Individual Differences in Behaviour – Dog Personality

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Introduction

Dogs are highly capable of adapting to new environments and learning to perform different behaviour in certain situations (see Chapter 8 in this volume). However, some aspects of a dog's behaviour might have limited plasticity. In fact, if you observe dogs and are focused on behavioural stability, you might find the dog quite consistent in a range of situations. For example, the dog's strategy when meeting unfamiliar persons may be very similar in different contexts and over long periods of time. A dog that shows signs of fear when exposed to loud and strange noise may still, several years later, show similar tendencies in such situations. Other examples are a dog's typical tendency to get excited or to be aggressive. Such stable dispositions create what could be called the behavioural style of a dog, which has also been referred to as temperament, individuality, coping style, behavioural syndromes and, more lately, as animal personality.

Traits as Complexes of Behaviour

Central for the issue of individual differences in behaviour, which I will refer to as personality in this chapter, is *trait*. If you observe the behaviour of a dog you will probably find that some behaviours often come together. For example, the dog that snarls when meeting other dogs will probably also raise its tail, lower the head, stare towards the other dog, bare its teeth, and perhaps also lunge towards the dog. Such a 'package' of behavioural reactions may be labelled a behavioural trait – a hypothetical construct with which it is possible to describe the behaviour

of an individual, as well as differences in behaviour between individuals. In everyday terms we probably would like to call this trait hostility, or aggressiveness. If you have the possibility to observe several dogs in a similar dog meeting situation it is very likely that you will find that dogs differ in regard to this trait. Some dogs will display these behaviours early in the meeting situation and with high intensity, other dogs will show some of the above-mentioned reactions, but not all and not very intensely, and still others may not show any sign of this trait.

From Behaviour Traits to Personalities

Is behaviour the same as personality, and are behavioural traits similar to personality traits? The study of personality in humans is closely related to the assessment of feelings, thoughts and beliefs. Within the study of animal behaviour, internal processes – such as feelings and thoughts – have been considered unobservable or even scientifically irrelevant. Researchers have striven towards explanations of animal behaviour in the simplest possible way, in accordance with Lloyd Morgan's Canon, and have avoided the use of unobservable events such as emotions and intentions as behavioural explanations. As a result of this, it seems that scientists interested in individual differences in animal behaviour also have avoided the concept of personality because of fear of anthropomorphism. However, besides feelings and thoughts, personality in humans also includes an issue that is possible to study in animals – behaviour. Personality traits can be described as dispositional factors that regularly and persistently determine behaviour in many different types of situations. Thus, an individual's personality can be inferred from the individual's behaviour. This makes the study of animal personality no different from any other studies of animal behaviour. The label of a suggested trait – such as 'fearfulness' or 'aggressiveness' – may only be a short description for a disposition of the individual to act in a certain way, and does not necessarily imply the existence of any feelings or thoughts. However, current research gives evidence for the existence of different basic emotions in animals, as well as cognitive processing that may be analogous to human thinking at a less complex level. It is probable that a dog that waves its tail and steadily focuses on the owner when he or she is going to throw a tennis ball really is full of expectancy and is anticipating the coming game, even though both expectancy and anticipation are private for the dog and not observable. Assumptions of emotions and internal processing in animals give even more relevance for the study of personality in animals. For example, rats that live in an unpredictable environment seem to be more pessimistic – having negative expectations about unknown events – than rats with a more stable life situation (Harding *et al.*, 2004). Development of new experimental designs has recently yielded tools in understanding cognitive skills in dogs, such as word learning, numerical competence and use of social cues to get rewards, which may help us to unravel individual differences in cognition (see Chapter 12 in this volume). However, there is still a need for highlighting the

Fig. 11.1. Behavioural reactions that are stable over time and across contexts can be assumed to be expressions of the dog's personality.

risk of anthropomorphism in assessing personality traits in species like the dog. Personality assessments in animals should primarily be based on behavioural observations, and not on assumptions of thoughts and feelings.

So, behavioural observations may be useful when we want to know something about the dog's personality. But are all behavioural reactions expressions of the individual's personality – is a behavioural trait the same as a personality trait? For example, can we be sure that the snarling border collie in Fig. 11.1 has an aggressive personality? Here we may use the definition of personality traits again: 'dispositional factors that regularly and persistently determine behaviour in many different types of situations'. In this definition, two aspects of stability are included – stability over time and stability across situations. When taking the first of these criteria of personality into account, it is possible that the aggressive reaction of the border collie is specific for this specific occasion. A similar situation the next day, month or year may give a different reaction. The reason for such time-dependent specificity may be that this reaction is sensitive to experience, which gives that the dog's reaction may change every time it is exposed to a certain situation. Thus, a behaviour that is easily changed by training should not be seen as an expression of the dog's personality (even though this might tell us something about the dog's general trainability, which can be part of a dog's personality). Change in behaviour from one time to another may also be due to maturation. For example, a male dog's non-response to a bitch in heat may give reason to assume that this dog has a low 'sex drive'. However, this assumption may be very misleading if the assessment is made at a young age. A test later on, after sexual maturation, could give a totally different picture. Similarly, behaviour reactions observed at a very young age may correspond poorly with reactions observed in a similar situation later on in life. Therefore, it is important to take maturation into account when

assessing a dog's personality – behavioural strategies are a part of the personality first when it is to at least some degree temporarily stable.

The second criterion from the definition of personality was stability across situations. A single observation of a dog may prove to be highly situation-specific, and may not be relevant at all in other situations, for example in a test. Even though the dog's behaviour is very similar every time it is exposed to a certain stimulus situation, it may be specific for this particular stimulus situation. For example, your dog shows avoidance reactions to Bill, who is a friend of yours. Through several meetings with Bill you know that this reaction is stable over time and exposures. Can this information be used to assess this dog as avoidant to humans, or at least men? I believe that your answer is 'no', since we have no information about the dog's reaction towards other persons. It is possible that this dog may show no avoidance reactions to other persons, which means that an assessment based on the first information should have been misleading. Similarly, a dog that is superior to other dogs in learning one task, but not another (where it is rather poor) should not be regarded as highly trainable or intelligent. In the definition of personality some degree of generality is inherent, which also tells something about one fundamental issue in the concept of personality – making predictions of the individual's behaviour from one situation to another similar situation. A reaction that is too specific, even though it is stable over time, is rather useless in prediction of behaviour and may not be a relevant measurement of the dog's personality.

Thus, a glimpse of a dog's behaviour may say something about its personality *if* the reaction is stable in two regards – stable over time and across similar situations. A behavioural trait can be referred to as a personality trait after positive tests according to these criteria; a personality trait is a hypothetical construct useful to describe the individual's *typical* behaviour. However, to expect that dogs or other living organisms are stable in the sense that they always show the same behavioural response is misleading. On the contrary, a dog that always behaves in a certain way – say, always waving its tail – should probably best be regarded as pathological, rather than having a stable personality. Personality in a dog should always be seen as an interaction between the dog and the environment, and assessed in a context – 'if this happens, or in this type of situation, the dog usually behaves in this way'.

One last issue regarding personality traits is how the trait is best described, and the distribution of different expressions in a population, say, a breed. A common assumption is that behavioural traits can be described linearly and are normally distributed; an individual can be assessed according to a dimension, and more individuals are assessed as intermediates than extremes. Most personality traits in both humans and animals seem to have this characteristic, even though the distribution is not always normally distributed (for example, skewed towards one end-point of the scale). In contrast to the assumption of linearity and normal distribution, there are some suggestions of traits that have a different characteristic. Within animal personality, the most well-known example is coping style, which has been studied in species like rats, mice, great tits and pigs (Koolhaas *et*

al., 1999). According to the theory behind this construct, some individuals have a disposition to cope with stressful events with activity and aggressiveness. These animals are also more prone to create habits, and, thus, less flexible when circumstances change in a familiar situation. Besides this coping style there is another type, which is characterized by a more passive strategy when stressed: low aggressiveness, prone to be inhibited and have a better capacity to adapt to changes in the environment. The distribution of this trait has been assumed to be bimodal – two separate and extreme types with no intermediate individuals. However, this can be seen as an exception, which also has been questioned (Jensen *et al.*, 1995). A safer stand-point is to assume that individuals differ in personality according to dimensions from low to high (or low intense to high, seldom to often, hard to elicit to easily elicited, etc.) regarding the behavioural reactions that the trait refers to. This means that personality descriptions often are relative rather than exact: 'dog A is typically more fearful than dog B'. This is contrasted with everyday descriptions of personality where references to types are common. For example, 'his dog is aggressive' or 'my dog is playful'. Because of what has been mentioned regarding distribution of personality traits above – types rarely exist – such labelling is misguiding.
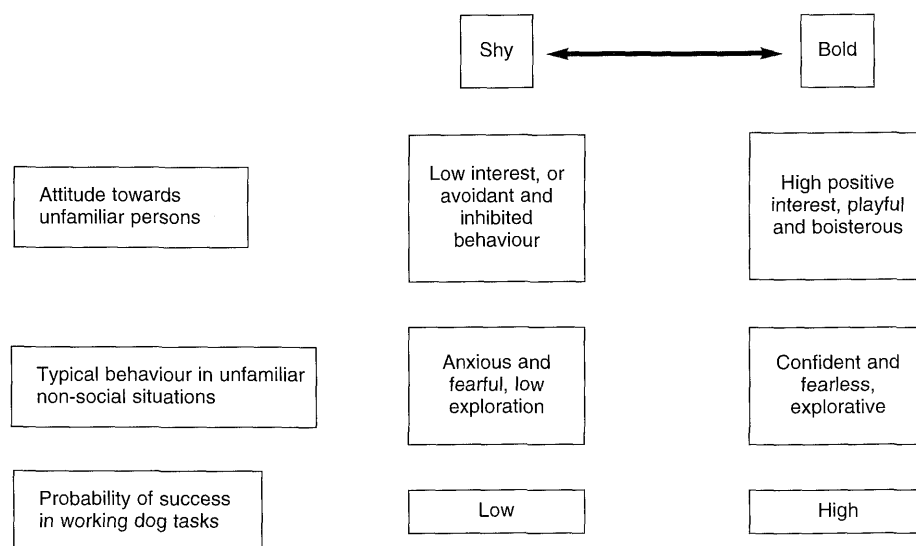
Why Study Personality in Dogs?

There has been an increase in interest in the study of animal personality, as well as in personality in dogs, during recent decades. It seems that this change is driven by a parallel increase in interest in other areas. One of them is animal welfare. If different individuals appraise threats or other stressful events differently, some individuals will be better able than others to cope with a certain life situation. One example in dogs is the capacity to cope with temporary separation from family members, or social isolation. To ensure that dogs may cope with this situation, which is a very common for pet dogs, it is important to take each dog's personality into account. Some dogs may be more easily trained to cope with loneliness, whereas others may suffer more in such a situation.

Another issue is prediction of behaviour. Knowledge of future ways of acting in different situations is valuable in selection of potential working dogs, such as guide dogs, dogs that are used for search tasks (explosives, drugs, etc.), guard dogs, hunting dogs and herding dogs. Behavioural signs in a dog that predict success or failure before the dog is trained, or in the early phases of the training period, bring great advantages. Time and money can be saved, and the welfare for dogs and trainers may be improved. Behavioural prediction in dogs may also be important for pet dogs. Early signs in the puppy may help the breeder to match the dog with an appropriate owner. Furthermore, in several countries there are extensive rescue dog programmes. Dogs that otherwise would be put down may be transferred to a new home after a stay in a shelter. An assessment of the dog's typical behaviour in certain situations when it is in the shelter may increase the chance of a good match between the dog and the new home. Behavioural problems may

be avoided, or at least diminished, by taking preventive steps. Furthermore, the value of early signs of behaviour that may cause problems for the owner, the surroundings and/or the dog itself may be extended to all pet dogs. Knowledge of the young dog's typical behaviour may help the owner to take appropriate steps, such as training programmes, that make life more pleasant for all parties.

A third issue is evolution or, in the case of the dog, domestication. What traits are favoured during selection, and why? In dog breeding, there is – consciously and unconsciously – a selection for wanted traits and against unwanted traits. If we assume that these traits have a genetic base, the type of selection that dominates will decide the typical behaviour of the dogs in future generations. Thus, methods that are useful in assessing the personality in breeding dogs as well as the offspring are of great interest for successful directed selection. For example, standardized behavioural tests have been used as tools in breeding programmes in breed clubs and in selection of working dogs. In addition, it is relevant to understand how other, more unconscious, selection criteria influence the ongoing domestication of dogs. Dog personalities differ in their adaptiveness in different life situations and contexts. A certain dog personality might be highly adaptive in one setting, whereas the same dog might give another owner problems in everyday life due to its typical behaviour. One example of this type of conflict is seen in Fig. 11.2. A shyness–boldness dimension has been detected in dogs in a standardized behavioural test (Svartberg and Forkman, 2002). This trait is related to everyday life – playful, explorative and fearless behaviour in both social and non-social situations – as well as to success in working dog trials (Svartberg, 2002, 2005). Depending on the goals of the owner and the breeder, different dogs will probably be favoured during selection. The bold dog might be favoured if the

Fig. 11.2. A certain dog personality might be highly adaptive in one setting, whereas the same dog might give another owner problems in everyday life due to its typical behaviour.

major goal is some kind of working performance, whereas less bold dogs, although not shy, may be more easy to handle for pet dog owners. This assumption is supported by correlations between the typical use of parents in different breeds, and breed-typical personality (Svartberg, 2006). Breeds where breeding dogs have a high number of merits from working dog trials are in general more playful than breeds with parents less often used as working dogs. Furthermore, 'show breeds' are shyer than breeds where show merits seem to be less important.

Scientific Methods of Assessing Dog Personality

Where should personality be assessed?

What do scientists do when their aim is to assess personality in dogs? Different methods are used, and there are some factors that influence the choice of method. For example, some aspects of the dog's personality may only be possible to assess over a long period of observation and in certain situations. If we assume that dominance, as an example, is a possible personality trait in dogs, a single behavioural test will probably not give us the whole picture of the dog's tendency to dominate or show submissiveness towards persons or other dogs. Dominance relationships are formed within the social group over some periods of time, which makes a behavioural test inappropriate in this regard. One way to get this information is to ask a person who is well acquainted with the dog about the dog's typical behaviour with other well-known dogs and with familiar persons. An alternative way could be to get access to the dog for a certain period of time, and study the dog's social behaviour in a controlled environment. Another issue could be the degree of generality. If, for example, the aim of a study is to compare the typical behaviour between several dog breeds, the personality of a large number of individual dogs has to be assessed. This limits the sampling method. To observe a sufficient number of dogs per breed in a behavioural test may be practically impossible, which justifies other methods.

Issues like these have led to researchers using different approaches in the scientific study of dog personality. Generally, three methods of collecting data on dog personality can be defined: (i) observation of the dog's behaviour in its normal environment; (ii) behavioural tests; and (iii) information from persons who are familiar with the dog, for example questionnaires sent to dog owners. Behavioural tests have been used in order to assess traits like greeting behaviour in meetings with unfamiliar persons, fearfulness towards different sudden or novel stimuli, and aggressiveness towards unfamiliar and threatening persons. A test situation, however, can be seen as a novel situation in itself, which limits its usefulness. The dog's typical behaviour may be masked by its reaction towards the test situation, which sometimes makes it necessary to use other sampling methods. One such commonly used method is questionnaires in which the dog owner rates the dog's behaviour or level of some predefined personality traits. This methodology may

capture such aspects of personality as the dog's typical social behaviour within the family, tendency to cooperate with known persons, and behaviour when left at home. Thus, behavioural tests may be useful to get information about some aspects of a dog's personality, whereas other methods, such as questionnaires, may be necessary in order to gather knowledge of other aspects of the dog's typical behaviour. A well-constructed questionnaire and large sample sizes may, at least partly, compensate for the bias that the large number of observers (dog owners) gives.

Measuring personality

Besides the issue of sampling method, another question concerns how to assess the dog's personality. Personality in animals may be assessed at two different levels – behavioural observations according to strict objective criteria and with subjective assessment. The first of these levels concerns what is the most common method in ethological studies in general. The behavioural reactions are rated according to strict objective criteria – for example, number, frequency, duration and/or latency. This method has been used in theoretical approaches, where behaviour measurements are used as indicators for a suggested personality type (for example, the time until an intruder is attacked by a resident may be used as a base for categorizing the animal as 'non-aggressive' or 'aggressive') or for the magnitude of a trait (for example, the number of threat behaviours observed can be used to assess the animal's degree of 'aggressiveness'). Objective measures of behaviour have also been used in more empirical and exploratory approaches, where clusters of correlated behavioural variables that presumably represent personality traits are searched for by the use of factor analysis or other multivariate analysis methods.

Animal personality may also be assessed at a more comprehensive level, where the observer subjectively rates the individual according to predefined traits. Observers, who assess the personality by observing it in several situations, are here used as data recording instruments. Commonly, the animal is described according to adjectives, such as 'curious', 'motherly', 'playful' and 'understanding', on a linear scale. This method provides a higher level of description, and may capture the overall pattern of an individual's behaviour that remains elusive when discrete events are measured. Studies on human personality have shown that descriptions of behaviour at a more general level may be more predictive than specific measures of behaviour (e.g. Funder and Colwin, 1991). However, direct assessment of personality is sensitive for subjective interpretations, and may easily be biased by the observer. Therefore, the accuracy of this method rests on the use of several independent observers, together with high criteria of inter-observer agreement for the suggested traits.

Besides these two general methods of assessing animal personality, there is one additional approach that is commonly used that may be seen as a

'middle way' – behavioural rating scales. In this method, the animal's behaviour is rated in a specific situation (in contrast to subjective rating, where the overall tendencies are assessed) according to a predefined scale with a number of steps. For example, aggressive behaviour in dogs has been rated according to a five-point scale (Netto and Planta, 1997): 1 – no aggression observed; 2 – growling and/or barking; 3 – baring the teeth; 4 – snapping; and 5 – biting and/or attacking with bite intention. Some additional assumptions are made when rating scales are used, compared to when using strict objective criteria. For example, that several behavioural reactions (such as growling, barking and snapping) are associated with the same behavioural category (aggressiveness). In spite of this, rating scales seem to be useful in dog personality studies, and, furthermore, are easy to use and therefore a common method in applied settings.

Personality Traits in Dogs

Perhaps the most intriguing question is what personality traits are to be found in dogs? This question is not easy to answer, however. In studies where stable aspects of dog behaviour have been in focus, a range of traits have been proposed, but only a few of these have been tested for stability over time and across situations. Thus, we have relatively poor knowledge of the stability of a number of proposed traits, as well as of their relevance in different situations. There are some traits in the literature of dog personality that are more commonly described than others, and more often tested for stability. The two most widely suggested are fearfulness and aggressiveness, which I will describe in more detail here.

Fearfulness

'Fearfulness' is probably the most studied trait in animals, and the domestic dog is no exception. In dogs, there are several behavioural reactions that are commonly associated with fearfulness. Examples are avoidance behaviour, flight behaviour, low body posture with low tail and ears, trembling, salivating and vocalization, such as yelping and screaming. Behavioural reactions associated with fearfulness have also been regarded as expressions of other traits, which may be said to be similar or closely related to fearfulness. The most well-known example is 'emotionality', which is a trait that has been thoroughly investigated, mostly in rodents. Other 'neighbouring traits' to fearfulness are 'stress-proneness', 'nervousness' and 'timidity'. They all share some, but rather different, facets of fearfulness. More or less, however, they are all constructs that are suggested to describe the individual's general tendency to react to threatening and potentially dangerous situations. This makes this trait highly relevant in several regards, not least from a welfare perspective. Dogs that are generally fearful appraise threats in a range of situations, and it is assumed that they often experience negative emotions such as acute fear and anxiety.

However, the concept of a general tendency to react to threats has been questioned. There are several studies that give evidence for more narrow subtypes of fearfulness. One example is the difference between fearfulness towards social and non-social stimuli; fearfulness towards strangers may not necessarily be associated with fearfulness towards such stimuli as sudden or loud noises, novel objects and thunderstorms. Indications of this come from studies of potential guide dogs that were observed in a range of situations (Goddard and Beilharz, 1984, 1986) and from questionnaire studies (e.g. Hsu and Serpell, 2003). Furthermore, social fearfulness may be divided into different subtypes, for example, fear of unfamiliar dogs and unfamiliar persons (Goodloe and Borchelt, 1998). Also non-social fear tests have yielded results that indicate the existence of several fearfulness traits specific to particular stimuli (King *et al.*, 2003). With the findings of different subtypes of fearfulness follows a questioning of the concept of fearfulness; does one general tendency in dogs to react to threatening and potentially dangerous situations really exist? This is a justifiable question – if there are different tendencies to react fearfully towards different stimuli, why use the concept at all?

Another question regarding general fearfulness is how the dog reacts in threatening situations. Research on other species suggests the existence of different coping strategies; either the individual reacts with an active strategy – fight or flight – or with a passive strategy – 'freezing' or immobility. Such differences in strategies have been reported in dogs. For example, results from several older studies suggest the existence of two types of fearfulness (e.g. Thorne, 1940; Royce, 1955). These studies seem to be inspired by the work of Pavlov, who suggested two types of dogs in this regard: an excitable and an inhibitable type. There is also some support for breed difference in this regard. Scott and Fuller (1965) reported that inhibition is easily elicited in cocker spaniels and Shetland sheepdogs, whereas basenjis are more prone to active avoidance. However, such clear-cut differences in coping strategies have been questioned. It is likely that such differences between individuals exist, but it is probably more a question of tendency than of kind – some individuals might be more prone to inhibition, whereas others might often react with active avoidance. Another factor that interacts with this possible personality trait is the type of stimulus-situation. Some threatening situations might elicit immobility to a higher degree than others, where strategies such as flight are more common.

There is, however, evidence of more general tendencies to react with fear that makes the concept of fearfulness relevant in dogs. Goddard and Beilharz (1984) found one general fearfulness dimension besides several more specific dimensions. Furthermore, fearfulness in social and non-social situations has been found to be correlated, just as fearfulness towards unfamiliar dogs and unfamiliar persons. Results from a study carried out by myself using a Swedish version of the questionnaire CBARQ (developed by Hsu and Serpell, 2003) showed positive correlations between four measures of fearfulness: 'stranger-directed fear', 'non-social fear', 'dog-directed fear/aggression' and 'pain sensitivity'. The correlations were moderate, ranging from 0.20 to 0.32, but indicate that there is a general fearfulness influencing fearful behaviour in different situations.

Aggressiveness

Another highly relevant trait in dogs is 'aggressiveness'. This trait has been suggested for dogs in a number of studies, and might be defined as the dog's general tendency to act threateningly (for example, raised hackles, bare teeth, heightened body posture, raised tail, growling) and aggressively, such as attacking and biting. Two Dutch studies are of interest in this regard (Netto and Planta, 1997; van den Berg *et al.*, 2003). In these studies, a similar test battery was used in order to describe the individual dog's aggressive tendencies. The dogs were tested in a range of subtests, where they were exposed to stimuli situations such as approaching persons, unfamiliar dogs, tug-of-war, handling by the owner, feeding competition and a life-sized doll. The major aim with these studies was to investigate whether the dog's behaviour in the tests reflected the typical aggressive behaviour according to the owners. No direct analyses were conducted in order to find out if there exists a general aggressiveness trait, but the results suggest that there is a general aggressiveness component in dogs – aggressiveness towards both dogs and persons – that is possible to predict in a behavioural test. However, two different types of aggressiveness were found based on the correlations of behavioural reactions (van den Berg *et al.*, 2003). One type was defined as 'threatening' (stiff posture, staring, growling, and pulling of the lip), and one was labelled 'attacking' (barking, baring the teeth, attacking, and, to some degree, snapping). Furthermore, the owner's description of the dog's typical behaviour indicated that aggressiveness towards dogs and persons does not necessarily have to be correlated. This suggests that, besides a possible separation between threat and attack, there are different types of aggressiveness associated with different targets. This is supported by studies where questionnaires have been used. Goodloe and Borchelt (1998) found evidence for three such types of aggressive behaviour: towards family members, towards strangers and towards unfamiliar dogs. Similar types were found by Hsu and Serpell (2003), who used the CBARQ. Their results also suggested an additional type of aggressiveness: towards familiar dogs. Clinical studies suggest types of aggressive behaviour that may be candidates as stable traits. Examples are object-related aggression (defence of food, toy or other object) and territorial aggression (for example, aggression towards persons when the dog is in its own yard).

Thus, the situation is similar to what has been described for fearfulness – the indication of several types of aggressiveness trait raises the question whether a general aggressiveness trait exists. As for fearfulness, correlations between different measures of aggressive behaviour from the Swedish version of the CBARQ indicate the existence of general aggressiveness (correlations between 'stranger-directed aggression', 'owner-directed aggression', 'dog-directed aggression/fear' and 'familiar dog aggression' ranged from 0.15 to 0.32). However, these are only indications. There is a need for studies of aggressive behaviour in a range of situations, such as the test in Netto and Planta (1997), where the issue of generality versus specificity can be raised.

Other personality traits in the dog

Some other candidates of relevant personality traits in the dog are worth mentioning. An often-proposed stable trait in animals is a *general activity level*. Compared to fearfulness and aggressiveness, which might be defined by reactions to a specific class of stimuli, activity is a more unspecific trait. The assumption behind this trait is that 'active behaviour' in one situation, for example measured as the frequency of paw liftings, is correlated with activity in several other situations.

A trait related to activity is *reactivity* or *excitability*. Results suggest a difference between being active in non-stimulating situations and being reactive or excitable when stimulated. In some studies, reactivity has been measured in threatening situations, which suggests that it might be a measure of the dog's fearfulness. But there is some support for a more general tendency to be excited when stimulated. For example, Hsu and Serpell (2003) found a relationship between the dog's excitability in situations such as when the owner returns home, when playing with a member of the household and when being taken on a car trip. Analyses of data from a Swedish version of the same questionnaire that Hsu and Serpell used (the CBARQ) suggest relationships between this type of excitability and other behaviours that indicate a more general reactivity. For example, correlations were found with attachment level to the owner – which the family-related items suggest – aggressiveness towards strangers and aggression and fear towards unfamiliar dogs.

The dog's tendency to be friendly towards unfamiliar persons has been described in several studies. This tendency has been proposed to be a personality trait in the dog, which often is labelled *sociability*. The dimension seems to range from an active and 'friendly' approach to strangers to an attitude of reserve, or hostility, to strangers. The negative side of this trait seems to be related to social fearfulness and aggressiveness, and perhaps it is the positive side – a positive interest and a friendliness towards unfamiliar persons – that motivates a use of a separate sociability trait. A question that seldom has been addressed is whether the dog's sociability towards unfamiliar persons is correlated with the same attitude towards unfamiliar dogs. Results from a questionnaire study made by myself (Svartberg, 2005) showed a correlation of 0.33 between friendly behaviour towards persons and dogs, which suggests a common sociability factor.

A very typical behavioural category in the dog is playing. There are results that support that there are stable differences between dogs in this regard, which suggest an existence of a *playfulness* trait. A trait that describes the dog's tendency to run after a thrown rag, grab it and willingness to play tug-of-war with it has been detected in a behavioural test (Svartberg and Forkman, 2002). This trait is consistent over repeated tests, and correlates with owner reports of their dog's general interest in playing with objects with familiar and unfamiliar persons (Svartberg, 2005; Svartberg *et al.*, 2005). From questionnaire studies, other play-related traits have been suggested. Goodloe and Borchelt (1998) found two playfulness traits that were both object-related and person-directed. One was related

to chasing after thrown objects and carrying objects, and one trait could be described as 'vigorous' play, related to growling and shaking while playing with objects, and tug-of-war. Results from Svartberg (2005) suggested one trait that described object-related play with humans and one dog-directed trait with relations to both interest in playing with other dogs and approach of dogs in general. This indicates that playfulness towards persons and dogs might be influenced by separate traits.

Finally, many attempts have been made to measure *trainability* – the dog's general success in training situations. Different studies have used different procedures to measure this trait: from using results from one specific task, such as retrieving, to an assessment of the dog's general performance, including such aspects as reactions to distractions, persistence and cooperativeness towards the trainer. However, the search for the dog's general trainability is so far rather unsuccessful. The results from the major study by Scott and Fuller (1965) are interesting in this regard. They trained dogs of five breeds in several different situations in search for a general 'intelligence'. Because of the aim of their project – understanding the genetic bases of behaviour – they used average breed values when presenting the data. The results were striking. No breed was generally better than the others when taking all tasks into account. For example, basenjis were the best in a manipulation test, but the poorest in a trailing test. The beagle was the best breed in a T-maze test, but was among the poorest breeds in the manipulation test. The only consistent pattern was found for the Shetland sheepdog, which was generally ranked as the least successful breed in the tests. The authors explain this with this breed's (at least in the sample used) relatively large fearfulness. Thus, fear of apparatus and persons inhibited learning performance. Probably, this is characteristic for performance in learning situations. A general trainability factor is difficult to find; performance is influenced by a range of task-specific factors as well as several personality traits. Results suggest that, besides low fearfulness, playfulness and excitability may predict training success. Playfulness probably sets the value of play as a reinforcer, which gives that playful dogs might be easier to reward than less playful dogs.

Excitability, which has been found to predict performance in guard dogs, seems to relate to success in a non-linear way (Martínek *et al.*, 1975). The dogs with the highest level of performance were those that had an intermediate excitability level, whereas dogs that had high or low excitability performed less well. According to the authors, this effect might, at least partly, be due to a higher habituation rate for the moderately excitable dogs. Such factors as fearfulness, playfulness and excitability are probably not equal to a general trainability factor, and might have no correlation with the individual's typical – if there is a typical – learning ability (such as habit formation and memory retention), but might nevertheless predict success in training situations.

Besides these described traits, there are a number of other candidates, although more poorly investigated in the dog. From questionnaire studies, traits such as separation distress, tendency to dominate or act submissively, predatory interest, attachment to owner, tendency to bark and pain sensitivity have been

suggested. Further studies might give us more knowledge regarding the stability of these suggested traits in dogs.

Motivational State or Behavioural Reaction?

It should be noticed that the theoretical basis of the suggested traits differ, and this influences the results. The theoretical issue is whether personality has its base in motivational states or in behavioural strategies. For example, if the researcher assumes that there is a fear state in dogs, the experimental design and the way of collecting behavioural data will be influenced by this assumption. Different potential fear-eliciting stimuli will probably be used, and measures of flight distance or latency to contact, or a fearfulness scale, might be used as fearfulness indices. Correlations between the measures will say something about the generality of fearfulness in the sample used. However, an alternative assumption is that personality derives from the individual's typical behavioural strategy, which might be independent of motivational state. If this is a correct assumption, there is a risk that such typical behavioural strategies are missed in a 'motivational state approach'. Assume, for example, that dogs differ in general excitability levels. A fearfulness scale, and even measures of contact latency and flight distance, could miss these differences, as well as the stability of each individual's excitability tendency across situations. On the other hand, if the researcher is focused on typical behavioural tendencies, differences in the individual's tendency to activate different motivational states (for example, how often the dog seems to be angry or fearful) may be missed. One such conflict is between coping theory and the concept of fearfulness. Coping theory deals with the type of behavioural strategy the individual uses when confronted with a threatening situation, whereas the fearfulness concept focuses on the level of assumed fear the individual experiences when threatened. In the list of personality traits in the dog presented in this chapter, traits such fearfulness, aggressiveness, sociability and playfulness are based on motivational states, whereas activity, excitability and trainability are closer to a behavioural strategy perspective. The somewhat contradicting results found for fearfulness and aggressiveness can, at least partly, be explained by the two different perspectives. The differences in focus have been acknowledged rather poorly within animal personality. It is likely that personality might be successfully studied from both directions; however, without taking differences in theoretical standpoints into account, there is a risk of confusion and misguiding results.

Personality at Different Levels

As the mini-review of personality traits above suggests, there seem to be traits at different levels of generality. Personality in both humans and animals seems to be best described hierarchically. At the top of the hierarchy, there are a few general traits that might influence the behaviour in a range of situations. These traits might, in turn, have different facets, or subtypes, that more specifically may
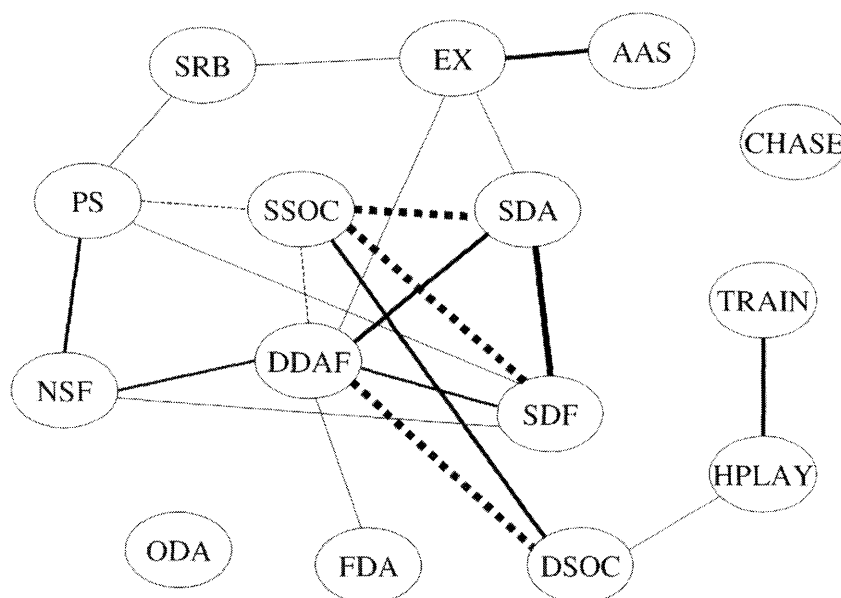
describe the dog's typical behaviour. In dogs, there are some suggestions of such general traits. For example, there are results that support two major dimensions in dogs that reflect positive and negative emotions (Sheppard and Mills, 2003). According to this view, positive activation correlates with such behaviour as playfulness, excitability and exploration, whereas negative emotions relate to fearfulness, phobic tendencies and anxiety. These two aspects of personality are analogous to two of the human 'supertraits': extraversion and neuroticism. There are other studies that support that these dimensions might also be found in dogs. Gosling *et al.* (2003) found evidence for these supertraits in dogs and, in addition, two others: agreeableness (lack of aggression, cooperativeness) and openness to experience (trainability, exploration). At an even more general level, a boldness–shyness axis has been proposed. This dimension, which ranges from shy and timid behaviour to an outgoing, active and bold attitude, has been found in several other species, as well as in humans, and might be correlated to both neuroticism and extraversion. As mentioned previously, a boldness dimension that correlates with sociability towards humans, playfulness and fearless behaviour in non-social situations has been suggested for dogs, which may influence behaviour in many aspects of life (Svartberg and Forkman, 2002; Svartberg, 2005).

These suggested 'supertraits' in dogs are interesting in the understanding of dog behaviour. However, when predicting a dog's more specific behaviour, these general traits may be rather powerless. When selecting a potential working dog, or when predicting behavioural problems, the focus should probably be on more narrow traits. Thus, there is a need for knowledge of dog personality on several levels – the aim determines which level is the most relevant.

Another point with the hierarchical view is that specific traits may be more or less correlated. For example, the theory behind extraversion in humans predicts correlations between activity, sociability and dominance. Such networks of correlations, and lack of correlations, might help us to understand how dogs generally act in different situations. An example of a network of correlations is shown in Fig. 11.3. The figure is based on data from a questionnaire study of 697 Swedish dogs from 16 breeds (Svartberg, 2005). Even though this sample may be too specific to use for a generalization for all dogs, the figure shows probable associations between specific traits. For example, (lack of) sociability, aggression and fearfulness towards humans are tightly connected. Aggression and fearfulness directed towards dogs are correlated to a range of other traits, such as non-social fearfulness, fear of and aggression towards unfamiliar persons, general excitability and aggressiveness directed to other dogs in the household. In contrast, owner-directed aggressiveness and tendency to chase (cats, squirrels, etc.) are not related to any other traits in this study.

Development of Personality

One issue regarding dog personality is related to development – change and continuity of personality during the life course. This question is often addressed in

Fig. 11.3. The correlation between different behavioural traits from the study of Svartberg (2005). The thickness of the line indicates the degree of correlation; from the thinnest line that represents a correlation of 0.20 to 0.25, to the thickest that represents correlations above 0.40. Dotted lines indicate a negative relationship (SRB = separation related behaviour; PS = pain sensitivity; NSF = non-social fear; ODA = owner directed aggression; SSOC=sociality towards strangers; DDAF = aggression and fear directed to unfamiliar dogs; FDA = aggression towards other dogs in the family; EX = excitability; AAS = attachment and attention-seeking behaviour; SDA = stranger-directed aggression; SDF = stranger-directed fear; DSOC = sociability towards dogs; HPLAY = playfulness towards humans; TRAIN = trainability; CHASE = interest in chasing).

human personality research. Within the study of animal personality, development of stable dispositions is less often studied. As a starting point for a discussion of what we know about personality development in the dog, three questions regarding personality development in humans formulated by Caspi and Roberts (2001) may be useful: (i) how early in the life course can we identify characteristics unique to individuals that will show continuity and change in personality? (ii) when in the life course is personality fully developed? (iii) what life course factors moderate continuity and change in personality? We are limited to the few longitudinal studies that have been carried out, something that we should have in mind when interpreting the results.

How early can we tell?

Among the relatively few studies where stability of behaviour from young age in dogs has been in focus, fearfulness is the most studied trait. There are some

suggestions on very early indications of fearfulness. Royce (1955) used data from a battery of tests carried out within the research programme at the Jackson laboratory (Scott and Fuller, 1965). He found that the average number of vocalizations – whines or yelps – from birth to the third week (observed during weighing) correlated with reactivity score in several situations at the 18th week, as well as with some physiological measures (blood pressure and sinus arrythmia) at 8–9 months of age. Another early sign was a fearfulness score (rated during a handling test) at the fifth week, which correlated with reactivity measures at 1 year of age. A study by Goddard and Beilharz (1986), which was carried out in order to predict fearfulness, activity and trainability in potential guide dogs, suggested that fearfulness was stable from 8 weeks of age. However, the correlation with adult general fearfulness increased with test age: better predictions were made at higher ages.

These results suggest that aspects of the dog's fearfulness may be possible to detect at a very early age. This is supported by a study on wolf pups, where several different tests at 7–9 weeks of age were carried out (Fox, 1972). The results suggested that one general boldness dimension could explain individual differences in a range of situations, including prey-killing, fearless behaviour in different situations and a tendency to dominate other pups. Puppy-boldness, in turn, predicted dominance score at 1 year of age, which suggests that the individual's general boldness, or the tendency to act in a fearless way, is developed at an early age.

The early fearfulness signs, which are promising from a prediction point-of-view, are contrasted by results of other traits. Several studies in this area suggest that behaviour before 8–10 weeks has a low predictive value for the adult's typical behaviour. For example, a study on the predictability of dominance and activity level using a popular test developed by Campbell (1972) suggested no correlation between 7 and 16 weeks of age (Beaudet et al., 1994). Another example is the study of Wilsson and Sundgren (1998), who used data from tests carried out by 630 German shepherds at the age of 8 weeks and at 15–20 months. There were no correlations found between behavioural measures from the early test (vocalization, reaction to a person, reaction to play objects, activity level) and measures from the adult test (however, this result could be explained, at least in part, by differences in methodology between the two tests).

Even though there are relatively few studies in this area, it seems that the predictive power of puppy testing is low. The exception may be fearfulness, which may be able to be predicted at an early age. At what stage it is possible to predict other traits is difficult to assess based on the knowledge so far.

When is personality fully developed?

A common but probably misleading view is that personality develops from birth to a certain age, and then remains stable. In human personality studies, it seems that stability of personality is rather low in childhood, increases in adulthood and
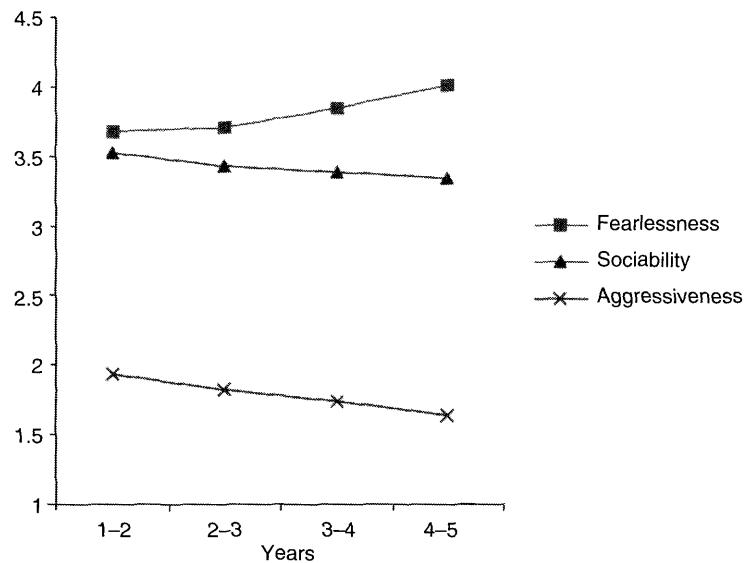
reaches a plateau between the ages of 50 and 70 (Roberts and DelVecchio, 2000). However, even though a plateau is reached, personality also continues to change at higher ages. Unfortunately, there are no studies that give us knowledge regarding this issue in dogs. Some studies show high stability of personality traits in dogs over short periods of time (1–2 months) in adult dogs. For example, high rank-order correlations (0.6–0.9) have been shown for sociability towards humans, non-social fear, playfulness towards humans and aggressiveness in adult dogs (Svartberg *et al.*, 2005). However, short-term stability is a basic criterion for personality traits, and does not necessarily tell anything regarding stability over the life span. There are also indications on stability over longer periods of time for these traits (Svartberg, 2005), but how they change in magnitude over the life span, if they change in a predictable way, is not known.

Results from the behavioural test DMA may give us some information regarding the traits that are assessed in the test. Dogs are tested only once, but the differences in scores between dogs of different age might give an indication on how personality changes over time. In order to investigate this question, I used data from one large breed, the German shepherd, where it was possible to group dogs according to test age. Very few dogs are tested at an age above 5 years, but four age categories were possible to compare (1–2 years, $n = 6$, 113; 2–3 years, $n = 675$; 3–4 years, $n = 192$; and 4–5 years, $n = 80$). Of the personality traits that are expressed in this test, three were of greater interest: curiosity/fearlessness (expressed as non-social fearlessness in everyday life); sociability; and aggressiveness. As Fig. 11.4 shows, there are differences between age categories for these traits. The same trends were found for both sexes, which indicates that non-social fearfulness, sociability and aggressiveness decrease slightly over the years.

These results, however, are only a rough indication. To really understand how personality changes over the life-span, studies where dogs are followed longitudinally are needed. Hopefully, such approaches will attract researchers in the future.

What factors moderate continuity and change?

The common way of thinking is probably that environment causes change in behaviour during development, whereas the genetic bases of behaviour make behaviour stable. Regarding environmental factors that influence behavioural change, it is likely that a range of factors may contribute to the variation of dog personality. The transition from the kennel to the new home may be an important factor, as well as the family setting in the new environment. The presence of other dogs, number of family members and their age, the non-social environment in which the puppy grows up – countryside or city – as well as how the social environment treats the young dog are probably important moderators of the dog's personality. There are, however, few studies that have focused on the importance of different environmental factors on personality in the growing dog, probably

Fig. 11.4. The figure presents the scores for the traits curiosity/fearlessness, sociability and aggressiveness assessed in the DMA test for four categories of dogs based on test age (German shepherds, males and females pooled). Statistically significant decreases in scores with age were found for sociability and aggressiveness, whereas a significant increase in curiosity/fearlessness was detected.

due to the methodological problems of separating different factors from each other. There are some indices from studies where the focus has been on factors associated with aggressive behaviour in dogs. For example, Podberscek and Serpell (1997) found several differences in environmental factors between a high-aggressive group of English cocker spaniels and a low-aggressive group. Owners of low-aggressive dogs were older and more attached to their dogs, whereas high-aggressive dogs were groomed less often and given less exercise. Another study showed that aggressive dogs, compared to dogs that are attacked ('victims'), are more commonly trained by shaking and hitting, whereas a dog owner attitude of believing that dog training should be fun or that training is irrelevant was associated with victim dogs (Roll and Unshelm, 1997). There are some other studies that indicate the importance of owner attitude on dog behaviour. For example, anthropomorphic involvement by the owner has been found to be associated with dominance aggression in the dog, whereas owner anxiety seems to be associated with over-excitement and aggressiveness in the dog (O'Farrell, 1997; Podberscek and Serpell, 1997). Even though these results tell more about how different life situations influence the eliciting of different behaviour, they might also indicate that these factors can be important in the development of a dog's personality.

The view that stability of behaviour during the development is caused by a strong genetic basis probably has its roots in work by early ethologists. Behaviours that were species-specific and difficult to alter with training attracted interest, which contributed knowledge about what has been called fixed action patterns

and instincts in a range of species. However, more current research has shown that it is hard to find behaviour in a species like the dog that is totally 'genetic': dog behaviour, in general, is possible to change by environmental factors. However, genetic factors may limit the possibilities, and set boundaries for the development of a behaviour. In some cases, there seem to be very narrow boundaries, which makes the influence by environment rather minor. The degree of heritability of a behaviour (see Chapter 4 in this volume) may give us a hint about how strongly the behaviour is influenced by genetic factors. In a few cases, behavioural traits seem to be strongly influenced by genetic factors. One example comes from an unpublished study by Arvelius (2005), who studied the heritability of herding traits in the border collie using data from a herding test carried out during early training. These results suggested heritability estimates of between 0.40 and 0.55 for several herding traits (for example, the tendency of keeping distance to sheep and anticipation of sheep movements), which suggests that these rather specific traits to a large extent are influenced by genetic factors. Regarding traits that may be considered as broader personality traits in the dog, such high estimates of heritability are rather uncommon. Heritability estimates of 0.2–0.3 are often acknowledged as relevant and rather high. A study of the heritability of the traits found in the DMA is an example of this (Strandberg *et al.*, 2005). The results suggested heritability estimates of 0.23 for curiosity/fearlessness, 0.22 for playfulness and 0.15 for aggressiveness. Such results indicate that there are genetic bases behind personality traits in the dog, even though these should not be over-emphasized. Thus, genetic factors may buffer the impact of environmental influences, and create stability during the development.

This view, however, is not telling the whole story. Genes may create change, and environment may cause stability. One obvious example of gene-created changes in behaviour is sexual maturity. During the transition from juvenile to adult, the genetic expression changes. Some genes that were active during the juvenile period deactivate, and other genes start to produce proteins that influence changes in the dog's typical behaviour. The findings that gene activation is fluctuating, over both the short and long terms, give a contrasting picture compared to the traditional 'stable gene' perspective (changes in gene expression is described in Chapter 4 in this volume). On the other hand, stability in personality may be caused by environmental factors: environmental stability causes stability in behaviour. A dog that changes homes several times during its lifetime may appear inconsistent in its typical behaviour, whereas a dog that lives in a non-changing environment may be assessed as more stable. This perspective is important when applying results from developmental studies. A common goal in scientific studies is to control or wipe out factors that may create variations that are not relevant to the aim of the study. For example, Scott and Fuller (1965) tried to give all dogs a similar environment during their first year of life due to the interest in the genetic basis of social behaviour. This meant, for example, that the puppies never made the typical transition from the kennel to the new owners at about 8–9 weeks of age. In turn, this effect upon behavioural development was never studied, which may make it difficult to apply their results to pet dogs. For

example, the breed differences found might be less pronounced when studied in a non-controlled environment.

There is an ongoing interaction between genes and environment, and it is seldom possible to single out one cause for behavioural development. The most striking example of such an interaction is the impact of environment during the socialization period. This period in the dog's life, which is assumed to range from 3 weeks to about 3 months of age, is marked by the large influence environment has on future behaviour. A number of experiments have been done regarding this, which show that several stable characteristics in the adult may be set during this period. Examples are fearfulness towards dogs and humans, reactions to separation, general activity level and trainability (reviewed in Lindsay, 2000; see also Chapter 6 in this volume). If the dog is able to interact with several dogs and humans during this period, the probability of developing high fearfulness in social situations diminishes. If this is delayed to after 3 months of age, the effect of the social interaction will be smaller, especially if the dog has been separated from dogs and humans before this age. Thus, the socialization period is a good example of how genes and environment interact: the genes open up a 'socialization window' during a specified period, but the effect of this is dependent on environmental factors during this period.

The currently emerging research within genetic techniques, which is developing very fast, may soon give us more knowledge of the genetic basis of behaviour – which genes influence which behaviour, and the function of the mechanisms that are in charge during development. With this as a base, we may single out environmental factors – what and when – that are important during the development of personality in dogs. Results from other species are promising. For example, newborn rats that do not get licked and groomed by their mothers grow up timid and highly sensitive to stress (Weaver et al., 2004). The mechanisms behind this effect seem to be an increase in methylation, which suppresses genetic activation. The decrease of genetic activation in a certain gene, a promoter for the glucorticoid receptor gene, causes fewer receptors to be produced, and, in turn, more timid and anxious rats.

Applied Use of the Personality Concept

This chapter has dealt with dog personality mostly from a scientific point of view. However, the concept of personality is also relevant, and has a widespread use, among dog owners, dog trainers and breeders. Besides the traits that have been presented here, there are numerous others. For example, in the breed standards there are large numbers of adjectives describing each breed's typical behaviour; most of these adjectives are similar to personality descriptions used for humans. There are also a number of popular behavioural tests that are used in the prospect of revealing the dog's typical way of acting, from a variety of puppy tests to different tests used to capture the typical behaviour of adult dogs. Evidently, personality in dogs – perhaps more often referred to as mentality, temperament

or nature in everyday terms – is relevant for all persons involved in dogs in one way or another. It is important to describe the characteristics in dogs; for the breeder, who cares for a selection of suitable breeding animals and strives for a good breeding result; for the dog trainer, who is interested in selecting potential individuals or matching the dog with adequate training; and for the dog owner, who might want to understand the essence of his or her dog.

While the benefits of using labels and behavioural tests to describe dog personality among dog people are clear, it could be important to highlight some drawbacks. Regarding descriptions of personality in dogs, it seems to be difficult to find a consensus even among scientists, which of course makes it more difficult for laymen to develop a common language regarding behavioural differences in dogs. A characteristic named 'stress-proneness' by one person could be referred to as 'liveliness', 'active temperament', 'high drive' or 'happiness' by others. Alternatively, one label may have different meanings to different persons. A dog with a 'calm' temperament according to a breeder of a pet dog breed may very well differ significantly in its typical activity level compared to another dog with the same description made by a breeder of working dogs. Even such a specific trait label as 'interest in objects' may differ between persons. One might mean the dog's interest in tug-of-war, another the dog's willingness to carry objects in the mouth, and a third the dog's enthusiasm to search for motivationally significant objects (such as toys or dummies). The differences in terminology might be a unsolvable problem, at least as long as the scientists in this field have difficulty reaching consensus. Within the field of science this is partly solved by a routine of defining concepts and terms that otherwise could create misunderstandings (for example, 'sociability' might be defined as 'the dog's interest to interact with other individuals in a positive manner'). My belief is that this strategy would be beneficial for the non-scientific part of society that deals with dogs. The mere knowledge of differences in definition is important to bear in mind in order to avoid confusion; defining terms and labels would be even better. In other words: don't take descriptions of behaviour and personality for granted, try to understand what is meant by them.

When it comes to behavioural tests it is important to bear in mind that the usefulness of results from a test is often very limited. The test situation itself limits the usefulness, something that has been described previously in this chapter. Some traits are possible to detect in a test, whereas others are not. Besides this, behaviour tests arranged by laymen often have several weaknesses.

First, the standardization of the test situations is often poor, so dogs may experience different test stimuli. For example, one dog may be tested in a situation where a person throws a tennis ball away from the dog, a second will experience a ball thrown to the side and a third dog may be put in a situation where the ball is coming towards it. When a test situation has this sort of variation – which could be both larger and smaller compared to this example – it could be difficult to separate the effect of test variation from the effect of variation in personality between dogs.

Second, the way of describing the dog's behaviour in a test is often insuffi-

cient. It might be too general to be adequate. For example, a three-step scale with the alternative of 'shows no aggression', 'shows moderate aggression' and 'very aggressive' may miss important differences between individuals (especially if the third alternative is only rarely used). Another issue, which might be more problematic, is that the description of the dog's behaviour or personality can be a mix between intensity and value, or just an evaluation that ranges from 'good behaviour' to 'bad behaviour'. When such a description is made, the person who describes the dog assesses the behaviour against some pre-defined standard. The risk of this is that this standard becomes a 'golden standard' for dogs in general, even though it was meant to be used for a specific object. One example could be that a dog that has carried out a test for working dog aptitude may be regarded as 'unsuitable'. This might give valuable information for the owner regarding working dog use, but it may say nothing about the dog's suitability to be a pet dog, or usefulness in some dog sport. Thus, it is important to look at the standards from which statements are made regarding the value of the dog's personality.

Third, even though it might seem that the test is useful for making predictions of a dog's potential in a certain area – such as working dog, hunting dog, herding dog or pet dog – it is very likely that test results have not been validated against the use for which they are meant to predict. Thus, there is a risk that the test result is a poor predictor for future behaviour and performance. For example, a puppy might be assessed as 'dominant' in a test made by the breeder, but the predictive power for development of dominance-related behaviour in future may be very little, *unless* someone has studied the correlation between test results and future behaviour in an unbiased manner and found positive associations between these two.

In conclusion, personality in dogs is of great relevance for all of us who in some way have dogs in our lives. There are, however, some difficulties in the application of the concept of personality in everyday life. One issue is that we have different ways of describing the typical behaviour of dogs. This may result in confusion and misunderstandings. Better definitions of terms and labels would improve communication. Another issue is the relevance of results from behavioural tests carried out by laymen. Poor standardization, insufficient description methodology and overestimation of the predictive value of the test results are three possible problems. Nevertheless, behavioural tests organized by serious breeders, dog clubs or trainers may give valuable information of a dog's personality. It is, however, important to use the information from these tests with great care, and avoid far-reaching conclusions.

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