

Canine Aggression Toward Familiar People: A New Look at an Old Problem

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Aggression, and specifically aggression toward owners, is the behavior problem most often referred to behavior specialists ([Appendix 1](#)) [1]. Although this complaint is common, it also is frequently misunderstood. In this article, the authors question the traditional explanation of owner-directed aggression as related to a dominance–submissiveness relationship between owner and dog, based on research findings, and provide alternative concepts.

To understand canine aggression better, it is necessary to examine canine social behavior and communication.

DOMESTICATION AND CANINE BEHAVIOR

Although dogs and wolves have phylogenetic similarities, they also are quite different. Dogs have been domesticated for at least 12,000 years and have been selected to remain behaviorally immature compared with wolves [2]. This retardation of development, or neoteny, accounts for many of the pronounced behavioral differences between dogs and wolves. Even in adulthood, dogs show many behaviors typical of juvenile wolves: they remain playful, enjoy physical contact, are highly social, and bark, paw, and nuzzle. Some breeds are more highly neotimized and show more of the behaviors characteristic of wolf puppies than other breeds do [3].

Another notable difference between dogs and wolves is that, unlike wolves, feral or free-ranging dogs do not form well-structured packs. Instead, they live in loosely knit groups, typically of two to five unrelated individuals, formed and increased in size by the abandonment or escape of pets [4].

These findings suggest that the extrapolation of wolf social behavior to dogs—or to dogs and their human families—probably is inappropriate.

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BODY LANGUAGE AND CONFLICT BEHAVIORS

Understanding canine communication and body language and in particular understanding conflict behavior allows the veterinarian to draw conclusions regarding a dog's motivation to be aggressive. This understanding also helps predict incidents of aggression and, it is hoped, to avoid experiencing its consequences.

Dogs communicate by using visual, auditory, and olfactory cues [5]. For humans, the visual cues usually are the most obvious, and the olfactory cues are the least salient.

Visual Communication

Depending on the situation, temperament, genetics, and experience of the individual dog, any of the following behaviors and body postures may be displayed in social situations:

- Self-confident and assertive dogs typically carry their body weight forward, with pricked or erect ears and elevated tail.
- Submissive dogs or dogs showing appeasement behavior typically carry their body weight low to the ground and shifted backward, with ears and tail low and close to the body.
- An offensively (rather than defensively) aggressive dog stands tall with ears and tail up and curls the lips with the corner of the mouth forward and only the incisors and canine teeth exposed.
- A direct eye stare indicates a confident dog and may precede offensive aggression. Avoiding eye contact usually indicates some degree of fear, anxiety, or conflict and may be an appeasement behavior.
- Defensively aggressive dogs lower themselves and shift their body weight backward, raise the lips with the corner of the mouth drawn backward, and expose the teeth on the side of the mouth as well as the incisors and canines.
- When a subordinate social partner greets a more dominant one, it shows appeasement behavior with the body lowered and the tail low and wagging very quickly. This behavior is accompanied by muzzle licking and nuzzling, as during food solicitation from a puppy to an adult. It is important to realize that these behaviors are appeasement behaviors and can be shown to any threatening individual, not just toward dominant members of a hierarchy.
- Exaggerated forms of appeasement include rolling over, exposing the belly and urinating
- Piloerection (raised hackles) indicates fear and anxiety.
- Mounting usually is not related to dominance but rather is a conflict behavior indicating some uncertainty related to the other dog (or person).

Conflict Behavior

Dogs often display signals that seem to be contradictory. In addition, they may exhibit behaviors that apparently are out of context, unrelated to those described in the previous section. Such behaviors may be conflict behaviors resulting from stress, frustration, or motivational conflict. Among other reasons, stress frequently results from an environment that is unpredictable

and does not give the dog any control over events, such as pleasant or aversive stimuli. Frustration results from the dog's being motivated to perform a behavior but thwarted from performing it. A dog is in motivational conflict if it experiences two opposing motivations, such as for approach and for withdrawal. For example, a dog that wants to socialize with a person but at the same time is afraid of how the person might react is in an approach-withdrawal conflict.

Conflict behaviors include yawning, lip- or muzzle-licking, looking away or toward the ceiling, visually scanning the surroundings, squinting the eyes, licking objects, scratching self, vocalization, and many others. Even aggression may be performed as a conflict behavior. Some conflict behaviors have become part of the normal behavior repertoire of dogs and a means of communication. These behaviors include averting the gaze when a threatening or dominant dog approaches, cowering and tucking the tail, rolling over and possibly urinating, growling and displaying the "submissive grin," and whining. These behaviors have become appeasement behaviors and are used by a low-ranking or fearful dog to inhibit aggression from a dominant dog or a frightening human. The play bow probably is another ritualized conflict behavior. It is a combination of moving forward and an intention movement to jump backward. It has become a means of signaling a nonthreatening approach.

Mounting, which often is interpreted as a sexual behavior, most commonly indicates that the dog experiences a conflict related to the mounted individual.

It is important to keep three things in mind regarding conflict behaviors in the dog. First, any of these behaviors also may be shown when the dog is not in conflict; for example the dog may yawn because it is tired or scratch because it itches. Thus, context always is important when interpreting these behaviors. Second, although ritualized conflict behaviors have become normal or species-typical social behaviors, they also are shown when the dog is in conflict. They therefore do not necessarily indicate that the relationship of owner and dog and is one of dominance and submission, nor do they necessarily allow any interpretation of the relative social position of the dog and owner. Third, it is important to be aware of and observe conflict behaviors, especially in aggressive dogs, because they indicate some degree of stress and uncertainty. Most important, such behaviors may predict imminent aggression and may point toward the reason for aggression. During human-dog interactions and in training, they may indicate that the dog is confused about what is expected or is afraid of the training situation (eg, of punishment-based training). During behavior modification such as systematic desensitization, conflict behaviors may indicate that the training has moved a bit too quickly. If a dog shows conflict behaviors when approached by a person, they indicate that the dog is uncomfortable or fearful relative to that person and may not necessarily indicate anything about social status. Conflict behaviors also should be monitored throughout the treatment of aggression, because they are a more sensitive indicator of stress or conflict than is overt aggression. In fact, close monitoring of conflict behaviors may help avoid overt aggressive responses.

Because conflict behaviors are an indication of underlying stress, punishment (which increases stress) is contraindicated. Even though punishment could be effective in suppressing particular conflict behaviors at the moment, it does not address the cause of the problem and in many cases increases the stress and conflict that lie at the root of the problem. Thus, because punishment does not address the underlying emotional state of the animal, it is likely to increase the conflict behaviors or may eliminate one behavior but induce another conflict behavior. For example, a German Shepherd dog was aggressive (because of motivational conflict) toward its owners when young. The owners were instructed by their trainer to leave a short line on the choke chain and to give a severe choke chain correction to punish the aggression. This technique suppressed the aggression (it “worked” according to the owner). A few days later the dog started tail chasing. It was presented to the behavior clinic for persistent tail chasing (several hours a day) when it was almost 1 year old. In this case, the outward aggressive responses were suppressed, but the underlying emotional state of conflict remained and resulted in the performance of a displacement behavior (ie, tail chasing).

CANINE AGGRESSION

Aggression is not a diagnosis. To approach a problem of canine aggression clinically, a diagnosis must be made first.

Types of Canine Aggression Toward Humans

The following list is a useful clinical classification of canine aggression exhibited toward humans:

1. Fear-induced aggression
2. Resource guarding (possessive aggression)
3. Conflict-related aggression (“dominance aggression”)
4. Territorial aggression (toward strangers and unfamiliar dogs)
5. Predatory aggression
6. Play-related aggression
7. Excitement-induced aggression
8. Pain-induced aggression
9. Maternal aggression
10. Disease-induced aggression/Irritable aggression

Most types of aggression also can be redirected toward another person or animal rather than toward the intended target (“redirected aggression”) and also often have a learned component.

Neurophysiology and Pharmacology of Aggression

Although play-related aggression directed toward the owner (especially if there is no bite inhibition) and occasionally predatory behavior, which may be directed toward children running or riding on bicycles, can be a problem, these behaviors are considered “nonaffective” or nonemotional behaviors rather

than examples of aggression. This article is concerned primarily with affective aggression.

Although behaviorists discriminate among many different types of aggression according to trigger, target, motivation, and other factors, neurophysiologists discriminate between only two or possibly among three types of aggression. Affective aggression also could be called “social aggression,” can be offensive (self-confident) or defensive (fearful), and is associated with a high level of sympathetic arousal. Affective aggression serves to increase the distance between the subject and a threat or nuisance. In contrast, predatory aggression is part of feeding behavior and really should not be called aggression at all. It is regulated by the appetite-regulating centers in the hypothalamus. It does not involve sympathetic arousal, and stimulation of the amygdala inhibits predatory behavior. Play-related aggression may be distinct from the two other types but has not been studied well.

Aggressive responses are preprogrammed in the brain stem, specifically in the periaqueductal gray matter of the midbrain. The expression of offensive aggression is controlled by the hypothalamus and the limbic system, especially the amygdala. The activity of the limbic system is influenced by perception of the environment (sensory systems, including the vomeronasal organ which perceives pheromones) and previous learning processes. In humans, amygdalotomy was recommended for treatment of aggression. The amygdala also is involved in all other emotional responses, however, so amygdalotomy blunts all emotions.

Defensive aggression is controlled by neurons in the periaqueductal gray matter (with input from the amygdala and the hypothalamus). The same centers control flight and immobility, as well as the killing bite, but not stalking and chasing. The hypothalamus and the amygdala are involved in defensive aggression as well by modulating these responses. Amygdalotomy can “tame” wild animals by eliminating fear aggression.

Serotonin is a neurotransmitter that has been implicated in affective aggression. It has been shown that some aggressive dogs have lower serotonin metabolites in the cerebrospinal fluid (CSF) and thus presumably have lower levels of serotonin in the brain [6]. In laboratory animals, destruction of serotonergic neurons increased offensive aggression, whereas increased serotonergic activity at synapses decreased offensive aggression. Injection of serotonergic agonists (serotonin-like substances) into the amygdala decreased aggression. (Interestingly, serotonin agonists, while decreasing aggressiveness, increased social status; serotonin antagonists decreased it.) This finding suggests that serotonin re-uptake inhibitors that reduce the breakdown of serotonin should be useful in treating affective aggression in dogs. For a review of the physiology of aggression, see [7].

Serotonin also is a neurohormone acting at targets that are remote from the site of release (as opposed to a neurotransmitter, which acts locally on receptors in the synapse into which it was released). As a neurohormone, serotonin is believed to have modulatory effects on other neurotransmitter systems such as

the dopaminergic system, which also has been implicated in aggression. The neurohormonal role of serotonin in aggression has not been elucidated.

Serotonin reuptake inhibitors are used frequently in the pharmacologic treatment of canine aggression, although conclusive clinical trials are lacking [8,9]. Not every case of owner-directed aggression is an indication for pharmacologic treatment, however, nor is fluoxetine the only or best choice in each case. The indication for a drug and the choice of drug needs to be determined individually, and blood tests assessing liver and kidney function always are indicated before a drug is used.

If fear and anxiety historically have prevented a dog from attacking its target, anxiolytic drugs (particularly benzodiazepines) sometimes can reduce fear and anxiety and thus disinhibit aggression or can have a paradoxical effect and increase anxiety and aggression. Therefore, when drugs are used to treat aggression in dogs, safety and preventive counseling is important, and clinicians should request that the owners sign a liability waiver attesting that they understand that risk. In some cases a muzzle may be used as an additional safety tool.

It also has been reported that tryptophan supplementation of a low-protein diet was successful in diminishing signs of owner-directed aggression [10]. Tryptophan is a precursor of serotonin, and a low-protein diet facilitates its uptake into the brain.

Genetic Basis for Aggression

Genes, of course, do not code for behavior. Rather, they code for proteins that are used as building blocks for the structure of the central nervous system, for enzymes, for neurotransmitters and neurotransmitter receptors, for neurohormones, and for sensory and effector organs, among others. They also affect mRNA folding, if and when other genes are expressed, transcription factors, and secondary messenger systems. Through these more indirect ways, genes do influence the functionality of the central nervous system, motivation, motor patterns, perception of stimuli, and responses to environmental and social stimuli.

A genetic effect on behavior can be demonstrated for qualitative traits by comparing related species or different breeds within the same environment, through the study of twins in different environments, by pedigree analysis, and by producing hybrid crosses. Quantitative effects can be studied through selection and inbreeding experiments. As a consequence of the separation of the gene pools for purebred dogs and some degree of inbreeding, it can be expected that behavior and temperament and the prevalence of behavioral disorders would differ among breeds of dogs. In their classical study, Scott and Fuller [11] found distinct behavioral differences between the breeds that they studied. Emotional responses to test situations varied particularly strongly among breeds. The investigators also found great within-breed variation and suggested that selection for temperament within a given breed should yield results rapidly. Later, Cattell and colleagues [12] tested 101 dogs belonging to five breeds for 15 different behavioral variables and were able to assign the dogs to

their breed correctly based on the behavioral measurements. Other studies have revealed breed differences in receptors for dopamine, a neurotransmitter that is involved in emotional and aggressive responses [13–15]. It therefore is not surprising that behavior traits such as excitability and general activity, aggressiveness, reactivity, playfulness, destructiveness, and ease of housetraining differ among breeds [16,17].

Of more interest to breeders are within-breed genetic differences in behavior. Svartberg [18,19] and Svartberg and Forkman [20] identified four personality traits in dogs (ie, aggressiveness, playfulness, curiosity/fearlessness, and chase proneness), the latter three traits forming the super trait, shyness/boldness. Heritability of these traits has been shown to be moderate (29%–40%) for aggressiveness and high (54%–74%) for shyness/boldness [21].

A recent study [22] in Golden Retrievers showed high (80%) heritability of aggressiveness, with only one or few genes determining whether a dog was categorized as aggressive. In Cocker Spaniels, a genetic effect on aggression has been demonstrated by showing that different coat colors are associated with different levels of aggressiveness [23]. In English Springer Spaniels, aggressiveness is associated with a particular sire [24].

These studies show that there is a genetic basis for aggressiveness, that breeds differ in how likely they are to be aggressive, and that selection against aggressiveness should produce rapid results. There currently is no reliable test to measure aggressiveness, however. The best data might rely upon honest reports from dog owners about aggressiveness in real-life situations [19]. It should be noted, however, that the heritability of aggressiveness was found to be only moderate. Therefore, although there is an obvious genetic contribution to a dog's level of aggressiveness, the environment also plays an important role.

CANINE AGGRESSION TOWARD OWNERS

Conflict-related Aggression

Prevalence

Aggression toward owners traditionally was diagnosed most commonly as dominance-related aggression. By definition, dominance-related aggression is directed toward household members in situations in which the social position of the (dominant) dog is challenged.

A recent study at the Atlantic Veterinary College found that 40% of dogs had growled at a household member in some situation. More than 20% had growled or snapped over food or objects, and more than 15% bit a household member. About 12% of dogs bit their owners hard enough to leave a mark [25,26].

A survey study of English Springer Spaniels performed at Cornell University [24] showed that more than one fourth of the dogs (26.3%) had a history of biting someone, and about two thirds of these (65.2%) bit familiar people. Approximately, one sixth of the studied population of English Springer Spaniels had bitten a familiar person.

Differential diagnosis

“Aggression toward owners” is neither a diagnosis nor a homogeneous condition: it is likely to have a variety of causes. In a study of CSF neurotransmitter metabolites in aggressive and nonaggressive dogs, only some dogs that were aggressive toward their owners had changes in neurotransmitter levels [6]. In another study, aggressive behavior worsened in some females but not in others after neutering [27]. Some dogs growl before biting, but others do not. Body language is quite variable among affected dogs. Individual affected dogs respond differently to treatment.

Aggression toward household members can have many reasons. Differential diagnoses include “dominance aggression,” conflict-related aggression, resource-guarding or possessive aggression (often considered a subtype of conflict-related aggression), fear-induced aggression, play aggression, excitement-induced aggression, and maternal aggression. It should be kept in mind that a dog that is excitable for any reason is more likely to be aggressive (or to show any other behavior problem). Hyperexcitability therefore should be addressed if present.

In cases of canine aggression, it is advisable to perform a physical examination with a basic neurologic examination (which frequently is difficult or impossible because of the aggression), a complete blood cell count, serum chemistry panel, and urinalysis. Medical differentials that should be considered are hepatic encephalopathy, hypothyroidism, and neurologic disorders such as seizures, storage disease, inflammatory and infectious diseases, and brain tumors. It should also be kept in mind that any disease process that makes the dog feel uncomfortable or painful may increase aggression. Such conditions include arthritis, otitis, dermatologic conditions, and any systemic disease. Other conditions that have been mentioned as differentials for aggression include acute renal failure, hypoglycemia, sensory deficits, hydrocephalus, meningoencephalitis, rabies, pseudopregnancy, Cushing’s disease, and hypocalcemia [28]. Therefore a veterinarian always should be involved in the clinical treatment of canine aggression.

Diagnosis

The behavior diagnosis is based primarily on historical information regarding the dog’s development, its current and past living situation, its temperament, the current presentation, and the development of the behavior disorder, along with a detailed history of recent aggressive incidents. Consequently, the history is broken down into three parts. One contains questions on general pet history and management. The second part addresses temperament by asking the owner to describe the behavior of the pet in a number of every-day situations (eg, its reaction when meeting a stranger on or off the property, when meeting children, when handled or restrained, around the food bowl, and in other situations). The clinician then categorizes the behavior (eg, as fearful behavior, offensive and defensive aggression, excitability). The third part contains information about the actual behavior problem. This information includes general

information: when and where the behavior occurs; what triggers the behavior; what behavior is shown (including body language and facial expression); who/what is the target; how people react and how the animal behaves right after an incident; the frequency and severity of the problem; and ways the owner has tried to treat the problem. For the aggression to be diagnosed correctly in individual cases, however, the history must include more than just the nature of the problem at presentation. It needs to consider the early history of the patient, when and how the problem presented initially, and how the problem presents now. Detailed descriptions of incidents are required. It is useful to have clients describe the most recent three and the very first two or three incidents. The description includes the location, the people and dogs present, their behavior just before the aggression, the aggressive behavior including the dog's body language, and the behavior of the dog(s) and people after the aggression. Owner–dog interaction is evaluated, among other things, by asking for descriptions of the owner's reaction to the aggression, of how the owner trains and disciplines the dog, and of the general management of the dog.

Clients are asked to bring along a videotape of the behavior, if possible. In cases of aggression, of course they are not asked to record a biting incident. It is helpful, however, to see how the owner and pet interact with each other in various contexts and what the pet's body language is during these interactions. Clients also are asked to bring along all training tools that they use or have used with their dog and the pet's favorite treats.

Factors associated with owner-directed aggression

As already mentioned, most cases of aggression toward household members have been diagnosed, by convention, as “dominance-related aggression.” “Dominance-related aggression” usually is described as aggression toward household members in situations in which the social position of the (dominant) dog is challenged. Often the owners report that the aggression is unprovoked (which only rarely holds true) and may occur without warning. If they can describe the body language, it is often ambivalent between offensive and defensive. Typically, the dog slinks away and “seems remorseful” (ie, shows appeasement behaviors) after the incident.

Consistent with a diagnosis of dominance-related aggression, it often was contended that aggression toward owners is a problem seen typically in intact male dogs about 2 to 3 years of age. It was assumed that the human family replaced the dog's pack, and that these dogs try to gain the top or alpha position. Once they have achieved that goal and are the dominant member of their family pack, they discipline other “pack” members (family) if these challenged the pack leader (the dog). In most cases, however, findings in the history and in the description of the dog's behavior are inconsistent with this traditional understanding of aggression directed toward household members. In fact, a careful analysis of clinical cases and newer research findings, as well as theoretic considerations, put the validity of a diagnosis of “dominance-related aggression”

into question. The following sections present some more recent findings on aggression to household members.

Genetics

The study performed at the Atlantic Veterinary College found English Springer Spaniels and miniature breeds to be overrepresented among the biting dogs [26]. The Cornell survey of English Springer Spaniel owners reported that show dogs, being bred by a “hobby breeder,” (choices for source in the survey included “hobby breeder/private home,” “professional breeder/kennel,” self, previous owner, pet store, and shelter), and being bred at one particular kennel and by one particular sire from that kennel in a four-generation pedigree predisposed for aggressiveness [24].

Gender

In an analysis of the caseload at the Ontario Veterinary College, although males were overrepresented among dogs that had dominance-related aggression as compared with dogs that had other behavior problems, neuter status had no influence. Guy and colleagues [26] showed that intact females were least likely to have bitten, and neutered males were most likely to have bitten. Among small breeds, being a female was a significant risk factor for biting, although this finding may have been a sampling effect rather than a true gender effect. Aggressive behavior of males occurred in more contexts and was considered more frightening by owners. This finding might be an additional reason males are more likely to be referred to a behavior specialist [29].

Reisner and colleagues [24] identified being male and being neutered (in either sex) as risk factors for biting.

Age

Of the cases analyzed at the Ontario Veterinary College, more than 50% of dogs started to exhibit “dominance-related aggression” at less than 1 year of age, and many exhibited this behavior as young as 3 to 4 months of age. Guy and colleagues [26] found that many dogs with aggression toward household members had growled over their food by the age of 2 months. At Purdue University, more than 70% of dogs had started to be aggressive by 1 year of age, and about 40% had begun to be aggressive by the age of 6 months. These findings are inconsistent with the traditional view of dominance-related aggression. Reisner and colleagues [24], however, found that being more than 4 years old was a risk factor in English Springer Spaniels.

Body language

Clients often report that their dogs show ambivalent body language during an attack, that they tremble after an attack, and that they slink away and seem “remorseful” (ie, show appeasement behavior) shortly after an attack. During behavior consultations, dogs presenting for aggression toward owners often show signs of fear. Again, this finding is inconsistent with the dog’s being dominant.

Owner interaction

Dogs that were obtained for breeding or showing had less owner-directed aggression, and dogs obtained mainly for exercise had less owner-directed aggression and were less likely to compete aggressively for attention. Dogs of first-time owners were more likely to show aggression toward their owners and were more fearful. First-time owners rated their dogs as more excitable and less obedient than did experienced owners [30].

Another study looked at a connection between owner personality and behavior problems [31]. The most relevant finding was that dogs of owners who had great anthropomorphic involvement with their dogs were more likely to show aggression toward family members and visitors, especially when patted or disturbed, and to demand attention. It might be that anthropomorphic relationships have little structure and, therefore, are inconsistent and unpredictable, possibly in turn leading to stress, anxiety, conflict, and aggression.

Disposition and other behavior

Dogs that show aggression toward their owners were more excitable and more fearful in the first 2 months they spent with the owner [29]. They are more likely to have had a serious illness in the first 4 months of life [32]. Dogs that are aggressive towards their owners get less exercise, are slow in reacting to commands, are more likely to pull on the lead, are more fearful of people, are more excitable, and are more likely to react to loud or high-pitched noises [25,33]. These dogs may show pronounced appeasement behavior toward their owners in various situations. Dominant behavior toward unfamiliar dogs and aggression toward household members do not seem to be correlated. Aggression toward household members often is associated with territorial aggression toward unfamiliar people.

Conclusion

To reiterate, most cases of aggression toward household members do not fit the traditional concept of “dominance-related aggression.” By far the majority of cases start at a relatively young age. The affected dogs often have a history of early disease and of excitability and fearfulness as puppies. They also are more excitable and more fearful as adults. Their body language before an attack is ambivalent and indicates high arousal. After a bite, affected dogs often are anxious and act submissive. They are likely to show appeasement behavior to people in other situations and often are submissive to other dogs. Furthermore, aggressive dogs have lower brain serotonin, whereas dominant animals should have high brain serotonin and show little aggression.

Alternative explanation

The following alternative explanation for these cases is offered. Aggression may be manifested in puppyhood as play aggression, fear aggression, or as a conflict behavior (aggression is exhibited by many species in experimental situations that induce motivational conflict or frustration). Fear aggression and conflict- or frustration-induced aggressions are rewarded by the person's

retreating and leaving the dog alone. (Play-related aggression is negatively punished by a person retreating, because the puppy wants to interact, and being ignored is a negative punishment. Play-related aggression therefore is less likely to be at the root of a persistent problem of aggression toward owners.) The puppy then learns that it can get itself out of any uncomfortable situation by being aggressive.

The aggression is reinforced by avoidance conditioning because the anticipated bad event does not occur or because uncertainty is ended. This type of aggression therefore also has been called “avoidance-motivated aggression” [34]. Behaviors reinforced in this manner are very persistent (ie, very resistant to extinction). Conditioning with negative reinforcement has an additional effect: as the animal learns that the strategy is successful, it loses its fear. Therefore, although initially aggression usually is defensive or ambivalent in nature, the aggression very quickly can turn to offensive aggression.

Some dogs are genetically quite aggressive (ie, they resort to aggression very quickly); others are not aggressive at all (aggression trait). Some dogs are very fearful; others are not fearful at all (shyness/boldness trait) [20]. Therefore, some dogs may resort to aggression when only slightly uncertain, whereas others would use aggression only when severely frightened.

For any animal, including humans, it is very stressful not to be able to predict what is going to happen or not to be able to control what is happening at the moment (ie, not having control over pleasant or aversive stimuli). To improve its well being, every animal strives to assume a certain degree of control and to maximize predictability [35]. Aggressive dogs may resort to aggression as a coping strategy [34]. Even though these dogs may not be truly fearful, they nonetheless are uncertain and therefore are anxious. They resort to aggression as their strategy to operate on the environment and achieve a predictable outcome—the frightening person backing off. These dogs present similarly to “dominant dogs” in the traditional sense, although their aggression probably has nothing to do with social order. Punishment is not likely to have a beneficial effect on the aggression in such cases and may make it worse [34]. It is conceivable that punishment, if it is severe enough, could suppress the aggression, but it does not address the cause of the aggression (ie, the dog’s uncertainty in an inconsistent environment). The authors suspect that highly trainable dogs that also are genetically predisposed to aggression may be at particular risk for that type of aggression, because they have been selected for being motivated to exert control over their environment (a dog that does not care about controlling rewards is not easily trained).

This concept has profound implications. It calls for an interpretation of the social relationship between dogs and owners using a more sophisticated paradigm than the dominance–submissiveness relationship. It points out the inappropriateness of domination techniques so often applied to puppies and adult dogs. It implies that any form of punishment for these cases of aggression is counterproductive, even though in some cases punishment can suppress the aggressive behavior. It draws into question traditional approaches to diagnosis,

especially ones focusing only on the aggression and the behavior at the time of presentation and ones relying on fixed diagnostic criteria. It points out the importance of considering the development of a behavioral problem and the disposition of an animal when making a diagnosis and of the choice of an appropriate treatment regimen. It leads away from the idea of “counterdomination” and instead compels the development of a new approach to the treatment of aggression directed toward familiar people.

TREATMENT OF CONFLICT-RELATED AGGRESSION

Treatment should address the way in which the dog is managed, the dog’s basic disposition (eg, fearfulness), and the cause of conflict (eg, inconsistency) in the owner–dog interaction and the dog’s environment.

A caseload analysis done at the Ontario Veterinary College showed that when dogs that were fed *ad lib* were switched to meal feeding the behavioral prognosis was improved. Twice per day feeding is therefore recommended. Exercise off the property reduces anxiety levels, and dogs that are exercised regularly were shown to have less of a problem with aggression [33]. Therefore, at least two daily walks off the property are recommended. Dogs with little training also are more likely to be aggressive [33], and training to some cues is important for control of the dog and for diffusing potentially dangerous situations. Training also encourages the practice of specific prescribed behavior modification exercises. The authors therefore always recommend training. Clicker training is especially helpful when dealing with these dogs; because it does not require proximity to or physical contact with the aggressive dog, confrontations between owner and dog can more easily be avoided. (For a review of clicker training, see [36].)

Next, the dog’s basic disposition should be evaluated and addressed. Aggressive dogs frequently are fearful or hyperexcitable. In the treatment of conflict-related aggression, both fear and hyperexcitability are addressed, at least in part, through “ignoring” (many cases of hyperexcitability are conditioned at least in part through owner attention, but some dogs may not tolerate a change in the amount of attention given them by owners), through consistent owner-initiated interaction (training gives the animal control over its environment and increases self-confidence), and through behavior modification techniques such as systematic desensitization, counterconditioning, and response substitution. These last three behavior modification techniques may have to be used in situations in which the dog is only fearful as well as in situations in which the dog is aggressive.

Situations in which confrontations are likely should be avoided, because any confrontation may undermine treatment success made to this point. The dog may need to be crate trained and crated or trained to an exercise pen and confined except during behavior modification excises. (Proper training to the crate or exercise pen is important so that the owner can get the dog back into the crate or pen, without confrontation, fear, or anxiety.) Confinement also is indicated when the owners are afraid of the dog, when smaller children are

involved, or when the owner is unable to avoid casual interactions with the dog. Toys or other assets that could trigger confrontations should be removed. It may be important to keep the dog from climbing on furniture, particularly if aggression occurred in a furniture-related context, either by verbal cue or by restriction from the furnished room (eg, with a baby gate). The dog should be re-introduced to such situations only in the context of systematic desensitization, counterconditioning, and response substitution.

The main reason for conflict resulting from owner-to-dog interaction is that the dog cannot predict what is going to happen, does not know what to expect, and does not have a response available that would be appropriate for the situation. Therefore, owners are instructed to avoid all casual interaction and to interact with the dog only in a cue-response-reward format. The owner initiates all interactions by giving a cue and then reinforcing the desired response. In some cases it may be useful to prompt the dog to perform the behavior (using a head halter and dragline or any other prompt that is safe), and then reinforce the behavior. Food obviously is pleasant and nonthreatening (unlike petting), relaxes the dog, and can be tossed from a distance if necessary.

This approach is not the same as nothing-in-life-is-free [37], which is intended by many trainers to make the dog dependent on the owner and “submissive” to the owner. Instead the training program described in the previous paragraphs is designed to assure that any interactions with the dog are consistent (ie, the focus is on the owner’s behavior, not the dog’s). It also teaches the dog to operate on the environment in a successful and appropriate way. Highly structured obedience exercises, especially ones that desensitize the dog to owner behavior perceived as threatening, are very useful [38]. They provide an opportunity for predictable owner–dog interactions, desensitization to owner behavior, and substitution of aggression with learned, appropriate responses such as sitting or going to a mat elsewhere in the room.

In many cases it is helpful to use a head halter with a leash attached. The head halter is placed on the dog (the dog first is taught to accept the halter through systematic desensitization and counterconditioning; see <http://abrionline.org>) so that the owner can control all aggression-inducing situations in a nonconfrontational, consistent way. No punishment, no choke chains, and no scolding are used. The dog’s behavior is controlled by the owner, but in a humane way that does not increase anxiety or arousal. A head halter also assists the owner in training and walking the dog. (In some cases, as is true for any close interaction, placing a head halter may increase the risk of biting; in these cases a head halter should not be used.)

When it is safe to do so, situations in which the dog still shows aggression are addressed by systematic desensitization and response substitution. The principle of systematic desensitization is to expose the dog gradually to a threatening or conflict-associated situation (eg, the owner “standing over” the dog) and to reward the dog for relaxation. Response substitution can be used to teach a dog to perform appropriate instead of inappropriate behavior. The head halter is an effective tool for preventing inappropriate behavior and to

induce desired behavior that then can be rewarded. For example, when the dog is on the couch and growls when approached, the owner can pick up the indoor leash attached to the head halter, tell the dog to come, gently but firmly pull the dog off the couch, walk the dog away from the couch, ask it to sit, and reward. Again, the halter and leash are there to induce desired behavior so it can be rewarded, not to discipline or dominate the dog. The dog thus learns an alternative, acceptable, and stress-free way out of a conflict-inducing situation. Again, when such interactions increase the risk of biting, it may be necessary to avoid such situations altogether. For example, dogs that cannot be asked safely to get off furniture should be gated securely from the furnished room at all times.

It may not be possible or safe to desensitize a dog to all human–dog interactions. For example, there may not be a need for the dog to learn to accept “standing over” by the owner, and such exercises would be contraindicated.

Aggression Over the Food Bowl

A common situation in which dogs may show aggression is over their food. Although food-guarding behavior probably is a variant of normal behavior in dogs, it is unwanted and potentially dangerous. Food bowl aggression can be addressed by simple management. The food bowl is put down in a room with the door closed, while the dog is outside the room. The owner then leaves the room and sends the dog in to eat with the door securely closed. Once the dog is finished eating, the owner calls the dog back out of the room, goes in, closes the door, and picks up the food bowl and removes it. If children are in the home, the location in which the dog eats should be securely closed, perhaps with a latch placed high on the door or in a crate, to avoid the possibility of disturbing the dog inadvertently. In some cases it also is desirable to confine the dog while food is being prepared.

In some situations when owners willing to work with the dog, food-associated aggression can be addressed with a desensitization procedure as an optional intervention. Again, such exercises may introduce unnecessary risk; cases should be evaluated individually, and owners should be counseled carefully about safety. Owners are instructed to feed the dog in a different place and to use a different food bowl, preferably an old saucepan with a long handle, so that the dog does not associate feeding with previous confrontations. The dog should be tied for safety. The usual amount of food is to be measured out. Only three kibbles are to be placed into the food bowl (saucepan) at once. The dog is then asked to sit, and the food bowl is lowered so the dog can eat the kibbles while the owner continues to hold the saucepan by the handle. When the dog is finished eating, it is asked to sit again, the container is raised, and the procedure is repeated until all the food is consumed. If the dog shows any aggression at any time, the owner removes the saucepan and leaves the dog for 10 minutes. The procedure then is repeated. Once both owner and dog are comfortable with this procedure, the owner can start gradually to place more food into the saucepan. The next step is to go back to only three kibbles

but to let go of the bowl's handle for short, and then increasingly longer, times. Once this process goes well, the owner again can increase the amount of food gradually. Eventually, the owner can place a third of the ration into the bowl and add more food with a ladle while the dog is eating. Finally, all the food can be placed into the bowl at once, and the owner can add strong-smelling treats such as small pieces of cheese or hot dogs to the feed while the dog is eating. In this way most dogs accept the owner's presence while eating. Progress must be monitored carefully, and with some dogs it may be unsafe to proceed to the last stages of this procedure. The authors do not recommend trying to touch the dog while it is eating, although with some dogs it may be possible to apply a desensitization procedure to achieve this behavior as well.

Guarding Items

Another situation in which conflict-related aggression often is exhibited is over stolen items or toys. In this situation the aggression often is called "resource guarding" or "possessive aggression," but in many cases it is conflict-related aggression in a specific context.

Dogs naturally guard resources. Seeing a pet devour a piece of chicken it dug out of the trash before someone can take it away or coveting a valued chew toy is a common sight to dog owners. Dogs also may guard objects such as socks, facial tissues, or plastic wrappers. In fact in many cases, the aggression seems to be related less to the item than to an expected confrontation, or to the owner's leaning down over or reaching toward the dog.

Resource guarding or possessive aggression can be very severe and quite dangerous to the owner. Such aggression expresses itself as guarding of an item from people or other animals. Possessive aggression commonly is related to conflict-induced aggression: possessive aggression in a puppy is a risk factor for aggression toward household members later in life [25]. Possessive aggression often is enhanced through inadvertent reinforcement by the owner: for example, some puppies become afraid when the owner wants to take an item away and run or hide under a bed (ie, they are cornered). When the owner reaches for them, they show fear-related aggression. The owner backs off, and the aggressive behavior is reinforced negatively. Other puppies get an item and enjoy the resulting "game" when the owner tries to catch them. Their behavior is reinforced positively by the owner's reaction.

It helps to teach a dog that giving up a stolen or valued object is not so bad because in return the dog will receive an extra special treat or maybe even a new toy. If a dog has learned that having things taken away is a very good thing, relinquishing items will not be a big deal; actually, the dog even may begin to look forward to it.

The basic exchange exercise

Precautionary safety instructions. To prevent further conflict while teaching the release command, it is best to keep all valuable items out of the dog's reach. If not all objects can be removed, and the dog still has the opportunity to grab objects and defend them, a head halter can be placed on the dog with a dragline

attached. If the dog gets hold of an object, the owner can toss a very desirable treat some distance from the dog. The dog probably will drop the object and go over to the treat. The owner lets the dog take the treat but then leads the dog away from the stolen object. The stolen object is retrieved only after the dog is securely confined elsewhere. This technique should be attempted only by adults, not by children.

Exercises to practice basic exchange. With the dog in a down-stay and tied to an immovable object by its regular collar and away from the place in which it historically has shown aggression, the handler starts by showing the dog an object that the dog does not value much. The object is placed about 3 feet away from the dog; a release cue (eg, “off,” or “leave-it”) is given, and object is removed. The dog then is given a food reward, and the object is placed about 2.5 feet in front of the dog. Again, after the release cue is given, the object is removed, and the dog is rewarded for staying in a relaxed down-stay. As long as the dog is quiet and does not lunge for the object, the object is placed closer and closer to the dog, the release cue is given, the object is removed, and the dog is rewarded. The exercise is repeated with objects of increasing value to the dog. When highly desirable objects are used, the value of the treats must be increased as well.

Once the dog behaves well in these situations, the owner should leave out items that the dog will take in its mouth but that are not of high value to the dog. In such situations, the owner can practice exchanges with objects the dog has taken spontaneously. The owner may have to show the dog a treat as a prompt to release the object, pick up the object while giving the dog a treat, and then return the object to the dog. If that goes well, the owner can start to leave out objects of increasing value to the dog and keep practicing exchanges with these.

After successful completion of this exercise, it is important to run occasional “cold trials.” When the dog is chewing on its favorite chew toy, the owner should go over to the dog, give the release cue, reward the dog for releasing the object with a highly valued treat, then return the toy to the dog. This exercise may not be safe with some dogs.

To make the dog feel comfortable releasing its favorite chew toy or stolen objects to any one and in any situation, new people who will handle the dog must follow the same protocol with the dog (each time starting at the beginning). The exercise also should be done in various locations, starting away from the place to which the dog usually retreats with a stolen item (often under a piece of furniture) and gradually moving closer to that place. Again, the exercise needs to be started from the beginning in each new location.

Another very effective method for treatment of resource guarding is to teach a release cue using clicker training [36,39]. Initially, the dog learns that the “click,” a meaningless sound, means a food treat is coming (ie, the click becomes a conditions stimulus). Then the owner observes the dog picking up toys or other objects at home. As soon as the dog drops the toy, the owner clicks and treats. Soon, the dog will start to enjoy that game and pick up

toys, look at or come over to the owner, and drop the toy, expecting a treat. At this point the owner will be able to predict when the dog is going to drop the toy and thus can give a cue just before that happens. Then, the owner occasionally does not give the release cue and then also does not reward the dog for dropping the object. (The cue must be given very frequently in the beginning, or the behavior of dropping toys will extinguish.) In addition, the owner uses the cue occasionally when the dog does not seem about to drop the toy and rewards the dog for successfully dropping it. In this way the dog learns to drop an object on cue and that dropping an object “pays off” only if the cue was given.

As in the exchange exercises, the owner then should leave some items of little value to the dog lying around and gradually increase the value of these items. The consistent interaction that this exercise provides also is helpful in eliminating conflict caused by an ambiguous type of relationship between owner and dog (see the previous discussion under conflict-induced aggression).

Some trainers use separate commands for leaving an object that the dog has yet not picked up and for dropping an object. It seems that the dog simply learns not to be in contact with a particular item. If only one command is used (often the word “off”), it generalizes to many other situations, such as the dog standing up on a person, scratching on the door, sniffing an unfamiliar but nervous dog, and so on.

Pharmacologic Treatment of Conflict-Related Aggression

Pharmacologic therapy often can facilitate behavior modification greatly. (See the earlier discussion of neurophysiology and the pharmacology of aggression.) The most commonly used drug is fluoxetine [8], a selective serotonin re-uptake inhibitor. It increases serotonergic transmission at the synapses and the activity of serotonin as a neurohormone. As a consequence, it also down-regulates serotonin receptors. Because of the complex nature of its pharmacologic effects, fluoxetine may take more than 4 weeks for full clinical effect. Fluoxetine has anxiolytic effects and is thought to also have antiaggressive properties. Sometimes fluoxetine can be combined with other drugs, either to reduce its most common side effect (reduced appetite) or to add a mood-stabilizing effect. Presently no medications are approved for the treatment of aggression in dogs.

Tryptophan supplementation of a low-protein diet also has been suggested as part of the treatment for owner-directed aggression [10], but the effect is inconsistent and therefore it seldom is used. In addition, the dog-appeasement pheromone (DAP, Ceva Santé Animale, Libourne Cedex, France) could be used as an adjunct treatment to reduce anxiety.

Punishment and Flooding

The considerations discussed previously lead to the conclusion that the use of punishment or flooding (uncontrolled exposure to the frightening stimulus) is contraindicated. Why do these techniques sometimes work? Some cases, there probably is not much fear or anxiety involved. Highly trainable dogs that are

strongly motivated to operate on the environment to achieve predictable outcomes and at the same time are genetically highly predisposed for aggression may resort to aggression very quickly. The aggression is reinforced with negative reinforcement and by the dog's success in controlling the environment. In these cases, the main cause for the aggression may be conditioning (learned behavior), and behaviors that are largely learned are more amenable to change. If such a dog is punished for aggression, the aggression is suppressed; if, at the same time, the dog is taught appropriate behavior in the situation, it is taught an alternative coping strategy. Again, this approach is acceptable (but unnecessary and perhaps inhumane) if little anxiety is involved. Such cases are difficult or impossible to identify, however. Furthermore, the ability to apply the technique properly is low, and therefore the risks associated with applying this technique are unacceptably high. The currently proposed treatment strategies achieve similar results, albeit more gradually, without the high risk and detrimental effects on the dog's welfare.

PROGNOSIS

The prognosis for cases of canine aggression is worse than for most other behavior problems. Behaviorists generally give a guarded prognosis because there always is a risk that a dog might be aggressive again. The prognosis depends on the size of the dog, whether children are involved [40], whether the dog shows a graduated aggressive response (gives warning and escalates slowly) or an all-or-nothing response, and whether the dog has shown bite inhibition.

PREVENTION

Aggression in adult dogs may result from experiences and the environment early in life. Examples include

- Lack of environmental stimulation
- Lack of handling
- Early weaning (possibly)
- Health issues
- Lack of socialization, exposure, and desensitization
- Inconsistent rules, environment, and interactions
- Adverse experiences, especially during the fear periods
- Lack of learning a bite inhibition, often because of lack of opportunity
- Lack of training

Addressing all these points allows a puppy raiser to diminish the chance that a genetically sound puppy might develop into an aggressive adult dog. Of course, training to prevent other behavior problems is just as important. For instance, a relaxed down-stay is useful in many situations, especially where the dog is either excitable or anxious; "alone training" is important in the prevention of separation anxiety; and housetraining of course is essential to allow a dog to share living quarters with its human family.

Box 1: Treatment of conflict-related aggression

1. Management

Avoid confrontations (confinement, use head halter and leash, ignore dog)

Restrict feeding to twice a day (remove bowl after feeding)

Exercise off the property twice a day

Obedience training to command control

2. Temperament

Address fearfulness

Address hyperexcitability

3. Behavior modification

Avoid casual interactions

All interactions to be in a command-response-reward format

Counterconditioning (classical conditioning)

Response substitution

Systematic desensitization

4. Pharmacologic intervention (optional)

Fluoxetine, 1 to 2 mg/kg once a day

SUMMARY OF TREATMENT OF CONFLICT-RELATED AGGRESSION

Box 1 summarizes the treatment of conflict-related aggression.

When drugs are used as part of a treatment program for behavior problems, the authors suggest that practitioners read the article in this issue by Seibert and any listed references. For drugs that are not licensed for veterinary use, doses, indications, side effects, and contraindications may not have been studied adequately. Practitioners should be familiar with the published literature and dispense these medications with informed consent.

APPENDIX 1**CLIENT INFORMATION ON CONFLICT-RELATED AGGRESSION****Cause of Conflict-Related Aggression**

Conflict-related aggression traditionally has been referred to as “dominance aggression” by most behaviorists. Dominance aggression is defined as aggression directed toward household members in situations in which the social position of the dominant dog is threatened. Most dogs seen for “dominance aggression” are not dominant or confident dogs, however. Instead, these dogs often act uncertain, fearful, or submissive. Owners often report that the dog shows ambivalent body language during and after an attack. These dogs may “slink off” after an attack, shake or show appeasement behaviors, or appear “remorseful” to the owner. Most dogs that are aggressive toward household members are not dominant, nor do they have confident personalities.

Affected dogs may become aggressive when they are in a conflict situation. Many conflicts occur when a dog cannot predict what is going to happen because of inconsistencies in dog–owner interactions. The dog is placed into a motivational conflict in these situations. It may want to be near the owner but also may be uneasy about what is going to happen. Another reason for a dog’s showing aggression as a conflict behavior is that the environment is inconsistent and thus unpredictable, so that the dog feels it has no control over events. Unpredictability and lack of control over events are major stress factors for dogs, as well as for people. Although some dogs may be perfectly happy letting things happen around them as they may, others may become anxious if they cannot keep things under control. It has been hypothesized that this trait can be selected for inadvertently when selecting for trainability. Some have suggested that a dog that is highly trainable strongly desires control and predictability in its environment and interactions. Depending on their genetic make-up, these dogs may be quick to resort to aggression.

Affected dogs learn to use aggression as a coping mechanism and to exert some control over the environment (because the outcome of the aggression is predictable). The aggression is reinforced because the anticipated event that the dog fears does not occur or because the dog gains some control over the situation. For example, the owner approaches, and the dog is unsure of what is expected of it; it shows aggression to control the situation, and the owner backs off. The dog’s aggressive behavior has been rewarded, because the dreaded event did not occur and it achieved a predictable outcome. Unfortunately, behaviors reinforced in this manner are very persistent.

Treatment of Conflict-Related Aggression

Because there are many different types of aggression that can be directed toward the owner, a behaviorist needs to make a specific diagnosis and devise a treatment plan appropriate for the individual case. The following techniques often are used in the treatment of conflict-related aggression.

Treatment should address the dog’s basic disposition (eg, fearfulness, anxiety), the way in which the dog is managed, and the cause of conflict (eg, inconsistency) in the owner–dog interactions.

1. Avoid confrontation. The situations in which confrontations are likely should be avoided. Any confrontation may destroy the progress made to that point in treatment. The dog needs to be crate trained and crated or confined in an exercise pen unless being worked with. Confinement is indicated if the owners are afraid of the dog, if small children are involved, or if the owner is unable to ignore the dog. Toys and other assets that can cause confrontations should be removed. The dog is not to be allowed on the furniture, including the bed, if it has shown aggression in these situations in the past.
2. Use a head collar. The dog should wear a head collar with a dragline attached when the owners are home. A head collar allows the owner to diffuse any aggression-inducing situations in a nonconfrontational and consistent manner. Example: The dog has been aggressive when approached while on its bed. The owner may call the dog, use the head collar and dragline

- to encourage the dog to “come,” ask the dog to “sit,” and then reward the dog. The confrontation (conflict) is avoided, and an appropriate and acceptable response is rewarded. If a head collar cannot be placed on the dog, a body harness may be an acceptable, although less effective, alternative.
3. The head collar or body harness also may be useful for walking and training the dog. Regular exercise (twice daily) helps reduce the dog’s reactivity and anxiety.
 4. Avoid inconsistent owner–dog interactions. The main reason for conflict resulting from owner-to-dog interaction is that the dog cannot predict what is going to happen and does not know what to do to achieve a predictable outcome. Therefore, owners are instructed to avoid all casual interactions with the dog and to interact in a command-response-reward format only. This procedure assures that any interactions with the dog are consistent and predictable. The owner gives a command; the dog responds and is rewarded for performing the behavior.
 5. Structured obedience exercises. Nonconfrontational obedience training such as clicker training and the use of a head collar provides an opportunity for predictable owner–dog interaction, desensitizes the dog to owner behavior, and allows the owner to substitute appropriate responses for aggression. Obedience training using positive reinforcement also will have a long-lasting effect on the owner’s behavior toward the dog by making it more consistent and confident. Obedience training allows the owner to tell the dog what to do before the dog makes the wrong choice (aggression), and the dog learns how to respond to achieve a predictable and desirable outcome.
 6. Clicker training. Clicker training is especially appropriate for teaching aggressive dogs because it can be performed without contact and therefore is extremely nonconfrontational. With clicker training, appropriate behaviors can be “captured” and subsequently be put on cue. Training should be done in a no-nonsense attitude, upbeat but not playfully.
 7. Do not use punishment. Punishment is contraindicated in treating aggression. No punishment of any type should be applied. Choke collars, pinch collars, verbal reprimands, or physical punishment are contraindicated in treating aggression. Punishment almost always is administered inconsistently and increases anxiety and fear. Punishment and domination techniques occasionally can be successful and yield very quick results, but their use is much too risky, both for the dog and for the owner. Furthermore, they tend to result not in the dog’s being relaxed and happy but in its being in a state of learned helplessness.
 8. Observe consistent and absolute rules. If the rules change all the time, the dog never can figure them out and cannot use them to control the environment. There should be a consistent rule structure that allows the dog to achieve a predictable outcome of its behavior and in which the behavior desired by the owner also pays off for the dog.
 9. Apply behavior modification for specific situations: Specific situations in which the dog shows aggression may be addressed by gradually exposing the dog to the threatening or conflict situation (eg, the owner “standing over” the dog or touching specific areas on the dog) and rewarding the dog for relaxation. A previously threatening situation can be associated with a pleasant event (eg, giving the dog attention and petting only when

the owner touches a previously sensitive body part). An appropriate behavior can be substituted for a previously inappropriate behavior (eg, teaching the dog to “shake hands” to have its feet handled, with reward for the appropriate behavior).

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