Functional Analysis and Reduction of Inappropriate Spitting

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Abstract: Functional analysis was used to determine the possible function of inappropriate spitting behavior of an adult woman who had been diagnosed with profound mental retardation. Results of an initial descriptive assessment indicated a possible attention function and led to an attention-based intervention, which was deemed ineffective at reducing the frequency of spitting. A follow-up functional analysis revealed an automatic function and an intervention of medication prescribed for gastro-esophageal reflux markedly reduced the frequency of inappropriate spitting. The implications for using functional analysis as a means of identifying biological events such as medical illness are discussed.

Identification of variables that influence the occurrence of problem behavior through functional analysis procedures has become standard practice in the literature on behavioral assessment (Hanley, Iwata, & McCord, 2003). Several variations and extensions of functional analysis procedures have been demonstrated to be beneficial toward clarifying ambiguous results (Kuhn, DeLeon, Fisher, & Wilke, 1999), examining low rate behaviors (O’Reilly, 1996), or examining temporally distant events (O’Reilly, 1995). Although inclusion of additional information in functional analyses have been found to be beneficial toward providing more meaningful results, the influence of these antecedent events on automatically reinforced behavior have not been frequently examined in the literature on functional analysis (Hanley et al., 2003).

Behaviors that are maintained by nonsocial variables may be considered to be automatically reinforced (Vollmer, 1994). Nonsocial maintaining variables have been shown to maintain behaviors such as pica (Piazza, Piazza, Hanley, & Fisher, 1999), stereotypy (Hanley, Ivata, Thompson, & Lindberg, 2000), and eye poking (Kennedy & Souza, 1995; O’Reilly, 1997). Although nonsocial variables may be relevant to several maladaptive behaviors, the direct manipulation of these nonsocial variables responsible for behavior maintenance may be difficult due to the complexities of separating the stimuli from the response (Iwata, Dorsey, Slifer, Bauman, & Richman 1994; Vollmer). Some behaviors hypothesized to be maintained by automatic reinforcement have been assessed by directly manipulating various idiosyncratic stimuli that could be controlled and ruling out competing hypotheses (Kennedy & Souza; Piazza et al.).

Inclusion of nonsocial variables in functional analyses poses numerous problems such as identifying which idiosyncratic variables may be most relevant to the analysis, isolating specific nonsocial variables, and differentiating the presence or absence of specific nonsocial variables. Kennedy (2000) proposed a method for addressing ambiguous functional analyses when an automatic function was suggested by the results. His method involved incorporating sensory extinction procedures on possible sources of automatic reinforcement. While sensory extinction procedures have been shown to be effective in identifying specific sources of automatic reinforcement (Rapp, Miltenberger, Galensky, Ellingson, & Long, 1999), the utility of these types of procedures may be limited with various sources of automatic reinforcement. Hanley, Ivata, and McCord (2003) suggested conducting functional analyses with and without the presence of physiological or internal states such as illness or drugs in order to clarify the impact of these conditions on a specific behavior and to identify a more accurate and effective treatment. Carr (1994) suggested that the utility of
functional analysis procedures could be extended by investigating nonsocial variables such as physiological or internal states. He referred to these variables as biological events such as physical illness or drug states. Examination of these biological events implies the need for incorporating medical examinations that could be time consuming, costly, and inconclusive. Even with the numerous difficulties associated with analyzing the impact of biological events on problem behavior, current research has demonstrated several strategies for incorporating these events into a more comprehensive assessment of problem behavior.

Conducting functional analyses in the presence and absence of biological events (i.e., allergy symptoms, otitis media), conditional states (i.e., sleep deprivation), and situational events (i.e., spending the night in a respite facility) have been demonstrated as a beneficial means of evaluating these types of variables and has resulted in determining these types of events to be related to the occurrence of problematic behavior (Kennedy & Meyer, 1996; O’Reilly, 1996; O’Reilly, 1997). O’Reilly (1996) conducted a functional analysis during the presence and absence of a situational event on the self-injurious behavior of a man with mental retardation. The functional analysis was conducted following two situational events (nights spent at home vs. nights spent at a respite facility). Conducting the functional analysis in the presence and absence of these two situational events was beneficial toward determining that nights spent in a respite facility were correlated with increased self-injury during the next day. O’Reilly (1997) used a functional analysis to determine that the presence of a biological event was correlated with self-injury. The presence or absence of the biological event in this study (otitis media) could be definitively determined through medical examinations and laboratory results. Some biological events may be difficult to determine due to the lack of available laboratory tests, rapid cycling of events, or inconclusive test results. While many biological events may present difficulty in precisely determining their presence or absence, the associated side effects of some of these events may be readily apparent (i.e., runny nose, watery eyes, etc.). Kennedy and Meyer (1996) conducted a functional analysis during the presence and absence of allergy symptoms and sleep deprivation. They distinguished the presence or absence of allergy symptoms and sleep deprivation by interobserver agreement among the teachers and parents of the children involved in the study rather than by medical examination. The results indicated that both biological events and conditional states could influence the outcomes of functional analysis sessions.

Pace and Toyer (2000) provided another example of a biological event correlated with a life threatening behavior. Their evaluation involved directly manipulating the administration of a multivitamin to determine the presence of a previously undiagnosed biological event (vitamin deficiency). They used a BAB design to demonstrate the reductive effects of a multivitamin on the pica of a 9-year old female diagnosed with severe mental retardation, iron deficiency, and anemia. Their study is unique in that it demonstrated how behavioral techniques could be used to determine the presence of an undiagnosed medical condition.

The current study examined the function of spitting behavior in an adult woman diagnosed with profound mental retardation. Both descriptive assessment and functional analysis procedures were conducted in an attempt to identify an effective intervention to reduce the occurrence of inappropriate spitting. Findings from the descriptive assessment were ultimately considered to have led to a false identification of function. Results of the functional analysis were indicative of a possible previously undiagnosed medical condition. These results were also used to develop an effective treatment that consisted of medication for gastrointestinal reflux disorder.

Method

Participant, Setting, and Dependent Variable

Sharon was a 31-year-old female resident of a state developmental center. She was diagnosed with profound mental retardation and functioned at the profound level of adaptive behavior as measured by the Vineland. Sharon had a verbal repertoire of approximately 20-30 words/phrases that she used to name objects.
Her typical daily routine consisted of self-care activities, meals, sheltered workshop activities, leisure activities, and various recreational activities. A review of documentation over the previous ten years indicated a history of maladaptive behaviors including the following: noncompliance, excessive salivation, regurgitation, tantrums, and aggression. Prior to initiating this study, the author consulted with Sharon’s primary care physician regarding any possible existing medical conditions. The physician indicated that no known medical conditions could be determined from recent medical examinations that might be associated with the target behavior of inappropriate spitting. During the course of this study, the only maladaptive behavior observed and/or reported by staff involved spitting saliva. The target behavior of inappropriate spitting was defined as expelling fluid from the mouth onto floor or location other than sink or cup. One incident of inappropriate spitting was documented each time saliva was expelled past the lips and contacted another surface area. A criterion of 30 s of no occurrence of target behavior was used to distinguish between episodes. The distinction between episodes was necessary due to instances of saliva lingering past the lips in long strands of drool.

Procedures, Conditions, Experimental Design

Assessment Phase 1. Two direct care staff were interviewed independently using a Functional Analysis Screening Tool (FAST; item by item inter-rater reliability = 94%). An analysis of potential maintaining variables recorded during direct observations in typical daily activities such as vocational tasks, mealtimes, self-care tasks, and leisure time was conducted. Throughout all phases of the study, direct support staff collected data on all observed episodes of target behavior that occurred during her typical daily routine. Reliability data was obtained from weekly direct observations of Sharon by the author and another trained observer, and monthly observations and interviews with staff regarding implementation of procedures. Weekly reliability observations and monthly interviews with staff regarding implementation of procedures were 100%. Data sheets were obtained from staff on a weekly basis throughout the study.

Assessment Phase 2. A functional analysis was conducted following procedures similar to those described by Iwata et al. (1982/1994). The functional analysis was completed on three consecutive days (day 114, 115, & 116) using 10 min. sessions. The five conditions manipulated during the functional analysis consisted of an alone condition, an attention condition, a demand condition, a play condition, and a tangible condition, which were alternated, in a multielemental design. During the alone condition, Sharon was placed in a room by herself and observed via a one way mirror. During the attention condition, the experimenter responded to inappropriate spitting by delivering a reprimand (e.g., “Stop spitting Sharon, it is not nice”). The demand condition consisted of sheltered workshop tasks (e.g., folding paper, shredding paper) and each occurrence of inappropriate spitting was followed by 30 s of escape from the task. During the play condition, Sharon had access to her favorite activities and the experimenter delivered noncontingent attention every 30 s with no specified consequence for inappropriate spitting. The tangible condition consisted of Sharon in a room with an experimenter and a highly preferred object (magazine). The experimenter held the object away from Sharon unless inappropriate spitting occurred. Upon each occurrence of inappropriate spitting, the experimenter carried the preferred object to Sharon and handed it to her for 30 s. After Sharon had held the preferred object for 30 s, the experimenter took the object away from Sharon. Inter-observer reliability was conducted during 100% of sessions and averaged 99% (range 98-100%).

Assessment Phase 3. A functional analysis following the same procedures described during Assessment Phase 2 was conducted with Sharon. This functional analysis was completed on three consecutive days (days 274, 275, and 276) when Sharon was receiving 30 mg Prevacid. Inter-observer reliability was conducted during 67% of sessions and average 100%.

Intervention

During Phase 1, staff was trained to implement NCR every 15 minutes in the form of
social interaction, preferred materials, or preferred snacks. In addition, staff were instructed to implement an extinction (EXT) procedure which consisted of ignoring episodes of target behavior. In Phase 2, staff continued to implement conditions described in Phase 1 and Sharon was prescribed 10mg Reglan each day. With Phase 3, staff continued to implement conditions described in Phase 1 and Sharon was prescribed 10mg Reglan and 30mg Prevacid. During Phase 4, staff continued to implement conditions described in Phase 1 and Sharon was prescribed 30mg Prevacid (10mg of Reglan was discontinued). At Phase 5, staff was told to discontinue implementation of procedures described in Phase 1 and Sharon was prescribed 30mg Prevacid.

Results

Assessment Results

Results of both FAST interviews indicated the maintaining variables of inappropriate spitting as attention from staff. Results of the direct observations indicated the inappropriate spitting to be maintained by staff attention in the form of reprimands (i.e., “Stop spitting”, “That is dirty”, etc.). Additionally, an intervention consisting of noncontingent reinforcement (NCR) and extinction was developed. The initial functional analysis depicted in Figure 1, resulted in the highest percentage of intervals of inappropriate spitting occurring the alone conditions. This represented an automatic reinforcement contingency for the inappropriate spitting. The intervention derived from these results consisted of additional consultation with Sharon’s primary physician in an attempt to determine any existing medical conditions. The physician was unable to determine any existing medical conditions but suggested a trial of medication for gastroesophageal reflux disorder. The results of the second functional analysis resulted in zero occurrences of spitting.

Intervention Results

The results of the intervention procedures are depicted in Figure 2. Phase 1 of the interven-
tion (NCR + EXT) resulted in variability of episodes of inappropriate spitting with the range of episodes per day increasing from daily baseline occurrences. Phase 2 of the intervention (NCR + EXT + 10mg Reglan) resulted in more stability among episodes of inappropriate spitting represented by a lower range of daily occurrence. Phase 3 of the intervention (NCR + EXT + 10mg Reglan + 30mg Prevacid) resulted in a noticeable decrease in episodes of inappropriate spitting with the daily ranges from 0 to 2 occurrences. Phase 4 of the intervention (NCR + EXT + 10mg Reglan + 30mg Prevacid) resulted in an overall decrease in the frequency of inappropriate spitting episodes from the previous phase with similar daily ranges (0 to 2 occurrences). Phase 5 of the intervention (30mg Prevacid) resulted in high stability with only two episodes of inappropriate spitting occurring throughout with a daily range of 0 to 1 episode.

Discussion

This study demonstrates use of functional analysis procedures for assisting in diagnosis of a possible medical disorder. Utility of functional analysis procedures with the behavior of spitting had not been previously demonstrated within the literature apart from a larger response class of behaviors (Hanley et al., 2003). The results of this study demonstrate a decrease in episodes of inappropriate spitting with the introduction of medication routinely prescribed for gastroesophageal reflux disorder (GERD). The functional analysis in this study was beneficial in identifying a possible physiological event which may have been associated with occurrences of inappropriate spitting.

An important limitation of the study is the fact that the biological event (GERD) considered to be effecting the inappropriate spitting was not directly manipulated or controlled. Reduction in inappropriate spitting appeared to be directly associated with medication routinely prescribed for GERD which seems highly indicative of the presence of this disorder. Additional information could have been obtained to clarify the presence of the disorder such as evidence of erosion of the esophagus, but this may only have been present in later stages of the disorder which may not have been an issue since the inappropriate spitting had only recently been reported as becoming highly problematic and was not noted during routine medical examinations. Prior to implementing medication, the presence of a condition such as GERD could not be ruled out completely due to varying degrees of the effects of this particular condi-
tion, the fact that the participant was not capable of providing self-report information, and the lack of clearly identifiable symptoms to validate the presence of the disorder.

The importance of this study is the practical implications of using functional analysis procedures toward identifying a possible medical condition. Identification of automatic reinforcement as the primary maintaining variable for a problem behavior could indicate the presence of a biological event that might not otherwise be recognizable based on the presenting symptomology. Previous research involving biological events focused on establishing operations that were relatively easy to define (McGill, 1999). The current study extends previous research investigating biological events acting as establishing operations by evaluating a biological state that was not clearly definable. In addition, functional analysis was demonstrated to possibly be complementary toward determining a medical diagnosis. Future research should focus on identifying the influence of other less clearly definable biological states in conducting functional analysis and the additional contributions that functional analysis may have toward making medical diagnoses.

References


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