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## **FUNCTIONAL/STRUCTURAL ANALYSIS: A BRIEF REVIEW OF FUNCTIONAL ASSESSMENT STUDIES CONDUCTED WITH PEOPLE WITH CHALLENGING BEHAVIOURS**

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*Since the re-authorization of the Individuals with Disabilities Education Act of 1997 functional assessment has become popular in designing interventions for people with challenging behaviour. The purpose of this study was to assess the applications of functional and structural analysis in the assessment of problem behaviour. The study analysed the extent to which studies either utilized functional or structural analysis methods and whether these studies were conducted in applied or analogue settings. Results of the study showed that 95% of the 101 studies were functional analysis studies while 5% were structural analysis studies. The studies also indicated that 94% of the studies were conducted in analogue settings against 6% conducted in applied settings.*

Functional analysis has become very popular as a most potent and effective behavioural assessment methodology (Vollmer and Smith, 1996). Functional analysis is an important component of functional assessment, which involves the direct manipulation of identified variables in order to clarify the hypothesized relationship (Dunlap, Kern, dePerczel, et al., 1993). *The re-authorization of the Individuals with Disabilities Education Act of 1997 (IDEA) introduced functional assessment to federal legislation and directed school personnel to use this research validated procedure (Zuna & McDougall, 2004, p18).* Since Iwata et al.'s landmark study (1982/1994), functional analysis has received a lot of scholarly attention and has been adapted to a variety of settings and populations (Broussard and Northup, 1997).

Procedures developed by Iwata et al., (1982/1994) involved *constructing analogue conditions in controlled environments that simulate the manner in which problem behaviour may be positively or negatively reinforced in natural environments* (Umbreit, 1995, p.18). Functions of behavior are identified by making positive reinforcement (attention or tangibles) or negative reinforcement (escape from task demands) available contingent on the occurrence of problem behaviour (Umbreit, 1995). Although these procedures were initially designed to assess functions of self-injury (Iwata et al, 1982/1994), several studies have successfully replicated these procedures with different populations.

To date, functional analysis has been successfully used to identify functions of self injurious behavior (Mace, Shapiro, & Mace, 1998; Vollmer & Vorndran, 1998; O'Reilly, 1997; Worsdell, Iwata, Hanley, Thompson, & Kahng, 2000; Kahng & Iwata, 1998; Zarcone, Iwata, Smith, Mazaleski, & Lerman 1994; Wacker, Harding, Cooper et al., 1996), pica (Piazza, Fisher, Hanley et al, 1998), stereotypy (Fisher, Lindauer, Alterson, & Thompson, 1998; Kennedy, Meyer, Knowles, & Shukla, 2000), aggression (Thompson, Fisher, Piazza, & Kuhn, 1998; McComas, Hoch, Paone, & El-Roy, 2000; O'Reilly & Carey, 1996), breath holding (Kern, Mauk, Marder, & Mace, 1995), elopement (Piazza, Hanley, Bowman et al., 1997), and out of seat behaviour (Northup, Broussard, Jones et al., 1995). These studies are a testament of the utility of functional analysis across a wide variety of behaviour disorders. This establishment is important because *treatment matched to the operant function of aberrant behaviour generally follows interrelated*

*strategies: (a) weakening the maintaining response-reinforcer relationship, and (b) establishing or strengthening a response-reinforcer relationship for an adaptive response class that replaces the function of the aberrant one (Mace, 1994, p.386).*

Functional analysis can be applied in both analogue and applied settings (Repp & Horner, 1999). According to Mace (1994) a significant limitation of functional analyses done in analogue settings is *that they may overlook important variables that operate in the client's natural setting, and, hence, the result may not generalize outside the analogue conditions* (external validity) (p.388). Wheeler, Carter, Mayton, & Thomas (1999) questioned the utility of functional analysis within applied settings since much of the research conducted has been in clinical settings. In view of this Mace (1994) suggested combining descriptive and experimental methods to design individualized assessment conditions. This, Mace argues, will incorporate into the design of analogue experimental conditions, naturally occurring consequences for target behaviours and the schedules in which these consequences are arranged thereby increasing the external validity of the experimental analysis. However plausible this sounds, *When no naturalistic observations are available or when descriptive and experimental findings are discordant, conclusions about the operant function of a behaviour problem under natural conditions are best tempered* (Mace, 1994, p.389). Unfortunately, there are very limited, if any, studies done in applied settings.

In assessing variables maintaining problem behaviour, two areas should be considered i.e. functional and structural analysis (Stichter, Sasso, & Jolivet, 2004). Functional analysis refers to the delivery of distinct reinforcers contingent on inappropriate behaviour while structural analysis refers to the presentation of distinct antecedent conditions (Repp and Horner, 1999). *To date, the majority of functional assessment research has focused on identifying and developing interventions that are based on the maintaining consequences of problem behaviour rather than developing interventions that incorporate the potential influence of antecedent events on pro-social and problem behaviors* (Stichter, Sasso, & Jolivet, 2004, p66). However, antecedent events are of critical importance in selection of the design of instructional goals and objectives and instructional methods to be used by the teacher and represent best practice (Wheeler & Wheeler, 1995).

The purpose of the present study was to synthesize recent research (from 1994-2004) published in the Journal of Applied Behavior Analysis on functional and structural analysis. The researcher wanted to investigate whether functional analysis studies conducted to identify functions of problem behaviour and published between 1994 and 2004 were done in applied or analogue settings. Also, the researcher wanted to find out if these studies were conducted using structural or functional analysis procedures. Another purpose of this study was to provide recommendations for future research by showing that although the merits of conducting structural analysis have been identified in prior research (Wheeler & Wheeler, 1997; Wheeler, Carter, Mayton, & Thomas, 2002; Stichter, Sasso, & Jolivet, 2004), researchers have, up to this day, almost exclusively focused on functional analysis in analogue settings.

## **Method**

### *Criteria for inclusion*

Studies selected for inclusion in this review were evaluated based on the following criteria: (a) experimental studies involving functional/structural analysis conducted with people with behaviour problems, (b) articles published in *The Journal of Applied Behavior Analysis* between the years 1994 and 2004.

### *Procedure*

The selected articles were identified through a search of ERIC search engine and *The Journal of Applied Behavior Analysis* (n = 101). The terms used in the search included *functional + analysis + behaviour*, and *structural + analysis + behaviour*.

The selected studies were coded on a matrix using the following variables: (1) title of study (2) year of publication, (3) type of setting (applied or analogue), and (4) type of analysis (functional or structural). The researcher put a check under the appropriate headings, for example, a check under analogue if the research was conducted in analogue conditions as opposed to applied conditions. This same procedure was used to indicate whether the research used functional or structural analysis methods.

### Results

One hundred and one studies met the criteria for inclusion in this study. Of these studies, 95% (n=96) were functional analysis studies while the remaining 5% (n=5) were structural analysis studies. Also, 94% (n=95) of the studies were conducted in analogue settings while only 6% (n=6) of the studies were conducted in applied settings. These results are presented in a tabulated form (see figure 1).

Year/Date of Publication	Total No. of studies	Assessment (Analysis)		Setting	
		Structural	Functional	Applied	Analogue
1994	9	1	8	0	9
1995	7	0	7	0	7
1996	11	1	10	0	11
1997	9	0	9	1	8
1998	7	0	7	0	7
1999	3	1	2	0	3
2000	6	0	6	0	6
2001	14	1	13	2	12
2002	15	0	15	0	15
2003	11	1	10	3	8
2004	9	0	9	0	9
<b>Total</b>	<b>101</b>	<b>5</b>	<b>96</b>	<b>6</b>	<b>95</b>
<b>Percentage</b>	<b>100%</b>	<b>5%</b>	<b>95%</b>	<b>6%</b>	<b>94%</b>

**Figure 1**  
**Table of studies**

### Discussion

It is interesting to note that only 5 of the 101 studies (5%) used structural analyses. Considering the perceived efficacy of antecedent management in reducing problem behaviour, one would expect that researchers would seek to manipulate the antecedent events that trigger problem behaviour as much as they manipulate the consequences. Manipulating antecedent events has the potential of establishing a basis on which to design instructional goals and objectives and instructional methods. On the contrary, consequence management tends to be a reactive strategy, which although sometimes helpful, focuses on temporary suppression of behaviours without teaching alternative responses.

Another significant discovery is that of the 101 studies in this study, only 6% (n=6) were conducted in applied settings while 95 (94%) were done in analogue settings. This raises questions on the generalizability of those findings of analogue studies to natural settings. Analogue settings can produce good results but transferring those results to natural settings can be difficult since a number of idiosyncratic variables available in the natural settings might not be present in the analogue settings thereby interfering with the authenticity of the findings. It is difficult to determine whether studies in this investigation were transferable because the main target for most studies was to determine the function(s) of the target behavior(s) and follow up data on results of the interventions is not present.

A major limitation of this study is that studies published in only one journal were included (*The Journal of Applied Behavior Analysis*). Apparently, there are several studies done in the same area published in other journals. Including those studies would have provided a more thorough

view on the subject. Another significant limitation of the study is that it did not consider the outcomes of the studies. Perhaps, doing so would have enabled us to make an informed comparison of the impact of functional analysis and structural analysis, as well as studies conducted in applied and analogue settings on problem behaviour. However, the major purpose of this study was to show the discrepancy between the perceived efficacies of antecedent management, and of doing studies in applied settings and the paucity of attention given to these areas in recent research.

Future research should investigate the efficacy of structural analysis in identifying antecedent events that occasion problem behaviour such as self-injury and aggression. Future researchers should also consider conducting functional/structural analysis in applied settings to promote the linkage between assessment and treatment. Such a focus, it is hoped, will augment the external validity of any findings thereby maximizing the utility of the functional/structural analysis process.

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