A Conceptual Framework for Understanding Patterns of Response Sequences

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Many individuals with severe challenging behaviors often display patterns of behaviors that sequentially escalate from less to more severe topographies (e.g., from whining to screaming). Described as an escalating sequence in vernacular, this pattern may be defined as a class of topographically different responses that occur in a sequential pattern in which successive responses are of increasing severity, intensity, or problematic topography (Albin, O'Brien, & Horner, 1992; Colvin, 1990; Patterson, 1982; Shukla, 1994). More likely than not, the various topographies are members of a common response class, maintained by one or more behavioral functions, e.g., escape from task or get adult attention.

The theoretical implications of understanding and intervening with such patterns of behavior are twofold: First, a need to operationally describe an escalating pattern of responses based on the organizational structure of the response sequence (Evans, Kurkijan, & Kishi, 1988). Second, a need to empirically document the occurrence of an escalating sequence, that demonstrates the occurrence of less severe topographies (e.g., whining) early in the sequence compared to more severe topographies (e.g., aggression), later in the sequence. This is prerequisite for designing effective interventions for individuals who engage in clinically severe forms of behavioral escalation. This paper provides a basis for understanding the organizational structure of the response pattern and suggests directions for designing functionally equivalent behavioral interventions.

Theoretical Foundations for Understanding Response Sequences

The theoretical foundations for understanding response sequences builds from recent research in two areas: Communicative functions of problem behavior and functional response classes. The theory that problem behaviors may have communicative functions is based on the logic that human behavior is not random. All behaviors, appropriate or inappropriate, serve some function which maintains these behaviors. If individuals knew socially acceptable ways to communicate, there would be little reason to engage in problem behaviors. However, in the absence of functionally equivalent modes of communication, individuals may engage in severe problem behaviors to produce the functional reinforcers. If individuals were taught other functionally equivalent ways to communicate the same function, it is likely that problem behaviors will decrease in rate (Carr & Durand, 1985). Topographically different responses could be interrelated by common function(s) and success of behavioral intervention procedures depends on our understanding of the organization of multiple responses within a response class (Evans et al., 1988; Schroeder & MacLean, 1987; Voeltz & Evans, 1982).

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, assess to tangible objects, or internal reinforcement) (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., whining may occur more frequently than hitting). Research has demonstrated that if one member of the response class is manipulated, it changes the probability of rate of occurrence of other members in the same response class (Grace, Kahng, & Fisher, 1994; Parrish et al., 1986; Shukla & Albin, 1996; Sprague & Horner, 1992). In other words, if one or more behaviors in a response class are blocked, punished, or placed on extinction, other behaviors will increase in rate. On the other hand, if a new response (e.g., signing "break") is added to the response class, this response will more likely occur at higher rates, making the problem behaviors irrelevant (Shukla & Albin, 1996; Sprague & Horner, 1992). The response class theory suggests that if problem behaviors have communicative functions, we need to identify classes of behavioral responses so that a single intervention could be implemented for all members of a class rather than implementing one intervention for each problem behavior (Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991).

Understanding the Organizational Structure of Response Sequences

Multiple problem behaviors that form a single functional response class seem to be organized in various patterns that appear to be structurally different from each other. Terms used in the literature to describe such behavior patterns include operant chains, response sequences, escalating sequences, and behavior hierarchies with each pattern being structurally different from the other (Evans et al., 1988; Voeltz & Evans, 1982). An *operant chain* is defined as "The response of one reflex [that] constitute[s] or produce[s] the eliciting or discriminative stimulus of another" (Skinner, 1938, p.32). This definition emphasizes the stimulus-control relation where one behavior immediately follows another (Baer, 1982; Millenson & Leslie,1979). In other words, the previous response acts as a discriminative stimulus for the next response, producing a chain of behaviors. 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 (Evans et al., 1988).

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 necessarily act as discriminative stimuli for the next behavior but *increase the probability* of occurrence of the next behavior sometime in the proximal future (Evans et al., 1988; Voeltz & Evans, 1982). The previous response in a sequence makes the later response more likely and hence predictable to a certain extent, e.g., screaming to escape from task demands increases the probability that hurling materials will occur if screaming fails to produce escape. However, hitting is equally likely to occur especially if this response is associated with a history of reinforcement. The two subsequent responses do not appear to be inherently organized in some form of a structural pattern as is evident in a response chain (Evans et al., 1988). This distinction is important because interventions designed to address operant chains are likely to require different considerations than those required for addressing response sequences.

Within a response sequence, if we assume that both less severe (e.g., whine) and more severe (e.g., aggression) behaviors are members of the same response class, it is logical to assume that more severe behaviors will occur only if less severe behaviors are functionally ineffective. Given this reasoning, it is likely that more severe behaviors will follow less severe behaviors. This pattern has been described as an *escalating sequence* which is characterized as a functional class of topographically different responses that occur in a sequential pattern in which successive responses are of increasing intensity, seriousness, or problematic topography (Colvin, 1990; Shukla & Albin, 1996).

The response class theory points to the need for understanding how behaviors become members of a response class. It appears that as new responses are learned, a *behavior hierarchy* is established (Baer, 1982). It is also important to understand what variables determine which member of a response class will be performed under any specific condition (Baer, 1982). Certain environmental events will occasion the occurrence of less severe behaviors and others will occasion the occurrence of more severe behaviors. An understanding of the hierarchical nature of the organization of different responses (less and more severe) within a class may provide an explanation for behavioral allocation.

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), the physical effort it takes to perform a behavior (Baer, 1982), or the overall efficiency of the response (Horner & Day, 1991; Horner, Sprague, O'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 et. al., 1990). 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 the schedule of reinforcement. If more severe behaviors were consistently more efficient for individuals, it is likely that they will engage in those behaviors at a higher rate and less severe behaviors would cease to occur over a period of time.

Effective research on response sequences must be preceded by development and integration of effective measurement procedures (Barrett, Johnston, & Pennypacker, 1986). We have for many years focused on the measurement of the rate and frequency of problem behaviors. To fully describe and understand complex response patterns, we need a measurement technology that will allow us to (a) directly observe the multiple problem behaviors that occur in a sequence, and (b) analyze the sequential relation between multiple problem behaviors and their controlling variables (Bakeman & Gottman, 1986; Moran, Dumas, & Symons, 1992; Repp, Felce, & Karsh, 1991; Repp, Harman, Felce, Van Acker, & Karsh, 1989). The methodology for the measurement of sequential relationships between variables provides tremendous potential for a fine-grained analysis necessary for understanding, predicting, and controlling severe problem behaviors. However, the complexity of the measurement and analysis procedures make it a heuristic for research purposes and prevents it from being a tool of practical utility. Making this a user-friendly methodology may well be the target for future research efforts.

To summarize, there is a continued need for research that demonstrates effective intervention strategies for complex patterns of problem behaviors in individuals with developmental disabilities. Our ability to support individuals in regular environments will depend on our ability to (a) identify and document escalating response sequences, (b) understand the hierarchical organization of escalating response sequences, and (c) identify and eliminate the controlling variables.

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