiv ift til det og er det DKK eller er det en eller anden hundetræner jeg har en sparring med, men så ligger det der for så skal jeg ikke huske på processen på 27 forskellige apps. Fauna det er min kæledyr. Det er samlingspunktet

L: det er en måde man bliver mere oplyst som kunde.

J: ja lige bestemt og man kan tilgå de der ting som er vigtige i omdrejningspunkt at have hund eller kat eller hvad det nu er.

M: så du vil sige – hvis du skulle vurdere jer at konvertere det - altså fauna som produkt, nu har vi integrationen ift. Vetnet der står for journalføringendelen af det, men man kan ligesom sige at den brugerdel af fauna som kunden sidder med, vil du også vurdere det til at være et nyt marked at træde ind i?

J: ja det synes jeg det er. Jeg synes det man mangler er arkiver, opdeling af logbog, hvad skal man sige, til at systematisere ting i. jeg har en del der kommer her for nogen bestemte ydelser, men hvis de så lige skal vise dem et eller andet på deres telefon [viser en iphone han swiper på]. Det bliver noget ustruktureret og det er jo i sagens natur, når man nu knipser og tager ting ind, har en mail her og der og en sms og hvor faaen var det at det stod. Og jeg synes jo, kunne jeg nu have dyrelæge information jamen så kunne det blive nemmere.

M: altså samlede kommunikation.

J: ja og har du al muligt med din dansk kennelklub som udstillingsbevis. Jamen så ligger det der helt entydigt. Og man skal jo gerne kunne dele op hvis man har 1 hund, 2 hunde eller 5 hunde. hvis man har et navn fra hver og de ligger bare sorteret.

14:25-23:36

M: hvem er det du ser som kunden for fauna?

J: jeg synes det for en ordenssans et dokumentmappe, med indholdsfortegnelse.

M: hvis man så ser på virksomheden og tænker på nu skal vi sælge det her produkt. Hvem er så kunden for selve produktet?

J: det er kæledyrsejeren.

M: er det også dem der betaler regningen for det.

J: det er det jo i sidste ende fordi dem der køber sig til en ydelse uanset hvor de er verden, så betaler de et eller andet.

L: så ydelsen, for at sætte det op på et meget praktisk niveau, så ville det være at kunden skulle betale et X antal beløb for at kunne tilgå arkivet?

J: det kunne det jo være, det kunne godt være en tanke i det, synes jeg man har. Hvis du bruger fauna, den er ganske gratis og du kan lave dit login, men du vil gerne i arkiverne og du vil gerne have adgang til de specielle ting, så betaler du måske en 5'er eller en 10'er om måneden for brug af et eller andet og det er det.

M: hvem betaler man til tænker du?

J: det vil være til kontoret fauna, de skal udvikle der her + at man vil jo. Kommer vi dertil så skal vi jo have et support af team. Man skal have et udviklingsteam, det koster bare at holde i gang.

M: ja selvfølgelig skal man have det. Jeg tænkte mere på strukturen af indtægtsmodellen. Det her med, når du kommer ned med ebbe, ned til klinikken har du så markedsfører virksomheden sig direkte til kunden og så kan man gå ind på jeres hjemmeside og oprette sig som kunde. Som jeg forstår det nu, så er det at man opretter sig igennem dyreklinikken.

J: Det er det første skridt i det og det jo fordi platformen ikke er helt færdigtudviklet, men ligenu er det jo en invitation fra din dyrelæge til at få de dokumenter og der vil jo også være betalingsmodul i. det forgår jo skjult hvis man kan sige det sådan. Dyrelægen vælger at sige jamen det synes de også er en god idé og kunne sende det til dem. Enden kan man jo sige til kunden, jeg vil have en krone for hvert dokument jeg sender til dig, så vil dyreklinikken sige, jamen for en 10'er så kan vi sende alt muligt til dig. Det er sådan et rent økonomisk perspektiv der giver mening. Men jeg synes jo, man skal også huske de mange dedikerede hundeejere der går til dyrelæge, men derfor kan det jo godt være nogen der i den grad har orden og har brug for alt der vedrøre de dyr og dyrlægen er forhåbentlig også det mindste brugte i det for dyrs skyld kan man sige hehe. Man skulle jo helst ikke give hver måned, det jo også lidt træls, hvis man har en dyrlæge der ikke heletiden har problemer det jo ikke rart.

L: hvis du skulle se det sådan lidt for kennelen side, hvad tror du så fauna kan bidrage med ift til kennelen?

J: altså en kennel?

L: en kennel der avler på en bestemt race

J: jamen det den kan bidrage med er at oprette en hund som det ene, men får du 10 hvalpe, de hvalpe får hver især et dokument og der vil være nogle oplysninger om de ting der og hvis man så får oprettet de ting der hver for sig så tænker jeg at det ville være smart at kunne sige "klik" du er den nye ejer "push" og så følger dokumentationen med og det er jo tit barnets første skridt hehe.

L: jaja lige præcis.

J: hvad er der sket, hvornår har fået [uklart] og hvornår har de fået vaccine, det er bare.

L: men kommer selve oprettelsen af en kunde – vil den så i princippet ikke starte her ved dyreklinikken.

J: nej den vil starte hos kennel

M: så en kennel kan på nuværende tidspunkt komme med 10 hvalpe og få oprettet en fauna konto med vaccinationer?

J: altså så snart de har integrationen med dyrelæge dataen, så kan de jo.

M: undskyld med hvad?

J: med et dyrelæge system, nu er der f.eks. vetnet, så hvis vi er uenige i de systemer vi har. Jamen lad os sige du har det her journalføringssystem og nu vacciner vi den første gang " bum bum", så ryger den videre, så kan man jo trykke på en knap og sige nu røg den over til dig. Hvis ikke du først sælger den her, så tænker jeg jo det næste skridt vil være at komme over til den nye ejer.

L: noget helt andet er, ift hvad i skriver i det her journaler her. Er det for jeres skyld eller for kunden? Hvor er fokuset henne? Er det vigtigt for jer at sidde og skrive journaler?

J: det er jo i dagens danmark dokumentations bureau, så har man jo lgiesom pligt til at skrive et eller andet og gøre på hver sin måde, men oplysninger der er sket og det er jo også ren historik hvis der ingenting blev skrevet ned overhovedet. Hvis det nu har relation til det andet, så det jo rart at have nogen ord på det, så man kan følge tråden i det.

L: hvor vigtigt er det for dyrelæge at journalisere. Hvor dyb en beskrivelse er det

hver gang der er en konsultation.

J: det er forskelligt, fordi du kan lave dem uden problemer. Så kan man jo godt skrive at man har lavet den her foretagende sundhedsundersøgelse og jævnfør vores procedure. Vores procedure kan godt stå et sted. Jamen det er tandtjek, øretjek, øjentjek, potetjek, lytten på hjertet, mærken efter osv. Men der kan man godt lave den korte udgave og skrive alt ok fordi man som dyrlæge har styr på de forskellige ting.

M: jeg sad og tænkte på om det overhovedet er nødvendigt, for alt det vetnet har i deres journalføringssystem, er det overhovedet nødvendigt for kunden. Hvor meget kan kunden få ud af de journaler?

J: altså tanken er jo det at i vetnets system. Der kommer der en lille beskrivelse til dyrlægen og nogen ord til ejeren. Fordi det er ikke det samme. Det giver heller ikke mening og sende nogen forkortelser og ting ud, som er inden for en kliniks agering, hvor det bare bliver rund forvirret. Hvad skriver de og hva faaen er det. Det er forkert eller et eller andet. Der skal der være en lille ordlyd til ejeren. Altså ligesom det man har i en journal, hvor vi i dag – hvis nu alle folk havde den med ind og så som notat om hvad er det egentlig man skrev et eller andet til folk, så vil det være det der svarer til den elektroniske del.

M: det giver god mening, hos lægen får du heller ikke al den information

J: det der skal være sat op i vetnet, det er at vaccinationsbeskrivelse, ja der er en knap der hedder "nu er du vaccineret med de og de ting" så er der en knap der hedder " har jeg information forhåbentlig eller formodentlig og så skrive den her "den der [uklart] vaccination der kan man se om et halvt år der er vi nød til lige at få vendt problematikken omkring tænder eller et eller andet" det er så det der fremstår og det med at få klippet negle det forventer jeg vi skal gøre om 3 måneder igen. Det er også der jeg synes de får den ekstra service. Som f.eks. nu har jeg glemt den bog, men jeg har det på min telefon. Jeg synes også vi har en del der ringer ind. De siger vi har glemt dem, den er ikke blevet vaccineret og vi har ikke fået nogen reminder og nogen gange er det jo rigtig, men andre gange er det så at det først er om en måned. Altså folk bliver ligesom grebet i en eller anden situation det skal jeg bare have gjort. Hvor jeg også synes hvis det var at det var nemmere at hive telefonen op af lommen, så står den som gyldig eller ikke gyldig, så er det en reminder. Jeg føler der er rigtig mange der gerne vil have styr på alle de der ting via sin telefon, fordi man ligesom har en bog i den, når man bliver i tvivl, så har de et sted at tjekke det.

23:36-28:10

M: har i det i drift i dag fauna? Altså her på klinikken eller andre steder?

J: altså jeg har prøvet at starte det op med den der indtil nu er vi også lidt [uklart] fordi at vetnet integration skal lige op og tage position men ellers vil jo starte op med at vi sender det ud igennem vores fauna, når det er og så kan folk se deres vaccinationskort på appen.

M: den her flaskehals der er med vetnet lige nu, det er fordi de sidder og forhandler med en masse virksomheder omkring udbydelse eller hvordan?

J: det tror jeg ikke de gør. De på markedet, men så er det jo så også en flaskehals, hvad er deres incitament for at få det her til at fungere ift hvordan man bruger det her. Hvem har mest brug for det hehe.

L: vi snakkede med benja og nicolai omkring det der med at de ville kalde et symbolsk beløb på 20 kr ekstra hver gang at de kommer herned på dyreklinikken. Vil du mene at det er penge – altså nu siger vi specifikt dyreklinikken her i odder. Men hvis man skulle gå ud til andre dyreklinkker, jamen du skal charge 20 kr pr kunde nu. Hvordan tror du det vil kolidere?

J: hvis det er værdiskabende, så tror jeg ikke det er noget problem.

L: tror du de vil komme til at føle det er penge ud af deres lommer hver gang.

J: ikke nødvendigvis, hvis det er at man kan se at nu har man muligheden for at sende de her dokumenter, det gør også at klinikkens (remang*staves), det er jo også en gevinst for klinikken i at de her ting bliver synliggjort og kunderne er bevidste om det. Der kan også blive den reminder service i det at kan vi nu have flået eller husk mad, altså der er mange ting man kan bygge op som en lille reminder i det system. Når vi sælger foder f.eks. hvis man nu siger den er beregnet til 35 dage den her sæk og på dag 30 kommer der en lille reminder der siger " hov du er ved at løbe tør, du skal forny det så på den måde kan der være mange gevinster ved det som virksomhed. Der er jo mange der gerne vil gøre det godt og fortsætte den linje de har lagt og hvis du kommer ud af kurs fordi, så det sgu lørdag søndag man kommer i tanke om det lort og står at skal købe det og så må jeg ud i nogen boldgader som måske også kan bruge, som de egentlig ikke ønsker. Jeg vil gerne fastholde min kurs.

L: vi snakkede også med Benjamin og Nicolai omkring det der med at dyrlægerne kommer til at bruge to separate programmer med fauna og hvor stor en omvæltning det vil være for dyrlægen. Kan du sætte lidt ord på det?

J: jeg tror der vil være stor uenighed om det, for jeg tror der er nogen der er klar til og så der nogen der vil sige "skrive arbejde er dobbeltarbejde". Grundlæggende tænker jeg ikke. Jeg kan ikke få ind i mit hoved at det er dobbeltarbejde fordi hvis du har de journalsystem- og folk de kommer med en fysisk bog og siger " dyrlæge skriv i den her for mig" hvor jeg så siger jamen det gør ikke noget jeg skriver det her så du får det i fauna, så synes jeg ikke det er det samme. Jeg synes det er en tvetydig modstand i det. Jeg synes ikke det er arbejde der giver mere arbejde.

L: det mener vi jo heller ikke det gør.

J: jeg synes man skal tage hele den der gevinst i den reminder. Alt andet lige folk elsker at blive reminded. Her for mange år siden blev der lavet noget VIPET. En konto for folk der kom her fast, så de kunne gå ind og se hvad de har købt og hvornår de har købt det. Og det kan folk godt li' og det også nemt at give en god service, ved at sige jamen jeg har styr på det.

28:10-31:56

M: Jeg har lige en tanke med frygt for at gentage mig selv, men for lige at få sådan at kunne tage det med i opgaven der. Hvis du ser på fauna, ser du det så som en isoleret virksomhed som har værditilbud, der kan sælges og hjælper både en klinik og en dyrejer eller ser du det som værditilbud fra klinikken der hjælper en dyrejer. Altså hjælper det også internt hos klinikken på arbejdsgange og processer. Hvordan er forholdet mellem de to ting?

J: den er ligeberettiget begge veje fordi klinikken får jo værdi ved at de ved hvad der er sendt ud til kunden og hvad de er informeret om, altså hvad står der i kunden tekst de har derhjemme. Så det har en kæmpe værdi for klinikken i og med vi ikke, nu snakkede vi om camilla sidst hun sagde sådan og sådan og sådan, men nu er det jo sara der læser det og hun har tolket det på en anden måde som i teksten. Men der er det at den tekst der kommer ud passer til hvad det er synes jeg. Og hvor der er taget hånd om hvordan de skal informeres omkring. Men som kunde der synes jeg også den er værdiskabende på samme måde ved at få tilbudt de der dokumenter online.

L: i det hovedhele er det bare man får større indsigt som kunde, det er det basale i konceptet

J: jeg synes jo man mangler noget. Jeg synes jo at dem der inde i nogen forløb, der synes jeg godt vi kunne bibringe dem lidt mere og sige det er sådan vi gør det og

de planer og de konsultationer der omkring det dem har i på skrift L: så sidder jeg og tænker nu var vi nede ved Vibeke f.eks. og det er kun hundeadfærd og der snakkede vi jo rigtig meget med hende mens vi er der i de 45 minutter omkring hvad vi kunne gøre bedre og alle de ting. Men er det noget som Vibeke efterfølgende går ind og notere eller er det noget hvor hun bare siger "sådan er det og sådan var det"

J: altså normalt så notere de det ned, det er udgangspunktet

L: fordi vi sad nemlig her for ikke så langtid siden og tænkte det går ikke så godt med hans alene hjemmetræning, hvad var det nu lige hun sagde, hvad er det nu lige vi skal holde hinanden op på. Og det ved vi i princippet ikke lige nu, fordi vi stod og tænkte hvad var det nu hun sagde? Så der har vi faktisk et lille problemstilling, hvor vi havde problemer med at huske tilbage. Og der sidder jeg og tænker sådan at nu har vi jo betalt eller hvis vi skulle betale for Vibeke ikk, så følte vi også vi gerne vil stå tilbage med noget vi kan gen se

J: det er jo det man skal føle som kunde. Jeg har været ende og ligge nogen penge, jeg har fået noget råd du har bare glemt det. Og det giver det jo en værdiskabelse for os. Fordi du kan også godt tænke det var sgu også for dårligt, der fik udbetalt mange penge osv osv. Hvor kom vi til ikk også. Der føler man jo at man får mere for det.

L: det vil jeg give dig ret i.

J: jeg synes jo også at det er den følelse man gerne vil give folk, det jo ikke fordi at vi – vi det står skrevet på papir eller hvad det end måtte være, så drukner det bare.

31:56-37:30

M: hvis man kigger på fauna og har kundesegmentet der hedder dyreejere, er der så forskellige segmenter, hvis man tænker på de forskellige typer af dyr. Er der så noget man skal skære over to kamme eller kan man holde det hele under ét kundesegment

J: ja og der tror jeg min konge tanke omkring det her er sådan lidt at den fauna app, den bliver meget personlig så helt basalt – lad os nu sige i har 10 linjer i den man kan vælge som kunde og sige de her 5 er mine de ryger ind resten er jeg ligeglad med, så man kan bygge sin, så det ikke bliver et job i det, fordi jeg synes jo det er der man går død mange gange, hvis man henter ting ned i en app de er

meget brede og de kunne godt bruge det lidt, men måske ikke fuldt ud. Men jeg synes det fede kunne være at man kan fuldstændig designe din egen app, hvis det kan lade sig gøre, det aner jeg ikke en pind om, det jo derfor i er der kan man sige hehe.

M: lad os sige der er hunde, katte og fugle, vil du så at alle de ting man kan vælge i mellem, vil du så både give ejere af katte og hunde og fugle vælge iblandt alle funktioner eller er der nogen funktioner der specifikt forholder sig til fugle f.eks..

J: ja det vil jeg synes, det jo også lidt at nu starter vi jo med hunde, men det er mest ligeså vigtig for katte som for heste eller slanger. Når man så downloader den app for kat, jamen så er det de muligheder der er og de relevante ting der er for en kat, men hvad er interessant for dig som hesteejer eller slange, så der dukker der måske noget op

L: den vil så være i det login flow man så laver, så har man ligesom klikket af om det er en papegøje eller et screen hvor du ligesom har.

J: det der kan være det tricky i det er det der med hvis man nu bruger fauna, men har 5 dyrearter, hvordan kobles det så ind. Men det er jo de kloge der skal tænke det ind.

M:hvis man kigger på jeres arbejdsprocesser internt på klinikken, hvor er det du ser fauna i fremtiden lige nu. Hvor er det den rent faktisk bidrager med og hjælpe klinikken med. Hvad er det fauna app har til klinikken internt?

J: internt har man en reminder, så det er jo det der med at holde styr på både det her med folk de bliver, man kan se det bliver reminded men også man kan se hvad er de informeret om? Det synes jeg fungerer, fordi det bliver jo meget. Nu hvis kunden ringer ind og siger " nå hov, hvad skete der egentlig med den der besked, men i kan jo ikke- så ringer de 14 dage efter og siger jeg har sgu glemt" jamen så er det den her besked jeg får. Jeg håber jo lidt på det bliver en lidt mere ens retning. Der skal ikke være så meget tvivl om, for ligeså snart det er forskellige mennesker så der forskellige tolkninger, men det er samme linje

M: bruger i så mindre tid på det?

J: ja det vil du jo blive så, det er netop for at undgå eller spare nogen opkald på at gentage nogen ting fra en journal eller opsætning af en reminder. Kan vi minde folk på de ting der står i journalen, så ringer de jo for at få den tid i stedet for at ringe ind og høre om hvornår det nu var de skulle komme. Det letter jo arbejdet der for veterinærsygeplejerskene.

M: hvad så med, nu snakkede vi jo om personale omkostninger og sådan noget, har i nogen besparelser udover løn = tid og ja hvad der ellers er.

J: så der jo tryk omkostninger, hver gang vi sender en kat eller hund hjem så er det papirer, så når det er digitalt så skal vi jo ikke printe eller skrevet på noget osv på samme måde.

M: er det en væsentlig besparelse?

J: den væsentlige besparelse er tid, helt klart alt i dag der kan spare lønninger det er det dyreste.

M: vi snakkede også omkring det der med velfærd, én ting er at man kan spare nogen penge ved at reducere tiden [afbrudt] J: men jeg synes også at være lidt respektfuld i miljøet som kører i dag, så er det jo også en besparelse på mange måder.

M: man kan jo også sige at det med at spare tid ikke vil få en pengemæssig faktor, men det kan også være en velfærdsfaktor, det der med at tid tit er en mangelvare på at kunne nå alle de opgaver man nu har sat sig for i sidste ende.

A.2 Interview 2

Formalia	**information**
Navn på fil	Vibeke veterinærsygeplejerske.
Dato	9. Marts 2022
Varighed	16 minutter
Koder	**Beskrivelse**
Uforståelige ord	[. . . + tidskode]
Ved usikkerhed	[ordet + tidskode]
ved overlap	[overlap]
Afbrudt sætning	. . .
Interviewer	**Navne**
L	Lasse
Respondenter	**Navne**
V	Vibeke

00:00-03:49

L: okay, jamen jeg sidder med vibeke som er veterinærsygplejerske og du har taget nogen kurser indenfor – du kan måske fortælle lidt om dig selv

V: ja, jeg veterinærsygplejerske og har taget en overbygning indenfor adfærd hos hunde og katte. Så jeg har et speciale i adfærd. Og arbejder rigtig meget med hunde og katte og problemadfærd.

L: hvordan mindske dyrestres ved konsultationer ved dyrlæge?

V: det kan man ved at der altid positiv velkomst med godbidder og stille hvis de på forhånd siger at hunden er nervøs, så siger vi gerne til dem at de skal komme herned inden og gå en runde i klinikken og give dem nogen godbidder og gå igen. Sådan så de vender sig til at klinikken er positiv med mad og det er oftest der man vinder deres hjerter. Når de skal ind til konsultationen, så vil jeg sige at dyrlægen skal være rolig og der skal være afslappet, vi har sådan nogen sprays vi kan spraye lokalet med inden. Som hedder "anoktil" som er nogen feromoner der dæmper dem, så rummet føles mere behageligt. Hvis dyret er bange for at komme på bordet, så gør vi gerne konsultationen på gulvet. Sådan nogen ting vil være, vi har et decideret rum vi kalder stresless rum, hvor der er en sofa og der kan vi godt tage dem ind og så kan ejer sidde i sofaen, det gør tit hunden også afslappet fordi, hvis ejeren ved at hunden bliver nervøs, vil de oftest være nervøse og det går lige igennem. Så hvis vi kan skabe den der rolige adfærd, så smitter det som oftest af på hunden

L: oplever i tit tryk på nede i venterummet omkring når der er mange hunde?

V: vi forsøger at folk ikke venter og vi jo kun har tidsbestilling, som så gør at de ikke sksal vente og derved at der er for mange hernede. Der kan selvfølgelig være tidspunkter hvor der er, og der forsøger vi og få dem til at flytte sig sådan at der ikke er hunde alle steder, men med god afstand. Hvis vi ved hundene er nervøse, så forsøger vi at få dem ind i nogen rum, så der ikke er den her opkørt stemning

L: hvornår oplever i mest der er stressede situationer?

V: det er jo hvis der skal ske noget med dyrerene, som ejeren ikke synes om eller der kommer de der knudepunkter hvor der er mange hvis én begynder at gø så bliver stemningen absolut anderledes og så bliver hundene nervøs

L: er det typisk nogen bestemte racer der reagerer på de her knudepunkter?

V: nej jeg tænker egentlig mere at små hunde gøer jo nemt og føler sig måske oftest truet af andre hunde, men det kan også være store hunde der har haft en

dårlig oplevelse, som gør at de kører lidt højt og så skal der ikke meget til at de bliver utrygge.

L: er det forskel på hunde og katte ift. Den her stressede situation som kan opstå?

V: ja altså ift til mange er det jo hundene oftest, kattene bliver tit stressede fordi de er i bur og der anbefaler vi også at de sætter dem oppe i højden, så der f.eks. ikke kommer en hund i nærheden af den og sådan nogen ting

03:49-4:59

L:hvordan føler i selv jeres tiltag bidrager til de her stressede situationer?

V: meget synes jeg, altså vores stresless rum har gjort rigtig meget, og jeg synes vi virkelig forsøger at mindske streshed og vi har jo f.eks. også foredrager til hundearrangementer og sådan noget, sådan at vi fortæller dem hvad de skal gøre og vi bruger rigtig langtid på deres første vaccination som hvalp har vi en aften hvor den kan lege sammen hernede, så jeg synes vi gør rigtig meget for at fortælle folk at de skal komme herned med dem og komme og låne vægten så jeg synes vi gør rigtig meget og der er god effekt af det.

L: så førstehåndindtrykket er rigtig vigtigt for hvalpene?

V: selvfølgelig, hvis vi kan fylde dem med så meget positivt som overhovedet muligt. Hvis de har 10 gode oplevelser, så er det det bedste og det holder længst. Vi ved af erfaring at én dårlig oplevelse gør at der skal 20 gode oplevelser til for at de slapper af i det igen. Så det er vigtigt

4:59-9:36

L: hvis vi ser lidt udover odder dyreklinik, ser du så generelt her problem hos forskellige dyreklinikker?

V: ja det gør det, fordi vaccination, ligeså snart ejer har opdaget et eller andet eller den har ondt i maven eller sådan noget, så vil vi påføre dyret en smerte og alt smerte bliver forbundet med noget dårligt, så det er noget alle dyreklinikker har problemer med. Nogen er gode til at tiltag til og mindske det. Det er blevet mere og mere synes jeg at jeg hører rundt omkring, men der er jo også nogen der tænker – det skal bare overståes, men i hundeverdenen, så det der bare med at få det overstås forståes som noget negativt. Så det er et problem vi ser overalt. Det

er et brancheproblem.

L: er der forskel på at man kommer til en privat dyreklinik eller et dyrehospital ift til stressede situationer?

V: nej det tænker jeg ikke, det er den samme ting som skinner igennem.

L: hvornår er det stressen forekommer – hvor i processen er det? Er det selvforberedelse hjemmefra, i bilen, i venterummet eller til konsultationen i ser problemet?

V: som oftest alt efter hvad der er der skal kigges på, så kan ejer godt hjemmefra allerede skabe en stresset situation. Fordi de allerede oppe i hovedet har sagt at det kan hunden ikke lide eller hvad er det jeg skal nend og have at vide. Og der kan hunden eller katte, katte specielt mere eller mindre fordi de bliver proppet ind i det her bur og skal transporteres. Det er unaturligt for katten. Men jeg tænker at de fleste steder er inde i venteværelset, hvor man jo kan se, b.la. ved at hunden udsender streshormoner til andre dyr kan lugte. Så den næste hund eller kat, kan jo lugte at her har der været noget ubehageligt og det vil sprede sig over det hele.

L: gør i noget for sekvensen af at man f.eks. tager en hund først , kat efter og så en papegøje efter. Eller er det forskellige racer i forskellige dyr i tager ind i sekvenser, så man ikke tager en hel hundedag eller i tager en hel kattedag?

V: ja altså, der er nogen dyreklinikker der har katte dage og det er med stor succes. så det er faktisk en god idé at tænke i de baner.

L: så det giver faktisk noget for dyreklinikken og gøre det

V:ja helt bestemt

L: men er hovedfokusset så katte i det her tilfælde?

V: nej de har bare valgt at den dag er kattedag, det kan i hvert fald godt være deres største prioritering er katte, men de har i hvert fald haft held med det og det gav voldsom ro for kattene.

L: hvordan generelt med dyreklinikker, er der noget de har et speciale i?

V: der er mange dyrelæger der har specialer og sygeplejersker og det er ligesom det man bliver bedømt på, hvad man tænker man er god til. Og det tror jeg folk bliver mere og mere bevidst om at det de går efter søger de ved deres dyreklinik.

L: er det noget de søger på hjemmesiden så eller hvordan?

V: absolut, det gør vi også selv såvel som alle steder. Hvis der er nogen der har speciale i hjerte, så fortæller de selvfølgelig om det og jeg tænker f.eks. vores bedste reklamesøjle er hvor folk kommer langvejs fra for at kunne blive opereret her.

9:36-11:55

L: nu har vi snakket lidt om, hvordan i forbereder jer når de kommer herned, men sender i så ting ud til dem inden de kommer ned til en konsultation eller operation?

V: nej, men det er noget vi har overvejet at gøre, at sende en besked ud. Hvad er det der skal ske med fido i dag, hvis den skal opereres. Det arbejder vi på at få op og køre.

L: kunne i så forestille jer hvad de her informationer skal indholde? Hvordan skulle selve processen være for dyreejeren?

V: jamen der skulle sendes en beskrivelse ud af hvad der skal ske inden, hvad skal de gøre hjemmefra, hvad er det der skal ske i løbet af den tid den er her og hvad skal de gøre efterfølgende, så de har alt på skrift inden.

L: hvordan har i tænkt jeg det skulle sendes ud?

V: der tænker vi bare på mail. Så har de måske et par dage før de kommer herned et skriv på hvad de skal gøre følgende, og man kan sige mens den er herinde får du så noget med ift til hvad skal de gøre efter operationen.

L: er der nogen grunde til at i ikke har gjort det?

V: jeg tror behovet heletiden har været her, men jeg tror bare ikke vi har gjort noget ved det eller fokuseret så meget på det, altså vi giver dem det i papir form, men jeg tænker det på mail er bedre. Så de får en instruktioner hjem. Vi står meget på telefonerne og tager imod opkald, så det vil mindske den tid vi står og besvare spørgsmål på i løbet af dagen. Folk husker jo heller ikke alt.

L: bruger i rigtig meget på telefonen for at besvare de her opkald?

V: ja det gør vi i høj grad og det vil vi på en eller anden måde gerne prøve på at mindske, så får vi også tid til at arbejde på det vi rigtig gerne vil i stedet.

11:55-13:04

[opsummering af hvad vi har snakket om ift fauna og odder dyreklinik]

13:04-13:09

L: det er meget følesomme dyr

V: ja absolut, det er derfor vi prøver at gøre det så tryk så muligt. Det betyder meget for os

L: nu skal

13:09-15:50

L: er der forskel på at jeg kommer ned med en jack russel terrier eller jeg kommer ned med en golden retriever?

V: ja det er der. Golden retriever er meget meget nemmere og lokke med mad, det kan jack russel terrier, nogengange sige nej til. Og sådan er det jo racemæssigt og så vil vi få større problemer, det er det vi gerne vil lokke med nemlig. Nogen race er mere mistroiske end andre. Jeg ved at richbacks, hyrdehunde, racer der er vagthunde har en mere mistroisk fremmed, det vil sige der skal vi ind og arbejde noget mere for at få kontakt med dem. Derved gør det også at de vil tænke det ikke er rart, så der er bare forskel på race og nogen er bare nemmere og synes mennesker er fantastiske og så er der nogen der tænker ligemeget hvad vi gør, så er vi jo bare farlige.

L: hvordan er det i modtager bestillingstider til konsultationer?

V: altså folk ringer jo og har et problem, og så siger vi at de skal komme herned og så kigger vi i systemet om der er tid. Derudover har vi så web booking og det kan de selv gøre. Det de gør for at få en web booking er at de skal gå ind på vores hjemmeside og bestille tiden og så går den automatisk ind til os. Så kan vi så se i systemet at der står web booking. Hvis de har booket via web, så har de booket sig selv ind, så de går direkte ind i systemet.

L: hvad er det så for en information i spørger efter, når de har ringet ind til jer?

V: deres telefon nummer eller adresse og så dyrets navn og hvad der skal ske.

L: så i søger på telefonnummer oftest når i har en i telefon?

V: ja både det og så adresse.

15:54-16:02

[AFRUNDING]

A.3 Interview 3

Formalia	**information**
Navn på fil	Odder Dyreklinik.
Dato	4 april 2022
Varighed	51 minutter
Koder	**Beskrivelse**
Uforståelige ord	[. . . + tidskode]
Ved usikkerhed	[ordet + tidskode]
ved overlap	[overlap]
Afbrudt sætning	. . .
Interviewer	**Navne**
JE	Jesper
L	Lasse
Respondenter	**Navne**
J	Jan
V	Vibeke
S	Sarah

L: nej hvad hedder det vi vil jo gerne lave et experiement med hundene når de kommer nede på dyreklinikken. Så simpelthen før de kommer ned på klinikken og indtil konsultation måle på deres, hvad hedder det Heart rate variability og deres puls og simpelthen se hvordan den kurve kommer til at være når den kommer ind i de forskellige stadier af den proces den skal igennem når den kommer til dyreklinikken

R: Ja

JE: Og grunden til vi også har valgt Polar er fordi der er apps hvor man kan få den her data

V: Så den går på apps med det samme, yes

JE: Ja der er en app der hedder Polar flow og en der hedder Polar Beat som så synkroniserer den her data så du kan få deres hjerte rytme altså deres heart rate variability

V: ah ja

JE: Men det er ligesom også vigtigt for os at øh at vi ligesom nu snakker vi om det og grunden til at vi snakker om det er, at noget af det litteratur vi har læst det siger at heart rate variability er en parameter som man godt kan måle stres på det er en anerkendt måde at så måle stres på i dyr. Fordi andre gange, det ved du sikkert godt Vibeke, men så gør man det ved at måle deres stres hormoner eller spyt osv. I den stil det har vi så ikke ligesom haft mulighed for at komme hen til det er ligesom lidt svære ...

V: ja jeg tænker det her (HRV) er nemmere

JE: ja, så det er også vigtigt at.. At øh i den her fase at vi har dig ind over eller jer indover det til lige så at sige heart rate variability er en okay parameter for os til at måle stresset på dyret med

V: Ja, men jeg tænker også at i skal have pulsen med.

JE: Ja, men det får vi også - vi får puls og vi får heart rate variability så hvis vi har de to parametre

V: ja super, så er i godt med

JE: Så er vi fint med til at gå ...

L: Men det som dagen, altså den her lille time kommer til at gå på, det er egentlig bare at vi snakker lidt omkring, jeg har jo snakket med jer to omkring øh dyreadfærd og generelt stres og de her ting men Jesper har ikke rigitg været med ind det, men øh der stiller vi lige nogle spørgsmål, nogle åbningsspørgsmål som vi ligesom får snakket omkring de her vigtige ting som vi ligesom skal tag højde for og så bagefter så snakker vi omkring det her eksperiment som vi vil lave og ift. Hvad i kunne synes vil være en god idé vi ligesom testede af og øhm ja forskellige scenarier og situationer man måske kunne måle ting på og så til sidst snakker vi lidt omkring det her hvad kunne nogle konkrete tiltag være for en dyreklinik som jer og hvordan er det ligesom at vi kan forberede ejeren på at komme herned og ligesom velfærden ...

JE: overordnet hvordan kan vi reducer stressen

L: og så velfærden er bedre på en dyreklinik generelt. Ja øhm og så så snakker vi lidt omkring vi har jo selv taget et udgangspunkt i hvordan vi tænker en IT-løsning skulle være men vi kunne også godt høre det fra jeres synsvinkel eller sådan hvad er det der ift. Jeres booking system hvordan er det fungerer nu og sådan noget og hvad kunne der tilføjes for at i føler at det giver en bedre velfærd for hunden i sidste ende ift. Sekvenser og sådan noget Hvor hundene kommer herned og katte osv.

JE: Ja øhm ja nu ved jeg, at i har gennemgået det lidt med Lasse og også Mikkel da han var her men nu kender jeg jo ikke så meget om det og jeg ved heller ikke rigtig hvordan faserne er i dyreklinikken og når der kommer en kunde ind så kunne i kort lige gennemgå hvordan det er, at det ser ud når der kommer en dyreejer ind og skal ha en konsultation her hos Odder dyreklinik og så med de steps.

J: jamen det er altså langt langt de fleste de jo bestilt en tid på forhånd så kommer de med deres hund og sætter sig i venteværelset eller så kommer de ind og går i receptionen og siger nu er vi kommet og melder klar eller sådan vi er her os så kan de blive anvist til at sidde i venteværelset til de bliver kaldt ind. Så det er nok den mest standard ting i det. Så er der nogen der siger jeg har en nervøs hund øhm som de så viser en hvis bekymring for og om vi kan takle det anderledes og der har vi så enden sådan et rum der er lidt anerledes som er mere hjemmeligt at der kan de sidde og vente i og nogen kan simpelthen så også gøre det at de venter i bilen til de bliver kaldt ind

JE: Hvordan bliver de kaldt ind? Får de en besked eller?

J: nja vi går ud og vinker til dem *laughter*

JE: meget beskeden måde at gøre det på *Laughter*

J: men det er nok sådan de tre hovedmåder der er at gribe det til

JE: jov okay

J: er det ikke det vi tænker?

V: Jov

J: der er også nogen der kan hvis de igen fortæller det her det er svært at vi så anviser dem bagdøren eller en anden måde at komme ind i huset på hvis de synes de har en hund der svært reagerer

L: Men er det fordi ejeren siger det på forhånd

J: Ja, ja.

L: det er jer der tager beslutningen?

J: Nej altså ikke på ...

V: ikke på de kendte, dem der kommer ind og vi kan se at de, uden ejeren måske har tænkt over det, at de bliver sådan fuldstændig (stresset) så er det klart at vi gerne vil sige til dem, træk lige ind i stress-less rummet og eller tag afstand eller gå lige en runde eller et eller andet sådan at der er ro på øhm så... men dem vi ved det der bestiller tiden siger i skal lige huske at Fido ikke kan li det.

S: Vi har også en funktion i vores booking system hvor man kan lave en lille note hvor man skriver at her skal der lige sprayes med nogle duftstoffer inden som sænker stres *Inaudible*

L: men det er ja der skriver kommentaren eller?

V: ja

L: så alle er enige om hvad der sker når den hund kommer

V: Ja

JE: Hvad er det der gør det der stress-less rum, stress-less?

V: fordi der er en sofa

JE: ja

V: Der er nogle sådan stole vi kan sidde på så hunden behøves ikke nødvendigvis at komme på bordet, bordet står, altså inde til konsultationen er bordet midtpunkt hvis man kan sige det sådan, inde i stress-less står det ude i siden så hvis det er et behov så kan man tage den frem og ellers så sidder dyrelægen på en puf eller et eller andet og ejeren sidder i sofaen. I det ejeren sætter sig ned i en sofa så sænkes deres stres niveau helt naturligt fordi sådan lidt hjemmeligt agtigt og så årh så kan jeg godt være chilled og det går lige igennem snoren ned til hunden og øhm ja det er tit også det der bord som de ikke kan lide og hvis vi egentlig bare med det samme signalerer at det skal vi ikke

Så slapper hunden også af

JE: Se det er spændende fordi litteraturen som vi har læst den afdækker nemlig også nogle af de tiltag der med at man har et værelse hvor det ser hjemmeligt ud

og vi ved også at hunden har en tendens til at reflektere deres ejers stres også så hvis ejeren er oppe at køre jamen så er hunden også oppe at køre

V: Absolut

JE: men det kunne egentlig også være rigtig spændende at måle på hvor afslappet bliver de egentlig derinde

J: Vi skulle jo egentlig ha en på ejeren og på hunden *laughter*

JE: ja det er lige før *laughter*

L: Ja det er faktisk rigtig nok, der er meget af litteraturen der faktisk siger at den aura som ejeren kommer med inde på dyreklinikken har meget stor betydning for hvordan hunden kommer til at reagere

V: Altså vi har nogen der kommer med deres hund og siger den kan ikke li jer og den er sådan helt uha indtil vi ligesom tager den og siger jamen vi går lige en tur med den og så fejler den ingenting altså den viser ingen tegn på at den synes vi er farlige, men ejeren kommer ind og siger den kan ikke li jer og den er stresset og den er uh og ih. Men hvis vi så bare tager ved den og siger vi låner den bare lige og går herhen så slapper hunden helt af

J: Der sker en beskytter trang tit i mange hunde overfor ejeren

JE: mhmm ja

J: og hvis de så slipper den hundene så agerer de anderledes og det gør at der også er det fokus i at hvis hunden har den tendens og vi skal stikke hunden som vi overhovedet ikke kan gøre imens ejeren er der men hvis vi så går udenfor med hunden så kan vi godt, så er det vigtigt at ejeren bliver stående i det rum og vi så går væk og det kan jo være sådan noget som at klippe negle eller give dem et prik eller sådan nogle ting og det fungerer tit og ofte anderledes fordi hundene ikke skal passe på nogen længere de er blevet fritaget for at være ved siden af ejeren så *laughter* det gør nogle ting

JE: ja.. nu ved jeg at du (Vibeke) blev interviewet af Lasse tidligere der snakkede i om hvor det var at stresset forekom mest kunne i forklare lidt om det? Er det meget inde under konsultationerne fordi det lyder til der også er en meget stor stres faktor der,

J: ja det er der os

JE: Jeg ved du nævnte sidst venterummet

V: ja altså bare det med at komme og altså hvis der er mange i venterummet så er der mange af dem der køre sig selv helt op især hvis de skal stå tæt og det er ligesom der hvor vi prøver at fordele dem øh hvor de kan gå rundt eller komme væk. Men det der med at komme ind i lokalet hvor dyrelægen er for mange af dem stres

JE: ja, ja men det er nemlig det der er vigtigt for os ift. Når vi skal lave et eksperiment her fordi nu siger vi hvor er de steder hvor der er meget stres, kan vi måle det og hvordan kan vi ligesom reducer det

V: umiddelbart vil jeg jo tænke at det er smartest at den der kom på (Måleren) hjemme, privat på hunden hvor den er helt stille fordi selv ude i bilen der er der mange hunde der allerede tænker jeg kommer kun i bilen når jeg skal til dyrelæge øhm så køre stres niveauet op og når den så kommer her og bliver halet ind igennem så hænger den jo helt oppe altså så jeg tænker da at i skulle sætte den på allerede derhjemme så man har en hvile puls der

L: hvad hedder det lige for at tag et andet perspektiv også hvordan... kan i ikke lige sådan samle tankerne sammen finde tre til fem faktorer som man kan se på hunden at den er stresset? Altså gør den nogle bestemte ting øh slikker den som om munden øh kan i ikke lige finde fem ting?

V: Den Halser, trækker vejret hurtigt, den vil ikke tage imod godbidder, den savler nogen gange af stres

J: Den viser det også ved at den søger dækning ved ejer, den går ligesom lidt bagom den gemmer sig lidt op i nærheden synes jeg

S: jeg ved ikke om det er mere frygten, men de citre også

L: Hvad er de mest tydelige af dem i har nævnt sådan? Hvad vil typisk komme til udtryk?

V: De ryster og de halser og de sådan hele tiden viger, sådan jeg vil helst ikke være her og forsøger at komme ud ad døren igen og sådan nogle ting yeah.

JE: Vi øh læste et observationsstudie som tillagde sådan en stres værdi ift. Hvordan hundes adfærd var øhm... ja præcis så øh der var noget litteratur der foreslog at man skulle både ift. Det her med at bedømme stresset skulle man både lave nogle målinger og man skulle have et observationsstudie for at validere det korrekt men øh jeg tror vores fokus kommer til at være på målingerne som sådan

L: Vi har ikke overvejet 100 procent ift. Hvordan observations fordi en ting er at vi

eksperimenterer med den puls og heart rate variability som vi kan se den der måler osv. Men også man måske skulle tillægge den her, hvad hedder det observation hvor man stiller et kamera op og ser hvad er det reagerer hvordan er det at de hver især kommer til at reagerer

V: Det tænker jeg kunne være meget godt

L: Ja præcis også ligesom tælle ud fra de parametre som i lige har sagt fx

JE: også har du data'en der siger en ting, dens puls er 200 eller noget i den stil og samtidig se jamen den gør alle de her ting som er tegn på stres

V: Jeg tænker det kunne være rigtig smart men rent praktisk tror jeg den kan være svært at få nummer to med men et er at i kan måle det men at i hele tiden skal have et kamera stående et eller andet sted det tænker jeg det bliver svært

JE: argh vi kunne da godt overvåge dyreklinikken 24/7 *laughter*

JE: der er måske noget GDPR der *laughter*

V: jeg tænker den tager i bare lige med ham (Jan)

S: Så skal folk bare lige skriver under hver gang de kommer ind

Inaudible

JE: Nå men ift. Hvis vi skulle udføre det her eksperiment, så er der selvfølgelig noget af det litteratur og studier der har været på det i forvejen som har været med heste og grise og køer og sådan noget, der er også nogen der har lavet det på hunde med tidligere polar produkter som vi snakkede om før og de har nogle fremgangsmåder til hvordan de har gjort det, nu har de selvfølgelig ikke gjort det i en dyreklinik, det er der ikke rigtig nogle andre der har gjort så vi bliver selvfølgelig nød til at tag inspiration fra hvad de gør, men jeg tænkt det der kunne være rigtig smart nu hvor vi er her ved odder dyreklinik og i selvfølgelig kender stedet bedst, at vi kombinerede noget af det som litteraturen siger med jeres foreslag ift. Hvordan gør vi bedst det her eksperiment og uden sådan at forstyrre jeres arbejdsplads alt for meget med det øh, jeg ved vi havde tænkt på og det siger litteraturen også lidt og det bliver nød til at støtte os op ad at det vigtigst det er at tag det i forskellige stadier af hvad de (dyrene) laver så måske tag nogle målinger på når hunden er helt afslappet, hjemmeligt og der ikke er noget der påvirker den som sådan og så måske tag nogle målinger når den er ude og lege og så måske noget leg med andre hunde og så til sidst tag nogle målinger her på klinikken for man så har hvad kan man sige basis'en for hvad det er dens puls og HRV ser ud.

J: Skal i som hjem til nogen i privaten eller hvad havde i tænkt jer?

JE: ja umiddelbart så har vi Ebbe

L: ja vi bruger ebbe og så har vi en backup i Felix hvis det nu skulle være

JE: Vores vejleder foreslog at vi skulle få så mange målinger som overhovedet muligt på så mange forskellige hunde som muligt øhm og det tænker jeg også det kunne være smart, det er bare lige hvordan vi kan få det koblet sammen med hvordan, som du siger det bedste er at starte helt fra hjemme af det kan godt blive en udfordring, det kan vi selvfølgelig gøre med vores egne hunde men det er ikke sikkert vi kan komme til at gøre det på samme måde med andres

V: så skal vi i hvert fald have fat i nogen kunder der kunne komme med nogen, med dem vi ved kunne være, men jeg synes egentlig også det kunne være fedt at tag en vægvest men så har vi jo så ikke hjemme målingen

L: så skulle det jo ligesom være hvor man står uden for klinikken og spørg

J: så kunne man jo gøre det at man har set en kandidat her og målt på og så spurgt jamen må vi komme med hjem her og så den vej rundt det behøves ikke først at være derhjemme og så her, altså dem der køre op giver det mening ift. Det så får man da et billede af derhjemme

L: det er rigtig nok

J: hvis der var nogen der var interesseret i det det kunne i jo se.

JE: så kunne vi jo bruge jeres kunde register eller hvordan?

J: nåmen det jeg tænkte på er vel meningen i kommer her og foretager nogle målinger er det ikke det?

JE: Jov

J: jov men så igennem kontakten så får man jo den der, jamen vi kan jo se at din hund reagerer og de her målinger hvis det så giver mening må vi så komme hjem til dig?

JE: Ja

J: og laver nogle målinger

JE: ja, jamen det var også det vi havde tænkt på om, med din tilladelse at vi kommer herned og så spørg

J: jov man så tænker jeg, det er jo dem der siger nej eller ja til det og ligesom de siger ja til at i må godt lave den måling på når de kommer

L: altså det kunne vi godt men det er jo også sådan noget øh det bliver meget direkte spurgt når man står hernede

V: vi kunne vel egentlig godt på Facebook skrive at de næste par dage i næste uge mandag, tirsdag, onsdag, torsdag eller et eller andet der kommer der to fyre

JE: det vil faktisk være super

L: ja så ved folk det ligesom på forhånd

V: ja så er folk forberedt at der vil blive spurgt om de må noget hvis hundene er urolig og i ikke må komme til den så er i velkommen til kontakte klinikken inden hvis i er interesseret eller et eller andet, kunne man ikke gøre det altså? Så har vi ligesom fortalt kunderne at de to dage der vil imøde nogle andre mennesker

L: jamen så skulle det være næste uge eller hvordan tænker du? Jeg tænker i den her uge får vi kørt de her interviews igennem og vi har også noget arbejde med opgaven og sådan, men en gang i næste uge kunne vi sagtens finde på og gøre de ting der som i siger sådan

V: ja det skulle jo så være de der par dage før påske ikk?

JE: Ja

V: altså, fordi det er jo påske næste uge

L: det er rigtigt

JE: jeg tænker hvis det kan være to dage vi kan komme herned

J: men det er måske heller ikke så dumt, så har folk måske alligevel lidt bedre tid

L: ja det er faktisk rigtigt ja, men skal vi ikke lige prøve at gå igennem sådan, hvad øh hvilke hunde scenarier ville være gode at udstille Ebbe for? Hvilke scenarier vil være hvor man kan se han er stresset altså prøv at nævn nogle scenarier hvor at vi ved at han vil blive stresset fx

JE: ja altså vi tænker jo øh vi skal jo også gøre det så nært en normal konsultation der så vi skal jo egentlig køre ham igennem der de faser som du snakkede om før, han kommer ind, sætter sig ind i venteværelset, forhåbentlig er der måske også nogle andre hunde så man kan få en ordentligt realistisk repræsentering af

hvordan virkeligheden måske ser ud og så vi får ham ind i konsultation efterfølgende så vi ser den der kurs

J: Der tror jeg da også på at målingerne vil jo også vise skarpt på at når han er på gulvet så bare går rundt ved ejeren men så når man tager ham op på bordet hvad gør det?

JE: jaja fx!

V: det kunne han godt reagere på

J: nå jov men det er der jo mange der reagerer på og derfor er det jo netop mange som vi ikke har på bordet af samme grund men det kunne jo godt give en afdækning og sige at det stresser dem faktisk rigtig meget

JE: ja

S: også meget det her med at blive holdt, selvom vi prøver at gøre det så roligt

J: ja

V: det kunne han faktisk også reagere på

L: ja jeg ved Ebbe han reagerer på både oppe på bordet og hvis der er nogen der holder ham udover mig, altså det ved jeg det kommer til at ske

S: nå jamen også nogle gange bare når ejerne holder den ikke os?

JE: ja jeg ved fx med min Felix der som er en lille pommeraner vi bor i en lejligheds kompleks og det er sådan at vi kan høre klokken når den bliver ringet selv hvis det ikke er til os så kan vi høre den over det hele, han hjerner jo ud til døren og står råber af den *laughter* altså så så tit så går jeg jo tit hen til ham og nusser ham lidt og holder ham og der kan jeg jo også mærke at hans hjerte bare flyver af sted ikke altså og det er jo ikke fordi men jeg tror i hans hoved der tror han at han nok ejer hele det der kompleks der, det er hans det hele så hvis der kommer nogen han ikke kender så bliver de selvfølgelig råbt af, men han kan jo ikke se hvem der kommer dernede altså så det er jo ligeså vel hvis det er mig eller min kæreste der står dernede og ringer på

V: Ja

JE: så er han stadigvæk derhenne med det samme så

J: men det kunne vel også være interessant at lave den måling når man hvad siger

man folk kommer ind og hvis man går ind i stress-less med det samme

L: ja altså simpelthen teste rummet af

J: ja også tag kontra dem der bliver sat i venteværelset, hvad gør det?

L: det er faktisk en rigtig fin idé

V: så i har ligesom lidt forskellige vinkler

L: jeg ved ikke de måler i får dem kan i vel ikke se lige med det samme kan i det?

JE: Øh data'en den går ind på app'en også kan du synkronisere den over til computeren og jeg mener kun det er på computeren at du kan se det hele, du kan se pulsen på mobilen med det sammme

L: men det jeg tænkte på var egentlig om de der data der nu kommer af sådan et besøg skal i hjem og evaluere dem fordi så kunne man jo sige til folk prøv at se nu har vi fået de optagelser her hvis det nu viser sig at din hund stresser meget må vi ha lov at kontakte dig så vi kan lave en hjemme måling, så man ligesom

JE: altså pulsen vil du kunne se direkte med det samme, jeg tror ikke vi kan se Heart rate variabiliteten direkte på

J: jamen det afhænger jo så hvad i har brug for at vurdere

V: ja om puls bare kan bruges

JE: ja men nu siger i apropos resultaterne øhm nu nævnt jeg for vores vejleder sidste gang at det eventuelt var smart hvis vi havde Vibeke til at validere resultaterne og fremgangsmåden i hvordan vi gør det fordi det giver selvfølgelig noget validitet til vores studie i det hele hvis det er okay med dig at vi ligesom kunne støtte os lidt op ad hvad du siger så du ser nogle af resultaterne så vi kan være sikre på at det vi egentlig finder det er rigtigt når vi kommer dertil, det tænker jeg kunne være smart

L: ja altså jeg tror i og for sig det er irrelevant om det er en eller jer tre bare vi ligesom har en inde over det

JE: Det er i hvert fald bare smart tænker jeg lige at kunne læne os op ad hvad kan man sige eksperterne ift. Det så vi er sikre på at resultaterne vi får de er ...

V: jamen altså det skal vi da nok finde ud af

J: Det tror jeg da også, det er bare at kigge på det her

JE: jeg tror hvis vi har computeren med på samme tid så kan du få dataen over med det samme og så se

J: jov ja men det er jo tit her i nuet at folk synes det er rimelig interessant at få det afklaret *inaudible*

V: Jov men også om det kan bruges sådan noget der så synes folk jo det er spændende

JE: helt sikkert

L: jeg tror da nok at når vi lige har fået, altså nu skal vi først lige hjem og teste det her i morgen og i overmorgen men når vi lige har fået sat det op og sådan noget og det egentlig kører så tror jeg da godt vi bare kan tag computeren med ned og så tror jeg bare det virker som det er og det står

J: Okay

L: Når det nu er vi går i gang

V: Fedt!

JE: Så jeg er mere overrasket over at der ikke nogen der har lavet noget studie på det her

L: ja det er jeg faktisk os

V: ja

J: ja det er meget overraskende

L: jov altså der er jo lavet nogle observationer men der ingen der har målt sådan på selve hunden altså

V: nej nemlig

JE: ikke i den her kontekst i hvert fald

J: ja det er nok meget adfærds studier ja det er jo egentlig lidt utroligt

V: ja det synes jeg også ja

JE: ja for hvad kan man sige mange af de her adfærdsstudier der er i forvejen det er alt sammen i etnografisk fremgangsmetoder altså ren observation ift. Stressen der er ikke nogen der har ...

V: ja der har målt efter og sammenlignet nej

JE: ja præcis så øh

V: spændende!

JE: Så det med at få data'en på den måde ...

L: ja altså der var den der artikel omkring hvor de havde målt med en ecg måler på hospitalet og så den her Polar, men det var jo ikke her altså i en klinik

JE: altså de har valideret at man kan bruge måleren til dyrene, det er sådan set der den er så hvad kan man sige vi tager skridtet videre og ind i den her kontekst hvor det kunne være stres

V: ja hvor der kunne være stres ja

JE: ja så det med stres målingerne det, er der ikke så meget på så det er lidt spændende hvad vi finder ud af der

V: ja det synes jeg da os!

JE: ja men lige ift. Hvordan vi skulle bare lige sidste gang ift. Eksperimentet her for at opsummere det så, den bedste måde at gøre det på at tag målingerne på er ved at lad os sige vi tager Ebbe her først det er, at vi starter hjemmefra

V: Ja

JE: Også kører vi hen til Dyre klinikken

V: ja

JE: kommer ind, checker-in

V: hvor han har måleren på i bilen os

JE: ja hvor måleren er på i bilen

L: ja altså ligeså snart vi går udfra døren derhjemme så ...

V: så stiger hans (puls) men jeg tænker også at du skal tag den hjemme hvor du er rolig

L: ja

V: hvor i ligesom ikke har lagt op til at nu skal der ske noget, men bare sat den på

985 og sætte jer i sofaen og så måle og så tænk nu skal vi ...

986 L: ja giv ham sådan en 20 minutter hvor vi sidder i sofaen så kan vi stille og roligt
987 bevæge os ud af. Det er iorden det kan vi godt aftale

988 JE: Vi skal lige finde ud af hvordan vi sætter den bedst på Ebbe

989 L: ja

990 JE: som sådan

991 L: ja en meget lille fyr

992 JE: når ja men det er jo selvfølgelig vigtigt fordi hvis den falder af en lille smule
993 på det jamen så mister vi målingerne

994 V: ja

995 JE: så det er jo også derfor vi har aftalt at vi skal ha den, vi sætter den på Ebbe i
996 den her uge også får vi ham også lige til at løbe rundt for at se om okay sidder
997 den ...

998 V: sidder den tæt nok og ja

999 JE: så vi skal sikre os

1000 V: ja det er i simpelthen nød til ja

1001 JE: ja

1002 V: absolut

1003 S: hvad er Ebbe for en race?

1004 L: en Jack-russel Terrier

1005 *laughter*

1006 L: meget han

1007 JE: det er for at sikre sig den sidder ordentlig fast og at man, det er selvfølgelig på
1008 mennesker, gør det her vådt [peger på elektroder på cardiobeltet] for at det virker,
1009 men vi har selvfølgelig ikke pels hehe. Så det er nok ikke det samme, men
1010 hvordan er det i foreslår vi bedst kunne gøre det her? Det var at vi købte noget
1011 velcro?

V: ja og jamen eventuelt laver velcroen rundt og sætter den ind under med et overlap på velcroen, tænker jeg.

JE: er det så hvor vi har den ude af den her

V: det er i nok nød til

JE: vi skal bare lige sikre os fordi at

S: ved i om det virker, nu siger i at de har prøvet den på heste og sådan noget, har de så prøvet på langhårede heste også?

JE: ikke ud fra hvad jeg kunne se. Der står bare at det var til "Industrial training" at de bruger dem. Men den sidder jo sådan her, så jeg vil antage at de målet for den her side af umiddelbart. Men den skal sidde tæt derpå, for den sidder jo normaltvis sådan her ikke.

S: var det en pommeraner du havde?

JE: Ja

S: der er noget pels

JE: vi klipper ham

Alle: Hahaha

V: det skal vi i hvert fald lige nå at skrive haha.

JE: der var jo den kat du skulle klippe, der var der noget firkanter rundt om hehe.

JE: det er lidt interessant hvis den måler hvis den bare sidder sådan her reelt set uden det her på.

V: det er i hvert fald lige noget i skal undersøge, umiddelbart tænker jeg at det burde kunne gøre det. For det her er jo bare for at holde den fast. Så den burde egentlig bare blive lagt herind [under brystet]

S: den er genial nok den her det er slet ikke det, men den bliver også ulækker

JE: hvordan kan den blive ulækker, er det pga pelsen?

V: du kan jo bare se på vores [tøj] altså

S: man bliver så nusset og fuld af hård.

JE: jeg tænker vi kan lige prøve den på ham i hvert fald.

V: sådan en vest som den her

J: det afhænger selvfølgelig også af at det kan være noget som irritere hunden eller stresser den, så nytter det selvfølgelig heller ikke noget så påvirker det resultaterne. Så man skal på et eller anden måde gøre det let så muligt uden dyret bliver stresset.

V: det også derfor jeg tænker buddy-stucking nok bliver for meget.

J: kan man ikke købe et eller andet elastisk bånd måske. Så kunne man jo gøre det at have 5 eller 6 forskellge størrelser og så købe sådan klips til at sikre den ikke bevæger sig. Så kan man jo ret hurtigt sætte den på og så lige den form der passer, hvor den nu skulle være. Man kan også godt klippe det her stykke her af og så trække over hovedet, men det jo den stresfunktion i det.

V: det tænker jeg det gør. Den må ikke komme hen over hovedet på den. Den skal bare rundt om livet, så den ikke skal løfte ben og poter op, fordi det er der bare noget i, så pas på med det.

L: så sidder jeg og tænker den der lomme der skulle være. Alle de her ting dem er vi gået igennem inden vi kommer ned i næste uge.

JE: min tanke umiddelbart er at det ikke er noget der påvirker resultatet, så ville jeg nok stadig kører med den her [Cardiobåndet]

V: så skal du jo nok have et par stykker, for hvis du har en der er vildt ulækker, så vil egen ikke have du sætter den på deres hund. Så hvis den er fyldt med pels fra den hund du lige har haft den på, så vil den næste sige, at den ikke skal på.

J: Jeg tænker den der bliver i nød til at have i nogle forskellige størrelser

JE: ja altså der var den der, som er XXS-M og det er jo til mennesker, så det er derfor vi købte den der, fordi de andre højst sandsynlig ville være for store til dyrene.

L: Jeg tænkte på hvad er det egentlig det gør det her [elektroder på cardiobåndet].

JE: det er bare så den sidder fast, fordi på mennesker der fugtigere du den her[cardiobåndet] som så klæber sig fast.

V: det kan du jo så ikke bruge til hunden, men den gør nok at den ikke glider så nemt

L: så det lige før vi skulle have den her med hjem, så vi kan lave noget forskellige størrelser, som du siger.

JE: vi må ud og købe det i hvert fald.

J: ja for jeg tror det her er for løst igen [forbinding til hunde] det går ud af form, men jeg tror sådan et elastikbælte eller et eller andet elastisk stof vil kunne få rundt om.

V: det er bare vigtigt i finder noget der går rundt om livet, men ikke over hoved eller poter. Ligeså snart i skal løfte poter, så der mange der er stresset over det og så får i egentlig en forkert måling. Så vil det være håndteringen der stresser og ikke det andet.

JE: der er mange forhold man skal tage.

L: vi finder i hvert fald ud af det i morgen med den her, når jeg putter den på ebbe.

V: hvis han nu synes det er fuldstændig forfærdeligt at sætte den der på, så er han et godt billede der illustrerer at de andre hunde heller ikke kan få den på på den måde.

V: man kan selvfølgelig godt lige når man sætter den på, sige at der kommer en reaktion, men hvis han så inden for kort tid falder til ro så kan det godt lade sig gøre.

L: jeg tænker i hvert fald hurtig vil prøve at bide efter den

V: ja tænke hvad det er for noget, men hvis man får ham til at stoppe med det og sige det må man ikke, så forstår han også det. Men hvis han heletiden prøver at få den af, så betyder det at han ikke synes den er rar at have på.

L: Vi har faktisk sådan en man tager over hovedet og klikker rundt om brystet. Det har han ikke noget imod.

V: så er han også ligesom vant til at have noget på, så bliver det en reaktion han ikke kan komme fra igen, så det fordi han ikke kan lide at have den på.

JE: Felix har også sådan man bare lige skal have fødderne i. det plejer ikke at være noget problem

J: der findes jo faktisk de der dragter, hvor man stikker foden ind igennem.

V: ja men mange af dem kan bare ikke lide at komme ned i den.

L: Ebbe kan f.eks. ikke lide at sætte hans fødder ned i dem.

V: i kan jo prøve den af[cardiobåndet] og se hvad reaktionen er på det.

[utydelig snak]

V:i skal også tænke over om i skal sortere efter om de er bange for at komme herind og stresser over det. Eller de stresser fordi de bliver glade for at komme herind.

L: det er faktisk ret vigtigt ja. Så man også lige får en vurdering på om det er stress overhovedet eller det bare er fordi de er glade over at være der.

JE: det er måske derfor det også vigtigt at have observationsdelen med i det, fordi der er jo også positiv stres der gør dem glade.

V: det kan i jo lave sideløbende mens i laver målingerne, så i notere ned om dens adfærd i venterummet og til konsultationen. Altså jeg tænker de observationer i skal lave er om den er glad eller bange.

S: hvis man skal måle stresset, så det måske ikke den vej man skal gå

JE: altså den arbejdende tese vi har lige nu er hvordan vi reducerer stresset ved konsultationer ved dyreklinikken, men det gør jo nødvendigvis ikke sådan at det behøves at være overhovedet. Især når man tænker på konteksten af den literatur der er og de få studier der egentlig er. Det vigtige er der kommer et viden bidrag og det kan jo godt være I form af at man bare får målt. Jeg tror bare vi er vant til at tænke på et eller andet med hvordan, hvilken og hvad ift til vores rapport.

L: men også at tilføje en løsning til sidst.

V: jeg tænker en god observation igen og sige jamen vi vil gerne have nedsat den dårlige stres. Det skal være formålet, men vi er jo nød til at se på dem der er glade over at komme her, men de får måske også en form for stress, men den kan vi bedre håndtere, hvis vi så får de andre, så vi kan samligne, så man ligesom har begge varianter. Det tænker jeg kunne være godt

JE: hvad tænker du også kunne være relevant for jer og for odder dyreklinik og noget af den data vi får ud.

V J: Ja absolut

JE: det kan man se ud fra dataen virker. Jeg synes også det er spændende I kan få noget ud af det, så vi ikke bare udnytter jer haha. Det er super fedt at I også har en interesse I at få nedsat stres.

V: ja vi synes det er mega fedt og det er jo også vores mål at nedsætte stressnivueat på klinikken. Absolut.

L: det kommer også frem til sidste ende af det her interview, hvad kan man gøre at konkrete tiltag. Nu har vi selv tænkt ting. Udover det I gør nu, hvad har I så overvejet at tiltag som kunne ændre stressnivueat?

L: det kommer også frem til sidste ende af det her interview, hvad kan man gøre at konkrete tiltag. Nu har vi selv tænkt ting. Udover det I gør nu, hvad har I så overvejet at tiltag som kunne ændre stressnivueat IT mæssigt? Det kunne være mail eller alt

J: har man nu sådan en tilgang som vi. Mange gange så bliver det ikke italesat før efter de har været her. At det kan være et problem og det kan være en bekymring de står med som de ikke deler med os, når de bestiller tid og modsat at vi ikke for spurgt ind til om deres hund er bekymret for at komme her. Så grundlæggende kan man sige, laver vi en justering og når kunden booker en tid at man sender en lille skrift ud til dem "er din hund utryg ved eller er der noget ved omstændighederne der gør det svært at komme til dyrlægen" eller et eller andet, så er der sådan eller gør det og det eller kontakt os eller noget andet eller hvad ved jeg. Altså ligesom at få en sms med en påmindelse om at nu skal du til dyrlæge, så kan man også sige at vi har fokus på det og det. Og man kan sætte dedt på hjemmesiden, altså der er jo flere steder man kan sætte det ind. Og det vil folk også kigge efter, fordi dem der er bekymret for at gå til dyrlæge, de prøver jo også at søge I verdenen, hvor er det mindst bekymrende at komme på en eller anden måde.

V: det er jo også derfor vi har nogen der kommer langvejs fra, hvor de har den tilknytning til at her kan min hun godt lide at være, så betyder det mere for dem at køre. Altså vi har nogen der kører fra Viborg og fyn.

JE: så det er en stor tiltrænings kraft?

J: jo atlså det betyder bare noget for nogen. Frem for at man skal tænke "kæft man skal jeg til dyrlæge igen" man skal nærmest slæbe den ind. Det er ligeså ubehagelig for ejeren som det er for hunden.

L: hvordan ift. Det bookingsystem I har? Hvordan får I bookingen ind. Er det gennem en liste eller hvordan var det?

V: ja det er det, men vi har bestemt hvornår på dagen de kan booke.

J: og der kan man sige, der tager vi hånd om det, hvis de nævner I en kommentar. Så bruger vi især det der lokale "stressless room" hvis det er ledigt til dem. Så prøver vi at guide dem derind.

JE: en af tingene vi kom frem til efter vi brainstormede forskellige idéer og en af de ting vi har set er at I lader nogen af ejerne gå ud når det er og så kalde dem ind når det er. Og det er en af de ting hvor man egentlig bare kunne lave et "check in" uden at man egentlig skal gå ind på klinikken. At checke ind uden at de først skal ind og så gå ud igen, men hvor det er at man så sendte en check ind meddelse til jer og så få den besked, og så sige okay dorthe kommer om 5 minutter, så hun går rundt udenfor og så kan I kalde hende ind når det er. Så skipper man hele den der stresfaktor med venterummet. At man så måske vil undgå det at det var på den måde. Det var en af de ting som er rimelig simpelt.

V: ja udefra uden man egentlig kommer ind også uden ejeren kommer ind.

L: det skal så kunne illustreres I jeres system. Som I har nu med den kalender der, så skulle det bare være en knap I trykker på, som så sendes ud til kunden. En standard sms.

V: ja det er en god idé.

J: jeg tror nogen I coronatiden, ville synes det var afstressende, men det var at alle folk ikke mødtes derude(på klinikken), som om de fik en lampe der lyste, når det var deres tur, for ligesom at undgå venterummet.

Alle: *laughter*

JE: det var ihvertfald en af de tanker vi sad med, når folk kommer herind, så kan de I princippet stå og vente udenfor og stadig melde der ankomst.

J: det jo egentlig også nogle fede tiltag man kan give overfor klienter, I må gerne komme ind og melde jeres ankomst og sidde I bilen. Der er nemlig mange der har det ubehagelig med at sidde I et venteværelse og have 3-4 hunde der går forbi og gøer. I bund og grund, så er det federe at have en god måde at skrive til dem på.

V: en af de ting vi gør nu ved nogen af de hunde der virkelig er bange, så bliver de I bilen og så går vi ud til bilen, men så kan de være bange for bilen. Men tit så det nemmere for ejeren den bliver behandlet I bilen, end at de skal slæbe den ind og de ikke vil. Så det har vi da også gjort et par gange, hvor man ligesom lader dem blive og sige til dem vi har set dem og så går dyrlægen ud til dem.

JE: altså det vi har forestillet os f.eks. hvis man skal køre et forsøg med det tiltag, det er selvfølgelig vi først har kørt målingerne med det normale som vi gør nu og så nemt lave et forsøg, hvor man tjekker ud udefra, men hvor man tog hunden direkte ind.

V: ja så kan man jo tjekke den stressfaktor.

L: der var også noget med literaturen der snakker om at have sekvenser af, hvor man har hunde og katte dage, hvor det faktisk blev valideret for at det har effekt for kattene, men ikke så meget med hundene. Hvordan vil I have at gøre I det og gør I I det nu?

V: ikke en hel dag.

L: er der nok katte til det?

V: ja det kunne det godt

L: er det et tiltag man kan tilbyde, hvor der måske er 1 eller 2 gange om måneden, hvor det kun er katte, fordi der er nogen der rigtig er emsy omkring deres katte.

J: det er svært, for der vil altid være akuttider man ikke kan undgå, så på den måde ville det ikke gå.

V: Det eneste man kan sige her, er hvis man kunne dele klinikken op, så man kunne bruge scannerummet og de kan gå ind af bagdøren og var der.

J: man kan sige grundessensen I det der, fordi alle klinikker er I bund og grund meget forskellige, kunne man opstille nogle tiltag man kan gøre brug af mange forskellige stedet, som f.eks. det med at blive siddende I bilen, det er jo sådan nogen ting der faktisk minimere det. Vi var på et katteadfærdskursus og det kan man sige også er essensen derfra, hvor de siger man ikke skal slæbe den kat med ind på klinikken, hvor der er 3 hunde der kommer og gøer den op I hovedet. Jeg tror mere det er at give nogen redskaber I det der med at man går til dyrlæge og hvordan man skal forholde sig især som katteejer. der er mange der sidder derhjemme og slet ikke tør at tage katten med til dyrlæge alene af de grunde. Det kan de slet ikke overskue.

S: så kommer ejerne også først ind, når det er rigtig slemt med katten, det kan faktisk være et stort problem.

V: så kører rouletten nemlig bare, fordi ejerne også bliver helt vildt nervøse.

J: det er tit forklaringen med katte, det er at de kommer I yderpunkt en en hund

gør. De er mere tilbøjgelig til ikke at komme ned på klinikken.

S: nervøsiteten starter jo allerede, når de skal finde den transport kasse, det ved kattene godt at det er en stressende faktor at blive sat I den. Og kan heller ikke lide at køre bil.

JE: det er sjovt I siger det der, for det stemmer overens med den litteratur vi har læst, at der var dyrlæger der sagde at de tit oplever at dse reelt kommer flere dage senere ind en de skulle have været. Dvs at dere skal meget mere behandling til end oprindeligt.

J: det er et kæmpe skridt, for jeg tror man har misforstået mange af de ting som foregår nu, for det er egentlig derfor de kørende dyrlæger er kommet, fordi så skal de ikke flyttes. Men så tænker jeg jo at man egentlig påfører hjemmet en skræk, for nu kommer de(dyrlægerne) hjem til mig og jeg skal holdes fast på køkkenbordet, så nu er jeg ikke engang sikker her længere. Det er jo nogen sjove ting man kan sætte I værk.

Inaudible

JE: har det en påvirkning hvor meget dyret kommet på besøg på dyrklinikken?

V: hvis man lige fra start som hvalp, vender dem til at komme her. Gå på vægten, få noge godbidder, gå en runde uden der sker noget som helst. Alle der ser den klapper den og hygger om dem, så bliver det virkelig lagret. Så det er virkelig det man skal have dem til at komme og gøre. F.eks. kom ind, få en godbid og gå igen, jo flere der har gjort det som hvalp, det er dem man ser have det godt med at være hernede og som synes det er spændende at komme herind. Så omvendt hvis de fejler noget og de skal have hjælp at dyrlægen og det er ubehageligt, så daler den hukommelse der hedder "fedt at komme til dyrlæge" så vil de få den samme reaktion som alle de andre, men det er nemmere at vende den situation om. Der skal mere til få at situationen vender igen efter disse oplevelser

J: nu det lidt interessant med de hvalpeaftener vi har, stort set de fleste af dem der har været till dem, er jo egentlg glade for at komme herned igen efterfølgende, så det har stor indflydelse på hundens opfattelse af dyreklinikken.

V: der er stor værdi I at få dem til at komme herned.

Feasibility study, virker den her teknologi eksemplificeret med hunde, kan det her bruges til andre dyr? eventuelt produktionsdyr

experimentet er inde for en niche, men det er en del af noget meget meget større

A.4 Focus group - Interviewguide

Område/Opgaver	Beskrivelse
Præsention af interviewere	Hej, vi er studerende fra Aalborg universitet. Vi er i gang med vores kandidat speciale indenfor It-design og applikationsudvikling.
Briefing og formål med fokusgruppen	Dataindsamling -
Aftale om lydoptagelse	Bed om samtykke til at optage samtale og gemme lydfilen til transskription
Aftale om transskribering	Bed om samtykke til at gemme lydfilen til transskription
Anonymitet vedr. projektet	Gør den interviewede opmærksom på at vedkommende vil optræde anonymt i projektet
Interviewets struktur	1. Præsentation af respondenter 2. Åbningsrunde, respondenter får uddelt papir og skriver to ord ned om hovedemnet, som de forklarer sig ud fra. 3. Diskussion runde om hvordan man som klinik skal forebygge dyrestress før/under/efter konsultation eller operation 4. Bud på hvordan man bedst kan måle hundes adfærd og hvilke situationer bliver dyr generelt mest stresset?
Fase 1: Præsentation	- Kan I hver især fortælle lidt om jer selv - Uddannelse? - Baggrund for at blive veterinærsygeplejerske? - Hvor mange år har du været veterinærsygeplejerske? - Har i selv hund eller kat?
Fase 2: Åbningsrunde	- Opgave - skriv 2 ord ned: Hvad tænker i på når i hører ordet dyrestress. - Hvad kom i frem til?
Fase 3: Diskussion	- Hvor i besøget hos dyreklinikken forekommer der mest stress hos dyrene og hvad er jeres bud på at det opstår? - Hvordan forebygger man generelt stres hos dyr på dyreklinikken på nuværende tidspunkt? - Hvordan mener i at det har effekt på dyrene med jeres forebyggelse? - Hvordan forholder i jer til stressede situationer i venteværelset? - Kan i fortælle lidt om hvordan man på nuværende tidspunkt måler hundes stres niveau? Er der noget mere effektivt end andre? (heart-rate, respitory rate)
Fase 4: Konkrete tiltag	1. Nu har vi snakket lidt omkring emnet, hvordan mener i en helt konkret forebyggelse kunne være fra at kunden for bestilt sin konsultationstid til at den er blevet afviklet? 2. Vi har selv overvejet nogle tiltag i forhold til et IT-mæssig perspektiv.

A.5 Interviews - interviewguide

Område/Opgaver	Beskrivelse
Præsention af interviewere	Hej, vi er studerende fra Aalborg universitet. Vi er i gang med vores kandidat speciale indenfor It-design og applikationsudvikling.
Briefing og formål med fokusgruppen	Vi er igang med at kigge på hvordan man kan mindske stres hos dyr ved et besøg hos en dyreklinik og vil i den forbindelse stille dig nogle spørgsmål, som vi tænker din ekspertviden har indsigt i og har lyst til at dele med os.
Aftale om lydoptagelse	Bed om samtykke til at optage samtale og gemme lydfilen til transskription
Aftale om transskribering	Bed om samtykke til at gemme lydfilen til transskription
Anonymitet vedr. projektet	Gør den interviewede opmærksom på at vedkommende vil optræde anonymt i projektet
Interviewets struktur	1. Præsentation af projektets størrelse og hvilke problemstilling der er stillet. 2. problematikker som opstår på dyreklinikken ved stressede situationer 3. nuværende tiltag for at mindske stressede situationer 4. Bud på hvordan man bedst kan måle hundes adfærd og hvilke situationer bliver dyr generelt mest stresset?
Fase 1: Eksplorativ tilgang	- Kan du fortælle lidt om de problemer i står overfor når i har stressede situationer på jeres dyreklinik? - Ser i det som et reelt problem for alle dyreklinikker? - Hvornår er det stresset forekommer. Hvornår er det i processen man kan se at dyret er stressede (turen derned, i venterummet eller inde ved konsultationen?) - Er der nogen bestemte dyr som har en bestemt adfærd når de kommer på klinikken? - Hvad oplever i specielt ved hunde?
Fase 2: Konkrete tiltag	- Hvordan kan man mindske dyrestress ved konsultationer ved dyrlægen? - Hvad gør i nu for at mindske stressede situationer. Hvilke tiltag har i? - Hvordan bidrager jeres tiltag at afvikle stressede situationer? - Hvilke forberedelser forventer i jeres kunder har før en konsultation eller en operation? - er der nogen dokumenter i sender ud inden i har mødet med kunden?

A.6 Relaxed baseline recording for a small dog

Max HR	135 BPM
Average HR	89 BPM
Mean RR	670 ms
RMSSD	127,78 ms
ln(RMSSD)	4,85 ms
NN50	256 count
PNN50	63%

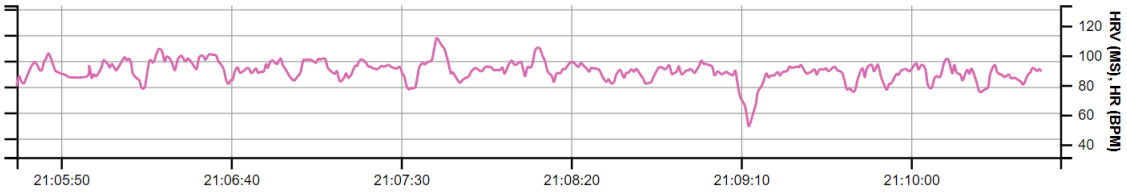

Figure A.1: Heart-rate graph - relaxed baseline for a small dog

The relaxed baseline for a small dog (RBSD) as seen in figure A.1 was taken over a duration of five minutes where the dog is sitting comfortably in a couch relaxing with its owner. The recording is taken to establish how the parameters look in a context with no stress or external stressors applied to the dog. Furthermore, it enables us to compare the baseline data to the data gathered of similarly sized dogs at the veterinary clinic. In a relaxed and calm state there are no major spikes in the heart rate and the maximum heart rate that the dog achieves during the recording is 135 BPM. Additionally, the average heart rate that was measured during the recording was 89 BPM. The mean R-R interval duration during the recording was 670ms, as previously mentioned, a higher heart rate variability indicates rest, while a lower Heart rate variability indicates that the body is under stress (*Heart Rate Variability vs. Heart Rate - Elite HRV*). See Elite HRV *. Furthermore, the count of NN50 is at 256 which highlights a large amount of successive R-R intervals with a length of over 50ms to the previous one. the subject's PNN50 value is at 63% furthering the indication that its HRV was high, due to there being a substantial proportion of successive R-R intervals with a length greater than 50ms to the previous one in the total amount of R-R intervals recorded.

*Elite HRV website, https://elitehrv.com/heart-rate-variability-vs-heart-rate, [Accessed: 19-May-2022]

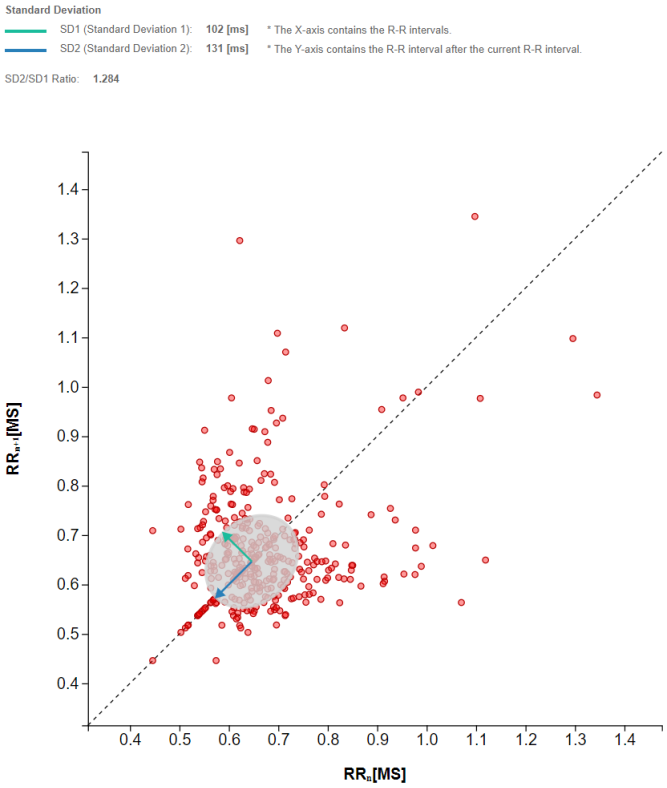

Figure A.2: Poincaré plot - relaxed baseline for a small dog

The Poincaré plot for the RBSD indicates great variance in the subjects HRV. This seen in how far apart the red dots are from one another. As previously mentioned in the subsection **??** the red dots represent the R-R intervals. The size of the ellipse which represents the total HRV is also very wide and long furthering the argument of great variance in the subjects HRV.

A.7 Active baseline recording for a small dog

Max HR	235 BPM
Average HR	173 BPM
Mean RR	346 ms
RMSSD	79,32 ms
ln(RMSSD)	4,37 ms
NN50	116 count
PNN50	18%

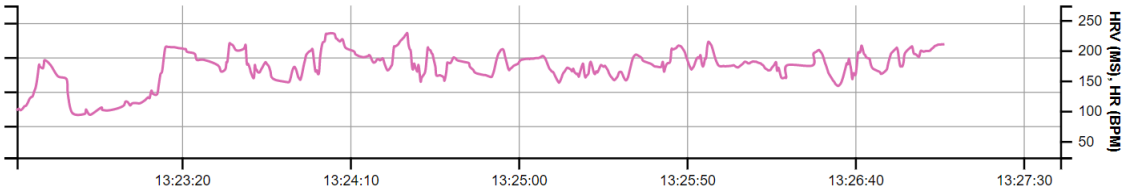

Figure A.3: Heart-rate graph - active baseline for a small dog

Akin to the RBSD, the active baseline recording for a small dog (ABSD) is taken over a five minute duration and it establishes what the parameters look like when the dog is actively playing with its owner. There is a sizeable difference between the relaxed and active state in terms of its HR and HRV parameters. The max HR the Subject achieves during the recording is now 235 BPM which is 100 BPM more than the RBSD. Furthermore, The average HR is 173 BPM which amounts to a difference of 81 BPM. Additionally, the Mean R-R interval length is measured to be 346ms indicating that the subject is under stress (*Heart Rate Variability vs. Heart Rate - Elite HRV*). Stress on autonomic nervous system can also occur in the form of exercise this is similar to how other forms of stress is portrayed in the HRV recordings (*Heart Rate Variability vs. Heart Rate - Elite HRV*). The count of NN50 is 116 which is less than half of the NN50 count of the RBSD at 256. This indicates that there is less HRV with ABSD than the RBSD. This also points to the ABSD's ANS being exposed to stress. The PNN50 value of the subject is at 18% which is a substantially lower value than the RBSD PNN50 value which was at 63%. Furthering the indication that the ABSD has a substantially lower HRV than the RBSD. The assumption is that the recordings produced at the veterinary clinic will mimic the active baseline recordings more than the relaxed baselines, despite the subjects mainly being stationary.

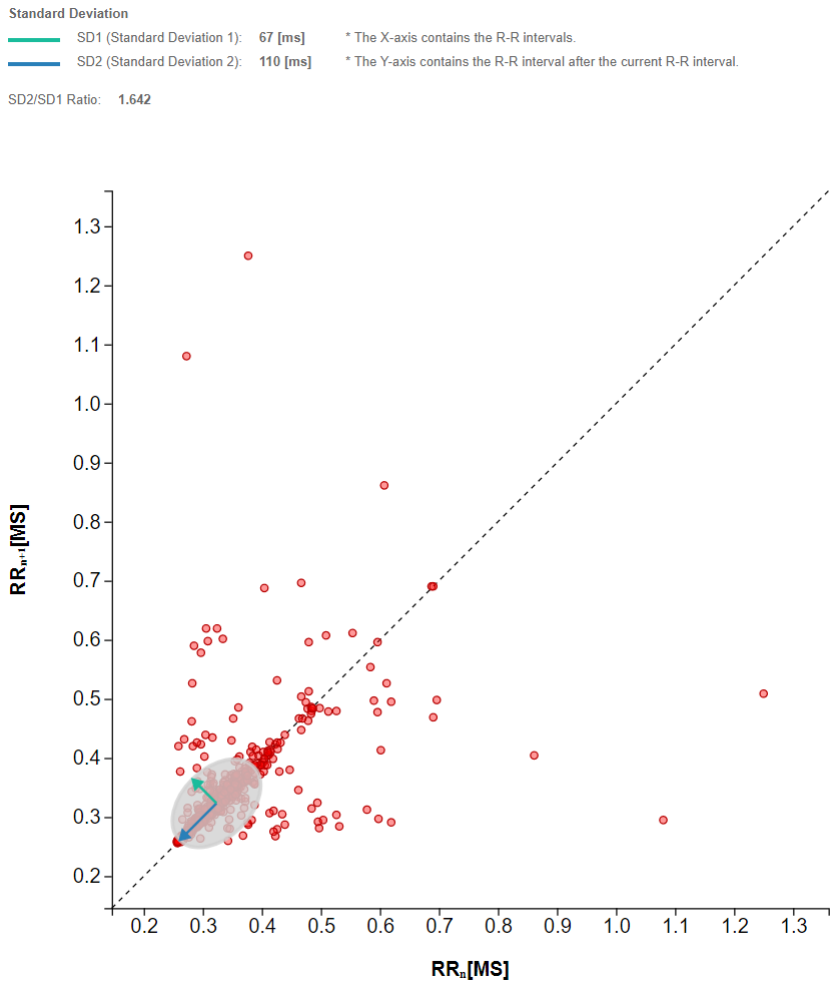

Figure A.4: Poincaré plot - active baseline for a small dog

Figure A.4 above shows the Poincaré plot for the active baseline for a small dog. It is evident that the red dots are far more closely connected than in RBSD. It indicates that the subject's system is under some form of stress - in this context it is physical exertion.

A.8 Relaxed baseline recording for a large dog

Max HR	145 BPM
Average HR	86 BPM
Mean RR	697 ms
RMSSD	79.74 ms
ln(RMSSD)	4.38 ms
NN50	239 count
PNN50	55%

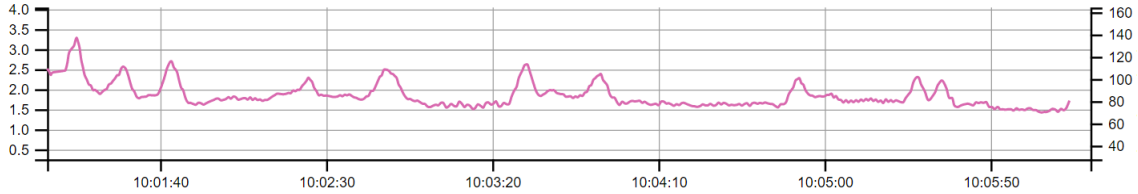

Figure A.5: Relaxed baseline HR graph

The relaxed baseline recording for a large dog (RBLD) indicates that the subjects system was under no apparent stress. The subjects HR peaked at 145 BPM and it averaged 86 BPM during the recording. The mean R-R interval length was 697ms which was 27ms higher than the RBSD. The count of NN50 at 239 is similar to that of the RBSD at 256. The subjects PNN50 value was 55% slightly less than the RBSD's value at 63%. Nonetheless, it indicates great variance in its HR.

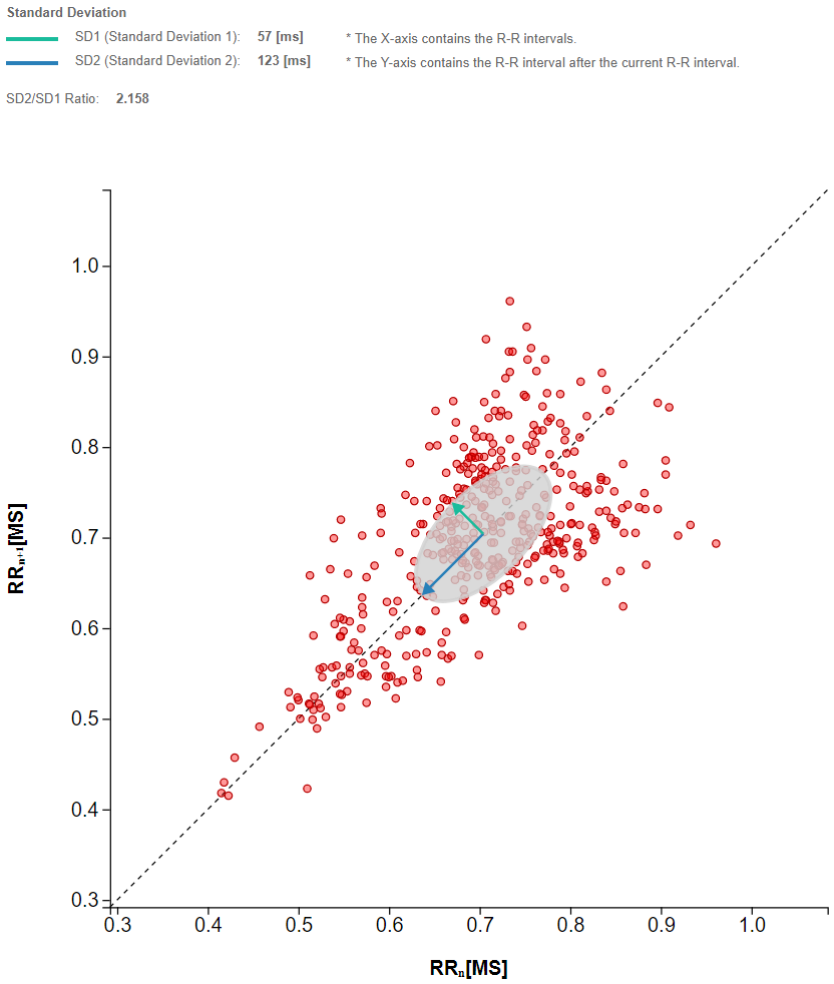

Figure A.6: Poincaré plot - Relaxed baseline for a large dog

Akin to the Poincaré plot for the small dogs relaxed baseline, the spread of the red dots indicate great variance in the subject and that the subject is in a relaxed state.

A.9 Active baseline recording for a large dog

Max HR	185 BPM
Average HR	130 BPM
Mean RR	460 ms
RMSSD	20.31 ms
ln(RMSSD)	3.01 ms
NN50	20 count
PNN50	4%

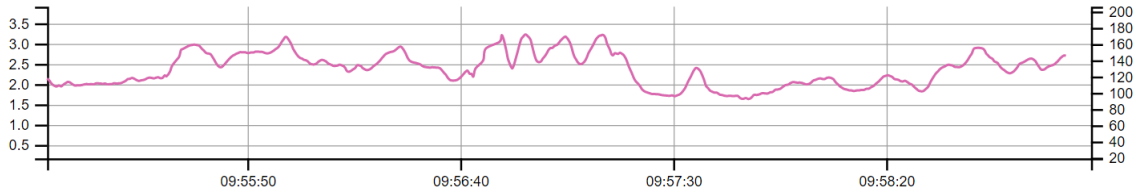

Figure A.7: Active state

The active baseline for a large dog (ABLD) shows an increase in max HR, average HR and the mean R-R length and a decrease in NN50 and PNN50 compared to the RBLD. The max HR is 185 BPM 40 BPM higher than the RBLD, the average HR is 130 BPM 44 BPM higher than the RBLD and the mean R-R length is 460ms 237ms less than the RBLD. There is a substantial difference in the NN50 count between the ABLD and the RBLD whereas the RBLD's count is at 239 the ABLD's count is merely at 20. This difference is further highlighted when looking at the PNN50 value where the difference is a staggering 41%. This underlines that the HRV of the ABLD is considerably lower than that of the RBLD and is an indicator of the ABLD's ANS being exposed to stress.

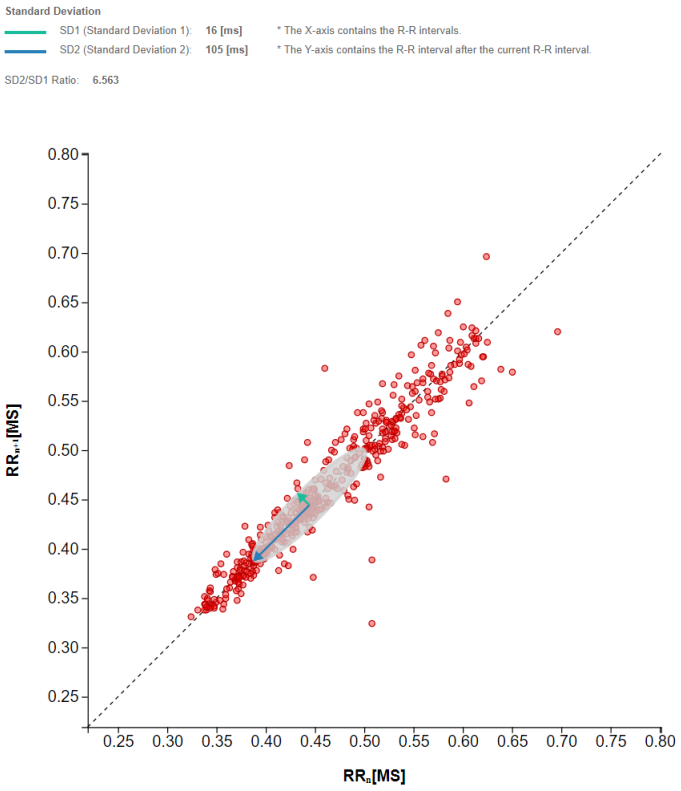

Figure A.8: Poincaré plot - active baseline for a large dog

The Poincaré plot of the ABLD indicates low HRV. This can be seen in how closely aligned the red dots are. Furthermore, the length of the R-R intervals is generally between 350ms and 650ms.

A.10 individual evaluation of all dogs

A.11 D1 Golden retriever

Max HR	235 BPM
Average HR	116 BPM
Mean RR	578 ms
RMSSD	258 ms
ln(RMSSD)	5.5 ms
NN50	352 count
PNN50	34%

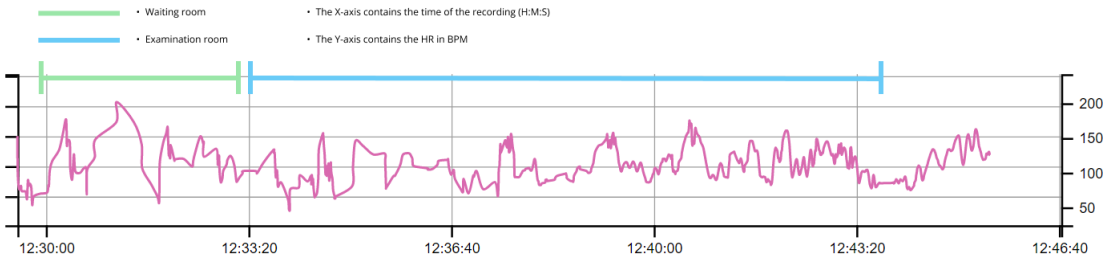

Figure A.9: Heart-rate graph for D1 (Waiting room - Examination Room)

Subject D1 was a male Golden Retriever at the age of 7. Prior to equipping the heart rate monitor the dog was relatively passive, slightly tense but still cooperative this behaviour continued upon entry to the clinic which puts it stress value at 3. The subject was situated in the waiting room for approximately three minutes, during the time in the waiting room the dog appeared more nervous and started cowering behind its owner, as well as barking at another dog in the waiting room. This correlates to what the literature and the knowledge acquired from the interviews suggest that behavioral patterns such as the aforementioned are linked to stress (Andreasen and Pedersen 2022c). The behaviour observed while the subject was in the waiting room suggest that its stress value increased from 3 to 4. Similarly, the data also suggests that during the waiting room period the HR of the dog spiked several times peaking over 200 BPM. The examination which was performed in the regular examination room lasted over a period of approximately 10 minutes. During this time the dog appeared less nervous and tense placing its stress value intermediately between 2 and 3. The data also indicates that the waiting room was a larger stress trigger than the examination itself according to heart-rate graph seen in figure A.9. During the period of time the subject spent in the waiting room its

HR reached a peak of 235 BPM which corresponds to 50 BPM more than the relaxed baseline for a large dog (RBLD). Contrarily, During the period of time the subject spent in the examination room it never reached above 180 BPM. Throughout the entire recording the average HR was 116 BPM which is 30 BPM more on average than the RBLD. The mean R-R interval of 578ms suggests that the subject was either capable of handling stress sufficiently or that it over the course of the recording was not under too much stress, most likely due to it experiencing less stress during the examination. The PNN50 value of 34% also suggests a relatively good HRV with the subject placing it close to the RBLD at 55%.

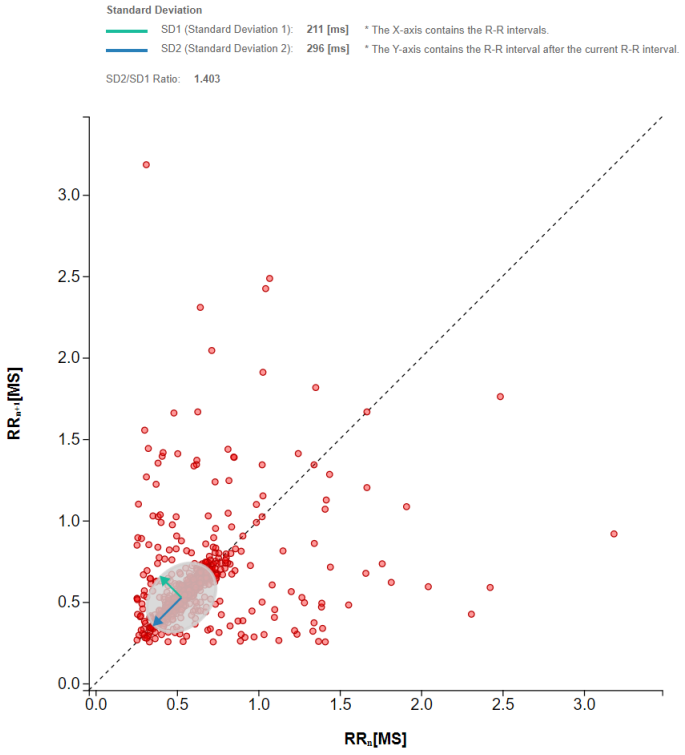

Figure A.10: Poincaré plot for D1

The Poincaré plot of D1 suggests a fairly good variance of its heart-rate. This is evident in the few red dots (The R-R intervals) that are placed on the outer rim of the graph and the general spread from the ellipse and outwards. Some of the R-R intervals have had a length of over 3000ms. The Poincaré of D1 looks like an intermediate between the relaxed and the active baseline for a large dog (ABLD) see figure A.6 and figure A.8. This is due to the Poincaré of D1 portraying a lot of R-R intervals close to one another but also some which have a great distance

between them. Additionally the size of the ellipse (The total amount of heart rate variability) appear greater than the one seen in figure A.8

A.12 D2 Labrador F1

Max HR	225 BPM
Average HR	114 BPM
Mean RR	539 ms
RMSSD	38,49 ms
ln(RMSSD)	3.65 ms
NN50	116 count
PNN50	13%

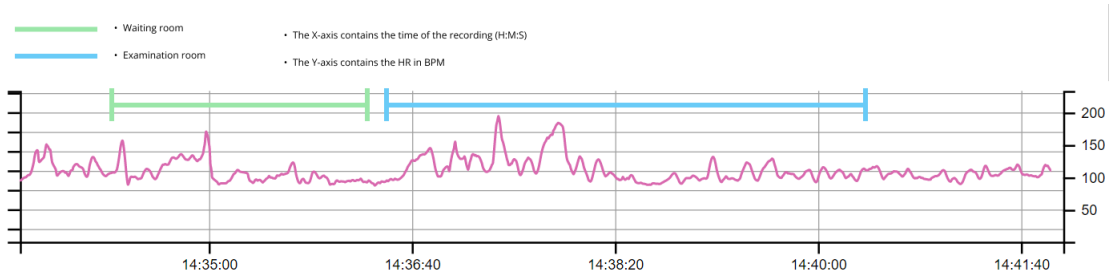

Figure A.11: Heart-rate graph Labrador Formel 1 (Waiting room - Examination Room)

Subject D2 is a female Labrador Formula 1 at the age of 11. At the time of equipping the dog with the heart rate monitor it portrayed a slightly uneasy and protective nature. The subject remained outside for a small span of time to ensure that it was ready to enter the clinic. Prior to entry, the subjects behaviour was akin to a stress value of 2. The subject was situated in the waiting room, for approximately two minutes and during this period of time the subject showed to a lesser extent the protective and uneasy nature that it had previously exhibited. However, as it entered the examination room it began exhibiting behavioural patterns related to stress such as heavy panting and whining. The HR graph also indicates that its HR spiked upwards to the 200 BPM mark.The examination lasted approximately five minutes and the veterinarian recognised that the subject was uneasy and anxious and in an attempt to remedy the situation he gave the subject treats which after some reluctance the subject accepted. This appeared to cause the subject to be more comfortable, less anxious and it was panting less. The average HR throughout the recording was 114 BPM, which is 28 BPM on average higher than the RBLD and 16 BPM less on average than the ABLD. The Mean R-R interval of 539ms suggests

that the dog was subjected to a modicum of stress but nothing too severe as it felt more and more comfortable as the examination progressed placing it somewhere between the mean R-R interval length of the RBLD and the ABLD which had values of 697 ms and 460 ms respectively. The PNN50 value of 13% suggests that it did not have a high proportion of successive R-R intervals in the total amount of R-R intervals recorded with a length greater than 50 ms.

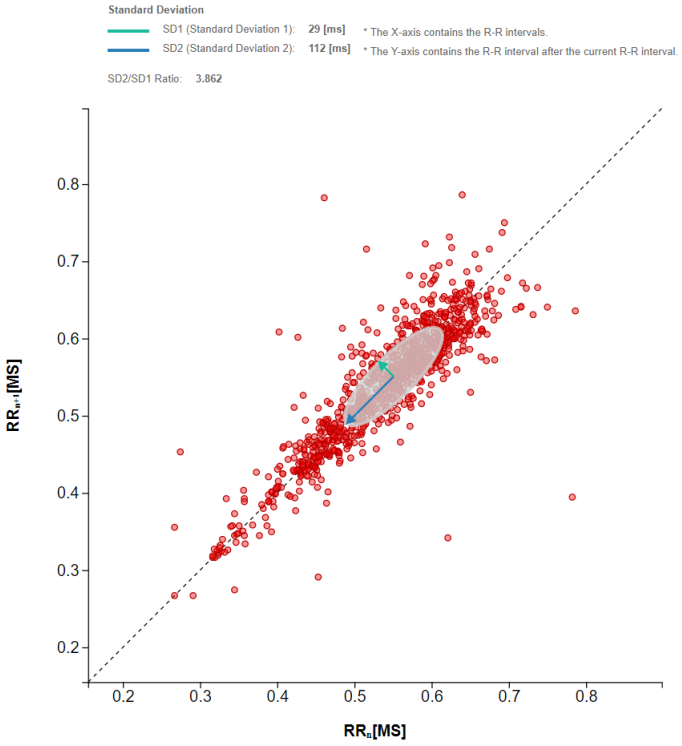

Figure A.12: Poincaré plot for D2

The Pointcaré plot for D2 is similar to the Poincaré plot of the ABLD seen in figure A.8. The ellipse is very narrow which is evident of a lower HRV. Furthermore, the red dots are closely spread between one another aside from a few outliers.

A.13 D4 Labrador

Max HR	237 BPM
Average HR	139 BPM
Mean RR	495 ms
RMSSD	224,5 ms
ln(RMSSD)	5,41 ms
NN50	167 count
PNN50	55%

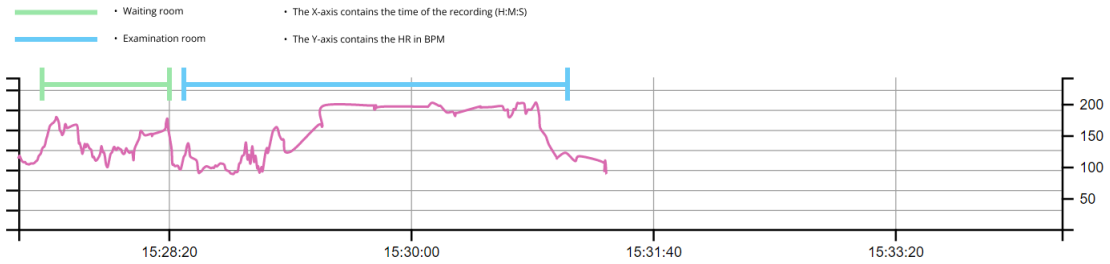

Figure A.13: Heart-rate graph for D4 (Waiting room - Examination Room)

Subject D4 is a male Labrador at the age of five, first observations prior to clinic entry indicate that the subject was effervescent and tense. It retained this behaviour going into the waiting room, where it sat with its owner for one and a half minutes. There were no other dogs present in the waiting room at the time, however, despite this the subject was still tense, it was panting and alert and it required encouragement from its owner. These behavioural patterns gives it a stress value of 3 while in the waiting room. The data also suggests that its HR went up when it entered the waiting room. The subject also seemed to be very alert to the presence of the three veterinary nurses present in the waiting room. When the owner and the subject was called into the examination room its heart rate spiked again, but subsequently lowered upon entering the examination room. Prior to the veterinarian joining them, the examination room itself did not appear to be stressful for the subject, however, when the veterinarian requested that the dog be put on the examination table the dog was reluctant to go. It began whining and it was difficult for the veterinarian to approach the subject. The behaviour the subject portrayed escalated to a stress value of 4. This is also seen in the HR graph which sows that during the majority of the examination its HR remained at 200 BPM or above. It only appeared to reduce once it was taken of the table and out of the examination room. On average the subjects HR was 139 BPM 53 BPM higher on average than the RBLD and very close to the average HR of the ABLD at 130 BPM. At its peak

it reached 237 BPM which amounts to 92 BPM higher than the maximum HR of the RBLD at 145 and 52 BPM higher than the ABLD at 185 BPM. The mean R-R interval length of 495ms suggests that the subject was under a substantial amount of stress during the recording and is similar to the mean R-R interval length of the ABLD at 460. However, the PNN50 value of 55% is equal to that of the RBLD. (Comment: explain what does this mean? Do we know?).

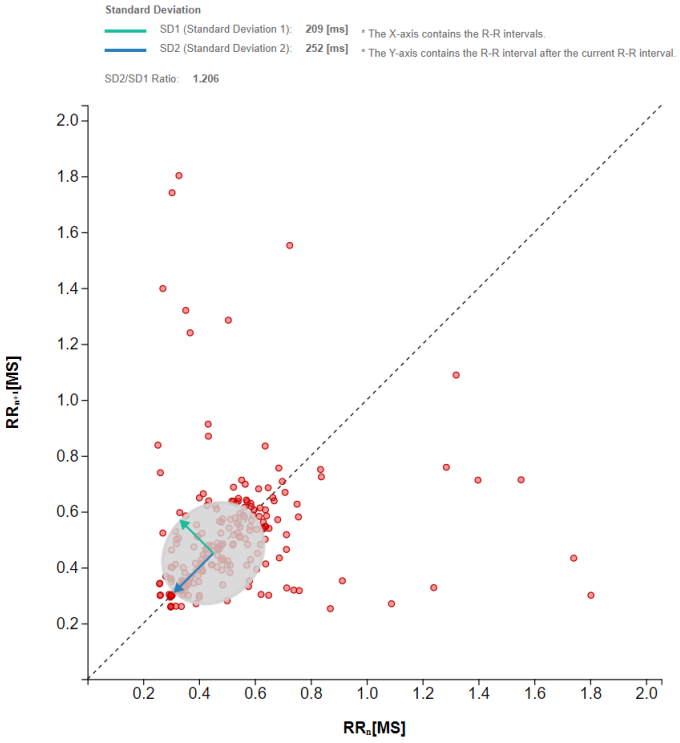

Figure A.14: Poincaré plot for D4

The Poincaré plot for D4 suggests great variance in its HR. This is evident from the size of the ellipse which is akin to the one seen in figure A.2. Furthermore, the red dots, are generally spread far apart some of them reaching as high as above 1800ms.

A.14 D5 Danish/Swedish Farmdog

Max HR	236 BPM
Average HR	119 BPM
Mean RR	583 ms
RMSSD	142,5 ms
ln(RMSSD)	4,96 ms
NN50	1529 count
PNN50	45%

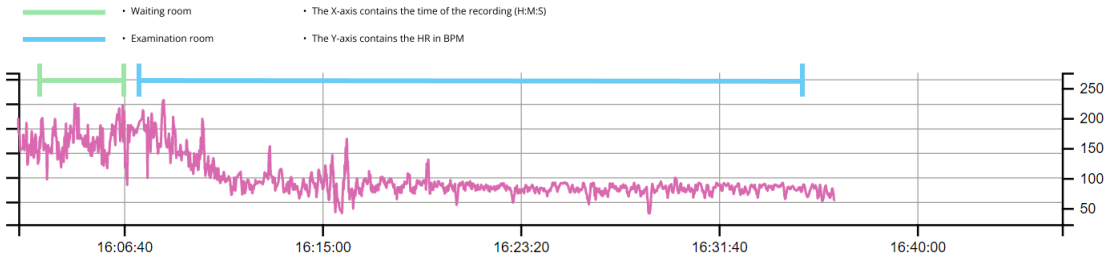

Figure A.15: Heart-rate graph for D5 (Waiting room - Examination Room)

Subject D5 is a male Danish/Swedish farmdog at the age of three. This recording is unique in that the subject was anaesthetised which is very clear in the HR graph. However, upon entry to the clinic and into the waiting room it was evident that the subject was particularly anxious and tense. it was also visibly shaking and alternating between whining and barking, as well as attempting to hide and cower close to its owner. This behaviour indicates a stress value of 5. The subject attempted to stay as far away as it possibly could from the other dogs present in the waiting room. When it was the turn of the owner and the subject to enter the examination room the owner was forced to lift the subject due to its reluctance to move on its own. It was in the waiting room for three and a half minutes and it spent upwards to 30 minutes in the examination room where the veterinarian were ensuring that the anaesthesia worked correctly. The first few HR spikes during the Examination room happens when the anaesthesia is applied whereby after its heart rate slowly reduces minute by minute. Subject D5 was evidently severely affected and stressed. The behavioural patterns and the general appearance of the subject resulted in a stress value of 5 both in the waiting room and the examination room until the time of the sedation. According to the data both the waiting room, as well as the examination room were stressors as the HR graph depicts the subject peaking above 230 BPM and at times as high as 236 BPM. The maximum HR of 236 BP is well above the relaxed baseline for a small dog (RBSD) at 135 BPM

and almost equal to the active baseline for a small dog (ABSD) at 235 BPM. The Average HR of the recording was 119 BPM which on average is 27 BPM lower than the RBSD despite it also being lower due to the affect of the anaesthesia. The same is applicable for the mean R-R interval length which is 583ms suggesting at face value that the subject over the full length of the recording was not overtly stressed. Contradicting the observations of the HR graph and behavioural patterns of the subject, however, we contribute the contradiction to the effect of the anaesthesia. The difference in the length of the R-R intervals between the subject and the RBSD and ABSD was 87 ms and 237 ms respectively. the count of NN50 is an outlier in comparison to the rest of the subjects, however, this is mainly due to the length of the recording, as NN50 naturally increases with the time of the recording. (Borell et al. 2007) Despite being under the effect of the anaesthesia for almost 30 minutes its parameters are still below that of the RBSD.

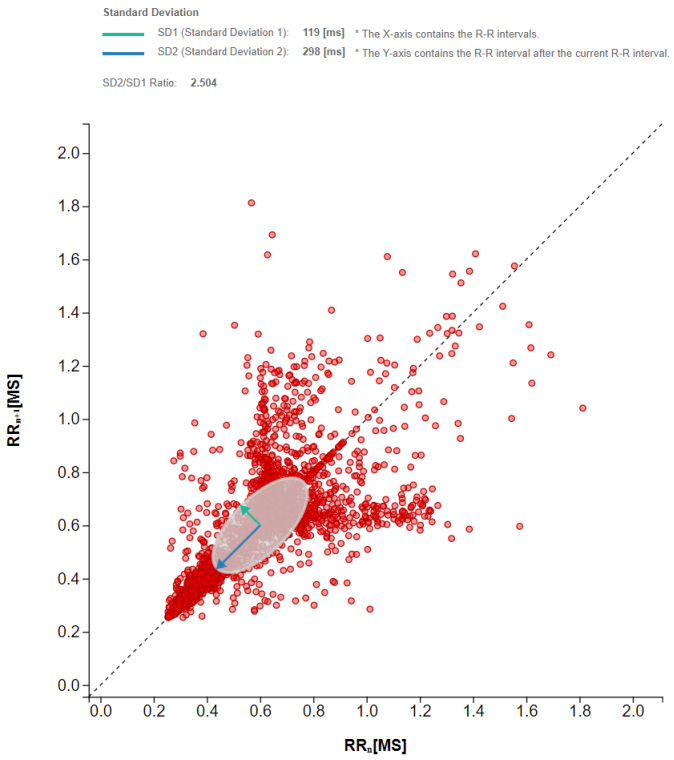

Figure A.16: Poincaré plot for D5

The Poincaré plot for D5 is intriguing in the sense that it is evident that the subject was both stressed and relaxed due to the anaesthesia during the recording. There are both closely related R-R intervals and simultaneously there are a lot of intervals

far apart.

A.15 D6 Dalmatian

Max HR	235 BPM
Average HR	145 BPM
Mean RR	442 ms
RMSSD	154,7 ms
ln(RMSSD)	5,07 ms
NN50	419 count
PNN50	12%

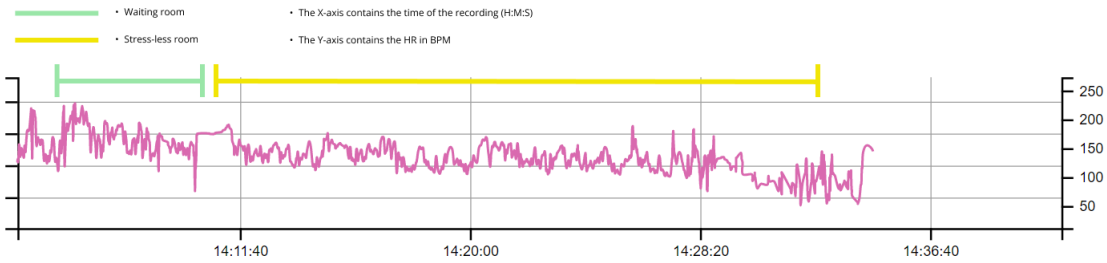

Figure A.17: Heart-rate graph for D6 (Waiting room - Stress-less Room)

Subject D6 is a male Dalmatian and at the time of recording was merely eight months old, puppies have a tendency to have a higher average HR than older dogs (Ferasin, Ferasin, and Little 2010). Prior to entering the clinic the subject was extremely excited and it was difficult to keep the subject in place, mainly due to other dogs walking by which caused a reaction with the subject. The behaviour of the subject is equivalent to a stress value of between 0 to 1. During the time in the waiting room the dog retained its excited nature, however, the subject also showed a modicum of panting. Furthermore, it was also barking at two others dogs that were also in the waiting room and in response to this the other dogs growled back at the dog. This interaction, indicates that the behavioral pattern of excessive excitement can aid in creating a chaotic and stressful atmosphere for owners and dogs alike. The duration of the time spent in the waiting room was approximately five minutes, wherein the first two minutes the subjects demeanour had changed mostly related to the interaction with the two other dogs present and that it had to be kept still by its owner, this resulted in an increased level of anxiety and whining from the subject. This increases its stress value from 0-1 to 3. The subject was under examination for 23 minutes in the stress-less examination room which

had a significant effect on the behaviour of the subject, as well as the correlated data for that period of time. The subject appeared less anxious and it was no longer whining. Furthermore, it accepted treats and both the owner and the subject appeared relaxed in the context of the SR. Decreasing its attributed stress value down to 1 again. Additionally, the calmness of the situation resulted in an easier examination for the veterinarian. Subject D6 was clearly stressed during its time in the waiting room with the data showing several spikes in heart reaching upwards to a maximum HR of 235 BPM. It is evident that the waiting room was a far bigger stress trigger for the subject than the SR was. The average HR for the entirety of the recording was 145 BPM which differs from the relaxed baseline of 86 BPM. This results in a difference of 59 BPM on average which is a substantial difference from the relaxed baseline. The difference is particularly large considering the subject spent the majority of the time in SR, however as mentioned previously puppies up to 12 months of age have a tendency to have a higher average heart rate than matured dogs (*What Causes a Low Heart Rate in Dogs? - Best Pets Veterinary Hospital*). The chasm of difference seen in subject D6's average heart rate can to an extent be attributed to the fact that the subject is a puppy. The mean R-R interval length of 442ms indicates that the subject was severely stressed as the variability of the heart rate is significantly lower than the relaxed baseline of 697ms constituting in a difference of 255ms.

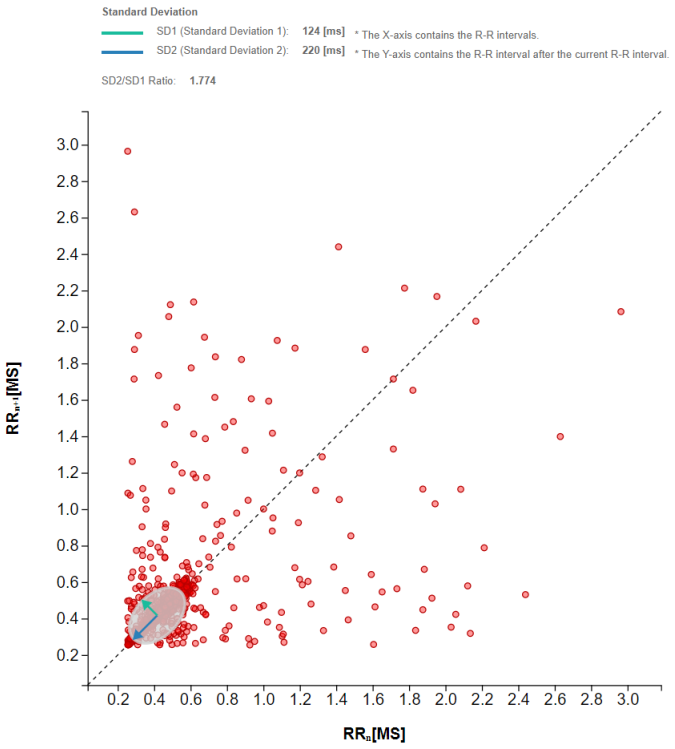

Figure A.18: Poincaré plot for D6

The Poincaré of D6 at face value looks peculiar. However, in actuality it displays that the subject had R-R intervals that were short in length likely from its time in the waiting room. And as we noted in the analysis of the subjects HR graph, behaviour and HRV parameters it was also relaxed when it was in the stress-less room.

A.16 D7 Golden retriever

Max HR	235 BPM
Average HR	104 BPM
Mean RR	610 ms
RMSSD	187 ms
ln(RMSSD)	5,2 ms
NN50	505 count
PNN50	25%

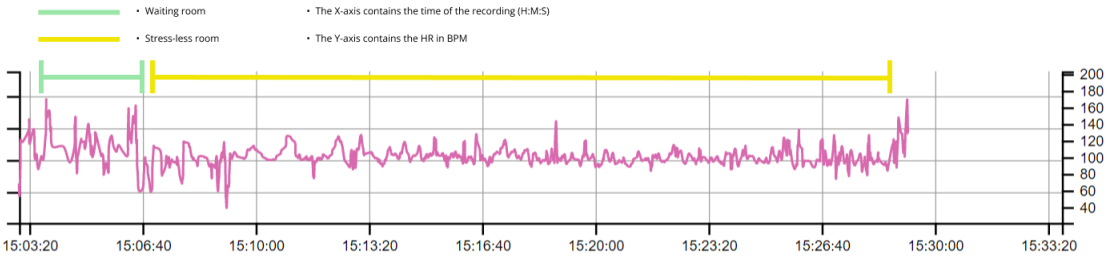

Figure A.19: Heart-rate graph for D7 (Waiting room - Stress-less room)

Subject D7 is a male Golden Retriever at the age of two. Before attaching the heart rate monitor to subject D7 it appeared excited and it was vocalising a substantial amount. The owner informed us that before attaching the equipment she was going to walk the dog around the place, because when the subject was a puppy it was attacked so it had difficulties with other dogs. Prior to entering the waiting room the subject was happily accepting treats which indicates the dog was comfortable outside (Andreasen and Pedersen 2022c). These kind of dogs with traumatic experience are often scheduled for the SR to reduce the stress they experienced during examinations. It was evident that the waiting room was a significant stress trigger for the subject as it spiked numerous times upwards of 200 BPM. It was also very close or behind the owner most of the time during the time in the waiting room which it was in for approximately three minutes. However, The familiarity and calming atmosphere of the SR had a significant effect on the behaviour of the subject. it immediately jumped in the couch and laid down and began accepting treats again which it had been reluctant to accept in the waiting room. The data also suggests that the SR had a significant impact on the subject as its heart rate remained mostly within the range of 80-120 BPM. The subjects heart rate only started rising again as it existed the SR and till the end of the recording outside of the clinic. Ultimately, the subject experienced periods of distress and stress but the SR helped considerably. This is reflected in the Mean R-R interval length of 610ms which is only 60ms less than the relaxed recording of 670ms. However, it experience a peak heart rate of 235 BPM resulting in a difference of 90 BPM compared to the RBLD and 50 BPM above the ABLD.

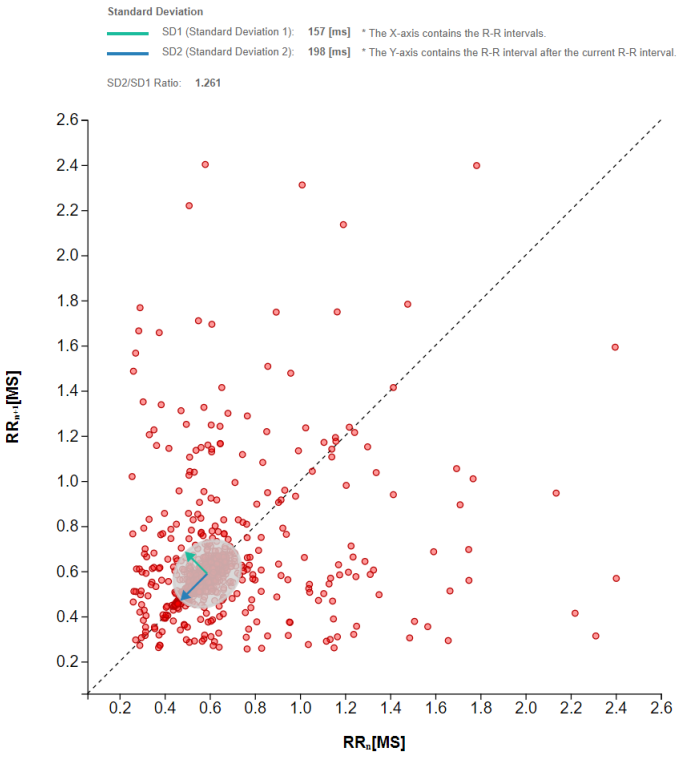

Figure A.20: Poincaré plot for D7

The Poincaré of D7 reflects the observations and analysis of the subjects behaviour and HR graph. Akin to the Pointcaré of D6 seen in A.18 it depicts a subject that was stressed initially but shows great variance towards the end. This mainly due to the SR helping considerably in calming the subject.

A.17 D8 Bull terrier

Max HR	253 BPM
Average HR	155 BPM
Mean RR	397 ms
RMSSD	27,8 ms
ln(RMSSD)	3,3 ms
NN50	184 count
PNN50	7%

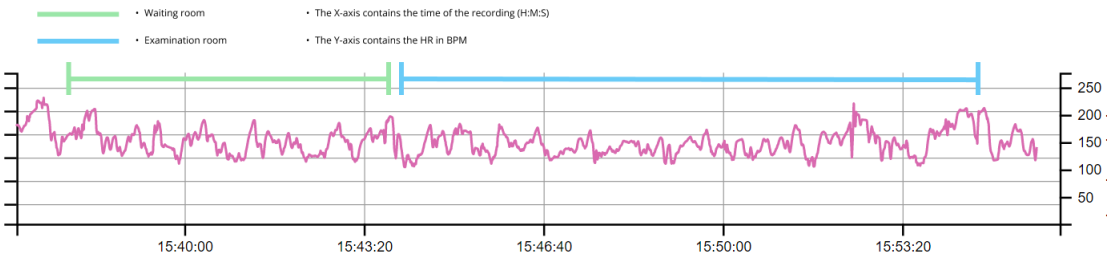

Figure A.21: Heart-rate graph for D8 (Waiting room - Examination room)

Subject D8 is a female Bull terrier at the age of three. It was evident that the subject was particularly nervous heading into its appointment. Prior to entering the clinic it was visibly drooling and panting audibly growling and vocalising this gives it a stress value of 4. The subject was less than keen to have the heart rate monitor equipped which references the initial spikes in the readings. It was given a minute or two before entering the waiting room to settle itself but it was evident both from its behaviour and the data that the subject was very anxious. It was quickly searching for a corner to hide in. There were three other dogs present in the waiting room and it was frequently barked at causing it various difficulties in settling in and finding it own space in the waiting room. The subject endured a fairly long wait in the waiting room approximately five and a half minutes and also an examination which took close to 13 minutes. It is clear that the both the waiting room and the examination room were major stressors for the subject as its average heart rate was 155 BPM and it reached a peak of 253 BPM a difference compared to the relaxed recording of 63 BPM and 118 BPM respectively. The subjects Mean R-R length of 397ms also underlines the considerable stress that it endured during the recording. The subjects mean R-R length of 397ms is also very close to the ABSD at 346ms and differentiates from the RBSD recording by 273ms. The subject did not experience any singular stress trigger but experienced several throughout the recording. The waiting room, as well as the examination room appear to be triggers of stress. The subjects PNN50 at 7% also suggests very little variance in its HR which points to the subject being exposed to stress.

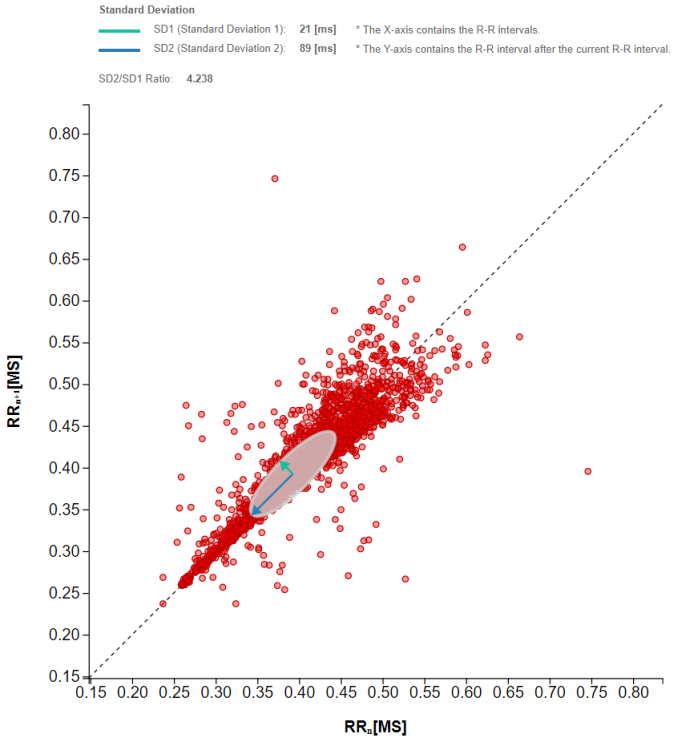

Figure A.22: Poincaré plot for D8

The Poincaré of D8 is very akin to what we see in the Poincaré for the ABSD seen in figure A.4. The R-R intervals are intertwined and very closely situated in the plot except for a few outliers.

A.18 D9 Cocker spaniel

Max HR	240 BPM
Average HR	159 BPM
Mean RR	411 ms
RMSSD	168,4 ms
ln(RMSSD)	5.13 ms
NN50	341 count
PNN50	38%

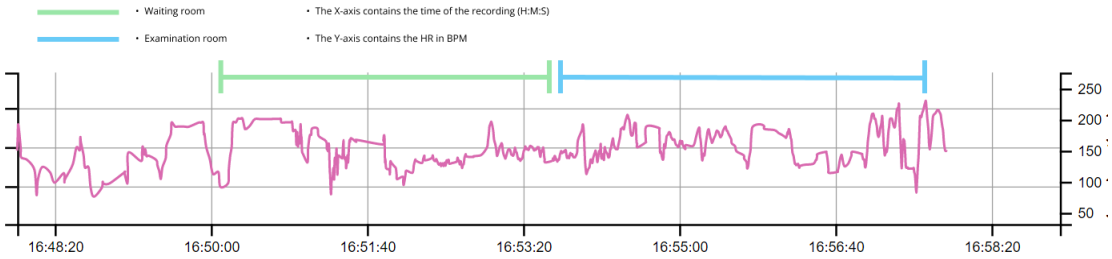

Figure A.23: Heart-rate graph for D9 (Waiting room - Examination room)

CSubject D9 was a male cocker spaniel at the age of three. The subject appeared content and it was accepting treats as it was being equipped with the Heart rate monitor. Due to the number of other patients and owners in the waiting room the owner elected to wait outside of the clinic for the waiting room to be less occupied by other occupants. They waited around two and a half minutes before entering the waiting room where the demeanor of the subject changed drastically as there were still several dogs in the waiting room at the time which caused a lot of barking, whining and panting resulting in a stress value of 3. This is also evident from the data with sees the subjects heart rate spike as it enters the room and confronts other dogs. The subjects heart rate diminishes slightly as time progresses due to there being fewer and fewer dogs present in the waiting room. After a waiting for three minutes and 20 seconds it is taken into the examination room. The subject is placed on the examination table which it appears anxious to be placed on. The data also indicates that the subject operates in a heart rate range of 150-200 BPM while being in the examination room. The data for subject D9 suggests that the waiting room and particularly the examination table in the examination room is a stressor. During the recording the subject reaches a maximum HR of 240 BPM a difference of 105 BPM from the RBSD at 135 and very close to the ABSD at 235 BPM. Additionally it averages 159 BPM throughout the entire recording a substantial difference of 67 BPM on average compared to the RBSD at 89 BPM. The subjects Mean R-R interval length is 411ms indicating that the subject experienced a significant amount of stress during the large portions of the recording. The length of the R-R interval recorded had a difference of 259ms compared to the RBSD at 670ms. Furthermore, the subjects R-R interval length was only 65ms from the ABSD at 346ms.

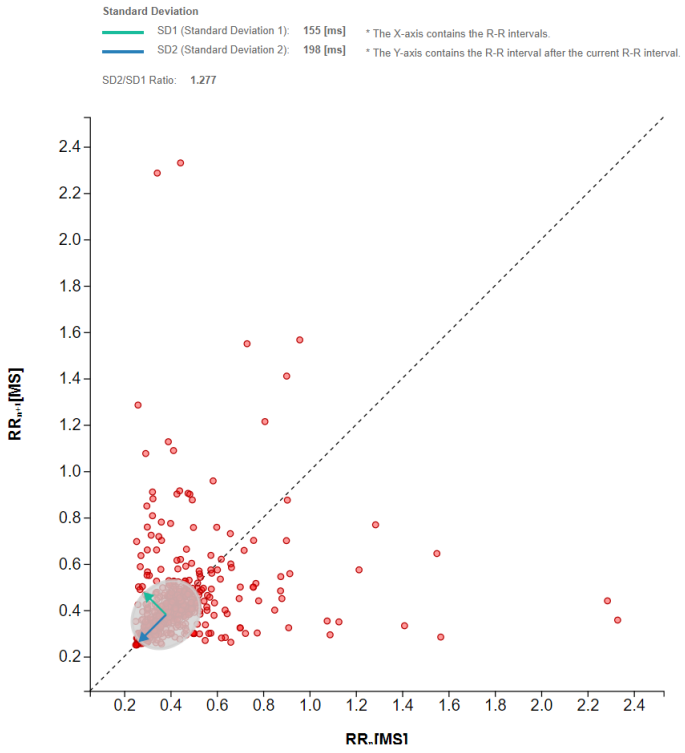

Figure A.24: Poincaré plot for D9

The Poincaré plot for D9 has a lot of R-R intervals in the range of 300ms to 600ms and a few outliers close to 2400ms. Generally, the R-R intervals are closely situated suggesting less HRV.

A.19 D10 Jack Russel Terrier

Max HR	236 BPM
Average HR	152 BPM
Mean RR	395 ms
RMSSD	31.28
ln(RMSSD)	3.44
NN50	198 count
PNN50	10%

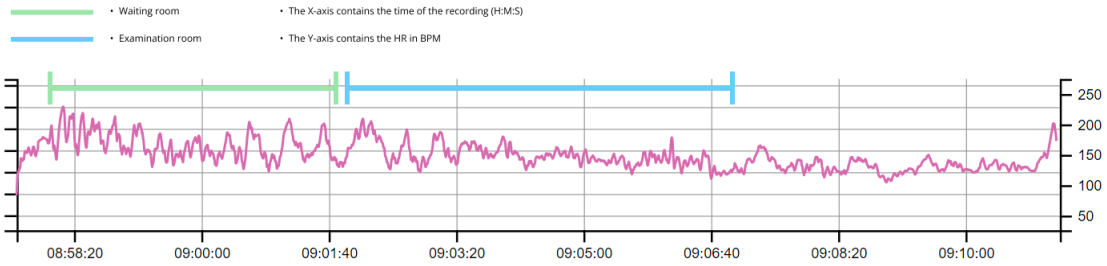

Figure A.25: Heart-rate graph for D10 (Waiting room - Examination room)

Subject D10 is a Jack Russel terrier and is a year and 6 months old. When equipping the heart rate monitor to the subject, it did not show any signs of stress and was in a relaxed state prior entering the clinic. Upon entering the waiting room, the subject appeared reluctant, and the owner had to encourage it to move. This can be indicative of the subject being afraid of going into the waiting room. The subject was situated in the waiting room for approximately 3-4 minutes, where it was audibly panting, shaking and cowered close to its owner. To calm the subject, a veterinary nurse gave the subject a treat, which the subject accepted and after that the subject began relaxing for a couple of minutes before it appeared to realise that it had to move into the examination room. The subject's body was visibly shaking when it was to be put on the examination table. After the veterinarian had injected the subject with penicillin it began to relax and no further clinical procedures had to be made during the examination. During the subjects period in the waiting room, the data indicates that the subject had been under a severe amount of stress, with several HR spikes during that period. Furthermore, the subject also reached a Max HR of 236 BPM a difference of 101 BPM from the RBSD at 135 and above the ABSD at 235 BPM during the time in the waiting room. likewise, the data suggest that the examination table was a stressor as the subject measured above 230 BPM and it appeared reluctant to be placed upon it. Additionally, the average HR during the entirety of the recording was 152 BPM which is a substantial difference of 66 BPM on average compared to the RBSD at 89 BPM. The subject's Mean R-R interval length is 395ms, which indicates that the subject was exposed to a substantial amount of stress through various stressors during the recording. The length of the R-R intervals had a difference of 275ms compared to the RBSD at 670ms. the R-R interval is almost identical to that of the ABSD at 346 ms, which is indicative of the subject being stressed during the entirety of the recording.

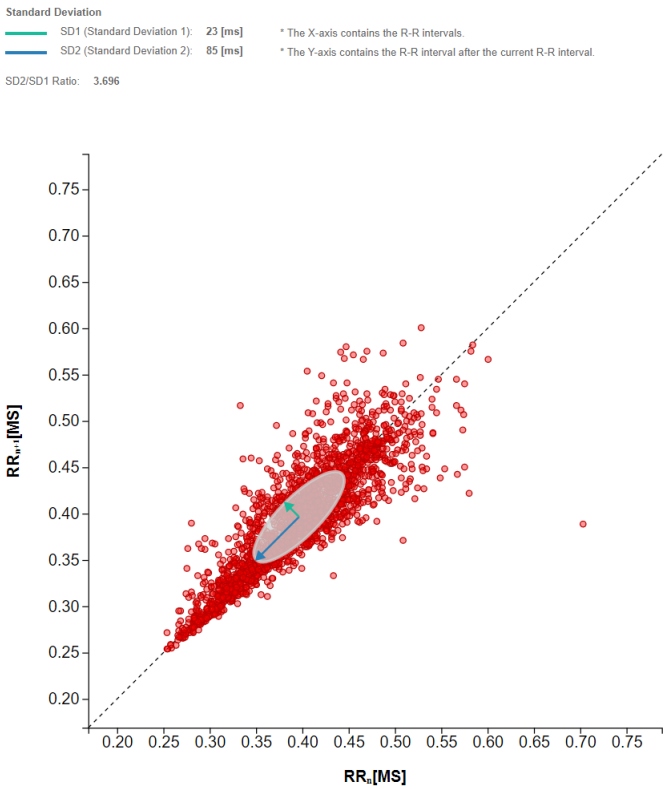

Figure A.26: Poincaré plot for D10

The Poincaré of D10 is similar to that of the ABSD. The R-R intervals are closely knit together indicating less HRV. Furthermore, the X and Y axis values only go as far as 750ms with only very few R-R intervals in that range. Most of the R-R intervals are in the range of 250ms to 550ms.