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TOPOGRAPHICAL AND FUNCTIONAL PROPERTIES OF PRECURSORS TO SEVERE PROBLEM BEHAVIOR

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A literature search identified 17 articles reporting data on 34 subjects who engaged in precursors to severe problem behavior, which we examined to identify topographical and functional characteristics. Unintelligible vocalization was the most common precursor to aggression (27%) and property destruction (29%), whereas self- or nondirected movement was the most common precursor to SIB (32%). Unintelligible vocalization and object-directed movement were the most common precursors to behavior maintained by social-positive reinforcement (27% each), and unintelligible vocalization was the most common precursor to behavior maintained by social-negative reinforcement (29%). Only one precursor was reported for behavior maintained by automatic reinforcement.

Key words: precursor, problem behavior, topography, functional analysis, response class, response chain

The defining characteristics of a precursor response are its temporal and probabilistic relation to a target response: A precursor precedes and predicts the occurrence of a target. Several studies have shown that precursors to severe problem behavior often are less severe than the behavior they precede and are maintained by the same consequences (Borrero & Borrero, 2008; Herscovitch, Roscoe, Libby, Bourret, & Ahearn, 2009; Smith & Churchill, 2002). These characteristics make precursor behavior relevant to the assessment and treatment of severe problem behavior for several reasons.

First, a functional analysis (FA) of precursor behavior may be helpful when the target (severe) behavior occurs rarely. Richman, Wacker, Asmus, Casey, and Andelman (1999) clarified ambiguous FAs of aggregated behaviors (precursors and severe behaviors) for three subjects by implementing extinction of the precursors. Second, an FA of precursor behavior might be considered when the severe behavior poses significant risk. Smith and Churchill (2002) conducted separate FAs of self-injurious behavior (SIB) and its precursors for four subjects. The precursors and SIB had the same functions, and SIB occurred at lower rates during the FA of precursors, suggesting that FAs of precursors might reduce risks associated with high rates of severe behaviors. Finally, the analysis of precursors may facilitate treatment or prevention of severe behavior. Najdowski, Wallace, Ellsworth, MacAleese, and Cleveland (2008) implemented treatments for the problem behavior of three subjects based on the results of precursor FAs and noted that severe behavior was minimal or absent throughout treatment.

Given the potential benefits of identifying precursor behavior, we conducted a review to determine the frequency with which precursors have been reported in research on problem behavior. We categorized precursors to determine whether certain topographies were reported more frequently and examined relations between precursor topographies and both the topography and function of severe problem behavior.

METHOD

General Inclusion Criteria

We identified relevant articles via Google Scholar and the Web of Science, as well as the online abstracts of 16 behavioral journals

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Table 1
Precursor Categories, Examples, and Percentages of Total Observed Precursors

Category	Example	% of total
Unintelligible vocalization	Scream or cry	28.2
Self-specific vocalization	Threat to harm self	1.4
Object-specific vocalization	Statement of possession	2.8
Task-specific vocalization	Task refusal	4.2
Person-specific vocalization	Threat to harm others	1.4
Nonspecific vocalization	Say "no"	4.2
Self- or nondirected movement	Flap hands	16.9
Object-directed movement	Reach towards object	16.9
Person-directed movement	Grab person	12.7
Locomotion	Run	9.9
Posture	Hold knees	1.4

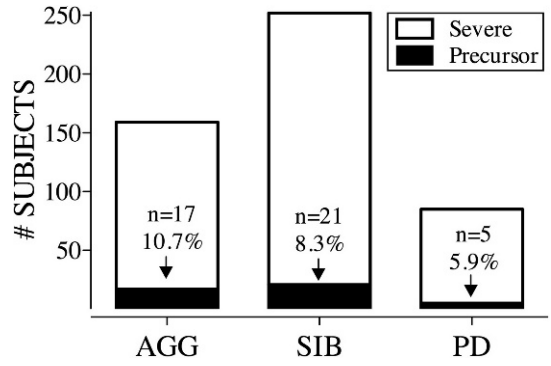

Figure 1. Total number of subjects reported to engage in each target response (white bars; aggression = AGG, self-injurious behavior = SIB; property destruction = PD) and in precursors to each target response (black bars) for journal years in which precursors were reported.

(journals published only electronically were excluded). Searches included the key words *problem behavior* and each of the following: *precursor, response class, response chain, precurrent, covariation, hierarchy,* and *escalation*. Only studies that contained data for the target behaviors of aggression, SIB, or property destruction *and* data for precursor behaviors were retained. We selected these target behaviors because they are the most frequently reported severe problem behaviors for which a precursor analysis might be considered. By contrast, stereotypy, another common problem behavior, is not considered to be dangerous. Precursors were defined as behaviors that occurred prior to the occurrence of target behaviors.

Precursor Categories

Categories that represented similar topographic characteristics were developed based on all reported precursors. Vocal precursors included intelligible and unintelligible vocalizations. Intelligible vocalizations were subdivided into self-specific, object-specific, task-specific, person-specific, and nonspecific vocalizations. Nonvocal precursors included self- or nondirected movements, object-directed movements, person-directed movements, locomotion, and postures. Each precursor behavior identified in the review was placed into one of the categories based on consensus among seven certified behavior analysts, including the authors. Table 1 lists examples of precursors found in each category.

RESULTS

Prevalence of Precursors

We identified 17 studies that reported data on 34 subjects who met the inclusion criteria (a complete list is available from the first author). Twenty-two subjects exhibited multiple precursor topographies, and seven subjects exhibited multiple target topographies.

To determine the extent to which precursors to each target were represented in the larger population of individuals reported to engage in a particular target behavior, we tallied the number of subjects reported to exhibit aggression, SIB, and property destruction in the same journal years for which precursor topographies were reported. The 34 subjects who engaged in precursor behavior were drawn from a population of 349 subjects who engaged in the target behaviors in the same journal years, for an overall prevalence of 9.7%. Figure 1 shows a breakdown of this distribution based on target behavior. A larger percentage of subjects who engaged in aggression were reported to display precursors (10.7%) relative to those who

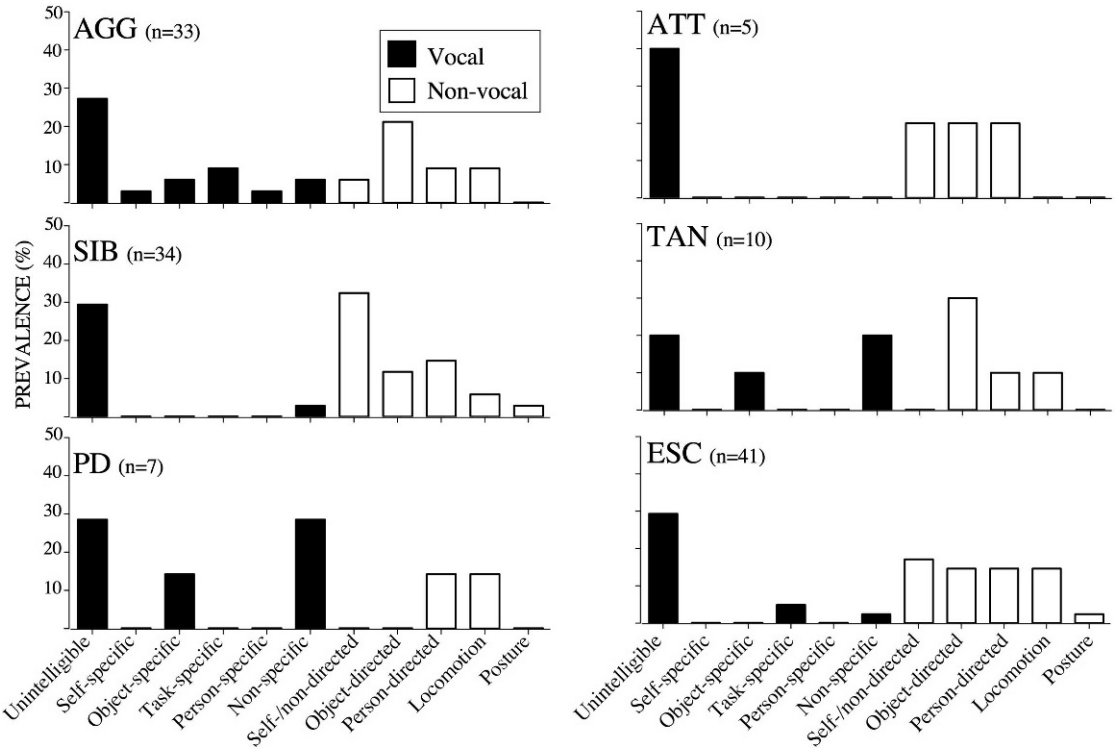

Figure 2. Prevalence of precursor topographies to each target topography (left) and each target function (right). The *n* indicates the total number of precursors reported for each target topography or function.

engaged in SIB (8.3%) or property destruction (5.9%).

Topographical Characteristics of Precursors

We generated a distribution of precursor topographies by dividing the number of times a given precursor topography was reported by the total number of reported precursors. If the description of a precursor was too vague to categorize (e.g., tantrums), it was omitted from this and all subsequent analyses (this criterion excluded 14 precursors). Table 1 shows the percentage of reported precursors in each of the 11 categories described above. The most frequently reported precursors were unintelligible vocalizations (28.2% of reported precursors), object-directed movements (16.9%), and self- or nondirected movements (16.9%). The least frequently reported precursors were self-specific vocalizations, person-specific vocalizations, and postures (1.4% each).

Precursor–Target Relations

To determine whether specific precursor topographies were likely to precede specific target topographies, we divided the number of times that a given precursor preceded a target by the total number of precursors reported for that target. Precursors for two subjects were omitted from this analysis because they engaged in aggregated topographies of severe behavior, making it impossible to identify precursors for a specific target. Figure 2 (left) shows the distribution of precursor topographies for each target behavior. The most frequent precursor to aggression was unintelligible vocalization (27.3%), to SIB were self- or nondirected movements (32.4%), and to property destruction were unintelligible and nonspecific vocalizations (28.6% each).

To determine whether specific precursor topographies were likely to precede target behaviors

with specific functions, we divided the number of times that a given precursor preceded a given function by the total number of precursors reported for that function. Precursors for five subjects were omitted from this analysis because the function of their severe behavior was not established. Figure 2 (right) shows the distribution of precursor topographies for each target function (attention, tangible, and escape functions). Unintelligible vocalization was the most frequent precursor for targets maintained by attention (40%) and escape (29.3%). Object-directed movement (30%) was the most frequent precursor to behavior maintained by access to tangible items. Only one subject (not shown in Figure 2) was reported to engage in a precursor (self- or nondirected movement) to a target maintained by automatic reinforcement.

DISCUSSION

Results indicated that precursors to aggression, SIB, and property destruction were reported in about 10% of published studies. This estimate is extremely conservative, however, and simply may reflect the fact that the necessary observations typically are not conducted during the course of assessment or treatment. Moreover, most precursors were easily observed responses such as vocalizations and gross-motor movements, whereas less salient responses, such as facial expressions or changes in orientation, were not reported as precursors. Perhaps these subtle topographies are reinforced less often and therefore are not likely to be acquired. Alternatively, subtle precursor topographies may be common but simply not detected.

The paucity of data on precursor behavior and the forms it may take suggests the need for further refinement in measurement. One easily accommodated improvement would involve more precise definition of precursor behavior as well as isolation of distinct target topographies. Several data sets could not be analyzed further because either precursors were described very generally or target behaviors were aggregated. A more difficult challenge involves the selection of precursor responses, which typically have been identified via anecdotal report followed by informal confirmatory observation (e.g., Najdowski et al., 2008; Smith & Churchill, 2002). Even when quantitative observation was used to identify precursors, responses usually were predefined (e.g., Borrero & Borrero, 2008). Although convenient, these procedures may tend to be biased in favor of behaviors that are easy to recall and detect. Herscovitch et al. (2009) described an interesting refinement by identifying potential precursors through staff interviews, collecting data on all responses via descriptive analysis, and then selecting precursors from those nominated based on probability analysis. This approach, however, still is based ultimately on caregiver recall, which is prone to error and may not be informative if precursors are subtle or if target behaviors occur infrequently. A more precise alternative would involve open-ended descriptive analysis using a checklist similar to that found in Table 1, in which data are collected on all response topographies that precede a target behavior, followed by probability analysis of the data to identify those responses most predictive of the target.

Our analysis of relations between precursors and targets indicated that varied precursor topographies preceded each topographical and functional class of severe behavior, making it difficult to predict the topography or function of severe behavior solely based on the topography of a precursor. Nevertheless, certain precursor topographies were correlated with particular target topographies and functions, raising questions about the types of response–response relations that may exist between precursors and severe behaviors.

Several studies have provided evidence that precursor and target behaviors may be members of the same response class by showing high rates of responding in the same test condition of separate precursor and target functional analyses (e.g., Smith & Churchill, 2002). We found that object-directed movements most frequently

preceded targets maintained by tangible items, and these seem intuitively to be a response class. Other intuitive precursor–target response classes, however, such as locomotion preceding behavior maintained by escape or person-directed movements preceding behavior maintained by attention, were not highly correlated.

In addition to response classes, other types of response–response relations (response chains and precurrent responses) may exist between precursors and targets. Two studies suggested the existence of a chain in which the precursor served as a discriminative stimulus for the target, and the target served as conditioned reinforcer for the precursor (Hagopian, Paclawskyj, & Kuhn, 2005; Kohlenberg, 1970). In both studies, self- or nondirected movements preceded SIB. These movements were the most likely topographies to precede SIB in all reported cases, perhaps reflecting a response chain rather than a response class relation. No studies suggested the existence of a precurrent relation, in which occurrence of a precursor increased the probability of reinforcement for a target. Such a relation might exist if a precurrent response increases a caregiver's detection of the target. For example, screaming or crying might serve this purpose well because they are salient responses regardless of the caregiver's location or orientation relative to the client.

Future research could determine more precisely the relation between precursor and target behavior through analysis of response covariation or the use of selective or parametric manipulations during the course of an FA. For example, an FA of target behavior is likely to produce decreases in precursor behavior only in the case of a response class, in which topographies are substitutable and efficiency is achieved by engaging in the reinforced topography. By contrast, precursors that are either links in a response chain or precurrent responses should not decrease during a target FA because in both relations the precursors, by definition, remain functional when the target is reinforced.

Finally, precursors to targets maintained by automatic reinforcement were reported in only one study, which incidentally reported the precursor as part of a response chain (Hagopian et al., 2005). This may suggest that social consequences are influential in the development of precursor behavior when precursors and targets are members of the same response class. Although multiple precursors and targets might be maintained by the same social contingencies, it seems less likely that precursors to a target maintained by automatic reinforcement would produce the same consequences as the target.

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