Understanding Behavioral Escalation: From Theory to Practice

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This article describes various theoretical structures that guide our understanding of behavior escalation. The conceptual and applied aspects of the article make it a timely tribute to the scholarship of the late Donald Baer, father of behavior analysis. Since the seminal article by Donald Baer and his colleagues on Some Current Dimensions of Applied Behavior Analysis (1968), educators and practitioners have strived for a better understanding the applications of behavior analysis and social validity of behavioral interventions for sustained effects. In keeping with most of Donald Baer's contributions to this field, this article is a dedication to his principles, beliefs and practice.

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In school settings, students with severe behavioral problems present tremendous challenges even to the most experienced classroom teachers (Carr, Taylor, & Robinson, 1991). In the event of a behavioral escalation, instruction comes to a standstill, the teacher and student become engaged in a confrontational dialogue, and other students in class become anxious or curious spectators. What appears to be particularly challenging is that teachers may not always be able to *predict* the precise moment in time when escalation will occur because they may not have a good *understanding* of the behavioral pattern. It is common knowledge that understanding and predicting behavioral patterns are precursors for *controlling* events of escalation (Baer, Wolf, & Risley, 1968; Vargas, 1977). This article provides an operational definition of behavioral escalation and describes the underlying theoretical framework. Embedded within the theoretical framework are various empirically effective strategies for preventing and managing behavioral escalation.

Behavioral Escalation Defined

Behavioral escalation is defined as an event where a class of topographically different responses occur in a sequential pattern in which successive responses are of increasing severity or intensity (Albin, O'Brien, & Horner, 1992; Colvin, 1990; Lagerspetz, 1964; Strain & Ezzel, 1978; Wahler & Fox, 1982). Such sequences usually begin with less severe topographies (e.g., complaining and arguing) and end with more severe responses (e.g., physical assault) that cause injury to people and/or damage and property (Patterson, 1982; Shukla, 1994). The various responses that form an escalating sequence are members of the same functional response class. In other words, they are maintained by the same behavioral function, for example, to escape an unpreferred activity or person or to access a preferred object (Shukla & Albin, 1995; Sprague & Horner, 1992). Preventing or managing behavioral escalation necessitates a conceptual understanding of the pattern and the laws that govern their occurrence. The next section describes the theoretical models that provide a better understanding of escalating response sequences.

Theoretical Framework for Understanding Behavioral Escalation

Behavioral escalation can be comprehended from the perspective of two interrelated theories of human behavior, that is, the matching law and stimulus control.

Theories of Human Behavior

Matching Law	**Stimulus-Control**
• Behavior is categorized into functional response classes where behavioral allocation is determined by response efficiency. • A functionally equivalent alternate communicative response is necessary to replace problem behavior.	• Behavior is not random but controlled by environmental stimuli. • Behavior can also be controlled by one's own previous response. • Establishing operations increase or decrease the value of reinforcers, thus affecting behavioral allocation.

The *matching law* states that all organisms choose to engage in specific responses out of a class of concurrently available alternatives at any given moment in time, depending upon the schedule of reinforcement associated with each of the topog-

raphies within the context (Bernstein & Ebbesen, 1978; Borrero & Vollmer, 2002; Herrnstein, 1961; Mace, McCurdy, & Quigley, 1990). The application of this law is best understood within the context of functional response classes (e.g., Martens & Houk, 1989) and functional equivalence (Baer, 1982; Carr & Durand, 1985a; Lalli, Casey, & Kates, 1995). Because the various members of a response class are controlled by socially mediated environmental stimuli (Baer, 1997; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Peláez-Nogueras & Gewirtz, 1997; Rogers-Warren & Baer, 1976) or one's own previous response (Grote, Rosales, & Baer, 1996), the stimulus-control theory cannot be disassociated from the matching law theory for understanding the structural organization of response patterns that lead to behavioral escalation.

Role of Response Classes in Behavioral Support

A response class is a group of topographically different responses (e.g., pushing, screaming, throwing objects) that are emitted to produce a common functional effect (e.g., escape from task, attention from peers, internal stimulation) (Barrett, Johnston, & Pennypacker, 1986; Carr, 1988; Johnston & Pennypacker, 1980; Parrish, Cataldo, Kolko, Neef, & Egel, 1986). Of the different behaviors that form a response class, some may occur more frequently than others (e.g., leaving one's assigned seat may occur more frequently than hitting the teacher) (Lalli, Mace, Wohn, & Livezey, 1995; Sevin, Gulotta, Sierp, Rosica, & Miller, 2002). Research has also demonstrated that if one member of the response class is manipulated by ignoring, blocking or punishing, it changes the probability of occurrence of other members in the response class either in frequency or intensity (Lerman & Iwata, 1996; Parrish et al., 1986; Sevin et al., 2002; Shukla & Albin, 1995; Sprague & Horner, 1992). When one behavior from a response class is suppressed, the next most probable behavior to produce the maintaining consequence from the same class of responses is likely to be performed at a higher rate than baseline levels (Goh & Iwata, 1994).

The response class theory points to the need for understanding how behaviors become members of a class of responses. It appears that as new responses are learned, a behavior hierarchy is established (Baer, 1982; Baer, 1986; Fuqua, 1984). It is also important to understand which variables determine which member of a response class will be performed under any specific situation (Baer, 1997). Certain environmental events will occasion the occurrence of either adaptive or less severe responses while others will occasion the occurrence of more severe responses. In fact, if less severe or adaptive responses produce new and preferred outcomes, the new contingencies will be associated with "even more far-reaching consequences," creating behavioral cusps (Rosales-Ruiz & Baer, 1997, p. 533). Therefore, it stands to reason that if a functionally equivalent alternative response is taught and maintained initially at high rates of reinforcement, the new response will occur at higher rates, making problem behavior inefficient and ineffective (Carr & Durand, 1985; Day, Horner, & O'Neill, 1994; Durand & Carr, 1992; Jayne, Schloss, Alper, & Menscher, 1994; Lalli et al., 1995). Teaching a functionally equivalent response, then, needs to be the focus of behavioral interventions if assessment of social validity is the over-arching goal (Schwartz & Baer, 1991).

The functional equivalence theory has empirical roots in the logic that problem behavior serves communicative functions for the person who engages in such behavior (Carr & Durand, 1985b; Kennedy, Meyer, Knowles, & Shukla, 2000). It suggests that if problem behaviors have communicative functions, we need to identify a class of responses so that a single intervention (e.g., functional communication training) could effectively decrease all problem behavior (Derby et al., 1997; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991). Multiple problem behaviors that form a single functional response class seem to be organized in various kinds of patterns that appear to be structurally different from each other. The next section provides a review of different response patterns described in the literature.

Organization of Response Structures

The literature has described different underlying variables in explaining response patterns that comprise of multiple behaviors that occur one after the other. Terms used in the literature include operant chains (Baer, 1982; Skinner, 1938), response sequences (Evans, Meyer, Kurkjian, & Kishi, 1988), escalating sequences (Colvin, 1990; Walker, Colvin, & Ramsey, 1995), and behavior hierarchies (Baer, 1982), with each pattern being structurally different from the other.

Operant chains. Skinner (1938) described an operant chain as "The response of one reflex [that] constitute[s] or produce[s] the eliciting or discriminative stimulus of another" (p. 32). Established as the "Law of Chaining," it emphasizes the stimulus-control relationship in an operant chain where one behavior immediately follows another (Baer, 1982; Millenson & Leslie, 1979; Rusch, Rose, & Greenwood, 1988). In other words, the previous response acts as a discriminative stimulus for the next response, producing an operant chain (Wolf, Risley, & Mees, 1964). A behavioral chain is likely to have a high degree of consistency in the steps of the sequence such that early behaviors can reliably predict the occurrence of later behaviors (Baer, 1997; Evans et al., 1988). A good example of an operant response chain might include doing specific tasks within activity routines that involve a series of behaviors learned in a sequence, e.g., brushing one's teeth. Sometimes problem behaviors also seem to occur as operant chains. An example might include a pattern where one problem behavior clearly serves as a discriminative stimulus for the next response (see Figure 1).

Response sequences. A response sequence is structurally different from an operant chain and more difficult to explain (Evans et al., 1988; Voeltz & Evans, 1982). In a response sequence, early behaviors do *not* act as discriminative stimuli for subsequent responses but *increase the probability*

Figure 1. An operant chain of problematic responses triggered initially by the teacher behavior but is maintained by the student's own response (i.e., a response-response chain) until a functional reinforcer is produced.

Discriminative Stimulus (S^d) 1		Response (R) 1
Teacher: Start your work, Jason. This needs to be completed before you can go to recess. (Teacher attends to other students.)	→	Jason: Why do we have to do this now? Shakes his head. (Whining and shaking head)
Consequence / S^d 2 Whining and shaking head	⇢ →	*R 2* Jason: This is boring. I hate such things. (Complaining)
Consequence / S^d 3 Complaining	⇢ →	*R 3* Jason: I can't do this crap! You can't make me! (Screaming)
		Teacher gives a time-out. (Functional reinforcer - escape from task)

of occurrence of the next response sometime in the proximal future (Evans et al., 1988; Voeltz & Evans, 1982). The sequence is likely to involve other responses from a class of responses until one is successful in producing a functional reinforcer (Duarte, Svein, Rosales-Ruiz, & Baer, 1998). The previous response in a sequence makes the later response more likely and hence predictable to a certain extent, e.g., pushing task materials away increases the probability that student might throw task materials if the previous response fails to produce a functional reinforcer (Shukla & Albin, 1995). However, it is also likely that the student will not throw task materials but hit the teacher. The two subsequent responses do not appear to be inherently organized in some form of a structural pattern as is evident in an operant chain (Evans et al., 1988), but are determined by the history of specific responses in producing a functional reinforcer (see Figure 2). Thus, one of the determinants of response efficiency is one's history with schedules of reinforcement (Baer, 1982; Carr, Bailey, Ecott, Lucker, & Weil, 1998; Duarte, Svein, Rosales-Ruiz, & Baer, 1998).

Escalating sequences. This pattern is structurally similar to response sequences described above, except that each subsequent response is more serious or severe compared to the previous one (Albin, O'Brien, & Horner, 1992; Colvin, 1990; Lagerspetz, 1964; Loeber, et al., 1993; Patterson, 1982). A content review on escalating sequences reveals that behaviorists have described this term differentially. Researchers in laboratory settings who studied animal aggression have stated behavioral escalations to be a result of externally induced stimuli. Studies indicate that trained fighting mice very rapidly escalated in intensity when placed with other trained fighting mice (Lagerspetz, 1964). The intensity of the victim's reaction to the attack correlated with the likelihood of higher intensities during future attacks except in cases where the victim was nonreactive or drugged, in which case the attacks did not occur (Knutson & Hyman, 1973).

Figure 2. A response sequence in which history of reinforcement for specific members of a functional response class determine behavioral allocation.

Discriminative Stimulus (S^d) 1		Response (R) 1	Response Alternatives and Related History of Consequences
Teacher: Did you bring your homework, Kanisha?	→	Kanisha: I need to speak with you.	• If "Yes" then teacher will ask to show homework • If "No" then teacher will take away a privilege • If "I need to speak with you," then teacher will have a private conversation
Consequence / S^d2 Teacher: What's the matter, Kanisha? Did you forget your homework?	⇢ →	*R 2* Kanisha: Why are you always on my case?	• If "Yes" then teacher will insult in front of peers • If "No" then teacher will ask to show homework • If "Why are you always on my case?" then teacher will give a time-out.
Consequence / S^d3 Teacher: I know when you are not telling me the truth. Show me your homework.	⇢ →	R 3 Kanisha: I will tell on you that you keep harassing me!	• Previous adaptive response did not produce functional reinforcer. • Need to escape request intensifies. • Use of past experience to access functional reinforcer.
Consequence / S^d4 Teacher: Well, I will send you to the Principal for insubordination!"	⇢ →	*R 4* Kanisha: Stops arguing with teacher.	• Previous history strengthened. (Functional reinforcer - escape from aversive request produced by arguing.)

Researchers in the field of conduct disorders define the sequential nature of behavioral escalation from a developmental perspective. Findings from a longitudinal study by Loeber and colleagues (1993) indicated that disruptive behaviors in boys with antisocial behavior tended to follow a systematic

developmental sequence showing a gradual unfolding of problem behaviors. The behavioral sequence started with stubborn behavior, followed by minor covert behavior, defiance, aggression, and property damage, the age of onset for early behaviors being 10 years. The moderate and serious delinquency, authority avoidance, fighting, and violence all shared a median age of onset at age 13. This sequential pattern, however, may be viewed as a "developmental pathway" (Costello & Angold, 1993; Reid, 1993) rather than as a response sequence emitted by specific discriminative stimuli and controlled by specific maintaining reinforcers that operate within a single behavioral episode. The literature in the area of conduct disorders emphasizes the coercive nature of interactions where both players escalate together in a fairly predictable sequence (Colvin, 1990; Kazdin, 1987; Patterson, 1982; Patterson, Reid, & Dishion, 1992; Walker, 1993). In other words, one person's response emits a more severe reaction in the other person to a point where both persons engage in progressively severe responses (Wahler & Dumas, 1986). The sequence culminates with a dangerous behavior on the part of one person (e.g., physical assault). This pattern of interaction basically operates on a negative reinforcement paradigm (Colvin, 1990; Patterson, 1982). When an aversive stimulus (e.g., teacher correction) is removed following display of a dangerous behavior (e.g., physical assault), the immediate outcome is that the dangerous behavior stops occurring. This serves to reinforce both players (see Figure 3). In fact, the teacher or parent's behavior often provides clues regarding the function of student behavioral problems (Taylor & Romanczyk, 1994). However, if one person avoids being drawn into the coercive interaction by remaining uninvolved or ignoring the previous response, the next response is less likely to be less severe in intensity and impact.

Behavior hierarchies. If we assume that both less and more severe responses are members of the same functional response class, it is logical to assume that more severe responses may occur if less severe responses are not functionally effective. Given this reasoning, it is likely that more severe responses may tend to follow less severe responses. Our clinical experiences indicate that in different stimulus contexts, the response pattern may demonstrate a different sequential order (Baer, 1982). In other words, certain contexts make some responses more probable than others (Ringdahl, Vollmer, Marcus, & Roane, 1997). From this perspective, the response class creates a hierarchy of probable responses where one response is linked to another by means of some propioceptive cues established as a result of an individual's learning history, circumstances of reinforcement or deprivation, and other motivational factors (Baer, 1982; Duarte et al., 1998; Evans et al., 1988). For example, a teacher who consistently reinforces either alternative communication or less severe problem behavior, makes more severe problem behavior irrelevant. Contrarily, if only more severe responses are reinforced (albeit inadvertently), then these will occur more frequently (Baer, 1982; Evans et al., 1988; Shukla & Albin, 1995; Voeltz & Evans, 1982) (see Figure 4).

Figure 3. An escalating sequence of responses where each successive response is more severe in topography compared to the previous response of the same person. In such a sequence, the response of one person is a discriminative stimulus for the response of the other player; hence, both persons escalate together.

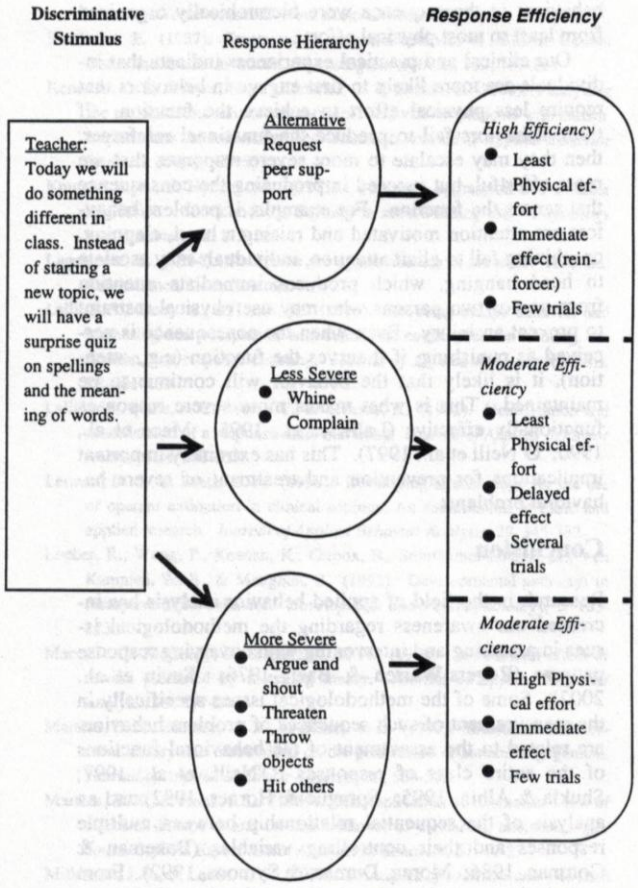
Discriminative Stimulus (S^d) 1		Response **(R) 1**
Teacher: Ruiz, most of your problems are incorrect. You need to re-do them.	→	Ruiz: I already did them once. Why do I have to do them again?
Consequence / S^d 2	↙ →	*R 2*
Teacher: Well, you got them all wrong. Now do them again because you're already behind the others.		Ruiz: No, I am not behind! You keep finding faults with me because you don't like me!
Consequence / S^d 3	↙ →	*R 3*
Teacher: Stop finding excuses, Ruiz. Do your problems now or else you will have to stay in class during recess.		Ruiz: I won't do this crap and you can't make me! And I am not staying in here during recess.
Consequence / S^d 4	↙ →	R 4
Teacher: Oh yes you are. I make the rules here not you. And if you don't start your work right now, I will have you in detention.		**Ruiz: Oh ya, let's see how. Gets up and starts walking out of the class.**
Consequence / S^d 5	↙ →	R 5
Teacher follows him, grabs his arm and tries to pull him back.		Ruiz: Get your hands off me! Hits the teacher in the face and walks away from the classroom.
Consequence / S^d 6	↙ →	R 6
Teacher calls for back-up support and leaves the student alone.		Ruiz goes with others teachers quietly. (Functional reinforcer for student – intimidate teacher and escape difficult task. Functional reinforcer for the teacher – remove aversive student from class.)

Development and Expansion of Response Classes

Selection of a specific response in a behavioral hierarchy is not random. In fact, it is likely to be determined by several factors, e.g., an established reinforcement history (Baer, 1982; Evans, et al., 1988; Mace, McCurdy, & Quigley, 1990; Martens, Bradley, & Eckert, 1997), occurrence of specific establishing operations (Chandler, Fowler, & Lubeck, 1992; Horner, Day, & Day, 1997; O'Neill et al., 1997; Wahler & Fox, 1981), the physical effort it takes to perform a behavior (Baer, 1982; Friman & Poling, 1995), or the overall efficiency of the response (Horner & Day, 1991; Horner, Sprague, Brien, & Heathfield, 1990). Recent research has indicated that a new functionally equivalent response is more likely to be learned and maintained if it is more efficient than the old response (Horner & Day 1991; Horner, Sprague, O'Brien, & Heathfield, 1990; Kennedy, Meyer, Knowles, & Shukla, 2000; Shukla & Albin, 1995). These authors have documented the role of response efficiency in the context of a competing behaviors framework and functional equivalence training. Efficiency of a response is likely to be affected by the physical effort it takes to perform a given behavior, the latency for functional effect, and schedules of reinforcement (Horner & Day , 1991). If a new response requires less physical effort to perform, produces a functional outcome with little or no delay, and operates on a high schedule of reinforcement, it is more likely to be learned and maintained. For example, if a student shows a cue card to request "help" and the teacher provides immediate assistance the first time, this behavior will become more efficient compared to screaming to access teacher attention. This is because the latter appears to require more physical effort when compared to showing a card.

With specific reference to behavioral escalation, it appears that more severe responses produce the desired function with impressive speed and with fewer instances of responding compared to less severe responses (Shukla, 1994). In other words, whining or complaining can be momentarily ignored but spitting or hitting a teacher cannot be ignored in any setting. Thus, if speed of effect is important to a person, more severe responses may be a most efficient response option. However, clinical experiences indicate that individuals do not always engage in more severe responses all the time. Less severe responses tend to be performed more frequently and more severe responses less frequently (Sprague & Horner, 1992). If more severe responses were consistently more efficient for individuals, it is likely that they would engage in those behaviors more frequently, making a sequence less predictable and more difficult to manage in clinical settings. However, there is ample evidence that individuals engage in both less and more severe responses (Dunhan & Grantmyre, 1982; Shukla & Albin, 1995; Sprague & Horner, 1992).

Figure 4. A model for determining the role of response efficiency in behavioral intervention and support. If a functionally equivalent alternative response (e.g., request peer support) is made to be more efficient, then less and more severe problem behavior will be occur at lower rates because these would be only moderately efficient.



One logical explanation for this pattern appears to be that more severe responses require greater physical effort to perform. Even though more severe responses are more likely to produce the functional reinforcer, individuals who continue to engage in less severe responses may actually prefer to allow for delayed reinforcement than to exert great physical effort. Skinner (1938) has stated the relevance of the "law of least effort" in the selection of responses. The physical effort involved in performing a response is especially important for our understanding of more severe responses in an escalating sequence of responses. Physical effort could be viewed as the force or number of calories of energy required to perform a response (Friman & Poling, 1995; Horner & Day, 1991). More severe responses involve high physical effort (e.g., hitting is more effortful than whining). In a case study, Albin,

O'Brien, and Horner (1992) did a preliminary analysis of an escalating pattern of problem behaviors to determine the role of physical effort. They used videotaped samples of the multiple responses to evaluate the amount of physical effort required for each of the behaviors in the escalating response sequence. Independent ratings of perceived effort on a scale of 1-10 by an audience naive to the purpose of the study revealed that some but not all of the behaviors in the sequence were hierarchically organized from least to most physical effort.

Our clinical and practical experiences indicate that individuals are more likely to first engage in behaviors that require less physical effort to achieve the function. If these behaviors fail to produce the functional reinforcer, then they may escalate to more severe responses that are more effortful, but succeed in producing the consequence that serves the function. For example, if problem behaviors are attention motivated and raising a hand, clapping, or whining fail to elicit attention, individuals may escalate to head banging, which produces immediate attention from one or two persons who may use physical restraint to prevent an injury. Even when the consequence is perceived as punishing, if it serves the function (e.g., attention), it is likely that the behavior will continue to be maintained. This is what makes more severe responses functionally effective (Lalli, et al., 1995; Mace et al., 1990; O'Neill et al., 1997). This has extremely important implications for prevention and treatment of severe behavioral problems.

Conclusion

Research in the field of applied behavior analysis has increased our awareness regarding the methodological issues in assessing and intervening with covarying response patterns (Rogers-Warren & Baer, 1976; Sevin et al., 2002). Some of the methodological issues specifically in the measurement of such sequences of problem behaviors are related to the assessment of the behavioral functions of the entire class of responses (O'Neill, et al., 1997; Shukla & Albin, 1995; Sprague & Horner, 1992) and an analysis of the sequential relationship between multiple responses and their controlling variables (Bakeman & Gottman, 1986; Moran, Dumas, & Symons, 1992). From a clinical perspective, the challenge lies in utilizing the current behavioral assessment technology to identify response patterns consisting of multiple topographies of problem behavior, identifying the controlling variables, and developing positive interventions to eliminate or prevent the occurrence of more severe problem behaviors (O'Neill et al., 1997). This is a major shift in the approach to behavioral interventions for complex behavioral patterns, moving away from a focus on reducing problem behaviors toward a focus on replacing them or preventing them from occurring (Horner et al., 1990). This is a more socially valid and values-based approach (Baer, Wolf, & Risley, 1968; Carr, Robinson, Taylor, & Carlson, 1990; Schwartz & Baer, 1991; Wolf, 1978). Besides, the ability to prevent the occurrence of severe problem behaviors will enable care-providers to better support individuals with disabilities in school and community settings.

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