



# **Puppies and Behaviour: Helping Owners to get it Right Mini Series**

## **Session One: Foundations of Canine Behaviour and Learning**

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**CPD Solutions Puppies Session 1**  
**Delegate Notes**  
**Foundations in Canine Behaviour and Learning**

**Overview of Session 1**

- Introduction to general dog behaviour because doing the best for puppies requires us to have an excellent foundation in understanding who dogs are, how they learn and communicate and how puppies develop and learn about the world.
- Why is it so important to be learning about behaviour? Risk factors for the development of behaviour problems and focusing on the prevention of problems.

So many of behaviour problems stem from inappropriate management of puppies during their early lives so it is the case that many of these problems could have been prevented.

Behaviour problems have many consequences for the dog himself, the client, other members of the public and their dogs and the veterinary practice.

Educating a puppy can seem a challenging task but if owners are aware of the potential consequences of not doing this well and the benefits of putting in the effort, they are more likely to be compliant in following your advice.

- The welfare of the dog. Emotional well being is as, if not more, important than physical well-being and therefore educating puppies to enable them to enjoy life, feel relaxed and content is a priority.
- Consequences for other dogs, humans and other animals within the household that might be affected by a behaviour problem.
- Dog bites are a very serious public health concern. DEFRA reported a 76% increase in hospital admissions over a decade. Owners should also be made aware of the changes to legislation covering aggressive behaviour in dogs.
- Consequences of behaviour problems within the veterinary context. It is extremely challenging to provide appropriate healthcare for dogs who are not relaxed about being handled and restrained.
- Financial consequences for the veterinary practice. If puppies are taught from the start that the veterinary surgery is a fun and relaxing environment, their owners will also have a positive perception of the surgery and will be loyal, long term customers.

**Legal implications.** As veterinary professionals we must be aware of legal implications for preventing the development of aggressive behaviour and from the point of view of aggressive dogs visiting the surgery and ensuring we advise clients on seeking help.

- *It's now against the law to let a dog be dangerously out of control anywhere. This change came into force in May 2014. We changed the law so that people could be prosecuted if their dogs carried out an attack anywhere, including in the owner's own home. We increased the maximum prison sentences to:*
  - *14 years for a fatal dog attack*
  - *5 years for injury*
  - *3 years for an attack on an assistance dog*
- *We have also introduced new laws to help local authorities or the police to prevent dog attacks, which came into force on 20 October 2014.*
- *They apply if a dog is causing a nuisance to people, for example by repeatedly escaping from a garden, or by acting aggressively towards visitors or other animals.*
- *If someone complains to the council or police about a dog, its owners could be ordered to do any or all of the following:*
  - *attend dog training classes*
  - *muzzle the dog or require it to be on a lead in public*
  - *require the dog to be microchipped and or neutered*
  - *repair fencing to prevent the dog leaving the property*
- *Police and local authorities can demand that owners take action to prevent a dog attack; if the owners don't do so, then they will risk a fine of up to £20,000.*

#### **Effects of short and long-term stress on health.**

Hormonal changes and immune system modulation occur during stress and are related to disease processes and shortened lifespan. Stress that results in activation of the hypothalamic-pituitary-adrenal (HPA) axis that continues for a long time or does not allow recovery periods in between acute episodes of stress can result in long term changes in this hormonal system. Dreschel (2010) made some significant findings:

- Owners who reported their dogs as 'well-behaved' had dogs with a longer lifespan.
- Skin disorders which were more prevalent in dogs with fear disorders and also of increased severity.

Appropriately socialised puppies will grow into dogs that don't experience these fearful and anxiety-inducing episodes on a regular enough basis to affect their long term health.

#### **Preventative advice proven to be beneficial.**

Gazzano et al (2008) demonstrated the beneficial effects of advice given at a puppy's first vaccination. The research consisted of two groups of dogs. The experimental group were puppies attending the surgery for their first vaccination who were given advice by a veterinary behaviourist for one hour (see more about this in session 2). The control group were seen on one occasion, at the first booster vaccination, having attended the surgery a year previously as puppies with no behavioural advice given.

The researchers found significant differences in frequency of undesirable behaviours between groups showing the preventative advice had helped reduce the development of behaviour problems e.g.

- Housesoiling 2% cf. 23%
- Non-stop playing 0% cf. 12%
- Mouthing people 11% cr. 37%
- Less aggressive behaviour to unfamiliar people (26% cf. 2%) and dogs (16% cf. 2%)

**Risk factors for behavioural problems.** In some situations risk factors may be unavoidable, such as an owner who has acquired a puppy with pre-existing issues. In these cases owners should be advised appropriately, perhaps referred to an appropriately qualified behaviourist, so that there is resolution or at least no exacerbation of the current issues. It is particularly important to take note of age of acquisition as a risk factor for several issues because you can take special care to keep an eye on puppies who have been acquired at a later age and be particularly pro-active about offering owners advice.

- First time owners
- Time left alone as puppy for separation anxiety
- Sex, breed, size.
- Age of acquisition of dog – risk for separation issues, food aggression, noise sensitivity
- Origin of puppy
- Excitability, anxiety and fear – additional risk factors for SRD
- Lack of exercise/stimulation
- Periods of kennelling
- Owner factors
- Attendance at inappropriately run puppy classes
- Social learning from other problem dogs
- Aversive experiences
- Puppyhood illness

**Factors that influence adult dog behaviour.**

Early handling and socialisation are the main factors that we as veterinary professionals have the opportunity to influence, both in terms of the experiences we provide for puppies at the surgery and also in terms of education of owners.

- Genetics – temperament is highly heritable
- Maternal factors
  - Gestational stress.
  - Pre-natal nutrition.

- Post-natal maternal care.
- Early handling and socialisation (at breeder)
- Interaction with litter mates prior to adoption.
- Socialisation
  - Quality and quantity post adoption.
- Learning experiences at any age.
- Owner control of learning environment
  - Depends on owner education as well as physical constraints

### **Heritability of temperament.**

The most important factor in terms of behaviour problems is a predisposition to fearful reactions and this has been shown to be highly heritable. Nervousness and temperament are affected by parentage and it is important to understand this in terms of advising owners about choosing puppies and in terms of providing an accurate prognosis if a dog does develop behaviour problems. Puppies who are showing signs of fear at a very young age need proactive intervention at the earliest opportunity because environmental effects can play a significant role in balancing out negative effects of an inherited poor temperament.

Heritability of various traits

Breed	Trait	Heritability
English Setter	Hunting eagerness	0.22
German Wire-Haired Pointer	Water retrieving	0.32
German Short-Haired Pointer	Tracking	0.48
German Shepherd Dog	Temperament	0.51
Labrador Retriever	Nervousness	0.58

*Data from Houpt KA, Willis MB. Genetics of behaviour. In: Ruvinsky A, Sampson J, editors. The genetics of the dog. New York: CABI Publishing; 2001. p. 371–400.*

In the table above the German Shepherd shows heritability of 0.51 for temperament and Labrador Retrievers showing 0.58 for nervousness.

Below is a graph of some of Svartberg et al's (2005) findings which shows further evidence of temperament heritability with these two different breeds, the Rough Collie and the Labrador Retriever, showing significant differences between fearfulness and curiosity.

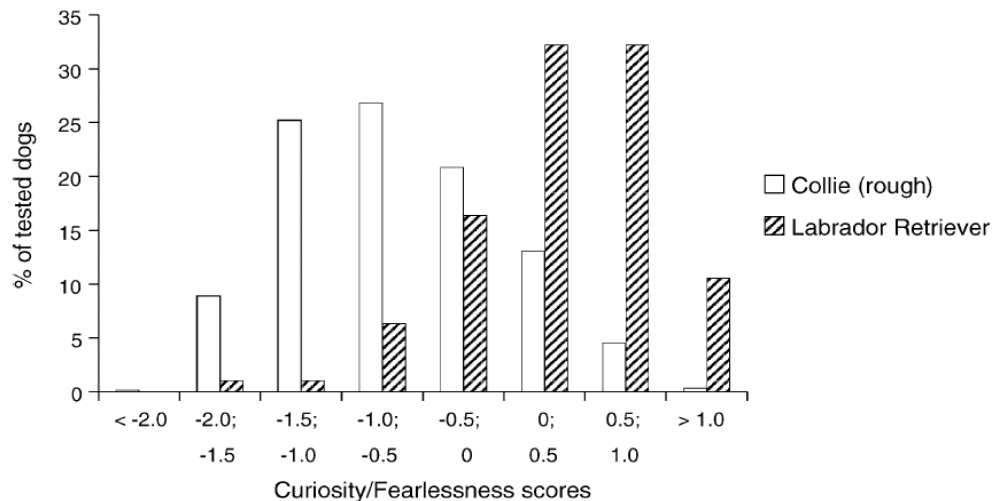


Fig. 1. The distribution of curiosity/fearlessness scores (males and females pooled) in the highest ranked breed—Labrador Retriever (shaded bars), and the lowest ranked breed—Collie (white bars).

#### **In utero effects re. risk factors.**

Hoffman et al (2004) researched effects of DHA (**docosa**hexaenoic acid) **supplementation**. This omega 3 fatty acid is known to affect eye and brain development. In this experiment, dams were fed a supplemented diet from pro-oestrus until weaning and the puppies were also fed this diet after weaning. The DHA supplemented puppies were found to be more 'trainable' than the control group. Hamazaki et al (1999) did a similar study supplementing mice with DHA and found that their stress related behaviour responses were lower.

**Consequences of stress during pregnancy.** If a bitch experiences high or persistently raised cortisol levels whilst the puppies are in utero this can prime them so that their ability to cope with stress in the future is severely affected. They seem to have a very low threshold for reactivity and emotionality. Maternal steroids play a decisive role in shaping foetal brain development and this can be via the HPA axis but also there appears to be involvement of the sympathetic adrenomedullary system in some animals.

#### **Neonatal stress.**

Fox (1972) researched the effects of mild stress on rats and mice. If they were removed from their nests for 3 minutes each day on days 5-10 such that their body temperature dropped slightly, they were better able to cope with stress as adults compared to their litter mates. The experimental animals showed a graded stress response whereas the control animals showed an all-or-nothing response. Similar experiments have been done with puppies that have shown minor stress can be beneficial to long term emotional stability. So, **mild** stress appears to be beneficial in neonates but higher levels of stress can have long term adverse effects such as affecting cognitive ability and affecting stress responses creating individuals who have heightened reactivity to stress.

Social experiences throughout life influence gene expression and behaviour but early in life these influences have a particularly profound effect. The behaviour of an adult dog is a product of the dynamic interplay between genes and the social environment. The development of puppies is dependent on so many factors. There are the aspects of maternal care – both pre and postnatally. These can have profound effects but the post-weaning environment is absolutely crucial and social and environmental influences during this time can modify what has occurred during the maternal care phase. A puppy that starts off life with excellent maternal care can soon be adversely affected by inappropriate experiences in his new home and vice versa – a puppy that has a bad start in life is still malleable given the appropriate responses and support in his new home that adverse effects could be partly or completely reversed.

### **What is a dog?**

Understanding the origin of dogs help us to understand how they fit into our world and what our expectations of them should be. Dogs were the first animals known to have been domesticated by humans. Domestic dogs and the modern grey wolf share a common ancestor, which is now extinct, and the current understanding based on genetic studies shows that dogs separated from wolves 15000 to 135000 years ago. There is conflicting evidence from DNA studies and archaeological findings. It can be difficult distinguishing between ancient wolves and ancient dogs as there will have been a considerable period of time, probably thousands of years, when their morphology remained similar. Archaeological evidence is used to interpret relationships between humans and wolf-like creatures and it was not until dogs were found in human graves that this type of evidence suggests a significant dog-human relationship.

Current evidence suggests that the relationship between man and dog has existed for at least 30,000 years, possibly as long as 50,000 years. There appear to have been several separate domestication events in different areas of the world, all involving canids which originated in Europe and Asia. When looking at a combination of genetic and anthropological information these suggest that at least 15,000 years ago there were dogs of differing morphologies living with humans. The existence of dogs of differing morphologies is suggestive of these dogs playing different roles, much as the dogs of today do. Clear evidence that dogs were deliberately selectively bred into different breed types comes from ancient art from around 3-4000 years ago. Several distinct breeds were known in ancient Egypt and a mastiff like breed is found in Babylonian illustrations of c.2200 BC. Attempts to classify dogs probably date from the time when humans discovered that certain canine traits were more useful than others. The earliest known system of classification, that of the Romans, included categories for house dogs, shepherd dogs, sporting dogs, war dogs, dogs that ran by scent, and dogs that ran by sight. These dogs were more than likely bred depending on ability and behaviour, more than appearance because they had a functional purpose.

However they did also have small companion breeds and these may well have been subjected to selective breeding for appearance.

Dogs have undergone considerable changes since they diverged from wolves, but much of their behaviour remains very similar. Current research on wild wolf behaviour shows them to live in peaceful, stable, cooperative family groups. This stable structure is maintained by a complex communication system involving appeasing gestures by which the wolves demonstrate their emotional state to each other in order to avoid conflict. They are experts in avoiding conflict. It is clear that dogs, as a highly social species, show these similar appeasing and conflict-avoiding communication signals to each other and to humans.

### **Learning processes relevant during socialisation in puppies**

**Habituation** is the process that results in decreased response to specific repeated stimuli that have no consequences. The purpose of this process is to avoid overwhelming the sensory systems and allow the brain to focus on relevant stimuli. Puppies need habituation to every day life encounters so that they do not show a fear response or get over-excited (often actually a sign of anxiety rather than pleasure). A major part of the socialisation process is not teaching a puppy to be excessively sociable but teaching him to ignore most the stimuli he encounters.

**Sensitisation** is the opposite of habituation with the animal becoming more responsive to a repeated stimulus. Puppies must be protected from sensitisation in order to prevent fearful or anxious behaviour. Many behaviour problems arise due to inappropriately excessive socialisation rather than lack of it which is why it is so important for owners to understand what we are aiming to achieve rather than giving them blanket advice to get as much experience as possible.

### **Which process will occur?**

Intensity is the key with low intensity stimulation allowing habituation and high intensity increasing the likelihood of sensitisation. Individual personality is hugely relevant in this context as well. Not all puppies respond in the same way in a given situation. Some will be confident enough to enjoy a car boot sale and learn appropriately from the busy, noisy environment. Others may be too sensitive to meet more than one or two novel people in one day. It is vital that owners are given the knowledge and advice to be able to react appropriately to their puppy's individual requirements.

### **The importance of novelty.**

If a puppy not exposed to significant level of novelty then he will find it harder to habituate to further novel stimuli. He needs to learn the general concept of habituating to novel stimuli that have no adverse consequences.

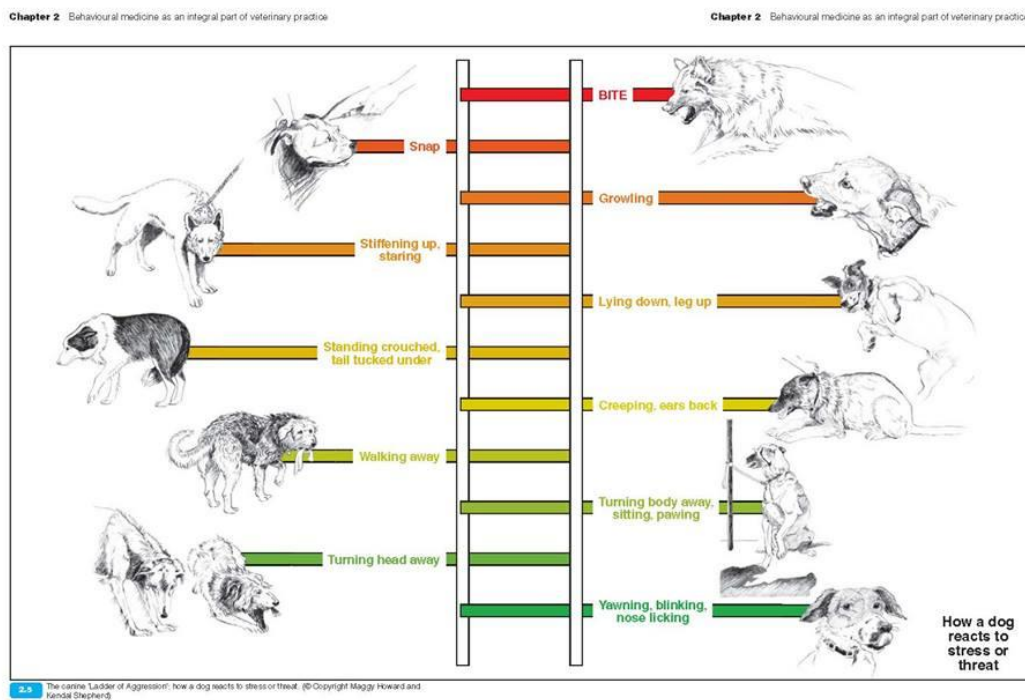


If puppies don't experience sufficient novelty and undergo this generalisation process then they may start to develop reactions not only to novel social stimuli but also inanimate objects such as wheelie bins, post boxes, statues and so on.

### Communication.

In order to be able to implement appropriate socialisation and habituation for puppies it is crucial to recognise their emotional state so that we can ensure that we are successfully achieving appropriate experiences and opportunities for puppies. Owners need to be able to recognise body language in their puppies in order to tell whether experiences are useful for habituation or are at risk of causing damage by sensitisation. They need to recognise lower level signs of stress in their puppy so that they can engineer appropriate learning opportunities rather than accidentally enhance fear responses.

### 'Ladder of Aggression'.



This shows how a dog responds to a threat or feeling stressed. All social species have a complex repertoire of communication signals aimed at avoiding direct conflict because getting into an actual physical fight risks serious injury. Which signals will be used depend on the context, the underlying temperament and previous learning. The lower level signals such as nose licking, avoiding eye contact and lifting a paw will be used in situations where the dog is feeling mildly stressed or threatened. Dogs will also show displacement behaviours such as scratching themselves or sniffing the ground when feeling mildly stressed. They also alter the direction of approach used during an interaction to avoid head-on approaches which are perceived as confrontational by dogs.

As the intensity of the situation increases, if the threat is not averted, the dog will be more likely to either use avoidance or escalate the level of signalling to match the level of the threat. The vast majority of dogs will choose avoidance if this option is available to them. However in the veterinary context, where the dog is confined, avoidance options are limited and the chance of a dog feeling the need to use defensive aggression is higher. At times a situation may be suddenly at a high intensity and therefore the perceived threat is far greater. In this case the dog will immediately use higher level signalling. As mentioned above temperament plays a significant role and the threshold for triggering a bite, and how severe that bite is, will vary considerably between individuals.

Although dogs use very similar body language signals to wolves, research has shown that the changes in morphology in the dog from the lupine form have limited the signals that some dog breeds are capable of sending, by modifying or removing the structures necessary for signalling, which has likely led to difficulties in intra-specific communication in the dog. It has been suggested that conformational changes such as heavy ears or hairy faces can make it difficult for dogs to communicate with each other. For example the heavy pendulous ears of breeds like Bassets make it hard for other dogs to notice ear movements. It can be difficult to gauge attention and eye contact with dogs with very hairy faces such as schnauzers, old English sheepdogs and so on. It is therefore important to be able to look at a broad range of these signals and view the entire dog rather than focus on a single piece of information, such as a wagging tail. If it is difficult to assess facial tension for example, if a dog is really hairy, then observing more subtle shifting of the weight away from you and being aware that a paw lift is a sign of stress assist in understanding the emotional state of the patient.



These pictures above show Boris (brown) and Ebony (black). Boris has his Kong Wobbler full of food and has just given Ebony a hard stare to tell her to leave him alone. She is showing appeasing gestures to say sorry to Boris and to avoid conflict with him. There are five clear signals she is showing here – lip licking, paw lift, turning head away, avoiding eye contact and moving slowly away from him. Had Ebony not shown these responses, the aggression from Boris would have escalated.



Boris is curling his lip, giving Ebony hard eye contact and leaning his body weight forwards. These are all signals that are aiming to make Ebony move away. Ebony responds by lowering her head, sniffing the ground (displacement behaviour), avoiding eye contact and shifting her body weight away from Boris. These are all signals from the lower levels of the Ladder of Aggression that aim to appease Boris' threatening behaviour and avoid conflict.

### **Submissive roll-over or relaxed roll-over?**

This is a behaviour which is frequently misinterpreted by humans and it is crucial to respond appropriately. If dogs show submissive, appeasing behaviours to explain to a person that they are worried and these signs are ignored, they may progress to using defensive aggressive strategies instead. The two most distinguishing features between the relaxed roll over (photo left below) and the submissive threat averting roll over (photo right below) are the level of muscle tension and the position of the legs. In the photograph of Ebony (left) below the muscles are loose and relaxed throughout the body and face. On the photo on the right (source internet) the ginger dog is showing a tense, submissive rollover in response to the malamute's confident and assertive body language. She is asking him not to threaten her and to either move away from her or show a gentler approach.



### **Sensitive or critical periods**

Social experiences throughout life influence gene expression and behaviour. However during early development these influences have a particularly profound effect. It is these times of heightened sensitivity to learning during early development that are called sensitive or critical periods. ***In terms of what we are discussing in dogs, we mean the periods of time when puppies are at their optimum for learning positive associations with their own species, other species and environmental stimuli and most importantly learning how to interact appropriately with these social and non-social stimuli.*** If the animal does not experience appropriate stimulation during these periods, it may be difficult, ultimately less successful, or even impossible, to develop some functions later in life.

Developmental stages –

- Intra-uterine.
- Neonatal (0-2 weeks). Puppies just suckling and sleeping but become active if there is a lack of tactile contact from the mother or their litter mates. Gentle handling and varied stimulation has been shown to be beneficial in terms of increasing exploratory behaviour, confidence, enhanced motor action and problem-solving later in life.
- Transitional (2-3 weeks). This is the phase during which the eyes and ear canals open and locomotor ability changes from crawling to walking.
- Socialisation (3-12 weeks). Peak at 6-8 weeks. This is when puppies become capable of seeking non-maternal social interaction and lasts until the point where environmental interactions become more interesting to the pup than social interactions which is around 12 weeks of age.
- Juvenile (from around 10-12 weeks to sexual maturity at around 6 months of age). See the emergence of advanced motor capacities such as raised leg urination and also increased learning capacity. Social relationships with other dogs become more stable. Dogs become less tolerant of change and unfamiliar stimuli during this time. This is why ongoing social and environmental experience is vital during this stage.
- Adult. Social maturity is reached around 18-24 months depending on the breed with large breeds tending to take longer to mature.
- Geriatrics. Start to see a decline in physical and mental capabilities. Cognitive dysfunction syndrome can develop in some dogs.

During the socialisation period, puppies need to learn to communicate with their own species, with humans and with any other species they may co-habit with or encounter. They need to learn to interpret the intentions of other social beings, most importantly whether they are being friendly or threatening. Most aggression cases are fear-motivated and are a result of either a generalised fear of the unfamiliar or the dog misinterpreting a person's body language and behaviour and therefore incorrectly believing them to be a threat.



Appropriate experience when young allows puppies to develop their skills at reading human body language and avoid such misinterpretations and therefore respond in a more appropriate manner. They also allow puppies to learn that novel and unfamiliar stimuli are not always scary or threatening.

Dogs are not naturally tame to humans – they must be exposed to humans early in life in order to be able to make enjoyable social relationships with them. Inadequate socialisation has long term effects which can be difficult if not impossible to remedy. During this early phase of development the brain is becoming behaviourally organised i.e. neuronal connections are being created and also removed. Although neurons can be re-wired as such in the future, some connections are far harder to alter than others so severe lack of socialisation can be an extremely difficult situation to resolve.

Freedman et al (1961) looked at the effects of introducing puppies to humans at different ages. They found that as the age of introduction increased, the response deteriorated. The puppies were reared with their litter mates and dams but in isolation from humans. At different ages they were subjected to a week of handling by humans and returned to their litter then all re-tested at 14 weeks of age. Puppies socialised between 3 and 9 weeks of age approached a passive handler most readily but that beyond 9 weeks the puppies were increasingly fearful. At 3-5 weeks of age puppies actively approached humans and sought interaction. If introduced at 5-9 weeks they were increasingly apprehensive to approach humans with the increasing age showing increase in apprehension. The control puppies did not meet humans until the 14 week test and they remained fearful even after many weeks of careful handling. Scott and Fuller reported on similar work and found that if puppies were not exposed to people prior to 14 weeks of age they were essentially similar to wild animals in their interactions with man.

Kittens and puppies. From 3 ½ weeks of age a puppy was fostered into kitten litter and then examined at 16 weeks of age to see the effects.

- Puppies reared with kittens ignored own reflection or apprehensive investigation
- Puppies raised with dam very excited by reflection
- Cat-raised puppies huddled with kittens and would not play with other puppies
- Within 2 weeks of cohabiting with puppies, cat-raised puppies had developed normal dog-dog social interactions

The recovery of these kitten-reared puppies to show normal canine social interactions suggest that the window of opportunity for socialising dogs to people is shorter and more precise than that for intra-species socialisation. Although these puppies were deprived of dog-dog interactions they quickly recovered despite already being 16 weeks old.

This is in stark comparison to the puppies that had been isolated from humans until 16 weeks who remained fearful after many weeks of intensive socialisation with people. This is most likely because dogs are naturally more strongly predisposed to make social relationships with their own kind than with other species.

### **On-going socialisation**

David Appleby and colleagues (2002) published a study which examined the background breeding environment and socialisation experiences of dogs that were showing aggression or avoidance and compared them to a similar sample of dogs that weren't showing these behaviours. They found that the maternal environment had a strong influence on behaviour with a domestic environment providing much less likelihood of problems than a non-domestic environment. They also found that experience during the juvenile or enrichment period had a strong influence and dogs that had little experience, particularly exposure to an urban environment, during the 3-6 month period were far more likely to show aggression to unfamiliar people or avoidance behaviour.

### **Applying knowledge of learning processes, communication and socialisation periods to puppy education.**

During the socialisation process the aim should be for the puppy to become habituated to all sorts of everyday stimuli such as traffic, people passing by, dogs passing by on the other side of the road, aeroplanes flying overhead, a child shouting out, police sirens zooming by and so on. The aim is to bring up a puppy into an adult dog that is well-behaved and polite. If you are living in an urban environment you would expect your dog to ignore most the people you pass along the pavement, unless that person was familiar or initiated an interaction with your dog. If another dog is being walked passed on the other side of the road, you would want your dog to walk politely past without straining at his lead to try and play with the other dog. So, in order for clients to understand better how to socialise their puppies, they need to understand which process is more likely to occur under a given set of circumstances. It is so important to try and set puppies up to succeed so that every experience they have is positive, enjoyable or relaxing. Intensity is the key – high intensity situations are far more likely to cause sensitisation and lower intensity situations allow the time for habituation. Observing the puppy's body language is also crucial. Owners need to be able to recognise when their puppy is relaxed and when there are signs of anxiety.

It is best to start off with a low intensity situation and gradually increase the intensity depending on the puppy's response. If the puppy copes well in a lower intensity situation, he can gradually be taken to more intense situations, continually monitoring his response to ensure he feels safe. The puppy must be able to have an element of control over the intensity of the situation and this is the reason to be careful if carrying a puppy.

It is very easy to end up in a situation where a puppy would like to show an avoidance response but is trapped in an owner's arms and therefore becomes at risk of sensitisation to that overwhelming stimulus. The puppy must be given his own opportunity to explore and interact with new stimuli in his own time rather than being forced into a situation too quickly or suddenly.

The most important thing is that there is no recipe book or tick sheet for owners – they must ***vary the amount of stimulation depending on the response of the puppy***. All puppies are individuals and will deal with different situations in their own individual way. Owners must be educated to make basic observations of their puppy's body language to see if he looks stressed, anxious or relaxed so that they are in a position to ensure that all experiences are positive or if they end up in a stress-inducing situation they are able to quickly diffuse that and turn it into a positive experience.