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BRIEF REPORT

Brief Report: A Comparison of Indirect Versus Experimental Strategies for the Assessment of Pica

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Abstract We conducted functional analyses of pica for three individuals with varying levels of intellectual disabilities. In addition, two indirect assessment instruments (the *Motivational Assessment Scale [MAS]*, and the *Questions About Behavioral Function [QABF]*) were also administered to both the parent and teacher of the child participants. Results of the functional analyses indicated that pica was sensitive to automatic reinforcement. Further, results of both the MAS and QABF also suggested behavioral sensitivity to automatic reinforcement.

Keywords Functional analysis · Indirect assessment · Pica

Introduction

Pica, or the persistent ingestion of nonnutritive substances (e.g., dirt, feces, cigarettes, paint chips), has been described in part, as behavior that is associated with a wide variety of medical risks (Motta and Basile 1998), including a higher risk of death than that for any other self-injurious response (Piazza et al. 1998).

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Of the various behavioral assessment strategies available (indirect, direct, and experimental), the preponderance of research on the assessment and treatment of problem behavior (broadly defined) has involved the functional analysis procedure described by Iwata et al. (1994). Hanley et al. (2003) conducted a comprehensive review of the functional analysis literature and found that of six published functional analyses of pica, half indicated that pica was sensitive to automatic reinforcement, with all assessments producing differentiated outcomes (i.e., outcomes that permitted the researchers to make conclusive determinations regarding behavioral function). Automatic reinforcement also appears to be a common outcome in more recently published studies (e.g., Kern et al. 2006). Thus, in terms of its utility, the functional analysis method of behavioral assessment may point clinicians and researchers to competing sources of reinforcement. However, the time required to complete a functional analysis has also been cited as a concern (Sturmey 1994). For example, Northup et al. (1991) estimated that functional analyses typically involve between 40 and 60 experimental sessions. With condition durations of 5 min, assessment duration could range between approximately 3 and 5 h. With condition durations of 15 min, assessment duration increases considerably (range 10–15 h). Alternatively, the time required to administer an indirect instrument and score the results may require considerably less time. Although, the validity of indirect assessment methods for the assessment of behavioral function has been called into question (e.g., Zarcone et al. 1991), there may be particular response topographies that are more likely to be associated with a particular behavioral function.

Recent work by Hall (2005) was designed to assess the degree of convergence in terms of three behavioral assessment strategies. The problem behavior of four

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participants was assessed by way of an indirect instrument (the *Questions About Behavioral Function* [*QABF*], Matson and Vollmer 1995), direct (descriptive) observation methods, and the functional analysis method described by Iwata et al. (1994). In short, results of the descriptive and functional analysis outcomes were the same in only one of four cases, while results of the indirect and functional analysis outcomes were the same in three of four cases. These results underscore a relatively robust finding in the literature—results of descriptive and experimental methods are rarely identical (e.g., Thompson and Iwata 2007). However, with respect to indirect and functional analysis outcomes, there remains some debate about the level of convergent findings with some work suggesting poor convergence (e.g., Zarcone et al. 1991) and other work suggesting good convergence (Paclawskyj et al. 2001). Thus, the purpose of the current investigation was to assess the extent to which results of two indirect instruments (*QABF*, and the *Motivation Assessment Scale* [*MAS*], Durand and Crimmins 1988) would comport with those of functional analysis outcomes.

Methods

Participants and Setting

Prior to data collection parents provided consent to allow their child to participate in this study. Three participants were recruited from a local school for individuals with developmental disabilities. Peyton was a 9-year-old Hispanic male with mental retardation, seizure disorder, and a long history of ingesting a variety of nonedible items including leaves, grass, tree bark, dirt, feces, and furniture (e.g., cushion and fabric). Brook was a 5-year-old White/Hispanic male with mental retardation and a history of consuming grass and weeds, twigs, spider webs, dirt, bark, feces, and rocks. Zoe was a 14-year-old Hispanic female with mental retardation with history of consuming feces, carpet, furniture parts, hair, paper, and magazines.

Response Measurement and Interobserver Agreement

Pica was defined as placing one of the baited items (described below) or any other inedible object past the plane of the lips. The primary data collector used a 10-s interval recording system to score the occurrence or nonoccurrence of pica. Interobserver agreement was assessed by having a second observer simultaneously but independently collect data for 33, 67, and 100% of sessions for Peyton, Brook and Zoe, respectively. Agreement coefficients were calculated for pica by dividing the number of agreements (per interval) by the number of agreements plus disagreements and multiplying by 100%. Mean agreement for pica was 94% (range 83–100%) for Peyton, 100% for Brook, and 99% (range 92–100%) for Zoe.

Procedure

Functional Analysis

A functional analysis was conducted for each participant using a single-subject multielement design (Kazdin 1982). All functional analysis sessions were conducted at a university laboratory, equipped with one-way mirrors. Test conditions included attention, escape, and alone, which were then compared to a control condition. The tangible test condition was excluded because parents did not report that pica was frequently correlated with the presentation of tangibles. The procedures in each condition were similar to those described by Borrero and Borrero (2008), and session duration was 5 min. Because of the potential dangers of consuming inedible objects, the room was baited with stimuli that were structurally similar to inedible stimuli, but stimuli that were in fact edible. A plastic table covering was placed on the floor of the room and the simulated pica objects were placed on the table covering. Edibles that closely resembled the inedible objects in appearance, as well as texture, such as cotton candy for cotton/lint, little chocolates (e.g., Whoppers) and licorice jelly beans for rocks, beef jerky for small twigs, Spring Mix lettuce for leaves and plants and crumbled pieces of cookies and brownies for dirt. Prior to the beginning of the study, parents and teachers were surveyed to determine what inedible items were consumed frequently, and to determine whether there were any food allergies.

Indirect Instruments

Both the parent and teacher for each participant completed the *MAS* and *QABF*. While functional analysis sessions were being conducted, a researcher administered both instruments to the parents. Teachers for each participant were administered both instruments in their classrooms, prior to beginning the functional analysis. The *MAS* is a 16-item questionnaire that involves rating scales designed to assess the relative influence of attention, tangibles, escape, and automatic (sensory) consequences on problem behavior (Durand and Crimmins 1988). Items on the *MAS* are rated on a 7-point Likert-type scale in which each item is rated by a caregiver and/or teacher from never to always. The *QABF* is a 25-item questionnaire and summary sheet/graph that is designed to assess the behavioral function of problem behavior. The *QABF* includes five subscales (i.e., attention, escape, tangible, nonsocial, and physical) that are rated on a 5-point Likert-type scale, and has been

demonstrated to have good reliability and validity (Matson et al. 1999).

Results and Discussion

Figure 1 depicts the results of the functional analysis for each participant. The highest levels of pica (responses per min, rpm) were observed in the alone condition for Peyton ($M = 5.1$ rpm), Brook ($M = 1.3$ rpm) as well as Zoe ($M = 2.3$ rpm), relative to the other test conditions and the control condition. Three consecutive alone sessions were conducted due to the elevated rates of responding for pica in these sessions to provide additional support to demonstrate and confirm that pica was automatically reinforced. Pica also persisted in the repeated alone sessions, for all participants.

Tables 1 and 2 depict the results of the *MAS* and *QABF*, respectively. For the *MAS*, sensory was the most commonly endorsed potential behavioral function for all participants, across both respondents. Similarly, for the *QABF*, the most frequently endorsed potential behavioral function was nonsocial. Both the sensory and nonsocial categories are interpreted as endorsements of a potential automatic reinforcement function.

The total time required to administer both the *MAS* and *QABF* was 10–15 min each while the total time for completion of the functional analysis sessions was

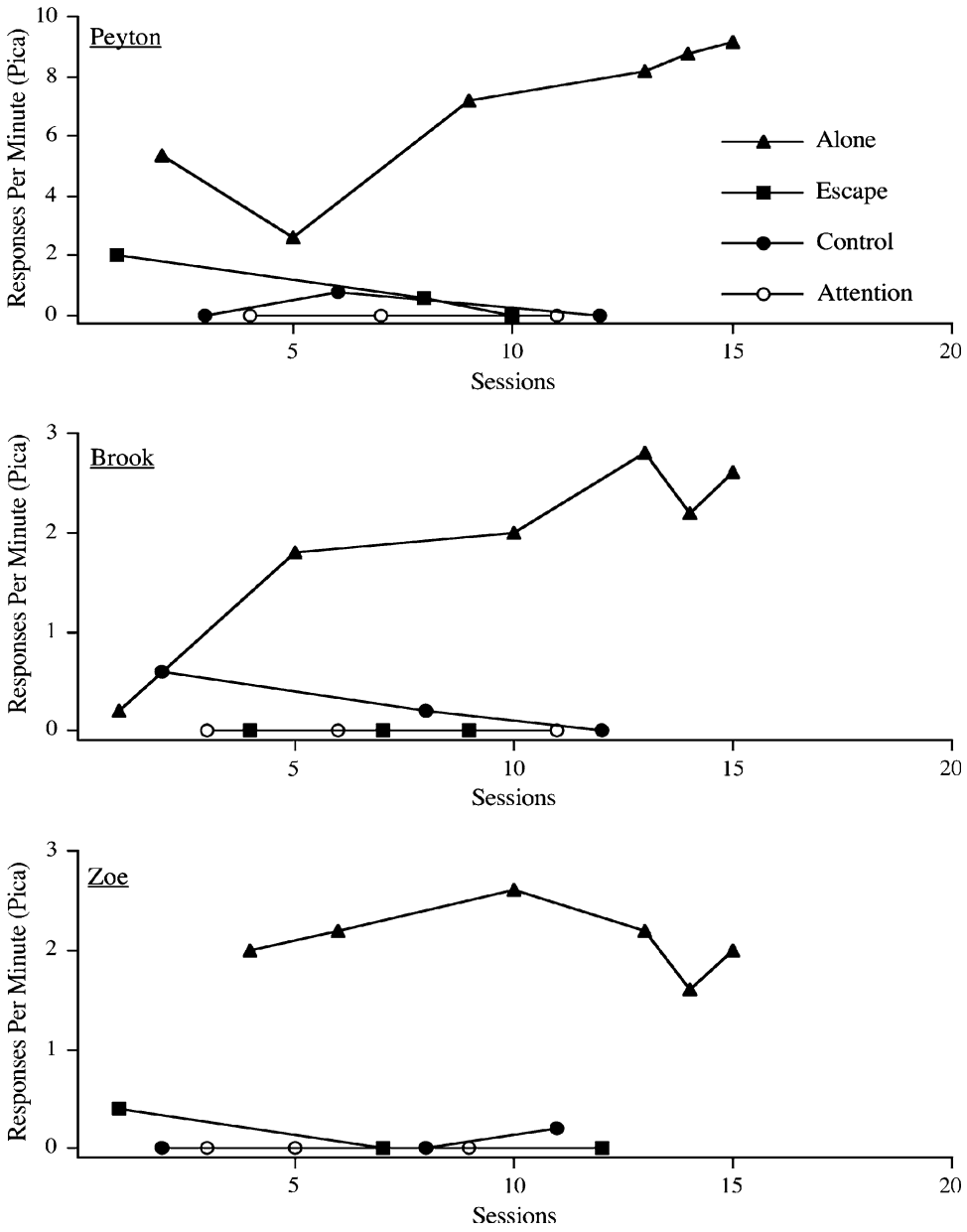

Fig. 1 Aggregate results from the FA for the three participants

Table 1 Mean raw scores for subcategories for the MAS

Participant	MAS subcategories			
	Sensory	Escape	Attention	Tangible
Peyton-parent	4.50 (1)	0 (3)	0.50 (2)	0 (4)
Peyton-teacher	4.75 (1)	1.75 (3)	1.50 (4)	2 (2)
Brook-parent	5.75 (1)	0 (3)	0 (4)	0.25 (2)
Brook-teacher	5.50 (1)	2.00 (3)	1.25 (4)	3 (2)
Zoe-parent	6 (1)	0 (3)	0 (4)	0.75 (2)
Zoe-teacher	5.75 (1)	0.75 (2)	0 (4)	0.25 (3)

Rank scores in parentheses

Table 2 Mean QABF subscale scores for pica

Participant	QABF subscales				
	Attention	Escape	Nonsocial	Physical	Tangible
Peyton-parent *M*	0.00	0.00	1.20	0.00	0.00
Peyton-teacher *M*	0.60	1.00	2.60	2.00	1.00
Brook-parent *M*	0.00	0.00	2.40	0.00	0.00
Brook-teacher *M*	0.70	0.80	2.80	1.20	1.20
Zoe-parent *M*	0.00	0.00	3.00	0.40	0.40
Zoe-teacher *M*	0.00	0.00	2.60	0.00	0.00

approximately 90 min. Based on time alone, the use of indirect instruments may be viewed as more practical in contexts in which individuals trained to conduct and interpret functional analyses are lacking. Further, for the three participants in the present study, both indirect and experimental assessment outcomes were identical (concordance was 100%). However, conclusions drawn from the present results should be developed cautiously. We do not suggest that indirect methods should be applied to the exclusion of experimental methods when experimental procedures are possible. Rather, results of the current study simply suggest that correspondence may be probable. It should also be noted that the *brief* functional analysis procedure described by Northup et al. (1991) is yet another alternative that may serve as an intermediate between indirect methods and extended functional analyses, in terms of the time required to complete each.

The specific topography of problem behavior assessed in the current study (pica) should also be interpreted in light of the correspondence between the two classes of behavioral assessment methods. Of ten specific topographies of problem behavior identified by Hanley et al. (2003), proportionally speaking, two topographies (stereotypy and pica) were most likely to be automatically reinforced. Topographies that were reported to have greater variability (across participants) in behavioral function (e.g., self-injurious behavior) may therefore be more difficult to assess using indirect instruments alone. In addition, although greater convergence between assessment methods may be associated with particular topographies of behavior, the present study lacks the sort of discriminant validity that permits for definitive conclusions. To do so would have required a demonstration of poor convergence between assessment methods for one topography (e.g., self-injurious behavior) and greater convergence between assessment methods for another topography (e.g., pica).

It is also important to note that the assessment results in the present study did not suggest any *specific* intervention involving functional reinforcers. Unlike assessment results that suggest behavioral sensitivity to attention, for example, treatments designed to decrease problem behavior that is automatically reinforced often require additional analyses (e.g., competing stimulus assessments). The absence of a treatment condition could be considered as a limitation of the present study; however, the purpose was not to demonstrate the effectiveness of a novel intervention. Rather the purpose was to determine correspondence between two indirect assessment instruments, and one experimental procedure that is frequently applied in the behavior analytic research literature.

At minimum, the present study adds to the existing literature on the behavioral function of pica. In all cases, functional analysis results indicated that the response was automatically reinforced. However, it is possible that results of the functional analysis might have differed if actual nonedible items were incorporated into the assessment (nonedible items were not included to minimize risk). The context in which pica was assessed (a baited room with stimuli that looked like nonedible stimuli) may also call into question the validity of the functional analysis of pica. For example, a typically developing child may produce similar functional analysis results using the current preparation because of the actual stimuli (e.g., cotton candy). This may underscore the need for precise and accurate indirect instruments when pica is the behavior under consideration.

Further evaluation of the validity of indirect instruments would also require a considerably larger sample. Because descriptive methods of behavioral assessment: (a) rarely corresponded to those of experimental assessment procedures (e.g., Hall 2005; Thompson and Iwata 2007), (b) often require as much to complete as experimental procedures, and (c) may require a greater degree of quantitative sophistication to conduct and interpret results as compared to experimental procedures, greater consideration may be given to the assessment of the utility of indirect and experimental procedures.

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