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BEHAVIOUR DISORDERS IN DOGS ATTENDING THE ANIMAL BEHAVIOUR CLINIC OF COMPLUTENSE UNIVERSITY OF MADRID

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List of abbreviations

5-HT – 5-hydroxytryptamine or Serotonin

ACTH – Adrenocorticotropic hormone

ALD – Acral-lick dermatitis

ANS – Autonomous nervous system

BD – Behaviour disorders

BID – Two times a day (each 12h)

BNST – Bed nucleus of the stria terminalis

BZD – Benzodiazepines

CCA-UCM – *Centro del Comportamiento Animal, Universidad Complutense de Madrid*

CCDS – Canine cognitive dysfunction syndrome

CNS – Central nervous system

CRH – Corticotropin-releasing hormone

CRR – Command-response-reward

DAP – Dog-appeasing pheromone

GABA – γ-aminobutyric acid

GAD – Generalized anxiety disorder

GI – Gastrointestinal

HPA – Hypothalamic-pituitary-adrenal

IA - Intraspecific aggression

LC – Locus coeruleus

MAOI – Monoamine oxidase inhibitors

OCD – Obsessive-compulsive disorder

PFC – Prefrontal cortex

PGM –Periaqueductal grey matter

PO – Oral administration (*per os*)

QOD – each 2 days

SA – Separation anxiety

SAD – Separation anxiety disorder

SID – One time a day (each 24h)

SL – Sublingual administration

SSRI – Serotonin-specific reuptake inhibitor

TCA – Tricyclic antidepressant

TID – Three times a day (each 8h)

Foreword

The present report is a consequence of a four months practical training at the Animal Behaviour Clinic of Complutense University of Madrid (CCA-UCM), in order to complete my studies as a final student of the integrated master in veterinary medicine of the Abel Salazar Institute of Biomedical Sciences, Porto University (ICBAS-UP). My main goal was to increase my knowledge regarding companion animals' behaviour disorders, due to its importance on animals' welfare. It's my objective to contribute to a better understanding of these disorders, allowing a balanced and happy relationship between families and their pets.

A study of the prevalence of behaviour disorders attending the CCA-UCM in the last eight years was developed and presented in the "XII Congresso do Hospital Veterinário Montenegro", 20-21 February 2016 Porto, Portugal (appendix II). This research allowed me to understand the difficulties in obtaining and interpreting clinical data and gave me the opportunity to present our conclusions to my fellow colleges and veterinarians. This study also provided the information that allowed me to describe in this final report the most frequent behaviour disorders and to explain how to reach a correct diagnosis and to implement a successful treatment.

Furthermore, this experience gave me the opportunity to get a deeper knowledge not only about behaviour disorders but also how to conduct behaviour clinic consultations and their follow-up. I had also the remarkable opportunity to attend ethology, puppy school and clicker training classes and to understand that with cooperative work it is possible to prevent and treat behavioural problems.

The prevalence study together with my enrolling on behaviour clinic consultations, puppy school classes, ethology classes, clicker training classes and an international congress was a fully rewarding experience. It allowed me to grow both academic and scientifically and to understand how much is there to learn about behaviour disorders. I must confess that I feel that a lifetime is not enough to truly explore behavioural sciences, so this is just the first step in the beginning of a new journey…

I hope you enjoy this reading as much as I enjoyed this subject!

Summary

Behaviour disorders represent a crucial factor in breaking owner-animal bond and originate more than 45% of dogs and 30% of cats' abandonment in the USA. This final report aims to discuss the most frequent behaviour disorders in dogs, based on a prevalence study of clinical cases presented at the CCA-UCM from 2008 to 2015. We gathered clinical information from 528 dogs and found that the prevailing behaviour pathologies diagnosed in dogs were anxiety-related: generalized anxiety disorder, reactivity and separation anxiety disorder. For treating behaviour disorders a combination of behaviour modification, pharmacotherapy and environmental enrichment is required. In generalized anxiety disorders dogs frequently present an anxious state even without the presence of stimuli, so its treatment may justify anxiolytic therapy. Reactivity is a pre-anxious state where the animal presents an abnormal response to specific stimuli, so stimuli desensitization and human-dog bond reinforcement are recommended. Regarding separation anxiety disorder, it's clear a dysfunctional attachment, so the dog will exhibit important separation distress signs when the owner is absent. In this case the treatment begins with environmental enrichment and the owner's gradual detachment. Therapy flexibility with constant adjustment to the owner's compliance and the dog's behaviour improvement is fundamental to succeed.

Keywords: Behaviour disorder, GAD, SAD, reactivity, intraspecific aggression, prevalence

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There is someone that I have been thinking during all my graduation, and that person is my beloved mother. Without her strength, her love for me, her belief, her faith, and her advices, I would have never have achieved anything. Even after her passing in my second year of university, her teachings, concerns and words continued emerging in my head so the pain could be attenuated by the image of her smile and laugh in my mind. So, firstly I would like to dedicate my final work to her, to the longing I feel for her every day.

I have always said that I am a really weak person, because alone I cannot make anything at all and that I feel powerless. My strength resides in the people I know and I care for, and without them I am unable to be happy. To all those who accompany my incredible journey throughout all these years, I would like to thank. I hope the future will allow me to requite you the double of what you sometimes unknowingly gave me with "simple" actions as your presence or your smile! You have not only this page dedicated to you but all this work, because you all worked directly and/or indirectly on it. But more important than my final work, you all worked on making me what I want to be.

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To my wonderful brothers and sister (Joaquim, José and Paula) that helped me in a way I cannot express by words and that I am forever grateful; to my sisters-in-law (Paula and Teresa) and brother-in-law (João Pedro) that were always there to give me ideas, tranquillity, and even humour when I needed it; to my girlfriend Joana that supported me and gave me strength in all the moments I was getting down; to my nephews (Miguel, Afonso, Tomás, Pedro), and my youngest nephew and godson João Diogo that make me smile so many times that I am already smiling when thinking about them.

To Miguel and Filipa, the two most improbable persons of crossing my way: you were my godfather and godmother in the university (and sometimes even out of there); to my academic

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Introduction

It was at least 27 000 years ago that the first separation event (domestication) occurred and the process of creation of *Canis lupus familiaris* has born (Miklosi 2015). Approximately 15 000 years ago they made a synergic effort with humans for hunting and feeding (Case 2009) and nowadays, with the development of society, they are considered a family member or a friend on 25% and 15% of Portuguese homes, respectively (GfKTrack.2PETs Portugal 2015). To all the families that take care of their pets, not only organic disorders (showing evident signs) get importance in order to search for a veterinarian; behaviour disorders (BD) that affects the way we interact with them and their welfare are also a true concern (Horwitz & Mills 2010).

Behaviour problems represent a crucial factor in breaking the owner-animal bond and can lead to disregard or even relinquishment of their pets (Horwitz & Mills 2010). At least 46.4% of the dogs and 33.2% of the cats abandoned in USA were due to BD (Salman *et al.* 1998) and it is also an important factor on rehoming failure (Diesel *et al.* 2008). In Spain, at least 9% of pet relinquishment is essentially due to behaviour problems (Fatjo *et al.* 2015). In some studies aggressive-related behaviours are the most common BD (Salman *et al.* 1998, Bamberger & Houpt 2006, Yalcin & Batmaz 2007, Martinez *et al.* 2011) in comparison to others, where anxiety-related appear at the top (Ibáñez & Ánzola 2011).

Dog behaviour

Ethology

Although the dog (*Canis lupus familiaris*) shares 99.8% of its mitochondrial DNA with the wolf (*Canis lupus*) (Vilanova 2003), it is the only social and sociable domestic animal and so it has the ability to develop its behaviour through social learning and imitation, adjusting its behaviour to its owner (Horowitz 2014). Their unique process of domestication has allowed them to use and read human communication in a way no other animal has ever been able to do (Horowitz 2014). This includes being able to understand sentences (Pilley 2013), human gestures (Hare *et al.* 2002), reproduce human actions (Topal *et al.* 2006) and swiftly regarding at a human face when experiencing a conflictive situation (Miklósi *et al.* 2003).

Dog's normal behaviour is different according to the development stage it is into, and its correct exposure to stimuli during the sensitive periods – 3rd to 12th weeks – is crucial to the development of a normal behaviour. In this period, they learn how to communicate and interact

with dogs, get habituated to noises and the presence of other people or animals, learn how to inhibit biting force, and many other important acquirements (Case 2009, Hammerle *et al.* 2015). The process of learning depends on brain neural pathways reinforcement by frequent behaviours, that have a higher probability of occurring again (Pageat 1998).

Both fear and anxiety are motivational states that play an important role on survival, as they allow the animal to develop an adaptive response to a negative upcoming situation. Fear is usually a motivational state induced by a specific and known stimuli, while anxiety is an unspecific response to an unknown prospective stimulus. So an animal will experience fear in response to an objective, real, present/nearby situation, whereas anxiety is usually a reaction to a future, unreal and speculative situation. Even though most of the times anxiety produce maladaptive responses, it is thought to represent a more complex and evolutionary motivational state. It allows the animal to forecast a dangerous event, avoiding its occurrence (Steimer 2002, Sherman & Mills 2008). But besides these psychologic responses, in the presence of a stimulus that announces danger the animal sympathetic autonomic nervous system is activated, preparing the animal for fighting or running (Steimer 2002).

Individual personality affects each dog's coping style when facing a threat. Passive coping involves immobility, freezing and sympathetic inhibition (bradycardia, hypotension) while active coping involves "fight or flight" strategy, with active confrontation when avoidance is not possible. There are no clear-cut division between those coping strategies since the interaction stimuli-environment-personality is what defines its response. Individual differences define not only the psychometric distance, but also the response to each stimuli (Steimer 2002, Jensen 2007)

When there is an ambivalent motivation (the presence of a conflict between two incompatible behaviours), an animal can have displacement activities (*e.g.* wet dog shake when dry) or et-epimeletic intentions (*e.g.* licking the corner of the mouth of other animal or human) in order to reduce its own stress (Lindsay & Voith 2013, Overall 2013).

Neurophysiology

Some neurotransmitters (noradrenaline, dopamine, serotonin, GABA) and hormones (cortisol) play an important role in dog's behaviour and its process of learning. Different neural pathways act simultaneously, regulating animals reactions to stimuli and making what is defined as their behaviour (Overall 2013). The knowledge of the brain structures involved on

the regulation of behaviour allow us to understand somatic and behaviour changes in animals and how to use psychopharmacology in the treatment of related disorders (Bear *et al.* 2007).

Noradrenaline is a neurotransmitter that plays an important role in mood regulation, arousal and reward system (Bear *et al.* 2007, Overall 2013). *Locus coeruleus* (LC) is the principal noradrenergic nucleus in the brain and it has a pivotal role in regulating attention, arousal, learning and memory, sleep-and-wake cycles, mood and anxiety (Bear *et al.* 2007, Crowell-Davis & Murray 2008). The ascending noradrenergic system – which originates on the LC – is proposed to be a key to stressful responses provoked by fear, anxiety and even by visceral stimuli (Steimer 2002, Bear *et al.* 2007). Anxious animals usually show hypervigilance and an increase in noradrenaline levels that activates α_{1-2} and/or β_{1-3} receptors originating both central and peripheral responses (Bear *et al.* 2007, Overall 2013).

Serotonin (or 5-hydroxytryptamine, 5-HT) is a neurotransmitter centrally produced in the *raphe nuclei*. Besides 5-HT classical gastrointestinal tract activity (Pageat 1998), it's effects in the control of mood, emotions, appetite, stereotypies, sleep and pain were already demonstrated (Bear *et al.* 2007, Overall 2013). There are seven different 5-HT receptors and the activation of some of them ($5HT_{1A}$, $5HT_{1D}$, $5HT_{2A}$, $5HT_3$) seems to have an active role on behaviour and anxiety, as they regulate dog's mood and sleep (Overall 2013, Uemura 2015). Furthermore, an experience with mice lacking $5\text{-}HT_{1A}$ receptors showed that those animals had less exploratory behaviour and exhibit a more anxious and aggressive behaviour (Bear *et al.* 2007).

Dopamine is produced in many zones of the central nervous system (CNS), but *substancia nigra* and the ventral tegmental area are the most important sources of melanin-pigmented dopaminergic cell bodies (Shimada *et al.* 1976, Bear *et al.* 2007). The nigrostriatal pathway is involved in voluntary movement control, the mesocorticolimbic pathway in the "reward system" (Bear *et al.* 2007) and the tuberoinfundibular system in controlling the release of the growth hormone (Overall 2013). There are two families of dopamine receptors: D_1-like family (that includes subtypes D_1 and D_5) and D_2-like family (that includes subtypes D_2, D_3 and D_4). Some of these receptors play a role in mood and stereotypies, so their pharmacological manipulation has been used to control behaviour disorders (Overall 2013, Uemura 2015). Another strategy involves the use of monoamine oxidase inhibitors (MAOI) like selegiline, since inhibiting the enzyme that metabolizes dopamine will increase its levels and activity (Dodman & Shustr 1998).

GABA or γ-aminobutyric acid is the main central inhibitory neurotransmitter localized essentially in the cortex and thalamus (Riviere & Papich 2013, Uemura 2015), released from approximately 30% of CNS synapses (Dodman & Shustr 1998, Overall 2013). GABA may activate two receptor subtypes: $GABA_A$ or $GABA_B$. $GABA_A$ receptors are ligand-gated ion channels that mediate postsynaptic inhibition by the increase of Cl^- conductance, inducing cellular hyperpolarization (Boothe 2011). Post-synaptic hyperpolarization may inhibit serotonergic, dopaminergic and noradrenergic neurotransmission (Dodman & Shustr 1998). $GABA_B$ receptors are a class of G-protein-coupled receptors present in presynaptic terminals that increase K^+ conductance, hyperpolarizing the cell (Overall 2013).

All of these neurotransmitters interact in different CNS areas like the Limbic System, a group of structures (that includes the amygdala, hippocampus and hypothalamus) where emotions are experienced and expressed (Bear *et al.* 2007, Uemura 2015) . The amygdala is a structure located in the temporal lobe, highly sensitive to fear stimulus. It has an important role in the learned fear behaviour (Bear *et al.* 2007), a quick and effective response implicated in species survival. Amygdala activation induces a stress response that stimulates the hypothalamus (inducing the activation of the sympathetic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis), increases vigilance and prompts an avoidance behaviour through the periaqueductal grey matter (PGM) (Bear *et al.* 2007). Both dorsolateral and ventral PGM are structures directly implied in fear responses and their singular stimulation induce unconditioned and conditional fear response in rats, respectively (Steimer 2002).

So a stressful situation leads to an increase of both: noradrenaline and cortisol release. Noradrenaline acts faster, activating several receptors that will induce tachycardia, hypertension, bronchodilation, mydriasis and other "flight or fight" responses (Steimer 2002, Bear *et al.* 2007). A long lasting stress response in mediated by the HPA axis; corticotropin-releasing hormone (CRH) released by the hypothalamus leads to adrenocorticotropic hormone (ACTH) release from the anterior hypophysis. Circulating ACTH reaches adrenal glands and induces the release of cortisol (Bear *et al.* 2007). Animals with high levels of ACTH are known to have learning problems (Overall 2013). There are also CRH neurons in the amygdala (and its projections) and its stimulation induce a fear and anxious behaviour. Curiously, exogenous glucocorticoids exert a negative feedback loop with hypothalamus (reducing CRH production) but induce a CRH increase in the amygdala (Steimer 2002).

Another important CNS structure is the hippocampus, that plays an important role not only on short/long-term memory processing (and also getting new memories) but also on the regulation of aggressive behaviours triggered by the HPA axis (Uemura 2015). The regulation of hypothalamus stress responses is made when its glucocorticoid receptors detect hypercortisolemia, suppressing of the release of CRH (Bear *et al.* 2007). Chronic stress leads to permanent high level of cortisol that may lead to some brain changes. Initially the increase of neuronal Ca^{2+} concentrations may allow animals to cope better with stress, but higher Ca^{2+} concentrations will induce excitotoxicity and neuronal death. So the continuous exposure to cortisol will damage hippocampal neurons, creating a vicious cycle (Bear *et al.* 2007).

Less studied in dogs, the prefrontal cortex (PFC) is a brain structure known to be related to the ability to forecast situations, being also involved in activities like attention, memory and behaviour (Fuster 2015). Although it has a greater development in humans and primates, it is known to exist in rats (Uylings *et al.* 2003) and to have a role on anxiety and fear responses (Steimer 2002). The PFC also exists in dogs (Stepniewska & Kosmal 1986, Adams *et al.* 2000, Preuss 2000, Fuster 2015), but its role remains relatively unknown (Fuster 2015).

Psychopharmacology

First of all, pharmacological agents will rarely by themselves solve permanently any behaviour disorders, but they are useful tool to reduce stress and clinical signs in patients, facilitating the application of behaviour modification techniques (Bowen & Heath 2005, Overall 2013).

The most important psychoactive drugs used nowadays alongside behavioural therapy in animals are benzodiazepines (BZD), tricyclic antidepressant (TCA), serotonin-specific reuptake inhibitors (SSRI) and, less frequently, buspirone. They have different mechanism of action, therapeutic effect and onset of action, making drug combination therapy a possible approach to some behaviour disorders (Bowen & Heath 2005, Crowell-Davis & Murray 2008, Pineda *et al.* 2014).

BZD potentiate the inhibition produced by the activation of $GABA_A$ receptors, resulting in anxiolytic, hypnotic and sedative effect (Dodman & Shustr 1998, Boothe 2011). They have a rapid onset of action, but their disadvantage is the tolerance and physical dependence that chronical administration brings to the patient (Dodman & Shustr 1998). BZD are considered "panicolytic" drugs (Overall 2013), useful in the treatment of anxiety and phobic disorders (Dodman & Shustr 1998). They produce an anxiolytic effect, decreasing noise sensibility and

increasing normal explorative behaviour (Wormald *et al.* 2016). Their amnesic effects have advantages in short term therapy (before a predictable strong stimulus, to prevent a relapse), but are unhelpful for long-term behaviour modification, inducing learning problems (Bowen & Heath 2005).

Clorazepate is indicated for the treatment of dogs that have a high anxiety level, but it has a significant sedative effect that may affect learning (Boothe 2011). Alprazolam is mainly indicated for anxiety and phobia disorders which require a quicker action (*e.g.* thunderstorm phobia) (Crowell-Davis *et al.* 2003). Comparing to other molecules like clorazepate or diazepam, alprazolam has a faster onset of action, lesser sedative effect (affecting lesser dogs learning ability), shorter half-life and hepatotoxicity potential (Dodman & Shustr 1998, Pageat 1998, Crowell-Davis & Murray 2008, Overall 2013, Riviere & Papich 2013).

Table 1 - Drug dosages, half-life and period of action of the most common BZD used in dogs.

BZD	Dosage for dogs	Half-life in dogs (hours)	Period of action
Alprazolam	0.02-0.1 mg/kg Q4h	n.d	Short
Clorazepate dipotassium	0.5–2.0 mg/kg Q4h	4.7 – 5.9	Medium
Diazepam	0.5–2.0 mg/kg Q4h	2.5 – 3.2 (dmd = 3.6-10)	Short

n.d. = not determined; dmd = desmethyldiazepam (active metabolite of diazepam).
Adapted from (Bowen & Heath 2005, Crowell-Davis & Murray 2008, Riviere & Papich 2013).

BZD should not be used for more than 2 months in order to prevent toxicity and tolerance (Dodman & Shustr 1998). To prevent BZD withdrawal syndrome (when the medication is no longer needed) it is recommended to do a 10-25% progressive dose reduction each week (Boothe 2011). Due to an unknown mechanism, it can cause paradoxical excitement and behavioural disinhibition, leading to aggressive behaviour (mostly in cats, but can also occur in dogs) (Crowell-Davis & Murray 2008, Riviere & Papich 2013).

TCA are a class of drugs whose anxiolytic action results of the blockage of the reuptake of biogenic amines in the CNS, increasing mainly serotonin and noradrenaline synaptic concentrations (Overall 2013). These drugs are used in dogs to manage mild aggression, compulsive disorders and anxiety states, but owners should be warned that these therapeutic effects will only became obvious 2 to 4 weeks after the beginning of the treatment (Dodman & Shustr 1998, Riviere & Papich 2013). This late onset of action is due to TCA pharmacokinetic and the time needed to modulate the action of all the receptors affected by these drugs. Besides noradrenergic, serotonergic and dopaminergic effects, TCA may also be responsible for anticholinergic and antihistaminic related side-effects like sedation, GI effects and urinary retention (Crowell-Davis & Murray 2008).

Among TCA, amitriptyline has been used to treat conditions like separation anxiety disorder (SAD) and generalized anxiety disorder (GAD) (Overall 2013), but it can cause important side effects related to its antagonism of acetylcholine and histamine receptors. Clomipramine is known to have the most serotonergic activity amongst all TCA and can be used to treat obsessive-compulsive disorders (OCD) like acral-lick dermatitis (ALD) (Crowell-Davis & Murray 2008).

Table 2 - Drug dosages, half-life and receptor antagonism of the most common TCA used in dogs.

TCA	Dosage for dogs	Half-life in dogs (hours)	Receptors affinity		
			5-HT (agonist)	H_1 (antagonist)	mACh (antagonist)
Amitriptyline	1–6 mg/kg BID	6-8	++	++++	++++
Clomipramine	1.0–3.0 mg/kg BID	5	+++	+	++

n.d. (not determined); H_1 (Histamine H1 subtype receptor); mACh (Acetylcholine muscarinic receptors).
Adapted from (Crowell-Davis & Murray 2008, Riviere & Papich 2013).

More recently, SSRI were introduced in veterinary medicine therapeutics, with a clear selectively advantage over TCA, inducing fewer side effects (Dodman & Shustr 1998). SSRI may takes 3-4 (Crowell-Davis & Murray 2008) to 6 weeks (Dodman & Shustr 1998) to have a therapeutic effect (Overall 2013), so dose revaluation should only be made after a full month of medication (Crowell-Davis & Murray 2008).

Fluoxetine has been successfully used in compulsive behaviours, some types of aggression and SAD treatment, whereas paroxetine in mainly indicated for GAD treatment (Crowell-Davis & Murray 2008). Nonetheless, fluoxetine can be a good alternative to paroxetine if the owners show financial restrictions (Boothe 2011). They are well tolerated and the most common side effects are sedation, weight loss and paroxetine has a mild anticholinergic effect. SSRI and TCA have the potential to cause behavioural disinhibition, so special attention should be given to dogs with aggressive behaviour history (Bowen & Heath 2005). A long treatment with fluoxetine may cause tolerance (due to serotonin receptors down-regulation) and requires its withdrawal, decreasing 25% of the fluoxetine dose each week (Crowell-Davis & Murray 2008).

Table 3 - Drug dosages, half-life and main therapeutic indication of the most common SSRI used in dogs.

SSRI	Dosage for dogs	Half-life in dogs (hours)	Main therapeutic indication
Fluoxetine	1.0–2.0 mg/kg SID	3-13 (nf = 33-64)	SAD
Paroxetine	1.0–1.5 mg/kg SID	n.d. (Shorter than fluoxetine)	GAD

n.d. = not determined; nf = norfluoxetine (active metabolite of fluoxetine).
Adapted from (Crowell-Davis & Murray 2008, Boothe 2011, Riviere & Papich 2013).

Due to the time necessary to obtain SSRI and TCA therapeutic effect, a BZD can be used in the first 4 weeks to induce the first anxiolytic effect that will then be followed by the late therapeutic onset of SSRI/TCA drugs (Crowell-Davis *et al.* 2003, Crowell-Davis & Murray

2008, Ibanez & Anzola 2009, Pineda *et al.* 2014). Furthermore, BZD have a better effect on reducing initial somatic anxiety signs whereas SSRI have a better effect on reducing psychic anxiety signs (Brawman-Mintzer 2001).

Less frequently other drugs can be used to treat anxiety states. Buspirone is an azapirone that acts like a serotonin$_{1A}$ partial agonist with moderate affinity to D_2 dopamine receptors (Crowell-Davis & Murray 2008) promoting an anxiolytic effect similar to BZD, but with a longer onset of action and less sedative effects (Beaver 2009). It can be used to treat anxiety states like thunderstorm phobia, GAD (Overall 2013) or SAD (Dodman & Shustr 1998).

Behaviour disorders

Most of the behaviour problems reported by the owner are normal canine behaviours, seen as a problem because the circumstances where they are expressed are unsuitable for the family's lifestyle (Landsberg *et al.* 2012). This is a real problem since allegedly 40% to 87% of dogs are identified as having a behaviour disorder (Martinez *et al.* 2011, Chung *et al.* 2016). It is difficult to find some consensus in the literature, but aggressive behaviour seems to be the reason why 39% to 59% of dog owners visit a veterinary behaviour clinic (Bowen & Heath 2005, Fatjo *et al.* 2006, Beaver 2009, Lindsay 2013, Overall 2013). Regarding anxious disorders, SAD is the most known disorder, diagnosed in 12% to 70% of behaviour consultation (Parthasarathy & Crowell-Davis 2006, Yalcin & Batmaz 2007, Sherman & Mills 2008, Case 2009, Horwitz & Mills 2010, Kahn & Line 2010).

In order to describe the most important behaviour disorders and knowing the controversy that exists in these data, we decided to evaluate the prevalence of behaviour pathologies presented at the Animal Behaviour Clinic of Complutense University of Madrid (CCA-UCM).

Behaviour disorders in CCA-UCM

With the agreement of the CCA-UCM clinical director and the support of attending veterinarians, we assessed all clinical case records from 2008 to 2015. Each clinical file had the initial form filled by the owners some days before the first appointment (appendix I), as well as all the information regarding the following consultation and follow-ups, filled by the attending veterinarian. This retrospective case study involved the assessment of 528 dogs and 42 cats, considering a wide range of aspects such as their sex, reproductive status, consultation year, birth date, breed, size, breed related activity (as considered in bibliography ((Palika 2007) and in the "World Canine Organization") and pet co-habitation. Due to the smaller number of cats

attending this centre, we present and describe in this work only the most important behaviour pathologies found in dogs. The three more prevalent BD in this population will be discussed latter in this dissertation.

Our analysis found that the prevailing behaviour disorders (BD) observed in dogs in this behaviour centre were generalized anxiety disorder (GAD, 24.81%), reactivity (23.30%), separation anxiety disorder (SAD, 13.83%) and intraspecific aggression (IA, 10.61%) (graph. 1). Other BD included sociopathy, generalized phobia, OCD, noise phobia, CCDS, interspecific aggression, hyperattachment and generalized aggression (17.23%). These findings are in agreement with some authors that consider that anxiety-related disorders predominate (Bamberger & Houpt 2006, Ibáñez & Ánzola 2011), although with a lower prevalence in Bamberger & Houpt study, where SAD and GAD were diagnosed in 14.4% and 5.7% of the cases, respectively. But these observations are not consensual and other authors consider that aggressive-related disorders are more frequent (Landsberg 1991, Salman *et al.* 1998, Bamberger & Houpt 2006, Yalcin & Batmaz 2007, Martinez *et al.* 2011, Lindsay 2013).
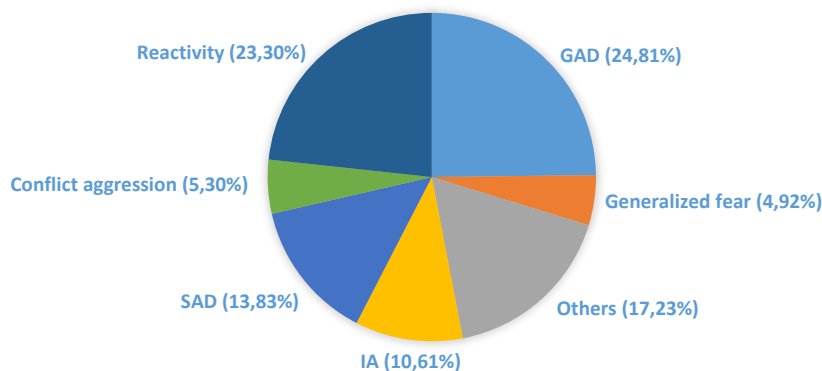
Graph. 1 – Prevalence of dog behaviour pathologies in CCA-UCM from 2008 to 2015.

Considering age distribution, we observed that dogs with 6 to 18 months of age (28.79%) were the most frequently presented to CCA-UCM consultations, but the following groups of young adults with 19-30 (20.08%) and 31-42 months (15.15%) were also common. The age range most frequently observed in dogs with reactivity and SAD were between 6 and 18 months (37.40%; 38.36%) and animals with GAD were between 6 and 30 months (50.38%) (graph. 2). Other studies found that BD are more frequently reported between 30-45 months (Landsberg 1991, Hsu & Serpell 2003, Bamberger & Houpt 2006, Yalcin & Batmaz 2007) and 12-36 months (Yalcin & Batmaz 2007), older animals than those observed in our study.
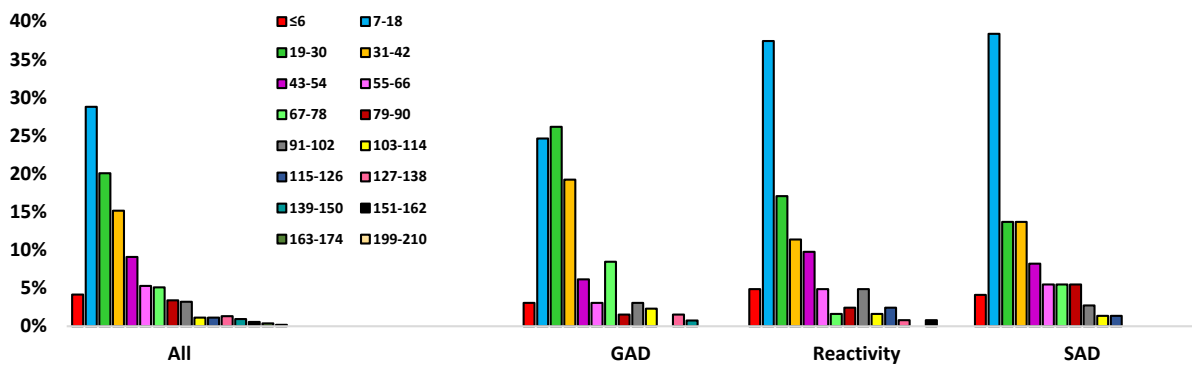
Graph. 2 – Age (in months) distribution of all dogs with BD that attended CCA-UCM.

In this population, unneutered males were the most common patients attending the behaviour clinic (39.58%), an observation that was also valid for the three more prevalent BD: GAD (33.59%), reactivity (41.46%) and SAD (42.25%) (graph.3). The predominance of BD in unneutered males was already described in another studies (Landsberg 1991, Hsu & Serpell 2003, Bamberger & Houpt 2006, Martinez *et al.* 2011), but some authors found that anxiety-related pathologies were more frequently seen in females (Bamberger & Houpt 2006).
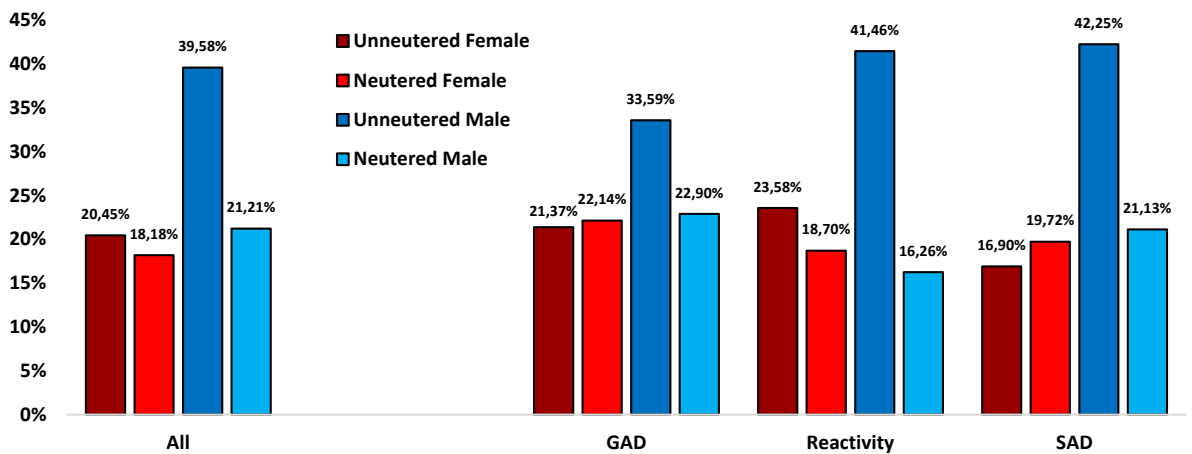
Graph. 3 – Gender and Reproductive state distribution in dogs BD in CCA-UCM from 2008 to 2015.

The most common dog breeds with behaviour disorders that attended the CCA-UCM were the German Shepherd (5.87%), the Yorkshire Terrier (4.36%) and the French Bulldog (4.36%), but mixed breed dogs were the most frequent patients (17.99%) (graph. 4). The frequence of breeds vary within breeds popularity in each region (Landsberg 1991). In Turkey a study found that German shepherd, Terrier and Anatolian sheepdog were the most common breeds with BD (Yalcin & Batmaz 2007), while in USA German Shepherd Dog, Labrador Retriever, English Springer Spaniel and Golden Retriever (Bamberger & Houpt 2006) predominate. Mixed breed

dogs were the most prevalent group, representing from 15% to 30.7% in some studies (Bamberger & Houpt 2006, Yalcin & Batmaz 2007).
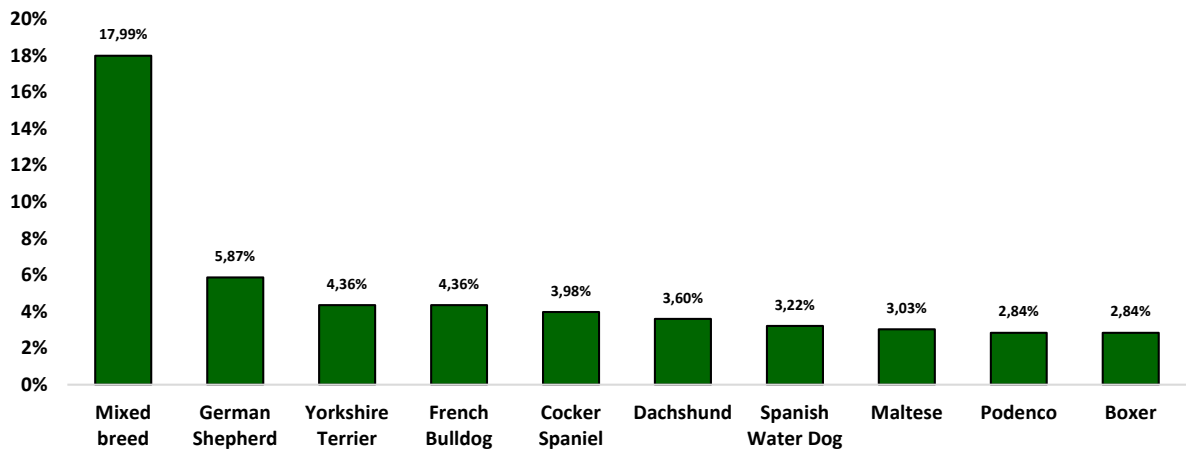
Graph. 4 – Breed distribution of dogs with BD that attended CCA-UCM.

Small (34.09%) and high activity (41.29%) dog breeds were most frequently found on CCA-UCM behaviour consultations. Regarding breed size, in GAD (52.88%) and reactivity (44.55%) small dogs predominate, whereas medium size dogs were more commonly seen in SAD (44.07%). Another study considered that large dog breeds were the most frequently found, but smaller and medium size dogs presented more often aggressive and fearful-related behaviours than large size dogs (Martinez *et al.* 2011). High activity dogs prevailed in the BD considered in this study: GAD (55.45%), reactivity (46.00%) and SAD (55.17%).
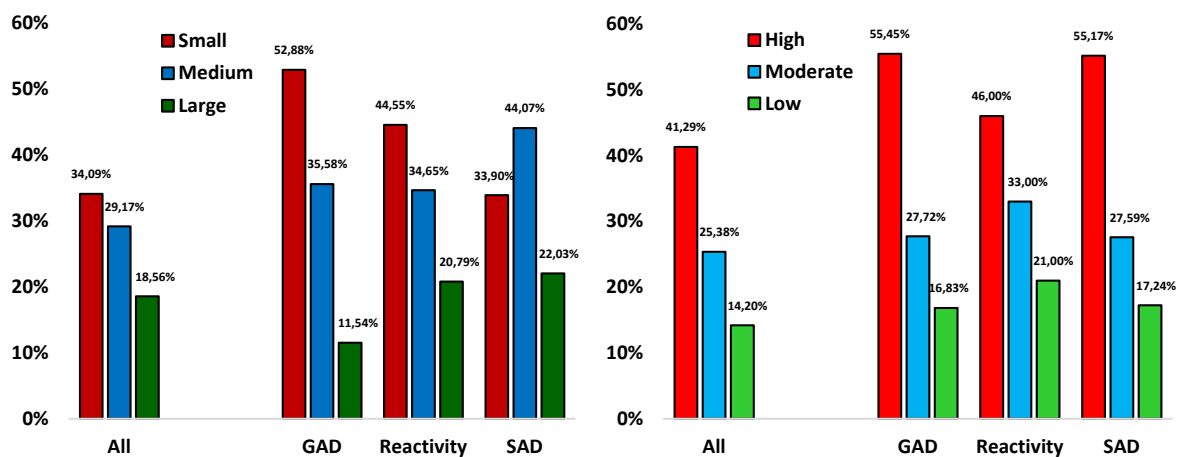
Graph. 5 – Breed size (on the left graphic) and activity distribution (on the right graphic) of dogs with BD that attended CCA-UCM.

Our results indicate that in this population the majority of dogs with BD that attended CCA-UCM consultations (53.22%) did not share their house with other pets, being the only animal

in that family home. Similar results were found in other studies related to SAD (King *et al.* 2000, Overall 2013).
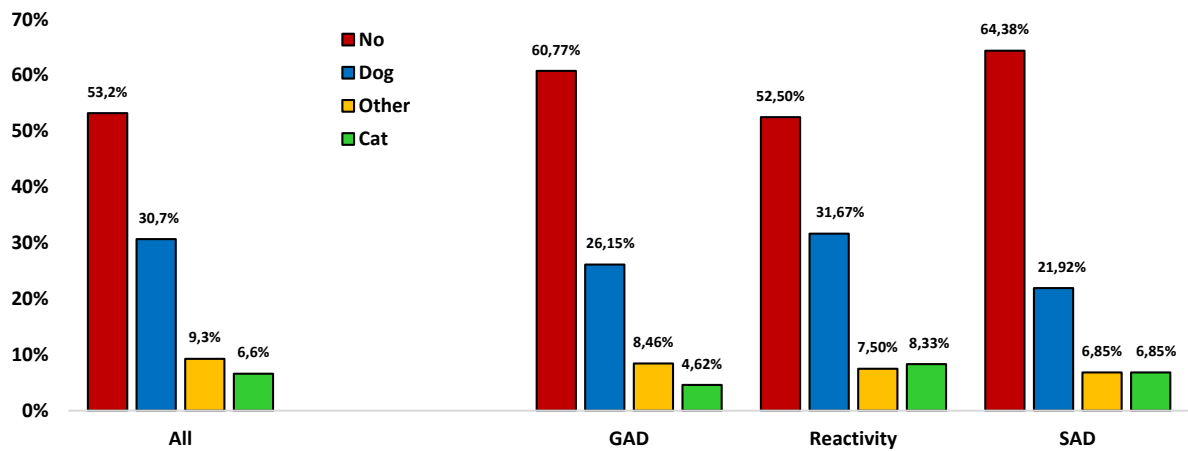
Graph. 6 – Distribution of dogs with BD that attended CCA-UCM and shared their home with other pet(s).

Considering this population analysis, we concluded that anxiety-related pathologies are the most frequent dog BD attending the CCA-UCM, so we decided to describe their general treatment (behaviour modification, pharmacotherapy and environment enrichment) and some important particularities of the three more frequent disorders: GAD, reactivity and SAD.

1.1.1 Anxiety-related disorders

Anxiety can be defined as a reactional state wherein the animal apprehensively anticipates an unwanted situation, developing higher probabilities of showing maladaptive responses (*e.g.* fear-like responses) to any surrounding change, losing the correct adaptive ability to respond to a certain trigger situation (Pageat 1998, Overall 2013). Anxiety and fear should only be experienced as an adaptive response that anticipate and protect the animal from a possible dangerous situation. It becomes a problem when they occur as a response to a neutral stimuli, preventing the animal from learning (Panksepp 2004).

Genetic predisposition and environmental factors are two major factors influencing the individual susceptibility to develop an anxiety disorder (Steimer 2002). When anxiety is developed on animals, they abnormally assume that their natural behaviour resides on hypervigilance, autonomic hyperactivity and increased motor activity due to a possible threat that they anticipate. Their behaviour blocks them from gathering and learning from their physical and social environment that there is no threat, becoming maladaptive (Lindsay 2013, Overall 2013).

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Generalized anxiety, separation anxiety, phobias and aggression (principally conflict and intraspecific aggression) are some disorders that have an anxiety state as their main background condition, triggering a BD (Overall 2013). On the other hand, reactivity doesn't have anxiety as a background, but it may evolve to an anxiety condition if not treated (Pageat 1998, Overall 2013).

1.1.1.1 General treatment

Even though anxiety-related disorders have different etiologies, severity levels and prognosis, it is possible to find a common basis behind their treatment. This allows us to have a better understanding of the nature of the disorders included in this category and thereafter a more effective treatment (Overall 2013). The treatment of anxiety-related BD should be based on behaviour modification protocols and environmental enrichment, aided if needed by the use of anxiolytic drugs (Landsberg *et al.* 2012).

1.1.1.1.1 *Behaviour modification*

Behaviour modification is crucial to the treatment of any BD in dogs, and there are some concepts that should always be considered independently from the source or nature of the problem (Landsberg *et al.* 2012).

Habituation and desensitization are the basic elements applied in behaviour modification that allow us to reduce and finally cease unwanted behaviours. It consists in a repeated exposure to a stimulus that usually induces an undesirable behaviour in the dog, which will gradually lead to the extinction of the unwanted behaviour. In the case of desensitization process, the stimuli are presented in a lower level that is unable to induce the maladaptive behaviour, and it is gradually increased until reaching the usual level that induces the unwanted behaviour. These techniques should be use within the tolerance level of the animal, otherwise we could unknowingly get to a situation that should always be avoided – flooding. This is a stressful situation where the intensity or frequency of the stimuli presented is so intense that the animal is no longer able to deal with it, inducing maladaptive responses like fear, anxiety, aggressiveness and even chronic inhibition (Steimer 2002, Beaver 2009, Overall 2013, Hammerle *et al.* 2015).

Another behaviour modification technique should be applied when the stimulus that triggers the unwanted behaviour is present. Counterconditioning and distraction/redirection are used to substitute an unwanted response that the animal does, or at least make it lose focus on the stimulus that provokes the behaviour that we want to extinguish (on the distraction and

redirection process). Right before or when it is starting an unwanted behaviour we induce and reinforce a positive behaviour that inhibits the animal from expressing the undesired one. Unsurprisingly, it will start to increase the frequency of the substitutive behaviour, as it is reinforced by the owner. If the reinforcement is valuable, the animal will learn very quickly to use it as a substitutive behaviour. Counterconditioning is usually coupled with desensitization, because the animal will present a substitutive response and at the same time it will not respond to the stimulus that previously led it to have the unwanted behaviour (Beaver 2009, Lindsay 2013, Overall 2013).

But if the objective is to modify animal behaviour, the binomial positive reinforcement / negative punishment has to be considered. It consists on increasing the future probability of an intended behaviour to occur by the use of positive stimuli (*e.g.* pleasant food, playing with the owner or having his attention) and decreasing the future probability of an unwanted behaviour to occur by the removal of a positive stimulus (Beaver 2009, Overall 2013). When using food as a positive reinforcement, one should chose other than the one used for feeding, to maintain the animals' motivation (Horwitz & Pike 2014). Positive punishment or negative reinforcement must never be used on animals with anxiety related disorders, as it will increase their anxiety condition and ultimately block their learning process (Crowell-Davis 2009). When a dog exhibits a "pseudoguilty expression" after an unwanted behaviour, it is just showing a fearful and submissive behaviour in order to prevent a positive punishment that may have occurred in the past. The animal recognises the owner's behaviour signs as anticipating a positive punishment, regardless of its "unwanted behaviour" (Lindsay 2013). Another strategy frequently used as a negative punishment is systematic ignoring - a technique that uses one important value to social and sociable animal like the dog: the social group (Lindsay & Voith 2013). It consists of systematically ignoring the unwanted behaviour, leading it to extinction. When ignoring is not possible, distraction and redirection followed by counterconditioning should be applied. Afterwards measures should be taken to prevent the animal from repeating the undesirable behaviour (*e.g.* cover the wall / door, maintain the animal further from the trigger noise) (Overall 2013).

Another important change that must be made to replace casual interactions between the animal and its owner is the command-response-reward (CRR) technique that consists of having highly structured interactions always preceded by a command that must be executed in order to have the reward. It must be applied in any interaction like feeding or during playtime (Mason & Rushen 2008, Landsberg *et al.* 2012). Based on this rule, controlled interactions are another

important concept: it must be the owner to begin and finish the interaction and any attempt of other kind of interaction must be ignored. All interactions must be initiated when the animal is calm and relaxed, so that behaviour is reinforced by our attention. A subtle gesture is enough for reinforce an attempt of interaction initiated by the animal, so it must be avoided (Bowen & Heath 2005). In order to increase the owner-animal bond and obedience, the principle "nothing in life is for free" must be applied. It consists of rewarding (with attention, food or playtime for example) the execution of correct commands / behaviours (*e.g.* being calm, sitting down) (Beaver 2009).

1.1.1.1.2 *Environment enrichment*

Simple environment enrichment strategies should also be implemented. The dog should be fed 3 to 4 times a day in order to decrease its anxiety levels, due to hunger (Beaver 2009). A portion of the owner's food should be mixed with its usual food, as more appealing food will increase serotonin levels (due to food quality and frequent change of flavours and smells) before and during the meal, potentiating dog-owner interaction (Bear *et al.* 2007). Even though most of human food can be given to dogs in small quantities, there are some that are specifically not allowed due to its high or cumulative toxicity: grapes, avocado, dry fruit, raw onion, raw garlic and chocolate are some of those examples (Gupta 2012). This change in the animal's feeding habits will make it feel more a part of the social group (Marshall-Pescini *et al.* 2011, Miklosi 2015) and gives the owner a perfect occasion to practice CRR and the principle that "nothing in life is for free". Occasionally, changing signal and corresponding action made by the dog can be beneficial, as it prevents the action from becoming "mechanical", increases dog-owner bonding and stimulates it cognitively (Beaver 2009).

As a part of environment enrichment, regular exercise with dog-owner interactions should be made several times a day, adapted to the dog's activity and the owner's timetable. A dog's exercitation is an important tool not only to lower its anxiety level but also to increase its cognitive functions and its obedience (Overall 2013). The owner should choose three groups of toys and use just one group of toys each day, during the controlled play time (toys should be exposed to the dog by the owner, and when the play time is over, they should be removed again). The play time should be set by the owner, so any play behaviour initiated by the dog should be ignored. This will keep the activity highly rewarding and it will help establishing a correct educational bonding (Beaver 2009, Lindsay & Voith 2013, Overall 2013). If adequate, some toys should be permanently accessible to the dog, so it can lower its anxiety by playing with them by itself (Overall 2013).

Other strategies like interactive and mental games (*e.g.* food searching - food hidden in cups or kong balls®) are useful to release dog's tension and to stimulate its cognitive ability. When applied correctly, mental games can show an incredible and durable stress releasing ability (Overall 2013).

1.1.1.1.3 *Pharmacotherapy*

Generally a BD pharmacological treatment is initiated by using the lower possible dosage of each drug. The initial dosage should be gradually increased every 5 days (or 3-4 weeks, depending on the drug's pharmacokinetic / pharmacodynamic) if it shows to be non-effective (Bowen & Heath 2005). If the animal presents severe signs due to a high anxiety disorder, a higher dosage should be used from the start (Overall 2013).

1.1.1.2 **Generalized Anxiety Disorder (GAD)**

This BD could be defined as an abnormal state where the animal presents a frequent or constant state of anxiety and fear, developing permanent non-adaptive responses to surrounding changes, regardless of the stimuli (frequency or intensity), presenting stimuli and response generalization (Crowell-Davis 2009, Overall 2013).

1.1.1.2.1 *Etiology*

Animals that had some strong experiences (*e.g.* early weaning, relinquishment, abuse, chronic environmental deprivation at young age, repeated exposure to fear-inductive stimuli) are more likely to present anxiety-related behaviours that can be reduced when harboured in a stable, caring and loving household. GAD should be acknowledged if the anxiety-related signs are constantly present two or three months following the dogs' introduction in a secure household, free from aversive stimuli (Crowell-Davis 2009). An animal with GAD usually presents many other specific anxiety-related BD, such as thunderstorm phobia, SAD (Sherman 2008) or any other fear-related disorder (Crowell-Davis 2009).

1.1.1.2.2 *Signs*

As the animal is usually in an anxiety state, its response to a stimulus can vary between hyper-reactivity and constant trembling/nervousness (Overall 2013).

Table 4 - Possible corporal, systemic and behaviour signs shown by a dog with GAD.

Corporal	Systemic	Behavioural

. Pinning ears back against the neck
. Holding mouth in a submissive grin
. Lowered body position
. Thumping tail
	. Panting (even in favourable environments)
	. Tachycardia
	. Inappropriate elimination
	. Salivation
	. Mydriases
	. Poor hair coat
	. Diarrhea
	. Vomit
		. Stress signs
		  (Trembles / yawning / lip licking)
		. Excessive / inappropriate vocalisation
		. Destructiveness
		. Hiding / Freezing
		. Hypervigilance / Restlessness
		. Compulsive and displacement activities
		  (Pacing / tail chasing / flank sucking)
		. General activity decreased
		. Fear-induced aggressive behaviour

Adapted from (Beaver 2009, Crowell-Davis 2009, Overall 2013).

In some cases of dogs with GAD stimuli induce an arousal effect, so the animal presents behaviour signs like hypervigilance and destructiveness. On the opposite, other dogs may show inhibitory reactions with a decreased activity and hiding tendency (Crowell-Davis 2009). Attention-seeking behaviour can be a sign of profound anxiety issues. Dogs may show different feeding behaviours, as chronic stress inhibits feeding and acute stress stimulates feeding. When chronicity is reached, the dog shows clinical signs even without any stimuli that could justify them (Overall 2013).

1.1.1.2.3 Diagnosis

The diagnosis is obtained by combining the dogs' history (presented by the owners) and the animals' signs (*e.g.* frequently tense, fearful, over-reactive and anxious). Usually the first anxiety signs appeared more than 2 months ago and have worsened with time. Some dogs already arrive to consultation with generalization of an anxiety response to neutral stimuli. When dogs present multiple BD (*e.g.* SAD, noise phobias, and reactivity to other dogs) it is probable that they have GAD. The diagnosis is confirmed if the animal, regardless of the place or the stimuli exposed, is constantly presenting signs of fear and anxiety that may get worse in particular situations. Some animals do not present clear signs of fear or anxiety, they maintain always a low activity level, giving the impression that they are permanently unhappy, miserable or frightened (Crowell-Davis 2009, Overall 2013).

1.1.1.2.4 Treatment

Reducing dogs' anxiety state is the first action to take in order to have success in GAD's treatment. Due to the chronical anxiety condition and its generalization (*e.g.* unfamiliar people / animals, noises, being left alone, vacuum cleaner) the long-term use of anxiolytic agents associated with serotonergic agents might be indicated to reduce anxiety in these dogs (Crowell-Davis 2009, Overall 2013).

Desensitization, counterconditioning, positive reinforcement-negative punishment and systematic ignoring are the baseline behaviour modification techniques (Crowell-Davis 2009, Overall 2013) that should be applied in order to solve GAD. All stimuli that can be categorized as stressors in the dog's life should be identified. Changes should be made to remove them (as possible) and a stable and predictable environment should be provide (Overall 2013). Systematic ignoring (negative punishment) of undesirable behaviours allied to rewarding desirable and calming behaviours (positive reinforcement) is important to slowly increase the frequency of the pretended behaviour and extinguish its stressful reactions (Beaver 2009, Overall 2013). The trigger stimuli should be found and used to play/interact with the dog (*e.g.* food, plaything and petting), lowering its anxiety state and creating a correct bonding. Owners must be taught how to identify calm and anxious behaviour signs, so they can act when the animal is beginning to present an early anxious state. Incorrectly reinforcing calm behaviours (*e.g.* cuddling the pet when it is whining against the owner's legs) should always be avoided and the owner should have in mind that forcing the dog to face an undesirable situation/stimuli (Crowell-Davis 2009, Overall 2013) may originate flooding, that may lead to unwanted aggressive responses (Beaver 2009).

To obtain good results a high environmental enrichment must be provided to dogs with GAD, allowing the animal to release all its tension and anxiety state in pleasant activities that are capable of capture its attention (*e.g.* kong®, food tracking, mental games). All family members should learn how to correctly play/interact with their dog (Crowell-Davis 2009, Landsberg *et al.* 2012).

Table 5 - Pharmacotherapy for dogs with GAD: drugs and dosage.

Pharmacological Family	Drugs	Dog's therapeutic dose
SSRI	Fluoxetine	1-2 mg/kg SID
	Paroxetine	1-1.5 mg/kg SID
	Sertraline	0.5-4.0 mg/kg SID
TCA	Clomipramine	1-3 mg/kg BID
Azapirone	Buspirone	0.5- 2.0 mg/kg SID–QID

Adapted from (Crowell-Davis & Murray 2008).

The use of fluoxetine in this disorder can be useful to prevent or treat obsessive-compulsive behaviours developed by the dog due to its high anxiety condition (Wynchank & Berk 1998). The concomitant use of benzodiazepines may have an appetite-stimulating activity as a secondary desirable action during the first weeks of anxiolytic therapy (Crowell-Davis 2009). Furthermore, if the animal presents noise phobia, benzodiazepines like diazepam can be used as SOS medication before a predictable stressful event occurs, preventing dog's flooding and

panic reactions (Crowell-Davis 2009). The use of pheromones (DAP) can also have some therapeutic effects, as it helps lowering anxiety in a closed environment (Mills *et al.* 2006).

Regardless of the etiologic cause and therapeutic management of dogs with GAD, recovery should take weeks to months. It is crucial that every family member endeavour a permanent effort to develop a relaxed state, to allow therapeutic success (Crowell-Davis 2009).

1.1.1.3 Reactivity

Reactivity – or hyper-reactivity (Overall 2013) is also called a pre-anxious state or the 3rd state of phobia (Pageat 1998). A dog with reactivity has maladaptive responses to neutral stimuli (Jensen 2007), responding to all of them in a magnified manner. Some dogs present a higher intensity or a quicker response to a given stimulus, that in the majority of cases ends up being maladaptive to the dog (Scott & Fuller 2012, Overall 2013).

Reactivity is different from excitability (excitability is the response to an interesting stimuli), even though there is a correlation between both (as a reactive animal presents a high excitability level) (Jensen 2007). In rodents, when comparing HPA axis activity and testosterone levels between reactive and proactive rats, they found higher HPA axis activity and lower testosterone level in reactive animals (Anthes *et al.* 2010).

According to some authors there is a positive correlation between a reactive and a fearful dog (Jensen 2007, Beaver 2009, Lindsay 2013, Horowitz 2014). A fearful dog does not necessarily face the threat in a reactive way, while a dog with reactivity reacts to stressful stimuli independently of its fearful nature (*e.g.* instrumentalization of a reactive response to normal noises due to inadvertently positive reinforcement from the owners) (Askew 2003, Overall 2013).

1.1.1.3.1 Etiology

A dog's reactivity can be predisposed by early weaning (Overall 2013), the quantity and quality of socialization (with a particular importance to learned behaviour), strong or inadequate prenatal experiences, and its genetic characteristics (the influence it has on its activity) (Beaver 2009). In rats, fearful mothers give birth to an offspring that presents a higher reactivity to stressful event (Jensen 2007), and reactive mothers induce reactive pups toward empathy, social and observational learning (Lindsay 2013). More active breeds (*e.g.* Terriers) are also more susceptible to develop reactive responses to stimuli, and usually more when younger (Scott & Fuller 2012). But more than a breed predisposition, there is an individual sensibility to

emotional reactivity (the threshold emotional evocative stimulation) that is directly connected to prenatal and early experiences (strong fearful experiences can induce higher sensibility to develop reactivity), due to in utero and epigenetic effects (Overall 2013). Dogs with poor interaction with people (mostly during sensitive period) and with poor stimulation tend to be more reactive (Lindsay 2013), so as dog that are frequently presented to ambivalent social interactions (*e.g.* punishment and reward of the same behaviour at different times) (Lindsay 2013). Endocrinal disorders that increases dog's activity (*e.g.* hyperthyroidism) may potentiate the development of reactivity (Overall 2013).

1.1.1.3.2 Signs

Reactivity is a pre-anxious state, so it usually does not produce permanent systemic signs like other anxiety disorders, but the appearance of stress related systemic signs during the reactive behaviour is excepted (Pageat 1998). According to Beaver (2009), dogs with reactive behaviour mostly present overexcitement, but can also present home distress, intraspecific and interspecific apprehension (possible resulting in maladaptive response), behaviour of natural drives, destructivity, and noise-reactivity. Other possible signs include hypervigilance, restlessness, excessive vocalization, stereotypic behaviours, inattention to owner's signals, salivation, trembling, hiding, and increasing of solicitous behaviours (in quantity or content) (Overall 2013). Yawning, body shaking, pawn lifting, startling, and increased self-grooming are considered like stress-related signs (Horowitz 2014), so they can be more frequently shown by reactive animals.

Table 6 – Possible corporal and behaviour signs shown by a dog with reactivity.

	Corporal	Behavioural
Grade 1 (response to high stimulation)	. Large palpebral fissure staring . Tail swing . Ears forward . Tense body position	. Apprehensive behaviour . Shifting weight to the front
Grade 2 (response to mild stimulation)	. Lip curling . Tail up	. Growling/barking . Snaping
Grade 3 (response to low stimulation)	. Head up, piloerection . More marked lip curling	. Jumping/lunging . Possible aggressive behaviour

Adapted from (Abrantes 1997, Kim *et al.* 2006, Overall 2013).

According to Kim and collaborators, clinical signs classification allows a better understanding of the reactivity condition of each dog (Kim *et al.* 2006) when it faces a triggered stimuli (*e.g.* animal, specific noise, people). These signs are not static, varying according to stimuli intensity, frequency, stress level, and many other factors that may influence the dog's tolerance. These "grades" allow us to correlate the specific stimuli with the severity of the

behavioural response. So if a dog presents a grade 3 behaviour it implies a high reactivity level and a higher possibility of an aggressive behaviour (Overall 2013).

1.1.1.3.3 Diagnosis

Reactivity is diagnosed when a dog presents the signs described above in the presence of specific stimuli (*e.g.* an unfamiliar dog), otherwise it behaves normally. Usually its normal behaviour is energetic and it is easily excitable. It is usually hypersensitive to stimuli, reacting in a strong and maladaptive way to stressful situations (Overall 2013). Reactivity can only be diagnosed after GAD and overactivity are discarded, so the animal cannot present an anxiety behaviour between stimuli (like in GAD) and frequent high motor activity (like in overactivity) (Overall 2013).

1.1.1.3.4 Treatment

An early intervention is crucial, because when a behaviour becomes frequent, it also gets more difficult to extinguish (Lindsay 2013). Solving reactivity essential resides on behaviour modification and environmental enrichment. Firstly, all the stimuli that induce the reactive behaviour should be identified, avoided and a predictable environment should be created. Then a strong dog-owner bonding should be developed, so the dog will gradually see the owner's attention as stronger than the stimuli it reacts to. This can be achieved by combining CRR protocol and highly rewarding stimuli (*e.g.* tasty food, toys which it has special interest), alongside controlled play time (Beaver 2009, Landsberg *et al.* 2012, Overall 2013). Secondly, desensitization/habituation to stimuli should be applied. When the dog is displaying reactive behaviours counterconditioning should be applied (Beaver 2009), with previous negative punishment of the reactive behaviour (in order to achieve extinction). When counterconditioning is not possible, then distraction and redirection should be applied, followed by the CRR protocol. Positive punishment must not be done, as it increases the animal's reactivity level (Overall 2013) and may potentiate a defensive aggressive behaviour (Lindsay 2013). In order to reduce the dog's reactivity, environmental enrichment with mental games and stimulating toys is important, as well as regular physical and mental exercise, that can be made together with dog-owner bonding strategies (Lindsay 2013, Overall 2013). The "nothing is for free" protocol should be implemented during feeding to increase dog's obedience (Beaver 2009).

A dog with reactivity usually does not present an anxiety level that justifies the use of medication. In more severe cases, the same anxiolytic drugs applied on anxiety-related

disorders are recommended (Overall 2013). When the dog presents aggressive behaviour, the use of muzzle is recommended until owners gain their pet's confidence and the required bonding is established (Lindsay 2013). However, it must not be used as a therapeutic tool, as a muzzle will increase the dog's reactivity and aggressiveness due to the inability to correctly respond to stimuli. The use of body pressure wraps (*e.g.* Thundershirt®) can also help reducing its reactivity responses due to their anxiolytic effect (Overall 2013).

If not treated, reactive dogs may naturally desensitize to the triggering stimuli and recover, or progress to an anxiety/fear/phobic state (Pageat 1998). After treatment, a dog presenting reactivity will evince reactive behaviours less frequently, although never ceasing them completely (Overall 2013).

1.1.1.4 Separation Anxiety Disorder (SAD)

This BD occurs when an animal presents a state of anxiety when faced with the absence of the person of its attachment and the stimuli he or she creates. The most visible maladaptive behaviour responses to this state are destructivity, inappropriate elimination and excessive vocalization (Lindsay 2013, Overall 2013).

Due to the neotenic behaviour of the domestic dog, these animals have developed a strong social bond with their owners (Voith & Borchelt 1996). Animals with SAD stay emotionally at an immature level of development, maintaining an excessive dependence to their owners (Lindsay 2013). Their condition is usually severe, as it breaks owner-dog bond, possibly leading to relinquishment or even euthanasia (Sherman & Mills 2008).

1.1.1.4.1 Etiology

Early traumatic experiences (*e.g.* premature weaning, change of home, living in shelter, relinquishment) (Lindsay 2013) and any abrupt change in a dog's social environment (*e.g.* long periods of solitude after being with its owner for a long time) are some of the predisposing factors for developing SAD (Sherman & Mills 2008). An inadequate sensory/social stimulation during the sensible period – particularly until the first 8 weeks of life – may potentiate the development of this disorder (Lindsay 2013).

There are evidences of a possible genetic influence as these animals are never able to recover from weaning distress, leading to a higher sensibility to develop SAD. Other conditions like juvenile illness, inadequate socialization or an ambivalent/anxious dam can also be risk factors for developing this disorder (Sherman & Mills 2008). When combined with a strong

fear condition (*e.g.* thunderstorm phobia) this disorder evolve into a panic/phobic condition of getting alone, if both are triggered simultaneously. No significant differences have been found between genders, but SAD is more frequent in dogs living in small family groups (Lindsay 2013).

1.1.1.4.2 Signs

If dogs are adopted from shelters they may associate getting alone with relinquishment, so the anxiety state is triggered when the owner goes out (Lindsay 2013). Usually dogs are referred to be perfectly normal during their owner's presence, but they show the most dramatic signs when the owner is away from home (Sherman & Mills 2008).

Table 7 – Possible corporal, systemic and behaviour signs shown by an animal with SAD.

	Systemic	Behavioural
Before the owner gets out		. Avoiding owner to get out (pulling, barking, aggressive behaviour); . Predeparture arousal . Mimic a state of catatonia . Whining, shaking . Resistance to go to the place where it stays when owner is absent
When the owner is outside (starts 5-30 min after getting out)	. Inappropriate elimination (house soiling) . Psychogenic anorexia . Tachycardia, tachypnea . Hipercortisolemia	. Yelping, excessive vocalization, howling . Destructivity (preferentially objects that contact with the owner) . Trying to escape from home/crate, jumping . Compulsive and displacement activities (pacing, circling, scratching doors) . Panic (*e.g.* self-absorbed/persistent distress vocalization) . Freezing/immobility
When the owner arrives	. Drooling, panting	. Arrival elation (arousal, agitation, behavioural activation, barking) that may last long
Permanent / non-temporal	. Restlessness . GI signs: Emesis/Diarrhea . Stress-related Immunosuppression	. Learning problems . Proximity-seeking behaviour . Self-mutilation (*e.g.* ALD)

Adapted from (Sherman 2008, Sherman & Mills 2008, Horwitz & Mills 2010, Lindsay 2013, Overall 2013).

Even though these are common signs presented by dogs with SAD, there are others where high anxiety levels induce a behavioural depression, misleading owners as they simply lay down and wait for the owner to come home. Presenting fearful stimuli supresses behavioural signs of separation anxiety, as they also induce behavioural depression (Lindsay 2013).

There are three types of separation anxiety: type A – dogs that present primary hyperattachment (retaining puppy-like behaviour); type B – dogs that present secondary hyperattachment (showing signs after an environmental change later in life, person of attachment can change) and type C – dogs that present hyperattachment when facing some fearful stimuli (*e.g.* thunderstorms) (Sherman & Mills 2008).

1.1.1.4.3 Diagnosis

This disorder should not be mixed up with others with similar signs, such as: hyperattachment, fear/phobia of solitude, fear/phobia to stimuli that can be avoided by contact with the owner (*e.g.* dogs, noises), destructivity due to poor environment enrichment/hyperactivity/fear/play, excessive vocalization due to fear/external stimulation, incorrect elimination due to housetraining problems/fear/marking (Parthasarathy & Crowell-Davis 2006, Kahn & Line 2010, Overall 2013). Within separation anxiety, there are different origins that may coexist in the same animal: fear of separation, panic of separation, boredom, and frustrative arousal (Lindsay 2013). Also medical differential diagnoses that can cause similar signs should be discarded (*e.g.* hepatic encephalopathy, GI disorders, seizures, cystitis and endocrine disorders) (Sherman & Mills 2008). In older dogs, SAD may be a consequence of neurodegenerative processes, such as progressive cognitive dysfunction (Lindsay 2013).

The correct diagnosis of this disorder depends on combining behavioural history and signs, and the exhibition of important separation distress signs when the owner or attachment figure is absent (excessive vocalization, inappropriate elimination and destructivity). Videotaping can be an important diagnostic tool to find some discrete signs that the dog only exhibits when the owner is absent (*e.g.* pacing, circling) (Sherman & Mills 2008).

1.1.1.4.4 Treatment

The first idea that must be made clear is never to apply retrospective positive punishment when the owner finds out what the animal has been doing in his absence. It will only increment the animal's anxiety level, or it can even be seen as a positive behaviour, as it can get the owner's attention by that behaviour. Owners must see that kind of behaviour as a displacement activity that can be extinguished by reducing the animal's anxiety (Sherman & Mills 2008, Overall 2013).

Upon the same therapeutic basis, different types of SAD and the animal's own nature will require some adjustments. In type A, the primary objective is to reduce the dysfunctional attachment with the owner. In type B, a comfortable and highly enriched environment must be created. In type C, desensitization/habituation to the fearful stimuli is crucial to the success of the treatment (Sherman & Mills 2008).

A safe place should be created where the animal likes to stay, one that promotes safety (*e.g.* transporter, blanket). In the beginning of the treatment, letting the dog alone the least time possible is important in order to avoid flooding and panic (Sherman 2008). It is important to

discourage the dog to have anxious behaviours (*e.g.* do not cuddle as a relaxation method when it is begging for attention, because it will reinforce the behaviour), teaching and rewarding a set of rules that helps it to be more calm and relaxed (Overall 2013). One should apply desensitization and counterconditioning to stimuli such as getting out of the house, staying on its own and any other stimuli directly connected to a hyperattachment of the dog (Horwitz & Mills 2010).

Every time the owner needs to get out he should make it discreetly, with no ritualized behaviours (*e.g.* say goodbye to the dog) (Sherman & Mills 2008). Around 30 minutes before departing high household enrichment should be made: put radio/recorder conversation, challenging toys filled with highly rewarding food (*e.g.* kong®) or others (Sherman 2008). The use of body pressure wraps on the dog (with correct pressure) can also help lowering its anxiety level (King *et al.* 2014). When at home, distance should be conquered slowly. Firstly, the dog should be taught to lay down by the owner. Afterwards, the distance between each other should increase gradually, always reinforcing calming behaviour (Sherman 2008).

If possible, gradual detachment from the owner should be made: gradually replace the dog's interaction with the person with whom it has dysfunctional attachment (Parthasarathy & Crowell-Davis 2006) to interactions with any other member of the household, in any possible daily task (*e.g.* feeding, walking, playing) (Overall 2013). Systematic ignoring of any interaction started by the dog must be made. An innocent face or verbal expression is enough to reinforce its behaviour, as attention is being given to it (Sherman 2008). Regular exercise should be made to lower the dog's anxiety, but always following the same systematic ignoring and calm rewarding protocol (Sherman 2008).

Due to the dog's high anxiety condition, pharmacological management is usually recommended (Overall 2013). Clomipramine (King *et al.* 2000, Sherman 2008, Overall 2013) and fluoxetine (Simpson *et al.* 2007, Landsberg *et al.* 2008) are possible anxiolytic medications that may help in the treatment of SAD (Sherman 2008). A combined therapy with benzodiazepines (Boothe 2011) and SSRI /TCA can also be used in more severe cases of SAD. If the dog shows SA signs due to CCDS, selegiline administration may improve its welfare (Lindsay 2013).

Medication can be used up to 2 months after getting satisfactory results, but then it should be withdrawn gradually, continuing with the behaviour modification protocol. However, some cases may require a lifelong medication (Sherman & Mills 2008). As a therapeutic adjuvant,

the use of pheromones (DAP) can help reducing the animal's anxiety level in the household (Gaultier *et al.* 2005).

1.1.1.5   Case report

Signalment: Jon is a neutered male dog, 13 months old, weighing 26 kg, mixed breed**. Presenting Complaint:** When it is left alone in the kitchen, it inappropriately urinates and defecates. It also presents destructivity. **History/Anamnesis:** Jon was adopted from a shelter at three months old, and it was a highly sociable dog. It was sterilised eight months ago and presented keratoconjunctivitis three months ago. Environment: the owner lives in an 80m^2 apartment, where the dog stays on its own for 7 hours, locked up in the kitchen. There are no other animals sharing the house. Activity: when walked it is a very nervous dog, but extremely affectionate with known people. It has 120 minutes of daily exercise: 3 walks on the street with leash (15 minutes), 1 walk in the garden (30 minutes) and 1 walk with training (45 minutes). It usually sleeps in the hall, stays in the kitchen when the owner is absent but has access to the entire house when the owner is present. Feeding: once a day with dry food, in the afternoon. It has access to its food for 20 minutes, but it finishes it in a few minutes. It never receives food when owner is eating. General behaviour: the toys it has access are balls and ropes. It has never had professional training and the only command it knows is to sit. It barks excessively when facing strangers. It is generally hyper-active, shows a high excitability and a low obedience level. Social behaviour: it behaves in an obedient and affectionate way with family members. When strangers enter the house, it reacts with excessive vocalization in the beginning, but after some time it is affectionate to them. When with other dogs it is usually a playful dog, but sometimes it shows aggressive behaviours. It barks to cats and tries to catch birds. Before the separation event, it reacts with jitters (predeparture arousal). When owner gets out, it cries and barks. When the owner gets back, it presents an excessive greeting behaviour, gets nervous and jumps to the owner (arrival elation). Vocalization: it has excessive vocalization to other dogs, people and unusual noises. It usually happens when Jon is in the street. Barking is strong and it can show some aggressiveness while having this behaviour. Sexual activity: Mounting other animals is a frequent behaviour. Other behaviours: it is frequent to it to jump to other people, to excessively lick itself and to present destructive behaviour. It evinces panic (phobia) when it hears the elevator's door or parking bars moving. Problem description: when locked at home (in the kitchen) it presents excessive vocalization, destructivity and inappropriate elimination. Its destructivity level is so high it has already pulled a 1-meter-high switch from the wall. First episode occurred just after it was adopted. It occurs frequently when it is alone (5 times/week)

and rarely when the family is at home (even at night). It is less frequent in summer. Owners had already tried getting out for short periods of time (5-10 minutes) and Kong® as environmental enrichment. Owner attitude: this is a serious problem to the owner. However, they will keep the dog with them. Normal day description: at 8 a.m. the dog goes for a 15 minutes' walk. It gets home with owner's presence until 1 p.m.. Before the owner goes to classes it gets another 15 minutes' walk. It is left in the kitchen until 7 p.m., when the owner gets back home. At 7:30 p.m. it gets a long walk and the owner goes into a park where it runs, plays with the owner and with other dogs. The owner gets home, have dinner and then feeds the dog. At 12 p.m. it gets its last 10 minutes' walk. Jon sleeps in its bed or under a bed until 7:30 am. **Behaviour-related problems:** it is an overly active dog. When walked it is a very nervous dog, but extremely affectionate with known people. It is fed only once a day and it has poor environmental enrichment. The owner has lack of control and obedience of her pet. It is a highly reactive dog to any surrounding stimulus (phobia to strange noises), expresses excessive vocalization, reactivity and even aggressiveness. It has frequent mounting behaviour and presents excessive licking behaviour (high anxiety). It presents hyperattachment to the owner. Every time the attachment person is going out, it presents predeparture arousal, destructivity, excessive vocalization, inappropriate elimination and arrival elation. **Presumptive diagnosis:** early state of generalized anxiety disorder (SAD, intraspecific aggressive behaviour and noise phobia). **Treatment:** behaviour modification – systematic ignoring (negative punishment) of any initiatives begun by it and any undesirable behaviour (*e.g.* destructivity, arrival elation); systematic positive reinforcement of calming behaviours; counterconditioning/distraction and redirection of any undesirable behaviour that cannot be ceased/handled with negative punishment (*e.g.* excessive barking); frequent physical exercise in different places accompanied by controlled interactions (in order to increase correct bonding and obedience); controlled playtime (save 6 toys for controlled playtime and use 2 different toys each time for 10-15'); cease any interaction when it starts showing any arousal; use muzzle (with previous habituation) in the park; Thundershirt® (with previous habituation) 30 minutes before getting out; environmental enrichment – feed 3 times a day and enrich the food with home-made food; leave it on its own the least time possible in the first month; put interactive toys at its reach, and use them appropriately (*e.g.* Kong ® with sticky food); create a comfortable safe place (kitchen) with high environmental enrichment; medication – lithium gluconate (0.2796 mg SL SID).

    1st Follow-up - 2 weeks later: The owner did not administer the medication in the first two weeks, though it was explained to them how and why it should be made; Jon continued with

inappropriate eliminations; it showed a better behaviour when being walked; the owner was applying the obedience protocol correctly.

2ⁿᵈ Follow-up - 4 weeks later: Jon's destructive behaviours stopped, it showed a calmer behaviour (with the help of the thundershirt®) and was more obedient to the owner. It still had sporadic episodes of inappropriate elimination, which the owner was ignoring. Separation anxiety (SA) protocol 0 and 1 (explained in table 8) were sent to the owners for clarifying the behaviour modification and environment enrichment protocols. Video recording: it was visible that anxiety signs were diminishing day by day, but inappropriate elimination and excessive vocalization were still present.

3ʳᵈ Follow-up - 6 weeks later: it's behaviour did not improve anymore and the anxiety signs returned, so it was decided to change medication: lithium was removed and it was given alprazolam (0,75 mg PO TID) and fluoxetine (20 mg PO SID). Behaviour modification protocol was maintained.

4ᵗʰ Follow-up - 10 weeks later: Jon's behaviour improved. The owner was applying both pharmacological and SA protocols correctly. SA2 and 3 protocols were sent, in order to continue improving its behaviour condition. It was advised to maintain fluoxetine administration and to withdraw alprazolam: 0,5 mg BID for 7 days, followed by 0,25 mg BID for 4 days and 0,25 mg SID-QOD for 3 days, then remove completely.

5ᵗʰ Follow-up - 20 weeks later: Owner bought a transporting cage to keep Jon when it is alone at home. He stays in the transporting cage calm and relaxed, without barking or crying. In the street it stays calm near other people, but in the park it still reacted in the presence of children playing. The assistant veterinarian decided to continue with fluoxetine for one week, then remove it progressively (10 mg SID for 7 days, then 5 mg SID for 4 days, 2,5 mg SID-QOD for 3 days, then remove completely).

6ᵗʰ Follow-up - 24 weeks later: Jon started to have an aggressive behaviour towards other dogs. SA signs improved, but anxiety levels were getting higher, so fluoxetine administration was reintroduced (20mg PO SID). Basic obedience classes were advised, in order to increase the dog's obedience.

7ᵗʰ Follow-up - 31 weeks later: when walking on the street or at home with strangers, it´s behaviour improved and so have SA signs and noise phobia. Both therapeutic and behaviour management were maintained.

8th Follow-up - 33 weeks later: Jon's behaviour improved significantly and it was attending dog training classes (with positive reinforcement training). Fluoxetine was removed progressively and it has been given medical discharge.

Table 8 – Separation anxiety protocols used in CCA-UCM and its description.

SA protocols	Description
SA 0	Quick explanation of SAD (causes, how to prevent dog from exhibiting signals). Explanation of respect protocol, how to create a safe place, and how to disguise departure signals (*e.g.* keys, clothes).
SA 1	Detailed explanation of how to desensitize departure signals.
SA2	Detailed explanation of planned departures, in order to desensitize it to getting alone. This protocol firstly focuses on how to gain distance from the dog, and then on getting out for a few minutes.
SA3	Quick explanation of planed departures protocol, emphasizing the important tasks that must be done in order to be successful.

Discussion: This early case of GAD begun with a SAD, but due to it chronicity it became generalized to other stimuli. The most frequent behavioural signs were due to SAD, but it also showed noise phobia and intraspecific aggressiveness to unfamiliar dogs. All these signs were due to frequent stress, so the objective was to reduce its chronic anxiety level (Overall 2013). The owner's engagement is always determinant, since the therapeutic plan depends on voluntary telephonic follow-ups, scheduled every 2 weeks. Fortunately, besides Jon's owner low interest (missed several follow-ups), its cooperativity made its recovery possible. Behaviour modification with positive reinforcement and negative punishment (systematic ignoring) were key factors to change Jon's anxious behaviour (*e.g.* arrival arousal, excessive barking) to a calm state (Horwitz & Mills 2010). Environment enrichment was also crucial for the treatment of SAD, as it allowed Jon to reduce its anxiety level through physical and mental stimulations (Overall 2013). Anxiolytic drugs were administered, but since lithium gluconate was ineffective (due to its incorrect administration or insufficient therapeutic potency) it was prescribed a successful combination of alprazolam and fluoxetine. As Jon became more cooperative, the owner successfully applied the behaviour modification protocol and environmental enrichment. Alprazolam's withdraw was performed as described and the fluoxetine therapeutic effects were maintained as Jon's behavioural kept improving. The attempt to remove fluoxetine and avoid drug dependency and tolerance was frustrated, and Jon's behaviour worsened. So fluoxetine was reintroduced and the dog started to attend basic obedience classes. The animal showed great improvement, but the owner's difficulty to apply positive reinforcement led to the recommendation to include a dog trainer in Jon's recovery plan. We believe that this case displays several challenges that behaviour disorders treatment may present: a) the diagnosis is usually neither clear nor static; b) the therapy must be flexible and adjusted to the owner's compliance; c) reports on the dog's recovery and behaviour

condition are not always a reflexion of reality and d) synergy between veterinarians, owners and professional dog's trainer can be the most efficient approach to behaviour disorders.

Conclusion

This final report aimed at increasing the knowledge regarding BD of an integrated master in veterinary medicine finalist. Domestic animals' behaviour disorders are an area of concern, since unsolvable BD can lead to relinquishment of pets that are actually considered as an important member of more than a half of Portuguese families. The great majority of BD are anxiety-related and the success of their treatment depends on a combination of behaviour modification, environmental enrichment and anxiolytic drugs. In CCA-UCM it was seen a predominance of anxiety-related disorders, being GAD, Reactivity and SAD the most diagnosed. In order to exemplify the integrative therapeutic plan applied in CCA-UCM a clinical case was presented and discussed. It became clear that the owners endeavour is fundamental for therapeutics success and that behaviour modification can be more easily achieve with cooperative work between veterinary and professional dog trainers.

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APPENDIX

APPENDIX I – Consultation Questionnaire

CENTRE OF ANIMAL BEHAVIOR
ANIMAL PSIQUIATRY
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QUESTIONNAIRE FOR DOGS   **HISTORY nº** [   ]

Date: _____   Attended by Dr: _____

Client Name: _____

NIF: _____   E-mail _____

Home address: _____

City: _____

Post Code: _____ Telephone number: _____

Referred by: _____

═══

**THIS QUESTIONNAIRE HAS TO BE FILL IN BY THE PERSON WHO SPENDS
MORE TIME WITH THE DOG AND SUPPORTED BY THE OPINIONS OF THE
FAMILY**

Please read each question carefully and answer briefly. If you have any video or picture that shows the abnormal behaviour, please bring it the day of consultation.

═══

1. General Information

Patient name: _____   Date of Birth: _____

Age: _____   Sex: M o   F o

Breed: _____   Colour: _____   Weight: _____

Neutered: o Yes   o No   ¿What age was him/her neutered? _____

Regular Veterinary: Dr. _____   Name of the Veterinary Clinic: _____

Address: _____   Postcode: _____

City: _____   Telephone number: _____

2. Medical History

Please indicate any medical and surgical problems and when they took place: _____

_____

_____

Please indicate any medications the animal might have had: _____

_____

Brief detail of the behaviour problem

_____

_____

_____

_____

3. Background

Where did you acquire the dog?   friend o   breeder o   animal shop o   adopted from a dog shelter o

Other origin: _____   When did you acquire him/her? _____

Name of the centre: _____ Address:

_____

Did he/she come from another owner? ___Yes ___No.   Motive of the donation: _____

Guarantee certificate: ___Yes ___No.   Pedigree ___Yes ___No.

Which is the purpose you acquire your dog for? o Companionship o Protection o For breeding o Exhibitions o Others

_____

Why did you choose this breed? _____

Why did you choose specifically this animal? _____

Number of puppies in the litter: Male: ___ Female: ___

Please indicate the behaviour as a puppy (only any observed abnormalities): _____

_____

Please indicate any detail regarding the behaviour of progenitors and littermates: _____

What was the puppy's environment between 3 to 12 weeks of age? _____

_____

Please specify any details regarding the behaviour in juvenile stage: _____

_____

4. The Dog's Environment

What is the type of area where you live?   City o   Town o   Village o

What is the type of house you live in?   Apartment o   House o   Size:_____

Did you change home since you acquire your pet?   Yes o   No o

Does he stay at home alone?   o Yes   o No   For how long: _____

In what area of the house or garden does the animal usually stay?

  a. During the day _____ b. During the night _____

  c. When he/she stays alone _____ d. When people come to visit_____

How many people live in the same household as the animal? _____

_____

Please indicate if any of the following animals live in the same household:

Cats: o Intact female   Dogs: o Intact female   Others: _____

      o Neutered female   o Neutered female   _____

      o Intact male   o Intact male   _____

      o Neutered male   o Neutered male   _____

5. The Dog's Activity

Please describe your pet's personality: _____

_____

_____

Access to a garden or similar: Yes o   No o

How much time does he spend inside the house? _____ %;   and outside? _____%

Daily exercise: Nº   Time dedicated (in minutes)

    Walks using a leash ___   _____

    Walks without leash ___   _____

    In the garden   ___   _____

    Others (agility, etc) ___   _____

Total exercise time in minutes: _____

Does he/she need to go out to eliminate: Yes o   No o

Where does he/she sleep? _____

Which rooms does your dog have access to? _____

Where does he stay when he stays alone? _____

Please describe the behaviour of your animal in each situation:

    a. Just before you leave your house_____

    b. Just after you come back _____

6. Food

Type of food: o Commercial (Dry food or wet food)

             o Homemade food

             o A mix of both

Diet: _____ % of dry food   Brand: _____

       _____ % of wet food   Brand: _____

       _____ % homemade   Supplements: _____

Favourite food: _____

When does your pet eat?   _____

Who usually gives him/her the food? _____

Where does your pet eat? _____

Does he/she get food from the table when you are eating? _____

How does he/she address the food? _____

How long do you leave the food in his plate? _____

7. General Behaviour

What are your pet's toys? _____

Did your pet attend any training programme? _____

Please describe the type of training your pet had and the result: _____
_____

Professional dog training: Yes ____   No ____ Name of the Dog trainer: _____
Indicate the commands learned: Sit_____   Still_____   Come_____   Don't pull_____
Does your pet interact with other dogs? _____   If your answer is no, please explain why: _____
_____

How does your pet react with unknown people? _____

General level of activity:	Low___	Average___	High ___	Exaggerated ___
General level of excitability:	Low___	Average___	High ___	Exaggerated ___
Level of obedience:	Low___	Average___	High ___	Exaggerated ___

8. Social Behaviour:

With the family members: _____
_____

With animals from the same household (fear, conflict): _____
_____

With unfamiliar people inside your household _____

With other unfamiliar dogs: _____

With other unfamiliar animals: _____

How does your pet react when he/she is isolated/separated? _____

How does your pet react when he is left alone? _____

How does he react when you come back? _____

9. Vocalization

Excessive barking: Yes o   No o

Target of the barking: _____

Frequency and context: _____

Describe the barking: _____

10. Sexual activity

Does your pet mount other people?	Yes ____	No ____
Does your pet mount objects?	Yes ____	No ____
Does your pet mount other animals?	Yes ____	No ____
Masturbation:	Yes ____	No ____

11. Other Behaviours

Does your pet jump onto people?	Yes ____	No ____	
Does your pet lick himself/herself excessively?	Yes ____	No ____	
Coprophagia?	Yes ____	No ____	
Does your pet eat objects?	Yes ____	No ____	
Is your pet destructive?	Yes ___	No ____	
Phobias?	Yes ___	No ____	Please, describe: _____

_____

12. Information regarding the behaviour problem

Please describe the behaviour problem(s): _____

_____

In what month or year did you first observe it? _____

Describe the situation when the problem is more likely to appear: _____

_____

_____

When does the problem occur?	Always	Frequently	Rarely	Never
a. When your pet is alone?	o	o	o	o
b. When the family is home?	o	o	o	o
c. During the night when the family is sleeping	o	o	o	o

Which is the frequency of the problem?   times/day ____   times/week_____   times/month _____ times/year _____

Has there been any changes in frequency, intensity or any other aspect of the problem? Please describe if so:

_____

_____

What have you tried to do in order to solve the problem? (Obedience, confinement, training, etc.) _____

_____

What was your pet response? _____

Has there been any damages caused directly by your pet?_____

Has there been any significant changes in the pet environment before the problem started?

- o Changed home/house work
- o Staying away
- o Visit (form people or other pets)
- o Place where your pet eliminates or the type of material
- o Schedule of the family
- o Family members
- o Food
- o Others: _____

How did these changes affect your pet? _____

_____

_____

Attitude of the dog owner towards the problem. Please choose one the following options:

- o   I am here only out of curiosity. The problem is not very serious.
- o   I am interested in solving the problem, but if this is not possible I will learn to live with it.
- o   It is a very serious problem and I need a solution. However, I will keep my pet no matter what.
- o   It is a very serious problem and I need a solution. If there is no solution, I will not have no choice but to give my pet up.

I.1.- Please describe a typical day of your pet (since he/she gets up until he/she goes to bed)

_____
_____
_____
_____
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_____
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_____
_____

2.- Please describe, as detailed as possible, the last episode(s) where the problem has arisen.

_____
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_____
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_____
_____
_____
_____
I.1.-_____

CLINICAL REPORT

DIAGNOSE: _____

PROGNOSIS: Mild o   Reserved o   severe o

TREATMENT:

- **Medical:**

_____

_____

- **Behaviour and environment modification:**

- Increase control and improve the dog-owner interaction
  - ☐ Treatment with food
  - ☐ Total Ignoring
  - ☐ Systematic Ignoring
  - ☐ Physical and Mental exercise
  - ☐ Muzzle
  - ☐ Play and games

_____

_____

_____

_____

_____

- **Protocols:**

  - ☐ Respect
  - ☐ Relaxation
  - ☐ Habituation
  - ☐ Desensitization
  - ☐ Counter conditioning

_____

_____

_____

NEXT FOLLOW UP: _____

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Prevalence of behaviour disorders in dogs and cats attending the Animal Behaviour Clinic of Complutense University of Madrid

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Clínica del Comportamiento Animal

Introduction

Behaviour disorders represent a crucial factor in breaking the owner-animal bond. At least 46,4% of the dogs and 33,2% of the cats abandoned in USA were due to behaviour problems[1]. In some studies, aggressive-related behaviours are the most common behaviour disorders[1,2,3,4], in comparison to others where anxiety-related appear at the top[5]. It is known that behaviour disorders are a real concern of pet owners, for it affects the common welfare of the family[6].

Material & Methods

We made a retrospective study that aims to evaluate the prevalence of behaviour disorders presented at the Animal Behaviour Clinic of Complutense University of Madrid (CCA-UCM), from 2008 to 2015. This retrospective case study involved the assessment of 528 dogs and 42 cats, considering a wide range of aspects such as their sex, reproductive status, consultation year, birth date, breed, size, breed related activity (in bibliography[7] and in the "World Canine Organization") and pet co-habitation. A global assessment was made, followed by an assessment of the relationship between diagnosed pathology and each of the previously studied variables.
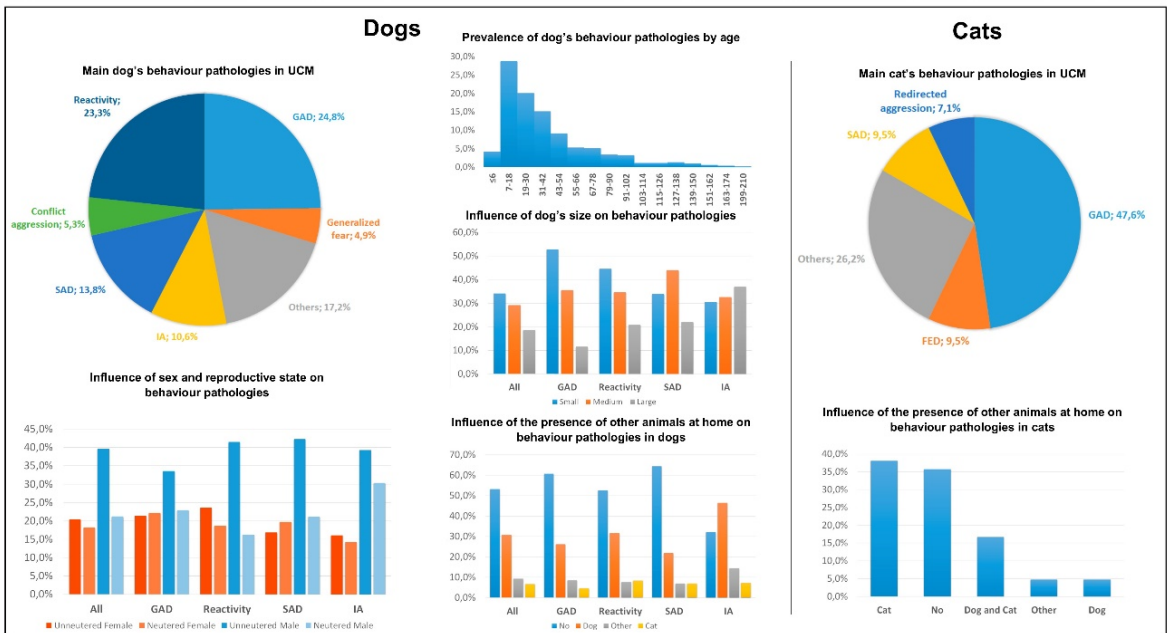
Results

Our preliminary analysis found that the most frequent behaviour pathologies diagnosed in dogs in this Behaviour Center were generalized anxiety disorder[8] (GAD, 24.81%), reactivity (pre-anxious state[9], 23.30%), separation anxiety disorder[8] (SAD, 13.83%) and intraspecific aggression[10] (IA, 10.61%), respectively. We also found that more unneutered males (39.58%), small breeds (34.09%), high activity breeds (41.29%) and age range from 6 to 18 month (28.79%) were presented in consultation with behaviour disorders. Dogs that didn't have any other pet for home sharing (53.22%) were also the prevailing group.

We observed that GAD and reactivity were prevailingly found in small dog breeds (52.88% and 44.55%, respectively), SAD in medium dog breeds (44.07%) and IA in large size dogs (36.96%), but all of these disorders predominated in high activity dog breeds. The age range most frequently observed in dogs with reactivity and SAD were between 6 and 18 months (37.40% and 38.36%, respectively), while animals with intraspecific aggression ranged in ages between 18 and 30 months (32.14%), and animals with GAD were between 6 and 30 months (50.38%).

Regarding cats, there are more neutered male cats (45.24%) presenting to consultation. Generalized anxiety disorder[11] was found to be the most commonly diagnosed feline disorder (47.62%), affecting primarily cats between 12 and 24 months (35.00%), whether living with other cats (45.00%) or alone (35.00%).

Conclusion

Taken together these results indicate that anxiety-related pathologies are the most prevalent cat and dog behaviour disorders attending the CCA-UCM and that the most common behaviour pathology directly related with aggressive behaviour is intraspecific aggression. With this preliminary study we hope to provide some helpful information to veterinarians and their staff about the most frequent pathologies that they may encounter when attending to animals showing behaviour disorders.

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