

An Analytical Evaluation of “Differential Negative Reinforcement of Successive Approximations to Alternative Behavior” Procedures in Changing Aggressive Behaviors: a Contribution to the Dialogue

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Introduction

Negative-reinforcement-based procedures, sometimes known as escape and/or avoidance conditioning, for changing negative-reinforcement-maintained (fear-based) aggressive behavior in dogs have become popular in recent months. The procedure is winning many advocates; however, there are critics of the approach, and negative reinforcement has generally been seen as best avoided because of its aversive nature. Proponents argue that it is no more aversive than systematic desensitization if carried out properly, that it is more effective and quicker than alternatives and that it generalizes better because it utilizes natural reinforcers. Critics counter that it is more aversive than an approach that uses positive reinforcement with counterconditioning and that it is not as reliable, efficient or effective as positive reinforcement with counterconditioning procedures because the latter address both emotional motivating operations and the operants involved.

I will evaluate graded differential negative reinforcement of successive approximations to alternative, other or incompatible behaviors (hereafter citing graded D-RSAA¹ for short) with regards to aggressive dog behavior

¹ The only topic being critiqued here is graded D-RSAA and claims made by some proponents of such a procedure. I will not be evaluating any particular proprietary protocol or identifying the sources of specific claims.

maintained by negative reinforcement. It is my conclusion that neither extreme entrenched position in this debate is credible, and that while graded D-RSAA has a place in minimally aversive behavior change programming, it is not necessarily superior to alternatives, and may have a more limited role than proposed.

Review of Aggressive Behavior and Explication of D-RSAA

We should start with a brief review of how aggressive behaviors are maintained and with an explication of the graded D-RSAA procedure I am evaluating.

Aggressive behaviors, as with all operants, are maintained by reinforcement. Although some contingencies involve positively reinforced aggressive behaviors, the vast majority of aggression consults involve the negative reinforcement of the aggressive behaviors. In other words, the aggressive behaviors are maintained or increase in frequency or intensity as a result of the ceasing or avoiding of some stimulation. In practical and colloquial terms, this means that the aggressive behaviors are motivated by “fear” responses and escape or avoidance from the stimulus in question is the reinforcing stimulation maintaining them (e.g., snarling, lunging and snapping convince the feared individual to back off). The learner uses aggressive behaviors because these have come to be effective means

of escaping from or avoiding “unpleasant” stimulation.

Graded D-RSAA is not commonly understood, partly because proponents do not describe it precisely and partly because critics seem more prepared to attribute to the procedure what they expect rather than what it really is (common cognitive bias). Although the name I have given this procedure is a little on the long side, it has the benefit of properly identifying the mechanisms involved, which allows us to better understand what we are and are not evaluating, which contributes to clarity in the topic. In a graded D-RSAA, the learner usually remains stationary. The aversive stimulus (or “trigger”) is initially brought to a point where the learner attends to it (or sometimes shows initial early signs of stress) but does not yet sensitize to it.² The rule is set that successive approximations to prosocial behaviors will be negatively reinforced with increased distance from the problem stimulus. The complementary rule is set that accidental sensitized responses (i.e., increased fear, general emotionality and aggressive and/or escape/avoidance attempts) are extinguished. Each successive trial involves continuing to differentially negatively reinforce approximations to calm, relaxed tolerance of the aversive stimulus and, ideally, eventually prosocial interaction with the stimulus. In other words, prosocial behaviors are shaped with negative reinforcement. Through repeated trials, the learner is conditioned to emit prosocial behaviors and not antisocial behaviors when confronted by the stimulus in question.

² In early contemporary versions of the procedure, the aversive stimulus was brought to a point where the dog sensitized and that was used to determine the initial threshold point. The procedure has been modified now to bring the aversive to a point where the learner attends to it or perhaps shows initial signs of distress but does not yet sensitize. This is definitely an improvement and readers familiar with the early approach should take note of this adjustment.

Claims and Issues to be Evaluated ***Choice Between Systematic Desensitization and Graded D-RSAA***

Proponents of graded D-RSAA procedures often frame the choice as being between graded D-RSAA and systematic desensitization. Systematic desensitization is a respondent-conditioning-based procedure, used to change the conditioned emotional responses that motivate aggressive operants. Systematic desensitization involves three components:

1. relaxation training;
2. graded exposure; and
3. counterconditioning.

A typical systematic desensitization procedure starts by either encouraging relaxation with massage or other practices or else simply carrying out the procedure when the dog is calm and relaxed. The important thing is that the learner enters the procedure in a relaxed and calm state and remains so throughout. The aversive stimulus is identified and a hierarchy of intensity of exposure to it is constructed. This usually involves dimensions such as distance, orientation and distraction. The dog is exposed to an intensity of exposure to the aversive stimulus at which they attend to the stimulus but do not sensitize to it (i.e., it is not yet aversive, as discussed below and shown in Figure 2). Treats, praise, play or other pleasure-eliciting stimuli are often paired contingently and contiguously with the aversive stimulus until the aversive stimulus, at that intensity of exposure, comes to elicit a pleasure-related response. At that point you move to the next level in the hierarchy and the process is repeated. Successive trials build on this until the stimulus that previously elicited fear elicits either joy or relaxation at a level of intensity that can be expected in real life, and generalization is then programmed. If you use joy-eliciting stimuli such as play or treats, then the conditioned response will be pleasure. You do not have to do so, though. You may simply maintain the relaxation and calmness. In that case, the conditioned response will become calmness and relaxation. Either approach is acceptable

although, in individual cases, one might be more appropriate than the other.

Proponents of a graded D-RSAA procedure often point to their procedure as superior because it involves a functionally relevant contingency—that is, that it involves a reinforcer that is particularly meaningful to the learner (i.e., escape/avoidance). But, in systematic desensitization, the motivation is addressed directly rather than indirectly. Proponents of graded D-RSAA also often argue that you cannot change conditioned emotional responses directly (i.e., without first changing the operant), but research has clearly demonstrated that you can. In 1920, Watson and Rayner published a landmark study on conditioned emotional responses and, in 1924, Jones published a study on changing fear responses in a boy named Peter. Lynch and McCarthy (1967) published an article on respondent conditioning of emotional responses with petting. Respondent conditioning occurs reflexively. If you arrange a procedure in which a learner is exposed to an aversive stimulus at an intensity where they are not sensitized and make that stimulus predict pleasure-eliciting stimuli instead, the emotional response will change. By changing the emotional response directly, you improve the efficiency of doing so and quickly remove the motivating operation for the aggressive behaviors. If the learner associates the stimulus with relaxation or joy rather than fear, there will simply be no need for the aggressive behavior. In that context, systematic desensitization would seem to address the problem of the emotional responses much more efficiently and effectively than using a functionally relevant reinforcer such as escape or avoidance (as opposed to treats or play, which proponents might consider functionally irrelevant).

Proponents often suggest using graded D-RSAA rather than systematic desensitization or another procedure because they observe that many people carry out these procedures poorly. They may argue, for example, that poorly performed systematic desensitization is likely to generate aggressive behavior chains and encourage rather than discourage aggressive behavior in the future (which they then use as an

abductive argument to use negative reinforcement instead). There seems to be a misunderstanding involved, though. For a behavior chain to be trained, accidentally or purposely, the aggressive behaviors need to be evoked. This might occur in some applications of counterconditioning on its own if the aggressive behavior is indeed evoked regularly. The previously negatively reinforced aggressive behaviors may, in this arrangement, become positively reinforced aggressive behaviors. While this is certainly a risk of pure counterconditioning with regular trials in which the aggressive behaviors are evoked, systematic desensitization avoids sensitization (more easily than negative reinforcement can; see Figure 2) and aggressive behaviors, and therefore does not pose a behavior chain risk. To the extent that it would, this risk would also be likely (perhaps more likely) with graded D-RSAA procedures; however, if properly executed, both procedures avoid sensitized responses. Therefore, this criticism is unfounded if applied to properly conducted systematic desensitization procedures. Furthermore, graded D-RSAA can at least as easily be misused. A common mistake while using graded D-RSAA is exposing the learner to too intense an exposure so that the stimulation becomes more aversive, or moving far too quickly. One reason for this common error is that the negative reinforcement relies on the aversiveness of the stimulus. See Figure 2 for a visual representation of why negative reinforcement must expose the learner to a higher intensity of aversive stimulation than positive reinforcement with counterconditioning or systematic desensitization. We can compare how likely misapplication of the procedures can be in that regard, but I see no reason why positive-reinforcement-based procedures or systematic desensitization would be misunderstood or misapplied any more than graded D-RSAA. Otherwise, we should be comparing the procedures with an assumption that each is being applied properly. Criticizing one for the problems associated with its misapplication while comparing this to proper application of one's favored procedure is unacceptable.

Where the contingency maintaining the aggressive behavior is negative reinforcement (that is, escape or avoidance based and “fear” motivated), systematic desensitization becomes a viable procedure. By removing the motivation to escape or avoid the stimulus in question, we ensure that the reinforcement for the aggressive behavior loses its reinforcing capacity, and the behavior declines or ceases. It is argued that systematic desensitization is often a slow process with frequent setbacks. Because of this, it is argued that an operant approach is preferable. It is argued that by changing the contingency with a pure operant approach, the operants will become more or less likely. Desirable behaviors are then reinforced and undesirable behaviors prevented from being reinforced (i.e., extinguished). The option posited is negative reinforcement, largely because it uses the highly salient and valued reinforcer of escape and avoidance to achieve the operants in question. But it is far from established that this is the only choice.

As mentioned above, proponents often argue that systematic desensitization is very slow, whereas graded D-RSAA procedures are quick. Proponents often justify the aversive quality of the procedure by arguing that a fast resolution is vitally important and that graded D-RSAA is faster than the alternative. Systematic desensitization can sometimes be slow, but a graded D-RSAA procedure could also be slow in some cases. There are no empirical grounds on which to claim that a well-executed graded D-RSAA procedure is any quicker (or more reliable) than a well-executed graded differential positive reinforcement with counterconditioning procedure (discussed further below). Anecdotally, from what I have seen, and from consulting colleagues, they seem to take approximately the same time. In any case, it has not been established that negative reinforcement achieves quicker results than positive reinforcement and counterconditioning or systematic desensitization procedures.

Natural Versus Contrived Reinforcers

As briefly mentioned above, proponents argue that the graded D-RSAA procedure makes use of natural reinforcers, whereas other

approaches tend to make use of unnatural reinforcers. The term “natural reinforcer” or “naturally existing reinforcement contingency” refers to the particular reinforcement contingency for the particular learner in question in the usual or common environment in which the contingency takes place or, put another way, the contingency that exists independently of the behavior consultant’s intervention. These reinforcers are not highly contrived but rather resemble the actual reinforcer qualitatively. A natural reinforcer is functionally relevant to the learner. A more natural reinforcer is used to promote better generalization. It can help ensure that the contingency arranged for in the behavior change program smoothly transitions to the real world and the new training remains effective with less work from the trainer. Proponents argue that by using escape or avoidance as the reinforcer, the most natural reinforcer is being utilized and therefore it will generalize well into the real world. They argue that positive-reinforcement-based approaches using food, play or praise make use of particularly unnatural or contrived reinforcers and therefore are not likely to generalize well to the real world. They point out that the trainer will have to maintain the contrived reinforcement indefinitely if they want that contingency to remain effective. This is probably the strongest argument for a negative-reinforcement-based procedure rather than a positive-reinforcement-based procedure. A couple of perspective points can be raised, though.

First, where counterconditioning or even mere habituation is encouraged, the motivating operation for the aggression-related contingency is changed drastically, making the natural reinforcer of escape or avoidance irrelevant or obsolete. A procedure that uses graded differential positive reinforcement of successive approximations to an alternative behavior in which counterconditioning is achieved (discussed further below), or straight systematic desensitization, will efficiently change the primary motivating operation for the aggressive behaviors. Once the fear is removed, so too is the motivation (or reason) to escape. In this case, the functional relevance for the contingency involving aggressive behaviors is moot.

Certainly for the replacement behaviors, functional relevance is important, though. Furthermore, as the negative-reinforcement-based behavior change program progresses, fear becomes less prominent and, in that regard, escape reinforcers become less functionally relevant (see Figure 2). As fear becomes less prominent, the calm, relaxed or joy-related emotional response will motivate prosocial behaviors, and escape behaviors then lose their functional relevance. In fact, we might expect the contrived reinforcers to become natural reinforcers.

Second, there are several strategies for promoting generalization, making use of natural reinforcement contingencies being just one of these. Miltenberger (2004, pp. 413–425) and Cooper, Heron, and Heward (2007, pp. 625–648) outline several strategies for promoting generalization. While making use of natural reinforcers is one important strategy, it is not the only one. Using natural reinforcers is not always possible, and many successful behavior change programs are built on contrived reinforcers. Among the other strategies, Miltenberger recommends reinforcing instances of generalization as they occur, incorporating a variety of relevant stimulus situations from the real world into the training situation, and training a range of functionally equivalent responses, meaning a variety of prosocial behaviors, any of which achieves the same reinforcement.

Furthermore, anyone who has trained a behavior to a high level of reliability with “contrived” reinforcers such as food can tell you that the performance criteria required to earn positive reinforcement can be increased and placed on an intermittent schedule, and the reinforcer generalized to include praise or play and still maintain the behavior solidly, even under high levels of distraction. Moreover, stressed dogs will not accept food, making the use of food an excellent ongoing gauge of the dog’s emotional responses, requiring less expertise of the trainer. While programming for generalization, you may not be able to arrange for some stimulus conditions. One benefit during generalization programming for a

positive-reinforcement-based approach is that the learner can be cued to perform specific behaviors for which reinforcement is then easily delivered. These installed alternative or incompatible behaviors can be very handy in the real world.

Nonetheless, making use of natural reinforcers that are functionally relevant to the learner will ensure that later, in the real world, the behavior generalizes effectively, and it is an important way to ensure that the contingency does not fall apart but rather continues to access reinforcers. If a particularly unnatural reinforcer is utilized, the trainer must pay particular attention to encouraging generalization, and those using food in particular will have to be careful to promote generalization into the real world, and likely continue to maintain the contrived reinforcement purposely and reliably. With natural reinforcers, you can allow the real world natural reinforcers to continue to maintain the behavior. While the problem of generalizing the behavior in the real world and the importance in that regard of ensuring the behavior accesses natural reinforcers must be considered, this does not necessarily demonstrate on its own the superior nature of negative reinforcement. In fact, as positive-reinforcement-based training progresses and the stimulus loses its aversiveness, alternative behaviors do access natural reinforcers (e.g., praise, treats, play).

Differential Positive Reinforcement of Successive Approximations: A Comprehensive Alternative

Positive reinforcement leaves us free to indulge our curiosity, to try new options. Negative reinforcement instills a narrow behavioral repertoire, leaving us fearful of novelty, afraid to explore. ... continued negative reinforcement transforms more and more of the people, objects, and places around us into negative reinforcers (Sidman, 2000, p. 96)

Differential positive reinforcement (DR+) is a well-established behavior change procedure that has been used successfully for many years and is supported by a large body of research. In DR+, a problem behavior is targeted for extinction while another, alternative or incompatible behavior is targeted for positive reinforcement. In this way, the undesirable behavior can be replaced with a desirable behavior. The procedure is flexible also. You may train an alternative behavior outside of the stimulus situation and then carefully install it into the problem situation, transferring stimulus control to the problem stimulus (that is, so that the problem stimulus comes to evoke the new behavior). The new behavior can include walking or turning away from the stimulus, getting the dog's attention off it (a cued cutoff behavior), or looking to the problem stimulus without aggressive behaviors so that the learner can monitor and acknowledge it (more comforting for some dogs). Many consultants train the learner to initially acknowledge the stimulus and then look to the handler. The specific behaviors can be chosen as appropriate on a case-by-case basis. Alternatively, prosocial behaviors can be shaped (D+RSAA). Usually the DR+ procedure is carried out in a graded, stepwise manner (graded D+RSAA) so that the learner is only exposed to the problem stimulus at a level of intensity that is not yet aversive. In a comprehensive procedure, antecedents (i.e., setting events, motivating operations and discriminative stimuli) are manipulated in order to make performance of the undesirable behavior highly unlikely or impossible and the desirable behavior highly likely. In this way, the learner discovers that the desirable behavior will be positively reinforced. Because the learner is maintained subthreshold (ideally, sub-aversion threshold rather than merely sub-sensitization threshold) and pleasant consequences are utilized, counterconditioning (CC) is also achieved simultaneously. The problem stimulus comes to predict the pleasant stimuli utilized and comes to elicit pleasure-related emotional responses. So, while undesirable behaviors are replaced with desirable behaviors using operant conditioning, the emotional response that motivates the problem operant is changed using respondent conditioning. The goal is, to repeat,

to change the emotional motivation for the aggressive behavior in order to make the aggressive behavior obsolete, and to train alternative prosocial behaviors in the stimulus situation that previously evoked aggressive behaviors. The beauty of this approach is that it does *not* rely on the experience being aversive and it addresses not only the behavior-consequence but also the motivation for choosing a behavior (antecedent-behavior).

An obvious criticism is that positive reinforcers simply could not be as powerful as negative reinforcers. It is true that, when faced with a feared thing, nothing is more powerful than escape—that is, negative reinforcement of whatever behavior will achieve escape quickest. The power of negative reinforcement cannot be denied. That is why it is important to countercondition the emotional response at the same time as installing replacement behaviors and ensure that there are as few aggressive responses as possible.

Some proponents of graded D-RSAA argue that a positive-reinforcement-based procedure introduces a new contingency rather than changing the existing contingency. The reasoning goes like this: After positive-reinforcement-based training, the learner will likely perform the alternative behavior in the same situation in which training took place but if the stimulus situation is pushed, the aggressive contingency remains intact; the learner knows that aggressive behaviors “work” well and so they will revert to this behavior when pushed above their threshold. They argue that this is not the case with negative reinforcement, that it does change the contingency in question rather than install a new one. Colloquially, it is argued that, with positive reinforcement, we have not “proved” to the learner that aggressive behaviors will not “work,” whereas, with negative reinforcement, we have “proved” to the learner that aggressive behaviors will not “work.” This is an interesting line of reasoning. Critics counter with the following points.

Counterconditioning of the emotional motivating operations for aggressive behavior does, in fact, change the actual contingency in

question. By changing the emotional responses that motivate the aggressive operants, the value of escape/avoidance consequences is changed diametrically and hence the behaviors can easily be changed with positive reinforcement of some alternative behavior that pays off.

Furthermore, in both procedures, it is the extinction trials that “prove” to the learner that the aggressive behaviors will not “work” as opposed to the reinforcement trials, which demonstrate to the learner that some other behavior will pay off in some way (e.g., relief or treats or play). Extinction is minimized in both procedures, so it is only to the extent that each includes extinction trials that they do in fact “prove” to the learner that aggressive behavior will not work. Extinction is quite aversive, which is why both procedures are arranged to minimize these trials and instead focus on increasing the learner’s repertoire of prosocial behaviors available to them in these situations. In a positive reinforcement procedure, the discriminative stimulus comes to indicate that certain prosocial behaviors will result in high-value “pleasant” consequences. The question of whether this reinforcer is “natural” or not or whether it involves installing a different contingency has merit, but quite simply, if you arrange the environment so that the stimulus in question comes to indicate that the problem behavior will not pay off and a different, desirable one will pay off heavily, you do in fact efficiently and effectively modify the contingency. The goal, in positive reinforcement, is to make prosocial behaviors “pay off” so well that the learner does, in fact, choose this option over aggressive alternatives. Establishing operations can be implemented that will create a highly valued positive reinforcer. But the key to making this choice work is the counterconditioning process described above—because negative reinforcement is so powerful, we need a way to make it obsolete. As escape/avoidance outcomes become less valuable (because the learner comes to like, rather than fear, the stimulus), positive reinforcement becomes more and more useful in these situations. And “natural” also.

Moreover, in both procedures, purposeful programming for generalization is important, so whether the learner is pushed past their threshold largely depends on addressing the various components of the stimulus package that have had a history of evoking the aggressive behaviors. With positive-reinforcement-based procedures, guardians do not have to rely specifically on the stimulus situation to achieve alternative behaviors. Guardians may cue specific behaviors as needed for troubleshooting. This is a flexible option available to those making use of positive-reinforcement-based approaches.

Before I move on, I would like to briefly discuss a benefit of graded D+RSAA with CC over graded D-RSAA. Graded D-RSAA requires exceptional skill in reading learners and shaping prosocial behaviors. Shaping itself is a rather advanced skill, and shaping while trying to maintain the learner at just the right distance for the stimulus to be mildly aversive but not generating excess emotionality and determining at what point to move the process forward or not requires a high degree of professional competency, which is fine for a competent professional, but not something the average companion animal guardian could be expected to do well. A graded D+RSAA with CC program, on the other hand, is flexible in terms of whether shaping is used and what behaviors are installed, and it maintains the learner at a distance that is easier to manage and less provocative. Because of this, it is something that behavior consultants can coach guardians on and allow them to continue working on with minimal supervision relative to graded D-RSAA. This, in my view, is a major benefit of using graded D+RSAA with CC.

Aversiveness and Emotionality in Negative Reinforcement Versus Systematic Desensitization or Positive Reinforcement with Counterconditioning

Proponents of graded D-RSAA protocols argue that the procedure is minimally aversive. Often the comparative argument is made that a graded D-RSAA procedure is no more aversive than systematic desensitization, which seems to

be a useful standard. Proponents often claim that all behavior change procedures used to change aggressive behaviors must expose the learner to the aversive stimulus in question. This point is debatable. Certainly both procedures expose the learner to the problematic stimulus, and that is one possible interpretation of the claim. The difference though, is that in negative reinforcement, exposure *must* be intense enough that escape will be reinforcing, whereas in graded D+RSAA with CC, the ideal exposure intensity is mere attention at an intensity at which escape would not yet be reinforcing. You can see this visually depicted in Figure 2 and this is a very important point. Because negative reinforcement relies necessarily on this exposure intensity and graded D+RSAA with CC relies on merely attending to the stimulus, the graded D+RSAA with CC option can be argued to be at least potentially the less aversive procedure. Even if this is the case, though, the negative reinforcement option can be made fairly minimally aversive. While negative reinforcement can potentially be a highly aversive procedure resulting in extensive problematic secondary effects, proponents of graded D-RSAA point out that the graded and sub-sensitization threshold (though still aversive) nature of the procedure, as well as meeting other requirements for effective reinforcement (i.e., mainly contingency and contiguity³), ameliorates the risks of countercontrol, aggression, problematic associations with the trainer etc. They argue that, because the learner comes to learn that they can easily turn off the aversive, there is very little stress involved. If contingency can be maintained and the learner is indeed maintained sub-sensitization threshold, then it does seem likely that fallout can be minimized significantly, if not avoided completely.

As far as maintenance of this contingency goes, the research does tend to suggest that, if the learner knows exactly how to avoid an aversive and the response effort is minimal, then doing so is indeed minimally aversive. In other

³ That is, that the reinforcer follows the behavior immediately, each time it is performed and not generally otherwise.

words, once you come to learn that some specific behavior can turn off something unpleasant, you are not as stressed or fearful of it because you know you have control over it. The less contingent the aversive is, or the more out of the learner's control it is, the more disempowered they are and the more likely learned helplessness, aggression and other side effects of aversive stimulation become. One problem is that, when making use of unpleasant stimulation alone, there are no pleasant stimuli to promote counterconditioning. One might achieve habituation merely through repeated exposure in a graded D-RSAA, but counterconditioning would be preferable to mere habituation. Furthermore, as noted repeatedly in this essay, negative reinforcement relies necessarily on aversive stimulation and so it behooves us to explore what aversive stimulation means and how it might relate to graded D-RSAA below.

Aversive stimulation is defined as any stimulation that a learner acts to evade, escape or avoid (Pierce & Cheney, 2004, p. 420). It should be noted that this implies that the stimulus is "unpleasant" for the learner. A learner only acts to evade, escape or avoid something to the extent that it is perceived as unpleasant. Note that the only operant quadrant that does not involve aversive stimulation is positive reinforcement. Negative reinforcement, positive punishment and negative punishment each necessarily involve aversive stimulation.

It is posited by some that aversiveness per se is not as relevant as whether the stimulation elicits emotionality. While this may be an acceptable claim (remember, emotionality indicates that stimulation is particularly aversive), the fact that a learner acts to evade, escape or avoid a stimulus necessarily implies that the experience was unpleasant. It bears repeating, the procedure only works to the extent that the stimulation is unpleasant (not the case with graded D+RSAA with CC). The perspective of emotionality as opposed to merely meeting the criterion of aversiveness seems acceptable and consistent with the moral principle of choosing behavior change procedures that are minimally aversive and

intrusive. Avoiding excessive problematic emotionality is indeed an important practice in the ethical application of any behavior change procedures. Distinguishing between aversive and emotional in this context is simply a difference in scale (see Figure 1). The aversiveness scale ranges broadly from any “unpleasantness” (determined through either emotional behavior or escape/avoidance behavior), whereas the emotionality scale ranges more narrowly on the

same continuum from particularly aversive to profoundly aversive. A minimally aversive experience does not rise to the level of eliciting intense emotionality. For clarity, referring to the quantity of aversiveness or emotionality is really measuring on the same scale; it is just that emotionality picks up further along than aversiveness (i.e., by the time emotionality is outwardly expressed, the experience is already quite aversive).

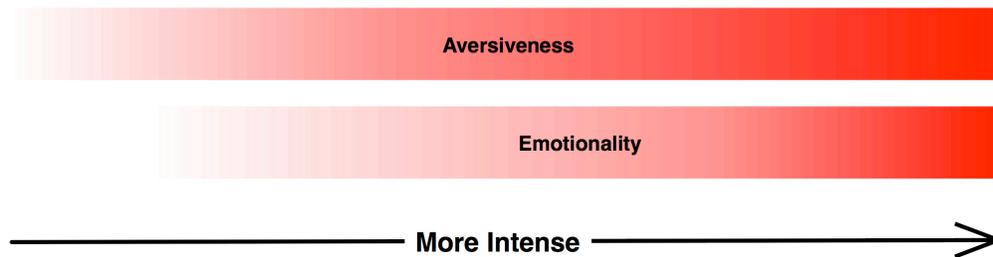


Figure 1. The relationship between aversiveness and emotionality.

Is it plausible then that a graded D-RSAA procedure is no more aversive than a systematic desensitization procedure (i.e., elicits no more emotionality)? Even though proponents often ignore graded D+RSAA with CC in this comparison, we should also include it along with systematic desensitization. Both systematic desensitization (or graded D+RSAA with CC) and graded D-RSAA necessarily involve the presentation of the problem stimulus (the discriminative stimulus that evokes the aggressive behaviors). No one can plausibly deny this. As we have seen, all that is required for a graded D+RSAA with CC (or systematic desensitization) procedure is attention to the stimulus, a point at which it is not yet experienced as aversive. Furthermore, the procedure is most effective when the stimulus is maintained as nonaversive. Graded D-RSAA, on the other hand, must involve presentation of the stimulus at an intensity that is at least a little bit aversive, and generally the more aversive it is the more effective negative reinforcement will be. Of course, graded D-RSAA is performed ideally at a point where it is the least aversive it can be while remaining effective to reinforce escape behaviors. Therefore, in consideration of

this, one could rightly say that, generally, graded D+RSAA with CC and systematic desensitization can be less aversive than graded D-RSAA. In practice, trainers can and often do push the intensity too far. In these situations, graded D+RSAA with CC is likely to suffer most, quickly becoming ineffective. I will briefly explore the relationship between negative reinforcement and aversive stimulation and put this in context with discussion of emotionality.

Again, for negative reinforcement to operate, it *must*, by its very nature and definition, involve aversive stimulation. It is otherwise logically impossible. If the event is nonaversive, then the procedure *cannot* be effective. The choice is between aversiveness on the one hand or ineffectiveness on the other, and neither option seems ideal. Does this necessarily rise to the level of producing overt indications of emotionality, though? Not necessarily, although this depends on our definition of emotionality, which is a somewhat ambiguous notion at present. Emotional behavior often involves changes in respiration, heart rate, galvanic skin response and blood pressure; changes in physiology, such as cortisol levels; and operants

that the emotions motivate. Clusters of these respondents and operants are usually given names such as “frustration/anger” or “fear.” We often do not observe many of the respondents involved but we easily observe the operants that they set the occasion for, including escape or avoidance behaviors (not to mention vocalizations or defecation and other species-specific emotional operants). So, if we define stimuli as aversive by observing escape or avoidance behavior, it seems reasonable that we should also consider this as emotional behavior since the “unpleasantness” is implied. It might be argued that minimally aversive stimulation can produce escape or avoidance behavior but that only a meaningfully intense aversive stimulation will also produce other obvious species-specific indications of emotionality. This may or may not be the case, and I would stipulate that with increased intensity of aversive stimulation we observe more intense and obvious indications of emotionality. The question is whether an aversive stimulation that evokes mere escape or avoidance behavior not yet rising to the intensity to produce intense indications of “fear” is acceptable or not. Intelligent people might disagree on this point I would think, and acceptability will be context dependent in any given case.

Further Potential Issues

It is conceivable and indeed plausible that through graded D-RSAA, the learner has not changed their emotional response to the stimulus in question but rather merely learned operantly to emit prosocial-looking behaviors as the best means to escape what they continue to perceive as “unpleasant.” The conditioned emotional response has not been addressed, at least directly, and, while the learner has learned an effective escape/avoidance behavior and thereby staved off the likelihood of problematic secondary effects of aversive stimulation such as learned helplessness and countercontrol (“neuroses”), the emotional response has not been changed. The reliability of the change in behavior is called into question. In a laboratory arrangement, the target behavior will indeed decline and prosocial behaviors increase, but in the real world, the particular prosocial

escape/avoidance behaviors may not always be effective on a continuous schedule. No research, as far as I could find, has been done to determine the reliability of graded D-RSAA-based procedures in these situations.

To the extent that the conditioned emotional response is changed or, separately, to the extent that there is indeed a decline in the aggressive behaviors, it has not been ruled out that mere habituation accounts for some or even all of the reduced frequency of the behaviors or any concomitant changes in the emotional response. The procedure involves repeated presentation of the feared stimulus without any resulting trauma to the learner, and habituation remains a rival hypothesis to explain a decline in the aggressive behaviors. Anecdotally, behavior consultants who begin cases with a meeting with the guardian and learner for filling out history forms, going over agreements and so on often see significant habituation effects to the problem stimulus in that time, resembling the timeframe used in a graded D-RSAA session. If it is the case that habituation contributes to the decline in aggressive responding, then the negative reinforcement component is not per se the sole cause of the change. This suggests that negative reinforcement is not per se an efficient procedure to achieve these results but rather some other procedure, such as a positive-reinforcement-based procedure that involves pleasant consequences other than increased distance from the thing in question, can be used to achieve these same ends. It further flies in the face of the argument that operant conditioning is the primary or sole variable at work.

Related to a point above, the learner is exposed to the problem stimulus while they are in the acquisition stage of learning. In this stage, the learner does not know what behavior will “work,” and trainers using negative reinforcement typically do not prompt specific behaviors but rather capture approximations to prosocial behavior when they emerge. One must be very aware of the learner’s behaviors and reinforce even an eye blink, opening of the mouth, relaxation of muscles, or brief glances away from the aversive stimulus, and in this way prosocial behaviors are shaped. Many positive-

reinforcement-based procedures, on the other hand, involve behaviors that are trained prior to exposure and applied to the situation. For behaviors that are free-shaped with positive reinforcement, again, the less aversive exposure to the problem stimulus and the use of “pleasant” consequences promote less stress. The acquisition stage can be a stressful stage of learning on its own, let alone being faced with a feared stimulus. The problem arises that the behavior that will access the negative reinforcement is contrary to the emotional state the learner is in. The learner is under at least very mild stress and is at least mildly fearful (they have to be in order for escape to be reinforcing). If the learner sensitizes, the trainer waits for the learner to calm down and display approximations of prosocial behaviors. Setting aside the hypothesis that this sounds a lot like habituation in the guise of a negative reinforcement procedure, the prosocial behavior expected represents a significantly different emotional state (indicated by emotional respondents and operants) than the learner is in. This sets the acquisition stage up to be even more stressful. Eventually the learner does “calm down” (i.e., habituate), and approximations of prosocial behaviors are then reinforced. After several trials, the learner does indeed transition from acquisition to a maintenance stage, discovering which behaviors will result in increased distance. Observers of this procedure have noted that dogs undergoing this procedure seem very “unhappy,” “checked out” or “shut down,” particularly in the initial stages. This is certainly consistent with learned helplessness, which might be expected to some degree in the acquisition stage when the learner must come to discover that calm and relaxed behaviors in the presence of fear- and anxiety-eliciting stimuli will result in increased distance. In this time, typically the trainer does not allow the learner to “check out.” We discussed natural contingencies of behavior previously. It hardly seems natural to “act happy” in the face of even mild fear. If the learner were truly calm and relaxed, remember, then increased social distance should not be reinforcing. This is why it is vital to countercondition problem emotional responses.

This criticism can be levied against graded D+RSAA with CC procedures as well. If one begins a differential-reinforcement-based procedure in the presence of an aversive stimulus, be it via positive or negative reinforcement, the initial stages can potentially be unpleasant, depending on how intense the stimulation is, for the learner as they struggle, experimenting with behaviors to win access to the reinforcer. One way that positive-reinforcement-based procedures can minimize this that negative reinforcement cannot is to train the desired behavior ahead of time and install it gradually in the stimulus situation. Another way that positive reinforcement can minimize this effect that negative reinforcement cannot is in the distance used or intensity of aversive stimulation (see Figure 2). This was referred to above. To elaborate, in graded D-RSAA, the stimulus must be close enough to be a problem stimulus, at least close enough that it will be aversive and escape will be reinforcing, and the more aversive the stimulation, the more effective will be the reinforcer. With a graded D+RSAA with CC procedure, the learner should be at such a distance that they attend to the stimulus but do *not* yet experience it as aversive. This is possible because all we rely on is it being perceived so that it can act as a discriminative stimulus and also become associated with pleasant stimuli. At this distance, escape would not be reinforcing but positive reinforcement of desirable behaviors can be reinforced. This is the case because the reinforcer intensity will be high; the treats or play will be salient because they are not tied to the distance of the aversive stimulus. The positive reinforcer acts as a reinforcer when the problem stimulus is at even a nonaversive intensity of exposure. As you can see in Figure 2, you can start a graded D+RSAA with CC procedure at a lower level of aversiveness and not only begin installing a desirable behavior but also begin the counterconditioning process. In this way, positive reinforcement *can indeed* be said to be less aversive than negative reinforcement, contrary to some claims. It is important to remember, though, that the intensity of exposure required for a graded D-RSAA to begin to work—that is, only mildly aversive, and not yet intense enough to generate intense emotionality—is not extremely harsh.

Even if, technically, graded D+RSAA with CC can be slightly less aversive than graded D-RSAA, this does not mean that graded D-RSAA is necessarily exceptionally harsh

and/or always inappropriate even for trainers who prefer to work with as few aversives as possible.

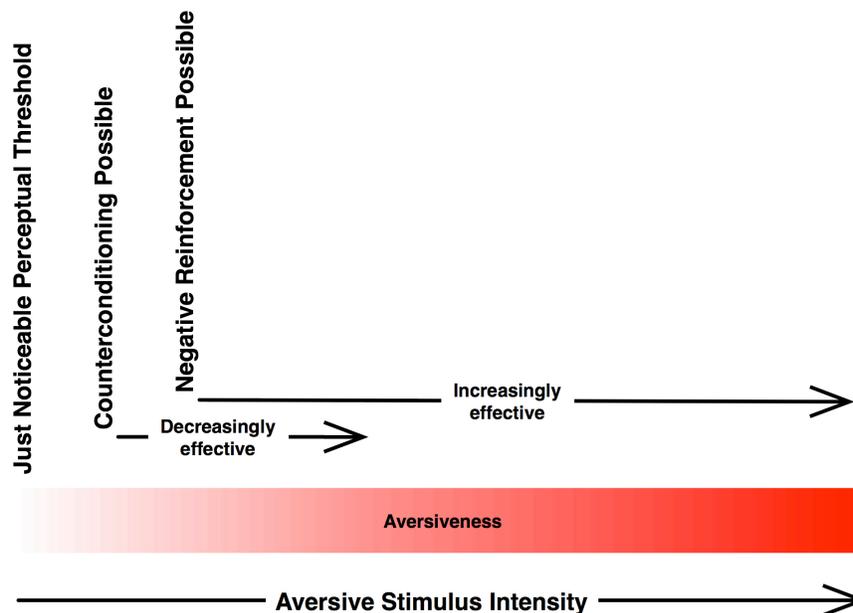


Figure 2. Aversive stimulus intensity diagram showing the range and direction of effectiveness of counterconditioning versus negative reinforcement.

Does Graded D-RSAA Involve Flooding?

Some critics have argued that graded D-RSAA is actually flooding, although this is not common now that the true nature of the procedure is being more clearly disseminated. Flooding is a highly unpleasant procedure for the learner and can easily result in fallout such as learned helplessness. In flooding, the learner is exposed to the feared stimulus and not able to escape until they cease responding to it, whereas, in negative reinforcement, the learner can avoid or escape the evocative stimulus by performing nonaggressive behaviors instead of aggressive behaviors (granted, a counter-prepared or “unnatural” behavior set in that situation). Flooding is achieved through respondent extinction of the conditioned emotional response. A flooding-like situation could arise in graded D-RSAA in the initial stages if extinction trials are not avoided. In the initial stages of shaping, the learner does not yet

know what behavior, if any, will allow them to escape the aversive stimulation. If, at this stage, the learner is exposed to aversive stimulation at an intensity that elicits emotionality and the extinction of aggressive operants rule is instated, a flooding-like arrangement is set in place. In graded D-RSAA, sensitized responses are supposed to be avoided, and, to the extent that they are, this flooding-like situation is avoided along with the emotionality it generates and the fallout that would likely result (but the aggression contingency is not “disproved” either, though). During the maintenance stage, the avoidance behaviors are well known and this does not occur. Many trainers have observed that graded D-RSAA is often rushed by inexperienced or unskilled trainers (something certainly applicable to positive-reinforcement-based approaches too, although the consequences of this are less dire) and the dog seems to be “checked out,” “unhappy” or

otherwise exhausted. It is possible that this is sometimes a form of learned helplessness resulting from what, to the learner, seems to be a noncontingent, seemingly uncontrollable aversive experience. But it must be remembered that this only occurs in the initial acquisition stage and only if the extinction trials are not avoided as they are supposed to be. This can only occur where the procedure is not carried out well. It is appropriate to point to potential consequences of misapplication of a procedure and the likelihood of misapplication, but it must be remembered that this is not a characteristic of the procedure when carried out properly. The reason I raise this issue here is not only because some critics seem to think the procedure relies on flooding, which it does not, but also because this is potentially a seriously problematic consequence for misapplication.

The Role of Emotional Motivation, Emotional Responses and Respondent Conditioning in Problem Behavior and Behavior Change Programming

Proponents of graded D-RSAA argue that, initially, emotional responses may have motivated the aggressive operants but quickly operant conditioning takes on the primary role. This, I believe is a problematic position because, as will be elaborated below, motivation remains important in the contingency as long as the reinforcer maintains its reinforcing capacity. Without the emotional motivation to escape or avoid certain stimuli, the consequences *cannot* act as a reinforcer. The behavior–consequence sequence does not exist in isolation. Without the antecedent condition of fear, there is no reason for escape or avoidance to be a valuable reinforcer. If escape or avoidance acts as a reinforcer, then it is implied that the emotional motivation remains an important component of the contingency. Contingency involves antecedents, behaviors and consequences, and the antecedent is not merely the discriminative stimulus but also the motivating operations. Of course, consequences are also important but only within the context of the motivating operations that make one consequence more or less valuable than some other consequence.

Proponents of graded D-RSAA procedures often point to the notion that aggressive behaviors are operants and so an operant approach must be used to address them. The issue is not that simple, though. The contingency for “fear”-based aggressive behaviors (see Figure 3) involves conditioned emotional responses as part of the antecedent conditions that set the occasion for and motivate the aggressive operants that are then reinforced. These conditioned emotional responses are made up of respondents, and their motivating power is an important part of the sequence. The mere fact that aggressive behaviors themselves are goal-directed behaviors does not mean that only consequences are important in changing the behaviors because this ignores the antecedent conditions that motivate them. A more comprehensive strategy is to manipulate both the antecedents and the consequences in order to change the behavior. Conditioned emotional responses are changed through counterconditioning,⁴ which then makes the aggressive operants irrelevant/obsolete. Simultaneously, the consequences can be manipulated and other, alternative or incompatible behaviors can be made more likely. “Pleasant” consequences result, rather than mere ceasing of “unpleasant” ones. This comprehensive approach of addressing both antecedents and consequences with only “pleasure”-eliciting stimulation seems likely to promote more reliable, if not also quicker, results.

⁴ They are also changed with flooding (based on respondent extinction) and habituation, although counterconditioning is generally preferred because it moves past mere “getting used to the thing” and actually makes the “thing” pleasure or relaxation eliciting.

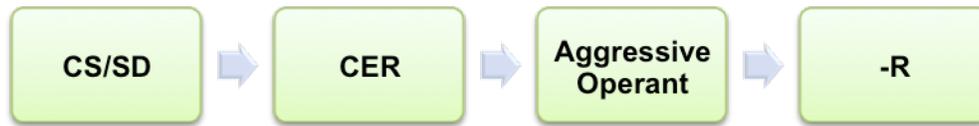


Figure 3. Common contingency in a “fear”-based aggression case. The conditioned stimulus elicits a conditioned emotional response that then motivates escape or avoidance operants that are then negatively reinforced. The conditioned stimulus is also the discriminative stimulus for the operant, indicating a likely schedule of reinforcement for certain behaviors.

While some proponents argue that, because the behaviors are operant and that because emotional responses are not important in a well-developed behavior pattern, one ought to use an operant procedure to change them, others may take a very different and contradictory approach.⁵ They argue that emotional responses *are* important in the contingency but that, while graded D-RSAA is carried out, calm and relaxed emotional responses “come along for the ride,” as it is often colloquially put. To the extent that this is the case, respondent conditioning *is* an important part of the procedure. Either habituation or counterconditioning is taking place, likely mere habituation. If this is the case, then negative reinforcement is less proportionately prominent in the procedure than often claimed. Conceivably, as the procedure progresses, the learner habituates and escape/avoidance consequences become less effective, which is not necessarily a problem since the motivation for escaping or avoiding decreases at the same time as the negative reinforcer loses its reinforcing capacity. It seems much more plausible to acknowledge the importance of emotional motivations throughout the “life” of the behavior rather than just initially in its development and also the important role of habituation rather than negative reinforcement in this procedure. The entrenched purist will not be willing to make this concession as it weakens the role of negative reinforcement in the procedure, but conceding the point seems

⁵ Contradictory to the first argument in that one accepts while one negates the importance or presence of emotional motivations.

unavoidable. If it is the case that habituation is an important contributor, then it begs the question of why negative reinforcement is required. Why not implement a positive-reinforcement procedure that can achieve habituation and even counterconditioning⁶?

Some proponents argue that emotional responses cannot be changed directly—that only by changing the behaviors first will emotional responses change. Certainly there is a complex causal relationship between emotional responses and operants. But, as pointed out above, the classic works of Watson and Rayner (1920) in directly changing the emotional responses of Little Albert, and Jones (1924) directly changing the emotional responses of a boy named Peter, demonstrate that we can change emotional responses directly (with respondent rather than operant conditioning). It seems to me that counterconditioning is a more efficient way to change emotional responses than changing them indirectly through graded D-RSAA through shaping prosocial behaviors and these behaviors influencing the actual emotional responses involved (like smiling when you are sad to try to feel better). It seems more likely to me that habituation is playing the major role in changing emotional responses in graded D-RSAA in any case, and habituation is direct.

More Empirical Research is Required

Although there is some supporting research for negative reinforcement as an effective

⁶ Not merely “getting used to it” but the stimulus coming to elicit beneficial emotional responses.

intervention procedure in humans (e.g., Azrin, Holz, Hake, & Ayllon, 1963; Kodak, Miltenberger, & Romaniuk, 2003; Marcus & Vollmer, 1995; Vollmer, Marcus, & Ringdahl, 1995), there is, at present, very little research published in peer-reviewed journals on the effectiveness of graded D-RSAA procedures in aggressive behavior in dogs. Granted, research on human subjects does provide some support for the procedure being applied to dogs since different species learn through operant conditioning in similar ways. As the procedure becomes more popular, there will likely be research with dog subjects published but it is important to understand that one research project is not usually sufficient to explore the full range of questions regarding a procedure. Research needs to be replicated in order to help justify confidence in the results. Furthermore, it is rare that individual experimental studies rule out all other rival hypotheses (such as habituation effects) or that they look at long-term reliability or even generalization reliability in real-world situations. Confidence in a procedure comes with replication and full exploration of the parameters of the procedure and its effects.

Discussion and Conclusion

While some claims made by proponents of graded D-RSAA procedures have merit, others are at least questionable. Conversely, stanch rejection of the procedure as being excessively harsh and aversive is probably not credible either. More reasonable seems to be a middle ground. Because graded D-RSAA necessarily relies on aversive presentation of the problem stimulus, it can be said to be more aversive generally than a graded D+RSAA with CC or systematic desensitization procedure, which requires only mere perception of the problem stimulus. But, if graded D-RSAA is carried out at a minimally aversive intensity of exposure, it is not likely excessively aversive (perhaps on par with negative-punishment-based procedures like time-outs). Certainly, contemporary graded D-RSAA procedures are generally far less aversive than positive punishment and flooding procedures. Proponents of graded D-RSAA contend either that emotional responses are not important, or that they are important but must be

changed indirectly through operant conditioning. But the procedure seems likely to involve an important habituation component. In any case, a graded D+RSAA with CC procedure changes the operants and the emotional responses directly and simultaneously. Graded D-RSAA makes use of natural reinforcers, which can contribute to making generalization smoother and more reliable, but with graded D+RSAA with CC, the emotional responses change, making the original escape reinforcer obsolete, and other strategies exist for working through generalization. There is a concern that, while the operants change in graded D-RSAA, the emotional fear responses remain intact and that long-term reliability is in question. This has not been verified, although it seems a plausible hypothesis. Proponents of graded D-RSAA often compare their procedure to poorly executed systematic desensitization, but this is an unfair comparison and it ignores other alternatives such as graded D+RSAA with CC. They argue that graded D-RSAA takes less time than systematic desensitization, but this has not been empirically determined and does not seem plausible anecdotally.

This is not to suggest or imply that there is not a place for graded D-RSAA in behavior change programming. Assuming the consultant is dedicated to the least aversive approach available for resolving the problem behavior, graded D-RSAA may not make the best choice as the first option. It may be reserved for intractable cases, for which other approaches have proven less effective than is needed. In some cases, it is not viable to achieve a great enough distance between the learner and the problem stimulus and hence a low enough intensity of exposure in order to achieve graded D+RSAA with CC. Remember that for counterconditioning to occur, the stimulus should not be perceived as aversive to the learner. Where it is not possible to achieve a nonaversive exposure to the stimulus, graded D-RSAA may be a viable and minimally aversive approach. In that case, one could use it as a way to get a “foot in the door,” so to speak, and switch as soon as possible to a graded D+RSAA with CC strategy. Graded D-RSAA should only be performed, in my opinion, by

professional behavior consultants who are very skilled at reading learner communication signals, and who are flexible. In my experience, trainers often have a tendency to work learners through graded D-RSAA too quickly, causing the learner stress. This must be guarded against with any procedure utilized.

I have come to the following conclusions: Is graded D-RSAA effective at decreasing “fear”-based aggressive behaviors? Sure. Is it highly aversive? Generally no, it avoids intense emotionality. Is it as minimally aversive as systematic desensitization or graded D+RSAA with CC? Not generally, although the difference may or may not be clinically significant. Does it avoid fallout associated with aversive stimulation such as countercontrol and learned

helplessness? Likely yes. Is it superior to a graded D+RSAA with CC procedure? My conclusion, based on the issues outlined above, is generally no. Does graded D-RSAA have a place in minimally aversive behavior change programming? Yes, but not as a first option unless it is impossible to arrange for nonaversive exposure to the problem stimulus. Is it a panacea? No! Is it abusive as some argue? Not if done properly by a skilled professional under the right circumstances.

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Suggested Further Reading

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