

# Managing behavioural problems in human-dog interactions

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**Summary.** The management of dog behavioural problems requires the expertise of professionals such as the veterinary behaviourist. Clinical assessment of behavioural disorders allows the veterinary behaviourist to formulate a diagnosis and prescribe a behavioural and/or pharmacological therapy. The objective of such therapy is to produce a stable change in the perception of a stimulus and the resulting emotion, leading to the correction of the behavioural problem. It may be crucial to evaluate the subject's pathological state in response to the observed symptoms in order to identify the functional impairment of the pivotal neurotransmitter systems involved in the disorder. This allows selecting a suitable pharmacological treatment. In order to implement behavioural therapy, the veterinary behaviourist collaborates, where necessary, with a team of qualified canine trainers.

*Key words:* dog, animal behaviour, veterinary behaviourist, behavioural therapy, pharmacological therapy.

**Riassunto** (*Gestione dei problemi comportamentali nell'interazione uomo-cane*). La gestione dei disturbi comportamentali nel cane richiede competenze professionali e specialistiche. Attualmente la figura professionale di riferimento è quella del medico veterinario comportamentalista. L'approccio di tipo clinico al disturbo comportamentale riportato dal proprietario del cane permette al medico veterinario comportamentalista di formulare una diagnosi e di prescriverne la terapia comportamentale e/o farmacologica. L'obiettivo della terapia comportamentale è di generare un cambiamento di tipo stabile nella percezione, e perciò nella emozione ad essa correlata, di uno stimolo, e nel comportamento abitualmente conseguente. Di fondamentale importanza è stabilire, sulla base dei sintomi, lo stato patologico del soggetto, utile a individuare l'alterazione funzionale dei principali sistemi di neurotrasmettitori coinvolti, a cui far fronte mediante un adeguato trattamento farmacologico. Nell'attuazione della terapia comportamentale il medico veterinario comportamentalista collabora, ove necessario, con un'equipe di figure qualificate in ambito cinofilo.

*Parole chiave:* cane, comportamento animale, medico veterinario comportamentalista, terapia comportamentale, terapia farmacologica.

## INTRODUCTION

The high recurrence of inappropriate behaviours in our pets within a domestic setting has driven some researchers to refer to animal psychopathology. However, to be sure that we are dealing with pathological behaviours, we must develop a full knowledge of the species behavioural repertoire in their natural environment, as well as a clear definition of what we mean by animal psychopathology.

All the processes involved in adaptation strategies are defined pathological when they contribute to lose adaptation rather than achieving it. In fact, the primary function of each behaviour is to allow an individual to adapt to environmental changes through a series of physiological and behavioural modifications inducing a balanced exchange between the organism and the environment, which involves behavioural plasticity. Changes of cognition and emotions in a

psychopathological setting lead to an alteration of regulatory factors underlying the development of behaviour, with consequent modification of the behavioural response.

Three different phases can be recognized in each behaviour: the appetitive phase, characterized by tension increase; the consummatory phase, marked by action; and the stabilization phase, leading to the tension decrease observed in the appetitive phase. A normal individual adapts to the environment to reach and to maintain a state of dynamic equilibrium – *i.e.* homeostasis – which makes possible to explain some phenomena as the ability to react in a suitable manner to sensory stimulations coming from the external environment (sensory homeostasis). Physiological and behavioural modifications allow the organism to reach the condition of homeostasis through an adaptation process.

Therefore, we are able to define as pathological those behaviours that have lost their own adaptive function and, consequently, we classify the behavioural alterations according to the following scale of gravity: undesirable behaviour, behavioural disorder, and behavioural pathology. An undesirable behaviour is a normal behaviour that is not welcome in a certain context. While there is no functional alteration in a behavioural disorder, such as communication difficulties, functional alterations are always present in behavioural pathologies [1-3].

### THE VETERINARY BEHAVIOURIST

The management of behavioural problems related to human-dog interactions is in charge of the veterinary behaviourist (VB). Among the different veterinary specialties, behavioural medicine is the branch dealing with diagnosis and appropriate therapeutic protocols.

The importance of the VB as the specialist addressing pets' behavioural disorders, like the ones afflicting the dog, is proven by the close relationship among physical health, emotional/cognitive competence and pet behaviour. We can fully understand the scope of behavioural medicine by considering the effect on pet's behaviour of different phenomena such as: organic pathologies of the nervous and endocrine system, metabolic alterations or localized pain phenomena.

A behavioural change is acquired through behavioural therapy, which is supported, in many cases, by a specific pharmacological therapy. Behavioural therapy is able to change dog behaviour using scientific methods, beneficial to both pets and owners. If necessary, the VB can turn to a team of different people with respective technical skills, such as canine educators, canine instructors, T-touch practitioners.

In order to choose the most appropriate behavioural and pharmacological therapy, it is first necessary to formulate a diagnosis, obtained after an accurate and detailed anamnesis of dog's behaviour.

### ANAMNESIS

The anamnesis includes a history of behavioural problem/s reported by the owner, the present environment and the dog lifestyle, his previous conditions (e.g. breeding, kennel, other family, straying), as well as the assessment of his current physical status. It is necessary to know the onset of the first symptoms, the frequency of such disturbances, and the circumstances in which they occur. Usually, long-term disorders are more difficult to treat, or can be partly improved but not totally solved (reserved prognosis). Furthermore, over time some behavioural disorders undergo changes and evolutions, making more challenging to determine the primary cause and the first symptom. The behaviour frequency is a measurable factor that allows the VB to quantify the gravity of the problem, and

it is also useful for an immediate feedback of the treatment success. The circumstances in which the event occurs (e.g. where and when it takes place, the presence of specific people, which events preceded and followed it) are pieces of information sometimes leading to the identification of the cause and the consequent strategy to solve the problem. For example, when dejections and urinations occur in inappropriate places (for example, inside the house), the behavioural and case history is enough to prescribe the most appropriate protocol.

In case of more complex disorders that involve social and interactive dynamics (such as aggressions towards family members, other people or other pets), testing the behavioural response (yet in a controlled environment to guarantee the safety of people and pets) leads to a more detailed source of information than the owners' reports. In fact, owners give subjective interpretations about complex behaviour dynamics, and they are not always able to describe the behaviour of their pets, as well as the onset and the real motivation. Moreover, it is often necessary to speak to different members of the family to compare and verify the various versions. It is also of paramount importance that the VB is made aware of any past attempt to correct the problem. Unfortunately, if the owner relies on canine trainers who are not ethically prepared and properly qualified, the pet's disorder can be exacerbated. A common symptom resulting from an incorrect intervention is the onset of fear when interacting with people, which in turn may lead to aggressive behaviour. When the obedience practise is part of the therapeutic protocol, it is important for the veterinarian to check the adopted method.

### BEHAVIOURAL EXAMINATION

The anamnesis is followed by the direct assessment of the dog at the veterinary clinic or, even better, at home. This, appropriately allows the veterinarian to observe the signals transmitted from the dog to the family members and the veterinarian himself, as well as any other behaviour. As explained above, in case of aggression the dog must be in a position of doing no harm, using innocuous means of containment, either the leash or the muzzle. Before testing the behavioural response to certain critical stimuli, it is necessary to evaluate if such a test is harmless and useful or, on the contrary, if it can lead to a reinforcement of the behaviour to correct. The test has also the function to measure the latency of the behaviour (the time lag between the originating stimulus and the behaviour under exam), which is a useful piece of information to set a correct program based on desensitization and counter-conditioning techniques (see the following "Behavioural therapy"). For some behaviours, for example those performed when the dog is left alone at home, the VB may require video and audio recording [4-6].

## BEHAVIOURAL THERAPY

The aim of the behavioural therapy is to produce a stable change in the stimulus perception, and therefore in the correlated emotion and consequent behaviour. Behaviour modification techniques aim to modify the mental processes underlying the behaviour. Through life, every individual develops a series of behavioural adaptations determined by the interaction between its own genotype and the environment in which it lives; also the cumulative experiences of a lifetime play a decisive role since they can modify the animal tendency to implement a certain behaviour.

The major techniques of behaviour modification, namely *extinction*, *counter-conditioning* and *systematic desensitization*, are based on the principles of both classical conditioning, which involve the knowledge of the relationships between two stimuli, and operant conditioning that requires the knowledge of the relationships between a stimulus and the consequent behaviour.

Two learning systems are involved: associative learning – a more primitive and simpler form of learning, that stimulates the implementation of automated responses – and cognitive learning, that implies an expectation in the dog mind, able to drive behavioural responses (that is, the pet decides whether to exhibit a behaviour or not on the base of the expectations produced by cognitive processes).

According to the theory of classical conditioning, there is a simple form of learning in which the subject creates an association between two stimuli or events, which are characterized by being contiguous (two stimuli appear together) or contingent (two events may appear together, making them predictable according to the relationship that keeps them together). They also show a certain frequency and intensity. Stimuli causing an innate response are defined as unconditioned; on the other hand, those provoking a response subsequent only to a learning process (conditioned response) are called conditioned stimuli. On the basis of this theory, a stimulus, initially neutral, is able to produce a reflex response through the association emerging between the neutral stimulus and the one inducing an unconditioned response. Following such association, the neutral stimulus or conditioned stimulus will be able to induce a conditioned response, entirely similar to the unconditioned one, even in the absence of the unconditioned stimulus. The associations among the stimuli correspond to the neural connections that are created during the conditioning processes (conditioned learning). The learning is fast if the presentation of the stimuli is contemporary (simultaneous conditioning), but it is even faster if the conditioned stimulus precedes that unconditioned one, yet remaining in the presence of the same (delayed conditioning). In such a way it assumes a predictive value (from an evolutionary point of view, this type of association is surely the most advantageous since the conditioned stimulus acts as an alarm signal of danger, foretelling its imminence). When the unconditioned stimulus is not longer associated to the

conditioned one, according to the *extinction process*, the conditioned response tends to disappear.

Nevertheless, in the clinical practice this is not always true. In fact, in the brain, the associations among the stimuli correspond to neural connections created during the conditioning processes. The simultaneous activation of two nervous centres, occurring during the conditioned learning, strengthens the already existing synaptic interconnections. During such extinction process, the neural excitatory connections, activated during the conditioning process, are not eliminated; on the other hand, other inhibitory connections are triggered among the same neural centres. The conditioned response decreases only when the inhibitory connections grow stronger, and it entirely disappears when it reaches a balance between the two types of connection, the inhibitory and the excitatory. Over time, this justifies the reappearance of the conditioned response (spontaneous recurrence); if it reappears right after a new stimulus, we refer to it as disinhibition.

Another method to eliminate a conditioned response is the *counter-conditioning* technique, whereby an animal is trained to perform an incompatible behaviour with the behavioural response, which is meant to be deleted. Generally, two types of counter-conditioning are recognized: the classical and the operant. The classical counter-conditioning uses an unconditioned response as desired behaviour (for example, food). It consists in coupling the conditioned stimulus (able to trigger a conditioned response) with an unconditioned stimulus leading to a different and incompatible unconditioned response. The greater the effectiveness of the unconditioned stimulus (generally, a game or a reward), the higher the probability that the original undesirable response is not fulfilled.

The operant counter-conditioning, or response substitution, uses a conditioned response to control the undesirable behaviour. In fact, according to the theory of the operant conditioning, it is possible to create an association between a response and a following stimulus meant as reinforcement. In accordance with the above theory, a response occurs with a higher or lower probability depending on its effects. A positive reinforcement is based on the emotional gratification obtained from achieving a goal: it consists in a stimulus presentation able to increase the probability that a determined desired behaviour will occur again in the future in analogous situations. The positive reinforcements are classified as consumable (food), social (attention manifested through visual or tactile contact, game, verbal reassurances, etc.), pertaining to activity (according to Premark's principle, every favourite activity can be used to reinforce less favourite ones), and possession (object). They are administered according to continuous time programs (continuous reinforcement, that is, every correct behaviour is immediately rewarded) or partial programs (partial reinforcement, with a fixed or variable frequency, and at fixed or variable time). Programs of variable interval reinforcement, where the reinforce-

ment can arrive in any moment with a variable frequency after any number of responses, are considered the best to retain the desired response constant over time. Therefore, in the operant counter-conditioning we no longer use an unconditioned response, as in the classical counter-conditioning, but a conditioned response: the animal is trained to perform the desired behaviour, and is rewarded through a reinforcement program in response to a command as "sit" (counter-stimulus). However, it is essential that the motivation to perform the desired behaviour is bigger than the one for the unwanted one, when both are evoked simultaneously.

When the behavioural disorder as fear has an emotional basis, *systematic desensitization* is the most common technique of behaviour modification. Systematic desensitization, introduced for the first time in psychiatry by Joseph Wolpe, is used to raise the *reaction threshold* towards objects or situations. Such a technique, used for example in the treatment of some sonophobias (fireworks, thunders, shots), consists in: the identification of the stimulus or stimuli causing the onset of an unwanted behaviour; their classification according to the evoked responses of increasing intensity; the identification of acceptable responses in the presence of a stimulus triggering the behaviour; relaxation training on command; and gradual exposure to the identified stimuli.

After every exposure, the animal is asked to relax in order to learn the relaxation behaviour associated with the triggering stimulus. It is necessary to proceed in a very gradual way and prefer frequent, but short training sessions. Before exposing the dog to higher intensity stimuli, the procedure is repeated many times in different contexts until a constant number of consecutive relaxation responses is obtained, that is, until the animal shows only a mild interest towards the critical stimulus.

Habituation is a form of non-associative learning aimed to decrease the undesirable response to a stimulus: it consists on the repeated exposure of the animal to the stimulus causing that response and not to the association of two events. In fact, the regular and non-traumatic exposure of the animal to numerous stimuli since puppyhood influences the specific response toward those stimuli, but also a general response toward everything new. Habituation is fundamental to prevent the development of behavioural responses to fear in connection with certain stimuli, but it is ineffective to modify the response to fear, unlike in case of systematic desensitization.

There are learning techniques based on learning by *imitation* of other pets or men. Nevertheless, not always such techniques can be used to modify dangerous behaviours toward men or other animals [7-9].

## PHARMACOLOGICAL THERAPY

The prescription of a psychoactive drug by the VB depends on the diagnosis, the dog general health and the evaluation of the drug effectiveness chosen for that specific disorder.

Psychoactive drugs are helpful to modify both the unwanted behaviour and the underlying motivations that trigger it. This is why they are extremely useful for the treatment of the alterations of animal behaviour, even if drug administration on its own can rarely bring to the resolution of the behavioural disorder. The effectiveness of such drugs has been improving thanks to a greater understanding of the complex interactions among the neural biochemical mechanisms, emotional disposition and behavioural response. However, the molecular mechanism that allows the receptor sites to trigger humoral and behavioural changes through the drugs are still unknown. As a matter of fact, we are able to observe changes in animal behaviour following the administration of psychoactive drugs and to correlate such behavioural changes to emotional and motivational variations. In the clinical practice it is common to use such pharmacological substances for the treatment of serious behavioural problems. Notwithstanding, the best results are achieved when they are associated to a correct management of the animal in its own environment, together with specific techniques of behavioural modification such as desensitization and counter-conditioning.

Sometimes it is necessary to turn to an association of multiple drugs. In this case, the understanding of the drug action mechanism avoids unwanted interferences or overdoses. In other cases, it is necessary to give up a drug because of its side effects and turn to a different one, even if not intended for that specific pathology or for that species. In this case the VB must verify the existence of a compliance with the pet owner, who must be informed of the use of a medicine in a way that is not authorized through an informed consent.

Not least, the administration mode and the cost represent a limiting factor in the choice of the drug. For those drugs with a bad taste, which nonetheless must be assumed for long periods, the tablet is given together with a particularly desirable food or through the solubilization of the medicine in an equally desirable liquid (*e.g.* meat or fish broth). For some drugs we can choose a transdermal administration, even if the resulting levels in the blood are significantly inferior compared to mouth administration.

Overall, as new clinical protocols are experimented, the understanding of these kinds of drugs changes quickly. Therefore, even if every patient represents a special case, it is recommended that the VB consults up-to-date data in clinical literature.

Once the diagnosis has been formulated and the therapeutic protocol established, it is important to reassure the animal owner that, most of the time, the treatment does not have to last all the animal life. It is difficult to foresee the exact duration of the pharmacological treatment since it depends on the severity of the behaviour, the prescribed drug, and the patient's response to the treatment. Generally, it takes quite a few weeks, sometimes months, to observe a result.

The owner's ability to follow the established procedures influences the duration of the treatment. The pharmacological treatments can last years or never solve the problem in patients seriously afflicted or refractory to therapy. The aim of the pharmacological treatment associated with the behavioural therapy is to eliminate the behavioural disorder. Once the aim has been reached, the therapeutic protocol will be extended for another two or three months following the disappearance of the behavioural disorder. Only then, for most of the psychoactive drug, a gradual reduction of the dose is possible up to the termination of the treatment [10].

### EMOTIONS, BEHAVIOUR AND PHARMACOLOGICAL THERAPY

Behind every behavioural response there is an emotional aspect that must be considered before choosing the pharmacological therapy. In case of fear, for instance, we recognize typical signs and symptoms in the dog behaviour (such as facial expression, posture, etc.), which communicate a specific emotion. However, emotions do not always generate a useful and adaptive behavioural response. In fact, when the intensity of fear is disproportionate to the triggering stimulus, or even unjustified, the behavioural response becomes abnormal and not adaptive, and the resulting emotion is referred to as phobia. A dog can have phobias towards objects, situations, people or other animals and react with a typical panic attack, showing hysterical symptoms or looking catatonic with sensory depression. Fear and phobia can have genetic basis, but they are often the result of experience and/or casual learning, occurring through classical conditioning and the consequent generalization of fear response.

Many patients are also suffering from anxiety, which may occur either in response to specific stimuli or contexts, or be generalized and independent from the specific situation. In all these cases, it is recommended to prescribe tranquillizing drugs in order to reduce the intensity and the duration of the undesired behavioural response, and facilitate the implementation of the behavioural therapy prescribed by the VB.

Fear is also the underlying emotion of most aggressive behaviours. Aggression is a specific emotional response with a high evolutionary significance, modulated by the interaction of several brain areas. Nevertheless, the nervous system regulates different types of aggression in various ways. The neuropsychology of emotions recognizes three main types of aggression: defensive, social and predatory. However, only the first two are connected with the activity of the sympathetic system and therefore represent affective aggression. Fear, dominance, territory defence, offspring defence, and resources possession of high social value can cause affective aggression. From a neurobiological point of view, serotonin is the amine involved in the modulatory processes of aggressive responses. The reduction of serotonin levels generates an increase

of aggressive behaviours, while the administration of drugs like fluoxetine and fluvoxamine (selective serotonin re-uptake inhibitors or SSRIs), which increase serotonin levels in the central nervous system and thus inhibit serotonin reuptake, greatly reduces the aggressive response.

Other disorders frequent in the canine species are compulsive behaviours. Although being part of the normal behavioural repertoire, they can occur out of context, in a repetitive, exaggerated and prolonged manner, thus considered as altered behaviours. The categories, or macro-categories, of compulsive behaviours are classified as follows: locomotory, oral, aggressive, visual hallucinatory and acoustic (vocalizations). In animals, unlike in men, it is not possible to associate the compulsive disorder with recurrent thoughts or fixations, sources of anxiety and anguish. Nevertheless, stressful or non-stimulating situations, as well as behaviours that have been inadvertently reinforced, can lead to the onset of the compulsive disorder. In addition to genetic predisposition (well known in some breeds), compulsive behaviours are considered as manifestations of stress, frustration or conflict, and therefore symptoms of physical or psychological discomfort. The treatment involves behavioural and environmental changes with the support of SSRIs drugs, such as paroxetine, sertraline, fluoxetine, fluvoxamine or tricyclic antidepressants like clomipramine, which have been approved by the Food and Drug Administration (FDA) also for the treatment of separation anxiety, but only in association with a suitable behavioural therapy.

Among anxiety disorders afflicting dogs, it is worth remembering post-traumatic stress disorder (PTSD). Even if PTSD is not described in the dog literature, recently there has been an increasing number of clinical cases suggesting the occurrence of serious psychological injuries suffered through human abuse. This is partly confirmed in the anamnesis and, most of all, by symptoms and behaviours. But a variety of conditions can cause PTSD in dogs, as well as in humans. In fact, PTSD is an anxiety disorder that can develop after exposure to a terrifying event or ordeal in which serious physical harm occurred or was threatened. Traumatic events that may trigger PTSD include violent personal assaults (physical abuse suffered from men or other animals), natural or human-caused disasters, accidents, or military combat for dogs supplied to the army. Trauma-related stress induces problems and reactions in dogs that are very similar to those exhibited by humans under the same conditions. Some symptoms include: panic at sudden loud noises, increased stress and anxiety, house-breaking/house-training procedures, separation anxiety, fear of unknown objects and people, barking and howling, hiding, and displays of unnecessary aggression. In particular, with no comprehensible motivations, abused animals exhibit sudden behavioural changes reflecting alterations in their emotional state, passing from game excitement to sudden fear, with seemingly momentary loss of their cognitive references. In order to heal, the patient needs the

calm, safe environment of a stable home and a regular routine; moreover, a pharmacologic treatment for post-traumatic stress disorder is of fundamental importance.

Therefore, the knowledge of the neural circuits, which are the basis of emotions and cognitive functions, allows, also through pharmacological therapy, better and lasting results in the treatment of emotional disorders and resulting behaviours [10].

### ETHICAL CHOICES

The veterinarian's evaluation must be particularly accurate when the animal is dangerous, for instance in cases of sociopathy or primary desocialization, pathologies where aggressions could even injure children in the family context. In such cases, among the various action strategies, the veterinarian should consider the possibility to put the dog in a family without children, with people able to foresee its pathological behaviour, therefore, avoiding it. The same applies to both deprivation syndrome, in which aggression is induced by fear, and hypersensitivity-hyperactivity syndrome, in which it is induced by intermittent anxiety. In such pathologies the inclusion of the dog in a different environment, in which the stimuli are different in quality and quantity, can help solve the problem, along with other measures.

However, sometime even changes in the environmental and social context (systemic therapy), along with the aid of pharmacological therapy, are not enough to avoid the most extreme solution. Examples of extreme cases in which euthanasia is applied are aggression in older dogs (associated with alterations of the serotonergic structures, which are resistant to any pharmacological treatments), dysthymia and dissociative syndromes.

Many episodes of aggression are due to painful organic pathologies or, in the case of older dogs, to localized pain and/or sensory troubles (for instance, impaired sight, hearing or olfaction). In these cases, the situation can be managed by treating the pain, together with the use of psychotropic drugs and a better communication with the pet.

When facing canine aggression, it is therefore essential to obtain a correct evaluation of the risk and factors triggering such behaviour. In fact, many territorial or defensive behaviours, as well as the typical dominance behaviour, can cause serious damages to people, but predatory aggression can even bring to the victim's death. This is one of the reasons why dogs showing this kind of aggression fail rehabilitation.

Thus, it follows that the evaluation of danger associated to an aggressive behaviour depends on various factors, which may lead to a negative prognosis for the subject's recovery. Therefore, it is up to the VB to suggest as extreme measures either custody or euthanasia, which are ethical choices requiring specific knowledge of psychopathology as well as the animal delicate systemic balance. At present, recent knowledge produced by ethological research on cognitive and affective skills in dogs, as well as on their psychotic suffering, justifies an action that, even if conflicting with the principles of life preservation, can ensure animal dignity [11, 12].

### Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

Submitted on invitation.

Accepted on 4 October 2011.

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