Concurrent Validity of Open-Ended Functional Assessment Interviews with Functional Analysis

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Abstract

Open-Ended Functional Assessment Interviews have limited empirical support for their concurrent validity with functional analysis. To address this issue, we conducted a study wherein 176 independent behavior analysts relied on data collected using Open-Ended Functional Assessment Interviews to identify the function of challenging behavior in four children with autism. Then, we compared the results of their analyses with those of a traditional functional analysis. Our results showed that the conclusions drawn by behavior analysts using the Open-Ended Functional Assessment Interviews corresponded with the outcomes of functional analyses in 74% of cases. These findings suggest that the Open-Ended Functional Assessment Interview may inform functional analyses to develop initial hypotheses.

Keywords: autism, challenging behavior, concurrent validity, functional analysis, indirect functional assessment.

Concurrent Validity of Open-Ended Functional Assessment Interviews with Functional Analysis

Functional behavior assessment is a systematic process to identify the environmental variables that maintain challenging behavior (Hanley et al., 2003; Horner & Carr, 1997; Matson & Nebel-Schwalm, 2007; Tarbox et al., 2009). Practitioners use functional assessments to inform the selection of function-based interventions, which are designed to produce timely and substantial reductions in challenging behavior (Erturk et al., 2018; Gerow et al., 2018; Kurtz et al., 2015). Therefore, researchers consider conducting a functional behavior assessment to select function-based interventions a best practice in the reduction of challenging behavior in individuals with developmental disabilities (Horner & Carr, 1997; Iwata & Dozier, 2008).

By far, the functional behavior assessment method with the most empirical support is the functional analysis (Hanley et al., 2003; Healy et al., 2013; Lanovaz et al., 2013; Watkins & Rapp, 2013). Conducting a functional analysis consists of experimentally manipulating specific antecedents and delivering associated consequences that are hypothesized to function as reinforcers for the challenging behavior (Call et al., 2012; Iwata et al., 1994). Researchers consider functional analysis as the gold standard in the functional assessment of challenging behaviors in individuals with developmental disabilities (Oliver et al., 2015; Beavers et al., 2013; Iwata & Dozier, 2008). Due to its high internal validity, researchers use the functional analysis to verify the concurrent validity of the other functional behavior assessment methods (Saini et al., 2020). To test concurrent validity, researchers compare the results of the other functional behavior assessment methods to that of the functional analysis for correspondence. When the two functions match, the study considers that the other functional assessment method may be valid (Healy et al., 2013; Lanovaz et al., 2013; Watkins & Rapp, 2013).

Despite its attractiveness and strong internal validity, conducting a functional analysis is a demanding procedure that requires time, money, and trained staff. Functional analyses involve complex and risky procedures that can be challenging to implement in clinical, school, or community settings (Healy et al., 2013). Professionals can experience difficulties implementing functional analyses with low-rate behaviors, multiple topographies, multiple functions, constantly changing reinforcers, or covert challenging behaviors (Hanley, 2012). Furthermore, functional analyses raise some ethical dilemmas for evoking potentially dangerous behaviors for the purpose of assessment while other less restrictive, more efficient, and safer alternatives could potentially achieve the same outcomes (Kahng et al., 2015; Weeden et al., 2010).

Alternatives to the functional analysis are descriptive and indirect methods. Descriptive methods consist of directly observing the challenging behavior in the natural environment and taking data on the associated antecedents and consequences. However, some environmental events may only correlate temporally or incidentally with the challenging behavior. Thus, descriptive methods often falsely identify attention as the function of challenging behavior (McKerchar & Thompson, 2004; St. Peter et al., 2005; Tarbox et al., 2009; Thompson & Iwata, 2007). In consequence, most descriptive methods have limited empirical evidence for their concurrent validity with functional analysis (Kahng et al., 1998; St. Peter et al., 2005; Tarbox et al., 2009; Thompson & Iwata, 2007).

Indirect methods depend on a third party recalling the conditions under which the challenging behavior occurs (Rooker et al., 2015). These assessments include rating scales, checklists, interviews, and questionnaires to collect data from a third party who witnesses engagement in the challenging behavior (Blakeslee et al., 1994; Cone, 1978). The behavior analyst then analyzes the data and formulates a hypothesis on the function of the challenging

behavior (Rooker et al., 2015). In general, most indirect methods have limited empirical evidence to support their convergent validity with the functional analysis (Iwata et al., 2013; Koritsas & Iacono, 2013; Paclawskyj et al., 2001). Nevertheless, some researchers have recently begun using open-ended or semi-structured items in a functional behavior assessment questionnaire to guide the design of conditions for functional analyses (Beaulieu et al., 2018; Hanley et al., 2014; Jessel et al., 2018; Slaton et al., 2017).

The Open-Ended Functional Assessment Interview developed by Hanley (2012) is the questionnaire used by those researchers during functional behavior assessment. Hanley (2012) designed the open-ended questionnaire based on the hypothesis that an individual variable could interact with other variables (synthesized variables) in a unique fashion to influence the challenging behavior. The Open-Ended Functional Assessment Interview involves 20 open-ended or semi-structured items that can be used to collect information about a challenging behavior. The behavior analyst analyzes the data collected, formulates a hypothesis about the function of the challenging behavior, and verifies that function in a functional analysis format that tests only the interview-informed hypothesis and a control condition. Hanley et al. (2014) described this procedure as the interview-informed synthesized contingency analysis (IISCA).

Several researchers reported that the Open-Ended Functional Assessment Interview was an efficient and valid functional behavior assessment method across a variety of topographies of challenging behaviors, participants, and settings (Beaulieu et al., 2018; Ghaemmaghami et al., 2016; Jessel et al., 2016, 2018, 2019; Santiago et al., 2016; Slaton et al., 2017). However, nearly all these previous evaluations involved the same research lab that initially developed the Open-Ended Functional Assessment Interview. An independent investigation with four participants with developmental disabilities found that the Open-Ended Functional Assessment Interview had

a low concurrent convergent validity (i.e., 50%) with the results of subsequent functional analyses (Saini et al., 2020). However, the research procedure in Saini et al. (2020) included no independent reviewers and carried the risk of Type II error (i.e., false negatives) about the behavior function. Saini et al. (2020) experimentally tested only the behavioral functions hypothesized as a function of the challenging behavior following the analysis of the data in the open-ended interview instead of conducting a standard functional analysis that tests all possible hypotheses. Thus, other independent investigations should verify the convergent validity of the Open-Ended Functional Assessment Interview.

The Open-Ended Functional Assessment Interview relies on the qualitative judgment of behavior analysts. As suggested by Lanovaz et al. (2013), behavior analysts may produce more accurate predictions than quantitative analyses as they can consider the actual strengths and limitations of the assessment method. Behavior analysts need to examine the convergent validity of the Open-Ended Functional Assessment Interview. Thus, the purpose of our study was to asses the concurrent validity of the Open-Ended Functional Assessment Interview with functional analysis.

Experiment 1 – Conducting the Functional Assessments

Method

The initial experiment involved conducting the functional behavior assessments with children and their families. First, a research assistant administered the Open-Ended Functional Assessment Interview to the parents. Second, the first author and a second research assistant conducted functional analyses to identify the function of the child's challenging behavior.

Participants and Target Behaviors

Four children with autism and one of their parents participated in the study. We recruited the participants and their parents by posting a Facebook advertisement that invited families with children with autism or intellectual disability to participate in our study. The advertisement included the phone number and the email of the first author, which the parents used to contact our research team. James was a 10-year-old boy with autism who attended a special education school for students with moderate to severe intellectual disability. According to his mother, James engaged in physical aggression, defined as hitting, kicking, scratching, or throwing objects at another person. He used approximately two-dozen spoken words to request preferred items and respond to basic questions. Tom was a 10-year-old boy diagnosed with autism, moderate to severe intellectual disability, and attention deficit hyperactivity disorder. Tom's mother reported that he engaged in screaming, defined as producing high pitched vocal sounds. The screaming occurred throughout the day across different activities and settings. The screaming disrupted his learning in class and had triggered unwanted reactions in public areas. When prompted, he used a picture-based communication system to mand for some preferred items.

Finn was a four-year-old boy with autism who attended daycare. According to his mother, Finn engaged in tantrums defined as screaming, crying, throwing and rolling his body on the floor. His tantrums could last up to a half-hour, and they occurred in different settings including home, daycare, car, and store. Leo was an eight-year-old boy with autism who attended a private special education school for students with moderate to severe intellectual disability. Leo's mother reported that he engaged in tantrums, which were defined as instances of crying, screaming, hitting objects, and running in the hallways. The tantrum disrupted his own learning and family activities. Leo's repertoire included ten spoken words. All the assessments took place in each participant's home in the presence of their parent.

Procedures

Open-Ended Functional Assessment Interview. Following parental informed consent, a research assistant administered the Open-Ended Functional Assessment Interview to the parent of the participant according to the rubric described by Hanley et al. (2014). During the interview, the research assistant questioned the parent about the child's language skills, the conditions in which the challenging behavior occurred, and the parent reaction following its occurrence. The interview lasted 35 min on average.

We transcribed the Open-Ended Functional Assessment Interview according to the procedure described by Lanovaz et al. (2013). First, the lead author removed all identifying information (i.e., names) to protect the identity of the participants. Then, he produced two sets of data: the original Open-Ended Functional Assessment Interview, a modified Open-Ended Functional Assessment Interview, where the topography of the behavior was omitted. We manipulated the data in this manner to test the hypothesis that knowing the topography of a target behavior could influence the subsequent analysis. We deleted the first nine items of the questionnaire and included only the 11 last items of the questionnaire.

Functional Analysis. Following data collection with the Open-Ended Functional Assessment Interview, the first author and a second research assistant (both blind to the content of the Open-Ended Functional Assessment Interview) conducted an unstructured interview with the parent and an observation of the participants in their home to learn about their challenging behaviors. Keeping the researchers blind is contrary to the recommended use of the Open-Ended Functional Assessment Interview (Hanley, 2012), but it was only way to control for the confirmation bias. Similarly, we did not test synthesized conditions, which is inconsistent with the procedures proposed by Hanley et al. (2014). The information collected during that initial

observation and unstructured interview was used to set up conditions likely to evoke the challenging behavior during functional analyses. We conducted the four test conditions (attention, demand, tangible, and no-interaction) and the control condition for Tom and Leo. For James, we did not test the no-interaction condition as his physical aggression implied the presence of another person. We did not conduct the no-interaction condition with Finn as his mother reported that his tantrum occurred only in the presence of another person. The trainer randomly alternated the conditions in a multielement design. Each condition lasted for 5 min.

In the attention condition, the participant had access to mildly preferred items and the research assistant first provided noncontingent attention to the participant for 2 min prior to the start of the conditions. After the 2 min elapsed, the research assistant discontinued his attention and engaged in another activity (i.e., reading). When the participant engaged in the target challenging behavior, the research assistant delivered some form of attention (i.e., “Don’t do that”; “Please be nice”,). The experimenter trained the parents of Tom, Finn, and Leo to run the attention condition as the challenging behavior may be more sensitive to parental behavior.

In the demand condition, the research assistant presented demands to the participant every 30 s. If the participant did not comply within 5 s, the research assistant used a three-step least-to-most compliance procedure to achieve compliance. When the participant exhibited the target behavior, the research assistant immediately discontinued the demand and took away the material associated with the demand for 30 s. In the tangible condition, the participant had 2 min of noncontingent access to the preferred item prior to the beginning of the condition. At the beginning of the condition, the trainer removed access to the preferred item, but contingent to the challenging behavior, the participant regained access to the preferred item for 30 s. We exposed all participants to the tangible condition because all parents reported that their child’s

challenging behavior could be maintained by access to preferred items. In the no-interaction condition, the participant had no access to either preferred stimuli or social consequence, and all challenging behaviors were ignored. In the control condition, the participant had access to preferred items, and the research assistant delivered attention on a fixed-time schedule of 30 s. The research assistant ignored challenging behaviors.

In all conditions, the first author collected data on the frequency of physical aggression and on the duration of screaming for James and Tom, respectively, and used partial interval recording (10-s intervals) to measure tantrums for Finn and Leo (see definitions in the descriptions of the participants). Another research assistant independently reviewed the video recordings of the functional analyses for at least 25 % of all conditions for each participant. We calculated interobserver agreement (IOA) using the block-by-block method with 10-s intervals (Mudford et al., 2009) for James' physical aggression and Tom's screaming, and the interval-by-interval IOA method for Finn and Leo. The mean IOA was 98% (range: 86%-100%) for James, 98 % (range: 93%-100%) for Tom, 98% (range: 97%-100%) for Finn, and 98% (range: 93%-100%) for Leo. Fidelity observers reviewed video recordings of the functional analysis and scored the implementation of procedural steps.

To measure fidelity integrity, our team first conducted a task analysis of the functional analysis procedures. Observers reviewed video recordings of the functional analysis and scored the trainer behavior as the opportunities to implement the procedures present. Scorers measured trainer fidelity on implementing procedures using a 15-step procedural fidelity checklist, according to responses relevant to each condition and the challenging behavior (Flynn & Lo, 2016). The procedural fidelity checklist included each session type, trainer-specific behavior as antecedent and consequence to the challenging behavior, and the correctness of each step.

Procedural fidelity was calculated by dividing the number of times the trainer implemented a correct procedure by the total number of opportunities and multiplying by 100%. Fidelity was evaluated during 33% of all functional analysis sessions for each participant and averaged 96% (rage 94% to 100%).

Results and Discussion

Figure 1 shows the results of the functional analyses. James (top left panel) engaged in higher rates of aggression in the tangible condition relative to the control and other test conditions, suggesting that his physical aggression was maintained by access to preferred items. The duration of Tom's screaming (top right panel) was initially high in the no-interaction, attention, and control conditions. In the second half of the assessment, this level of responding persisted in the no-interaction condition but decreased to near-zero levels in the attention and control conditions. This pattern of responding suggests that Tom's screaming had a nonsocial function.

The level of tantrums for Finn (bottom left panel of Figure 1) was higher in the attention condition relative to the others, which indicates that attention was a function of his challenging behavior. In the second half of the assessment, engagement in tantrums also remained higher in the tangible and demand conditions relative to the control condition. This pattern of responding suggests that tangible and escape from demand were also functions for his tantrums. Leo (bottom right panel of Figure 1) engaged in higher levels of challenging behavior in the demand and tangible conditions than in the control and other test conditions. The level of responding suggests that escape from demand and access to tangible were the functions of his tantrums.

Experiment 2 – Indirect Analyses by Behavior Analysts

Method

Behavior analysts analyzed the transcripts of the Open-Ended Functional Assessment Interviews to identify the function of the challenging behaviors. We examined the correspondence of the functions identified by the behavior analysts with the results of the functional analyses.

Participants

The second author recruited Board Certified Behavior Analysts (BCBA and BCBA-D) to participate in our study. Potential participants received an e-mail distributed by the Behavior Analyst Certification Board (BACB) that invited them to complete our survey. The email included the link to the survey. The BACB sent the email to 40,022 behavior analysts and 176 respondents fully completed the survey.

Materials

The participants completed a survey on LimeSurvey, which contained 18 items organized in two sections. The first section included basic socio-demographic items such as number of years of professional experience, primary work setting, and clinical population served. The second section guided the behavior analysts to analyze the data from the Open-Ended Functional Assessment Interview. We set up the survey so that behavior analysts could only select one function per interview. Each participant had to analyze interviews from two different randomly-selected children. LimeSurvey randomized so that each participant analyzed one original Open-Ended Functional Assessment Interview and one modified Open-Ended Functional Assessment Interview (i.e., without topography).

Procedure

The behavior analysts had access to the survey for five weeks, but they were granted access to it only once via the initial email. After the initial access to the survey, the behavior

analysts could save and complete the survey at any time during the five-week period. Two weeks after we sent the initial invitation email, we sent a second email to thank the behavior analysts for completing the survey and to remind those who had not submitted their response yet about the closing date of the survey.

Data Analysis

First, the analysis involved comparing the functions identified by the functional analyses with the functions identified by the behavior analysts to examine their correspondence. For each child, we calculated the percentage of correct functions behavior analysts identified using the Open-Ended Functional Assessment Interview. Second, we examined whether knowing the topography of the challenging behavior would influence the behavior analysts in their analyses and selection of the function of the challenging behavior by applying a two-proportion *z* test to the results from each child. Third, we conducted a Spearman test to determine whether the level of certification and the number of years of professional experience predicted correspondence with functional analyses when analyzing the Open-Ended Functional Assessment Interviews.

Results and Discussion

Tables 1 and 2 present the demographic data of the behavior analysts and their clients, respectively. One hundred seventy-six behavior analysts fully completed the survey. The majority were BCBAs (91 %), held full-time positions (79 %), and had 5 years or less of professional experience (57 %). Most behavior analysts worked with children who attended elementary schools (80 %) and who had autism spectrum disorder (96 %) or intellectual disability (61 %). Figure 2 shows the proportion of behavior analysts who identified one of the child's correct function using the open-ended interviews. Of the 352 analyses of the transcripts

of the Open-Ended Functional Assessment Interview, the behavior analysts identified 74% (n = 262) of behavior functions that matched the single or one of the results of the functional analysis.

Figure 3 compares the proportions of behavior analysts who identified one of the child's correct functions using the original or the modified Open-Ended Functional Assessment Interview. For James, the *z* test results show no significant difference with or without behavior topography for the Open-Ended Functional Assessment Interview ($z = 0.92$; $p = .36$). The *z* test results for Tom revealed a significant difference between the Open-Ended Functional Assessment Interview with and without topography ($z = -2.97$; $p < .01$). For Finn, behavior analysts performed similarly on the Open-Ended Functional Assessment Interviews with and without topography ($z = 0.17$; $p = .86$). Finally, the results for Leo indicate no significant difference for the Open-Ended Functional Assessment Interviews ($z = 0.95$; $p = .34$) with and without behavior topography.

Finally, we examined the contribution of variables that could potentially explain the differential results observed across behavior analysts when analyzing Open-Ended Functional Assessment Interviews. We conducted a Spearman test to examine the relation between number of years of professional experience and whether the behavior analyst identified the same functions as the functional analyses. The results of the Spearman test revealed no statistically significant relations between the number of years of professional experience and the accuracy in analyzing Open-Ended Functional Assessment Interview data ($r = .005$, $p = .94$).

General Discussion

The Open-Ended Functional Assessment Interview had an acceptable convergent validity with functional analysis. At least 60% of behavior analysts correctly identified one of the functions of the challenging behavior for three of four participants. Two hypotheses may explain

those positive outcomes. First, the inclusion of open-ended items in the questionnaire prompted interviewees to provide more qualitatively rich details that allowed behavior analysts to identify the function of the challenging behaviors (Saini et al., 2020). Second, the open-ended interview allowed the interviewer to gather a wide range of information about historical and current environmental influences on the challenging behavior, which may have led to an informed hypothesis about the function of behavior.

The results of our study are different from those reported by Saini et al. (2019) which detected correspondence between the functional analysis and the Open-Ended Functional Assessment Interview in 50% of cases. However, our results about the concurrent validity of the Open-Ended Functional Assessment are consistent with those of Beaulieu et al. (2018), Jessel et al. (2018), Santiago et al. (2016) and Slaton et al. (2017). Unlike most prior studies, our investigation was independent from the lab that developed the open-ended interview, which provides further support for its use in generating hypotheses about the function of challenging behavior prior to conducting a functional analysis.

The analyses found a significant difference between having access to the topography of the challenging behavior and using Open-Ended Functional Assessment Interview for a single participant. Unexpectedly, having access to the topography of the behavior worsened the decision-making process. One potential hypothesis to explain these results is that behavior analysts hold preconceived ideas about how topography relates to function, which may have influenced responding. Despite this observation, we advise against removing or ignoring these questions in practice because they may provide invaluable information about precursors and the dangerousness of the behavior. Furthermore, we found no statistically significant relations between number of years of professional experience and accuracy in identifying behavioral

function. This result was also unexpected as one would anticipate that highly trained and experienced behavior analysts would more accurately analyze indirect and descriptive functional behavior assessment data.

Our study has at least four limitations that should be discussed. First, the small sample of four children with developmental disabilities restricts the generality of our findings. Second, the survey in Experiment 2 asked the behavior analysts to select a single function of the challenging behavior. As half challenging behaviors in our study had at least two functions, our results could have been different if we had given the option to behavior analysts to select more than one function. Third, we did not use the Open-Ended Functional Assessment Interview to inform our functional analyses, which is contrary to what is recommended by Hanley (2012). This manipulation was necessary to control for confounding variables. That is, using the data from one analysis to inform the other may have introduced a confirmation bias. Moreover, the functional analysis did not test synthesized conditions, which may have produced different outcomes. Future studies should consider the previous limitations while examining the concurrent validity of the Open-Ended Functional Assessment Interview with a large sample of diverse clinical populations and topographies of challenging behavior.

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Table 1

Behavior Analyst Characteristics

Characteristic	n	%
Certification		
BCBA	161	91
BCBA-D	15	9
Employment status		
Full time	139	79
Part time	22	12.5
Master/doctoral/ postdoctoral study	8	4.5
Not working and seeking work	1	0.6
Not working and seeking job	1	0.6
Other	6	3.4
Setting of work		
Center/clinic	46	26.1
Client home	46	26.1
School	48	27.3
Residential facility	11	6.2
College or university	10	5.7
Hospital	3	1.7
Community	6	3.4
Other	6	3.4
Years of experience		
0-5 years	100	56.8
6-10 years	51	29
11-15 years	15	8.5
16-20 years	6	3.4
More than 21 years	4	2.3

Table 2

Client Characteristics

Characteristic	n	%
Age group		
Early childhood (0–5 years)	114	64.8
Elementary school (6-13 years)	140	79.5
High school (14-18)	83	47.2
College age (19-22)	45	25.6
Adult (23-55)	43	24.4
Senior (55+)	15	8.5
Population served		
Autism spectrum disorder	169	96
Intellectual disability	107	60.8
Child welfare	4	2.3
Gerontology	2	1.1
Emotional behavioral disorders	78	44.3
Special education	72	40.9
Brain injury	13	7.4
General education	23	13.1
Mental health	27	15.3
Organization behavior management	12	6.8
Neurotypical individuals	17	9.7
Other	5	2.8

Figure 1

Functional Analysis Results for James, Tom, Finn, and Leo

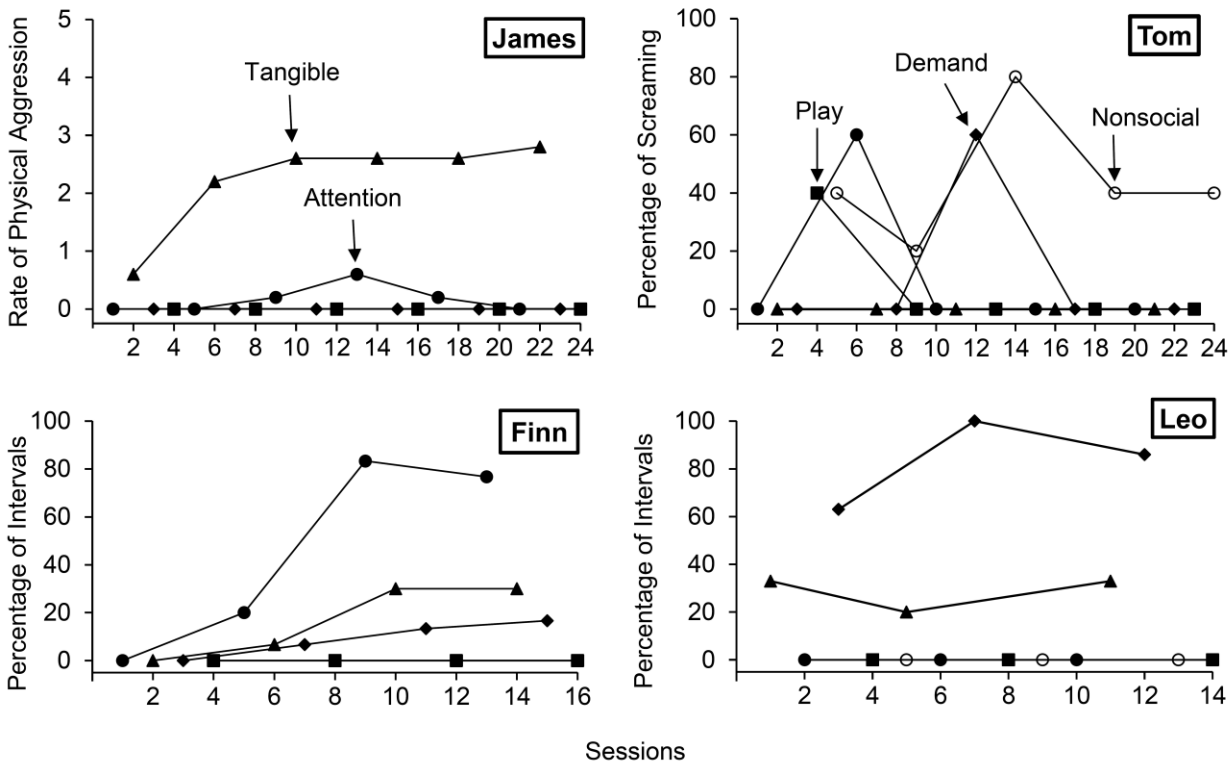

Figure 2

Percentage of Behavior Analysts Who Identified One of the Corresponding Functions Using the Open-Ended Interviews for Each Child

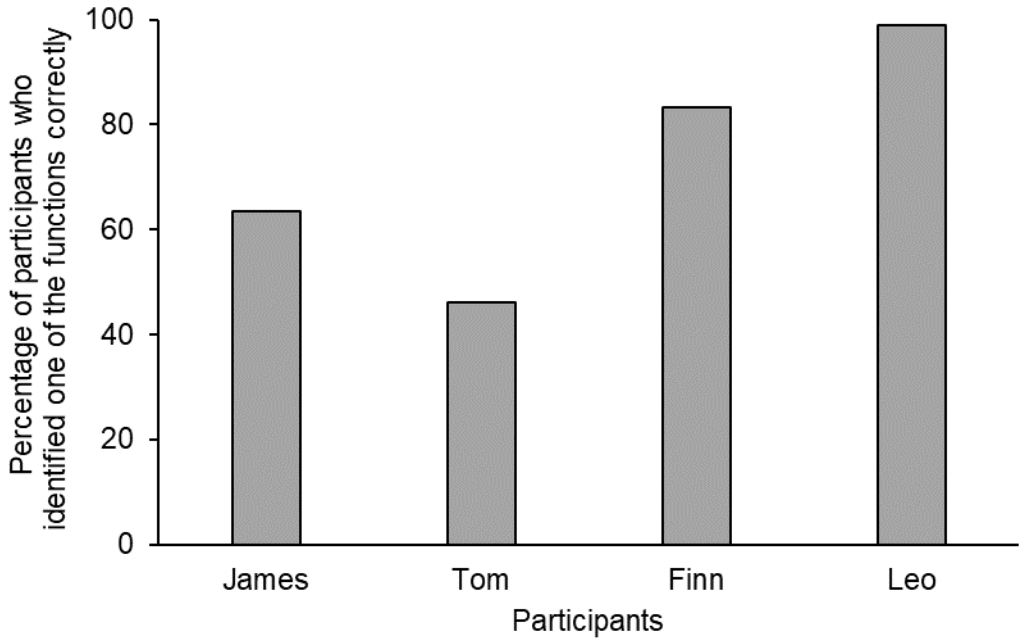

Figure 3

Percentage of Behavior Analysts Who Identified One of the Corresponding Functions Using the Open-Ended Functional Assessment Interview With and Without Topography for Each Child