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Design of Individualized Behavioral Treatment Programs Using Functional Analytic Clinical Case Models

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The design of an individualized treatment program in behavior therapy is critical, complex, and strongly affected by pretreatment data obtained as part of a multimethod, multimodal assessment. The functional analysis is the integration of several elements for individualized treatment decision making: the relative importance, interrelationships, and sequelae of a client's behavior problems and treatment goals and the relative modifiability, interrelationships, and strength of causal variables. The functional analysis can be represented visually with the functional analytic clinical case model (FACCM), a vector-graphic representation of variables and functional relationships. This article describes and illustrates the methods, rationale, and characteristics of both the functional analysis and the FACCM, using a clinical case example. Research and restrictions on the treatment utility of the functional analysis are discussed.

The design of an individualized behavioral treatment program involves important and complex clinical judgments. These judgments can affect the degree to which clients will experience a reduction in distress and an increase in quality of life. Individualized treatment programs can be difficult to design because they are often based on an integration of many separate clinical judgments, each of which is affected by multiple sources of data and subject to many sources of error and bias (see discussions in Eels, 1997; Garb & Schramke, 1996; Nezu & Nezu, 1989; Turk & Salovey, 1988).

The degree to which treatment programs are individualized varies across treatment paradigms. In some paradigms (e.g., person centered, experiential, psychopharmacological, and Gestalt therapies; see reviews in Bergin & Garfield, 1994), particular treatment strategies are consistent across clients.[1] The use of consistent treatment strategies is sometimes based on a presumption of univariate causality, that is, that there is a limited array of causal variables or mechanisms for a particular behavior problem (Haynes, 1992).[2] Given univariate causal models, treatment strategies are often less individualized and independent of data from pretreatment assessment.

Although standardized treatments are sometimes used in behavior therapy (see reviews in Bellack & Hersen, 1993; Turner, Calhoun, & Adams, 1992), behaviorally oriented treatment programs often differ across clients with the same behavior problems. Pretreatment assessment and clinical judgments based on assessment data affect the selection of therapy strategies in these cases. For example, different therapy strategies may be selected for different clients with the same behavior problem as a function of (a) the clinician's judgments about the characteristics and parameters of the behavior problem (e.g., its rate or magnitude), (b) co-occurring behavior problems, (c) situational factors that affect the behavior problem, (d) triggering and maintaining events, and (e) client skills that can be used in treatment.

Treatment individualization and the importance of pretreatment assessment to treatment decisions in behavior therapy reflect several characteristics and assumptions of the paradigm. First, the behavioral treatment paradigm includes many treatment methods because the cognitive–behavioral principles on which they are based can be applied in many ways. For example, behavioral intervention with one client who experiences panic episodes may emphasize graded natural environment exposure, education, and imaginal desensitization; treatment of another

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[1] In many nonbehavioral and some cognitive–behavioral treatment paradigms (e.g., Beck, 1995), particular intervention strategies (e.g., transference interpretation, emphatic understanding, and homework on automatic thoughts) are used for most clients although the elements of the strategy (e.g., the specific feelings and fantasies transferred onto the therapist, the specific client feelings reflected, and the specific strategies for encouraging clients to modify beliefs) vary across clients and across sessions.

[2] The concept of causality is associated with complex theoretical, inferential, and measurement issues. We adopt a definition of causality that is congruent with that described in Asher (1976), Blalock (1964), Kenny (1979), and Haynes (1992): Two variables have a causal relationship when (a) they covary, (b) the causal variable reliably precedes the dependent variable, (c) there is a logical connection, and (d) alternative explanations for the covariance can be excluded. Causal variables may be original, triggering, maintaining, moderating, or mediating. Furthermore, causal variables need not be necessary, sufficient, exclusive, important, or modifiable. The term *behavior problem* refers to the behavior, cognitive, emotional, and psychophysiological problems.

client who experiences panic episodes may emphasize interoceptive reconditioning, medication, and rational discourse about core beliefs (Barlow & Cerny, 1988; Beck & Zebb, 1994).

Second, clients often have multiple behavior problems which may interact in complex ways and which may have different magnitudes of importance across clients. For example, a client who experiences panic episodes may also experience social anxiety, excessive alcohol intake, and sleep disruption. A different array of treatment strategies may be most appropriate for each behavior problem and may act as a function of co-occurring behavior problems (see discussions of comorbidity in Brown & Barlow, 1992).

Perhaps most important, the emphasis on individualized behavioral treatments derives from emphases on *multiple and idiosyncratic causality* and on the modification of *controllable causal variables,* associated with the behavior problems. Because treatments often affect causal variables for behavior problems, treatments are likely to differ across clients because the same behavior problem can be the result of different permutations of multiple causal factors. In the example of a client who experiences panic episodes, treatment may differ depending on the degree to which the panic episodes are judged by the clinician to vary with heightened anxiety sensitivity, catastrophic thoughts, state or trait anxiety, and interoceptive conditioning (Beck & Zebb, 1994).

Sometimes an intervention strategy with a client can affect multiple behavior problems. Interventions for multiple behavior problems maintained by the same consequences, triggered by the same antecedent stimuli, affected by the same causal mechanisms, and that address these causal elements are likely to have positive outcomes (e.g., Anderson, Taylor, & McClean, 1996; Derby et al., 1994). For example, aggressive and self-injurious behaviors may have similar communicative functions for some individuals with developmental delays, and they may both be reduced with alternative communication training (Durand, 1990).

Pretreatment assessment allows clinicians to prioritize and select individualized treatment strategies because pretreatment assessment provides data on which treatment decisions are partially based. The behavioral clinician's assessment-based judgments about a client's behavior problems (e.g., specification, relative importance, and interrelationships), the relationships among these behavior problems, the causal variables and mechanisms associated with those behavior problems (e.g., specification, estimated strength of impact, and modifiability), and variables likely to moderate treatment outcome (e.g., reactions of family members) can affect subsequent decisions about the best treatment strategies.

The *clinical case conceptualization,* which is an integrated array of treatment-relevant clinical judgment, is the link between clinical assessment data and the design of individualized treatment programs. The clinical case conceptualization is an integration of multiple judgments about the client's behavior problems and their causes.

Several authors have proposed strategies for behavioral clinical case conceptualization (Nezu & Nezu, 1989; Persons, 1989; see Eels, 1997, for an overview of clinical case conceptualizations). In this article we discuss one such strategy—the *functional analysis.* The functional analysis is the identification of important, controllable, causal functional relationships applicable to specified behaviors for an individual (Haynes & O'Brien, 1990; Haynes et al., 1993; O'Brien & Haynes, 1995).[3] We also discuss the functional analytic clinical case model (FACCM) as a way of organizing, illustrating, and drawing treatment inferences from the functional analysis (Haynes, Richard, & O'Brien, 1996; Nezu, Nezu, Friedman, & Haynes, 1997). The FACCM is a vector-graphic model of the functional analysis. When component clinical judgments are quantified, the FACCM can be used to estimate the magnitudes of effects of hypothesized causal variables. These estimates, in turn, guide decisions about the focus of treatment.

We first present several elements and characteristics of the functional analysis. Then, we delineate how behavioral assessment strategies, clinical assessment data, and research findings affect the functional analysis. FACCMs are then discussed. The main section of the paper illustrates the development of a functional analysis and FACCM using a clinical case example. Subsequent sections summarize research on the relationship between pretreatment assessment and treatment outcome and review limitations of the functional analysis.

The Functional Analysis

The functional analysis is critical to the design of individualized behavior therapy programs. Each element of the functional analysis (e.g., estimates of the relative importance, interrelationships, and sequelae of a client's behavior problems and treatment goals; the relative modifiability, interrelationships, and strength of impact of causal variables) affects decisions about which variables should be targeted in treatment.[4] In contrast to extant psychiatric diagnostic systems (e.g., *Diagnostic and Statistical Manual of Mental Disorders*—4th ed.; American Psychiatric Association, 1994), which emphasize covariance among multiple symptoms, the functional analysis emphasizes the identification of important functional and causal relationships.

The functional analysis consists of at least 10 classes of clini-

[3] The terms *functional analysis* and *functional assessment* are defined differently across different subdisciplines and by different assessment scholars in psychology, education, and rehabilitation. Definitions of these terms are discussed in Haynes, Uchigakiuchi, et al. (1993) and Haynes and O'Brien (1990). The *Journal of Applied Behavior Analysis* (Iwata, Volume 27) in 1994 published a series of articles in which functional analysis was most often, but inconsistently, described as a method of assessment—the systematic manipulation of hypothesized controlling antecedent and consequent variables in controlled settings to identify functional relationships. The definition of functional analysis used in this article stresses the inferences about functional relationships that may be derived from many methods of assessment (e.g., inquiries to teachers about functional relationships for a student's behavior problems; functional relationships identified through time-series self-monitoring).

[4] Many factors other than the functional analysis affect treatment decisions in behavior therapy, including client motivation, social support from the client's family and friends, treatment credibility, time limitations, and treatment side effects. These have been outlined in Haynes (1986) and in many treatment books such as Kohlenberg and Tsai (1987), Linehan (1993), and Silverman and Kurtines (1996).

Table 1
Clinical Judgments That Contribute to the Functional Analysis and the Design of Treatment Programs

Component	Description/comments
1. The identification of a client's behavior problems/goals	Clients may have multiple problems and goals; behavior problems have multiple modes (behavioral, physiological, cognitive), multiple dimensions (e.g., onset, duration, magnitude), and can vary across situations and time.
2. The relative importance of a client's behavior problems	Importance may reflect client prioritization, potential for harm to self or others, degree of functional impairment.
3. The relationship among a client's behavior problems	Behavior problems may be functionally related (causal or correlated).
4. The effects of a client's behavior problems	The effects of a behavior problem or its sequelae affect the estimated magnitude of effect of a treatment focus.
5. The identification of important causal variables for a client's problems	An emphasis on contemporaneous social–environmental and cognitive antecedent and consequent variables; multimodal causes that can differ across situations; contextual factors; reciprocal causation; may be at systems level (e.g., family, occupational, cultural environments); change across time.
6. The modifiability (clinical utility) of causal variables	Causal variables can differ in the degree to which they are modifiable through clinical interventions (e.g., historical events such as physical traumas cannot be modified, but their sequelae may be reduced).
7. The relationship between causal variables and behavior problems	May be unidirectional or bidirectional; may vary in strength and form (e.g., catastrophic, linear); may change over time.
8. The relationship among causal variables	Causal variables may be embedded in causal chains; they may be additive or interactive.
9. The operation of causal mechanisms	Causal mechanisms can explain "how" or "through what means" a causal variable affects a behavior problem.
10. The operation of moderating variables	Moderating variables affect the strength of relationship between two other variables (important with unmodifiable causal variables).

Note. Data from Haynes (1997, in press-a, in press-b); Haynes, Richard, & O'Brien (1996).

cal judgments. These judgments, outlined in Table 1, affect decisions about which treatment focus (i.e., which hypothesized causal variables should initially be targeted in a treatment program) is likely to result in the greatest benefits for the client. In this article, we present a subset of these judgments and discuss several aspects of the functional analysis. The conceptual foundations and clinical applications of the functional analysis have been presented in more detail in Haynes (1994, in press-b), Haynes and O'Brien (1990), Haynes, Uchigakiuchi, et al. (1993), Nezu et al. (1997), and O'Brien and Haynes (1995). Methods of estimating functional and causal relationships in clinical assessment have been discussed in Haynes (1992) and in Haynes, Spain, and Oliveira (1993).

One goal of pretreatment behavioral assessment is to determine the degree to which research-generated causal models fit the idiographic clinical case model for a client. Each component judgment of the functional analysis integrates nomothetic and idiographic empirical research findings with the results of quantitative and qualitative assessment of the client. Empirically derived causal models for a behavior problem can point to possible causal relationships for an individual client's behavior problem and guide initial assessment foci with that client. For example, McManus and Waller (1995) presented a nomothetic functional model of binge eating that can be used as a template to help the clinician construct functional analyses for individual clients.

With respect to the clinical case example described in a later section, Constructing an FACCM: The Case of Mrs. M, many published studies suggest that presleep worry could be a causal factor for Mrs. M's sleep-onset insomnia (Morin, 1993). However, results from prior research only suggest possible functional relationships and assessment targets for a client: A clinician cannot know the degree to which a particular client's insomnia covaries with presleep worry.[5]

[5] Some standardized treatment protocols are based on nomothetic research findings. For example, a 12-session treatment program for sleep-onset insomnia might include 4 sessions of cognitive and relaxation strategies to reduce presleep worry. Such standardized treatment protocols are empirically based, but not idiographically tailored, because presleep worry is not an important causal factor for all clients with delayed sleep onset. Empirically based, standardized treatment programs would be effective when judged on the basis of group effects but neither optimally effective nor efficient for some individual clients because the emphases in the program would not be congruent with the relative importance of causal variables for a particular client.

Although guided by prior research, researchers or clinicians construct the functional analysis for an individual client primarily from quantitative and qualitative pretreatment assessment data collected from multiple methods and sources. Clinical assessment data may be derived from (a) behavioral observations of clients interacting with others in the natural environment, (b) observations of clients' overt behavioral and psychophysiological responses in controlled clinic settings, (c) interviews with clients and others familiar with the clients, (d) functionally oriented questionnaires, and (e) self- and participant-monitoring of functional relationships in natural settings (see discussions of behavioral assessment methods in Hersen & Bellack, 1997). The goal of pretreatment assessment is to obtain data that enhance the validity of estimates of variables and functional relationships in the functional analysis for individuals within a particular context.

A functional analysis can be difficult to develop. Sometimes, there are insufficient data from which to estimate variables and functional relationships. For example, a client may not be able to identify automatic thoughts associated with interpersonal conflicts. At other times, data from different assessment methods or different sources of data may conflict. For example, parents may disagree about how they typically respond to a child's oppositional behaviors. Consequently, the empirical basis of the functional analysis and the clinician's confidence in its validity will vary with the quality of the data.

The supraordinate goal of the functional analysis is to estimate the relative magnitudes of effects of all causal variables. The *magnitude of effect* is an estimate of the extent to which a causal variable influences a client's behavior problems (or treatment goals). The estimated relative magnitude of effect (the estimated magnitude of effect of a causal variable compared with the estimated magnitude of effect for other causal variables) can be used to prioritize treatment foci for clients with multiple behavior problems and multiple causal variables.

Given that many factors affect intervention decisions (see Footnote 4), the preferred treatment focus addresses causal variables in rank order of their estimated impact on the client's behavior problems: The most beneficial treatment focus is on those causal variables whose modification is likely to result in the greatest reduction in the client's behavior problems and the greatest enhancement in the client's quality of life. Estimates of magnitudes of effects of causal variables in a functional analysis can be derived visually from an FACCM, which quantifies and maps the 10 judgments outlined in Table 1.

A functional analysis is always hypothesized, probabilistic, and incomplete. All elements of the functional analysis are subjectively estimated and probabilistic, rather than wholly deterministic. Although confidence in the functional analysis can be strengthened to the degree that it is based on data from multiple sources, assessment methods, and empirical research, the functional analysis remains a subjectively derived clinical metajudgment. It summarizes many of the clinician's treatment-related clinical judgments about a client and also reflects the errors in those judgments (e.g., misjudging conditional probabilities of behavior problems or selective attention for particular causal variables).

It is not assumed that a functional analysis will capture all of the variance in a client's maladaptive behavior, cognitions, and emotions. The functional analysis reflects the clinician's inferential errors and imprecise measurement, both of which reduce its predictive efficacy. Also, important causal variables can be overlooked. For example, the clinician may fail to assess presleep worry for a person with sleep-onset insomnia. The subjective, probabilistic, and imprecise nature of the functional analysis suggests that it should be viewed cautiously, and we warn against its reification. A functional analysis should be considered a tentative best estimate, subject to continual refinement.

The functional analysis is *dynamic;* it changes over time. New behavior problems and causal variables are often identified as assessment continues. Additional assessment data can also lead to changes in the estimated parameters of a functional analysis. For example, estimates of the relative importance of a client's behavior problems, or of the strength of causal relationships for a client's behavior problems, can change across assessment sessions. Also, the characteristics of behavior problems, the settings in which they occur, and the conditional probabilities of behavior problems can change over time (see discussions of dynamic nature of life events, behavior problems, causal factors, personality traits, and reinforcers by Agras et al., 1994; Bandura, 1982; Hillson & Kuiper, 1994; Nesselroade & Boker, 1994; and Timberlake & Farmer-Dougan, 1991). The functional analysis can also change as a result of treatment.

The functional analysis is *conditional;* its validity is likely to vary across domains such as the physical states of a client (e.g., whether or not the client is taking psychotropic medications), environmental settings (e.g., home vs. school), and social contexts (e.g., in a large or small group).[6] For example, the factors maintaining an adolescent's aggressive behaviors may be different in the home versus the school setting, as a function of which parent is present, which peers are present, and whether he or she has been using drugs or alcohol.

The functional analysis incorporates *reciprocal* (e.g., bidirectional) causal relationships. Reciprocal causal relationships have an important impact on treatment decisions because they reflect the active role of clients in affecting environmental causal variables and the reciprocal influences among cognitive, behavioral, and physiological response modes. The magnitude of effect of intervention in a reciprocal causal relationship is enhanced because the effects reverberate over time (Bandura, 1981; Haynes, 1992).[7]

The functional analysis can be presented at different *levels of specificity.* Molar level variables, such as sleep disorder, depression, and marital distress may be useful when selecting

[6] The validity of a functional analysis refers to the degree to which the elements in the model accurately reflect the client's behavior problems, the causal variables affecting those behavior problems, and the strength of relationships among variables. The most serious threat to a functional analysis may be inadequate content validity—a model may fail to include important causal variables or behavior problems or may include irrelevant variables (Haynes, Richard, & Kubany, 1995).

[7] The magnitude of effect of intervention with one variable when two variables have a reciprocal causal relationship depends on the modifiability of the variables and the strength of each relationship. With parameters held constant, the effects of intervention can be about 50% greater in reciprocal compared with unidirectional, causal relationships.

initial treatment foci in cases with multiple behavior problems. A functional analysis with lower level variables may be more clinically useful for guiding treatment decisions for smaller arrays or more narrowly defined behavior problems. For example, marital distress would be the subject of a lower level functional analysis if it was selected as an important target from among a client's multiple problems. Lower level variables for marital distress might include avoidance–escape behaviors during conflict and critical comments during problem solving. Although the level of specificity of a functional analysis should be appropriate for the contingent clinical judgments, lower level and more specific causal variables and behavior problems often provide stronger guidance for treatment decisions.

In summary, the functional analysis involves the integration of many clinical judgments about a client's behavior problems, treatment goals, and causal variables. The functional analysis is informed by idiographic behavioral assessment data and by the results of previous research on behavior problems and causal variables. The ultimate goal of the functional analysis is to assist the clinician in deciding where to center treatment efforts. The functional analysis is idiographic, hypothesized, tentative, dynamic, and conditional; it includes reciprocal causal relationships and should be at a level of specificity sufficient to facilitate treatment decisions.

Because the functional analysis can involve many variables and relationships, treatment decisions based on it can sometimes be aided by visual representations in an FACCM. The FACCM organizes the components of the functional analysis, helps the clinician describe her or his clinical case conceptualization, and helps to estimate the magnitudes of effects for component causal variables.

Functional Analytic Clinical Case Models

The FACCM is a vector-graphic diagram that uses subjectively estimated path coefficients and variable weights to illustrate and organize the functional analysis. The functional analysis often involves a complex array of multiple judgments, and the FACCM is designed to aid the clinician in making treatment decisions on the basis of the functional analysis of complex cases.[8] The FACCM presents, in diagrammatic and quantified form, all elements of the functional analysis. The FACCM includes estimates of the relative importance of a client's behavior problems and the relationships among and sequelae of those behavior problems. It also includes the variables thought by the clinician to be functionally related to those behavior problems—the estimated magnitudes, type, and direction of relationships (e.g., bidirectional, unidirectional causal, noncausal/correlational, and moderating) and the modifiability of causal variables (i.e., their clinical utility).[9]

The FACCM has several applications. First, and foremost, the FACCM guides decisions regarding treatment targets for an individual client. Second, the FACCM encourages a sequential and precise approach to clinical case conceptualization and decision making by decomposing the functional analysis into its component clinical judgments. This approach may be particularly helpful in training students to conceptualize their clinical cases in a systematic manner. Third, the FACCM facilitates clinical case presentations to other professionals (e.g., in-case conferences; third-party payers). Fourth, the FACCM encourages the empirical examination of clinical judgments because it involves the specification and quantification of clinical judgments—FACCMs are congruent with the empirical hypothesis-testing emphasis of behavioral construct systems (Haynes, 1997, in press-a).

Elements and Construction of an FACCM

The main goal of an FACCM is to help the clinician estimate the relative magnitude of effect expected if treatment were to focus on each of the causal variables in the functional analysis. The estimated magnitude of effect is derived from several component judgments: path coefficients, modifiability of causal variables, causal sequelae and chains, moderating variables, and relative importance of behavior problems.

An *FACCM path coefficient* (see Figure 1) represents the estimated degree of covariance between two variables. An FACCM path coefficient can be considered an estimate of the magnitude of correlation or covariance between two variables across time for a client. For unidirectional and bidirectional causal paths (those depicted by arrows), FACCM path coefficients represent the estimated magnitude of causal relationship. For noncausal relationships (those depicted by straight lines without arrowheads), FACCM path coefficients represent the estimated magnitude of (noncausal) covariation. Treatment-related changes in a behavior problem are presumed to result in no change in a correlated behavior problem unless treatment focuses on a causal variable that affects both variables. Noncausal correlational relationships have implications for assessment strategies in that one variable may be measured more easily than the other. However, they do not contribute to the estimated relative magnitudes of effects of treatment foci. Methods of deriving causal inferences in clinical assessment are discussed in Haynes, Spain, and Oliveira (1993).

Decisions regarding treatment objectives for a client are also affected by the estimated *modifiability of causal variables.* Many causal variables with strong estimated effects (i.e., high path coefficients) are not clinically useful because they are difficult to modify. For example, early childhood abuse or neglect, mild head injury, and chemotherapy for cancer can be important but unmodifiable causal factors for many behavior problems. These variables are often invariant across time and often function as original causes for the onset of behavior problems. Causal variables that are historical, genetically based, social-institution based (e.g., poorly trained and underpaid psychiatric staff), dependent on uncooperative social agents (e.g., an abusive spouse who will not participate in therapy), or for which effective treatments have not been developed, are often not treat-

[8] Because of cognitive limitations (bounded rationality), clinicians often simplify, with heuristics, complex information when making decisions (Elstein, 1988; Goldstein & Hogarth, 1997). FACCMs allow the clinician to consider more information when making treatment decisions.

[9] Elements of FACCMs are borrowed from structural equation modeling (e.g., Asher, 1976; Loehlin, 1992) and vector geometry. We have adopted path model representation without strict adherence to constraints associated with traditional path models. For example, some FACCMS, if nomothetic, would be considered underidentified.

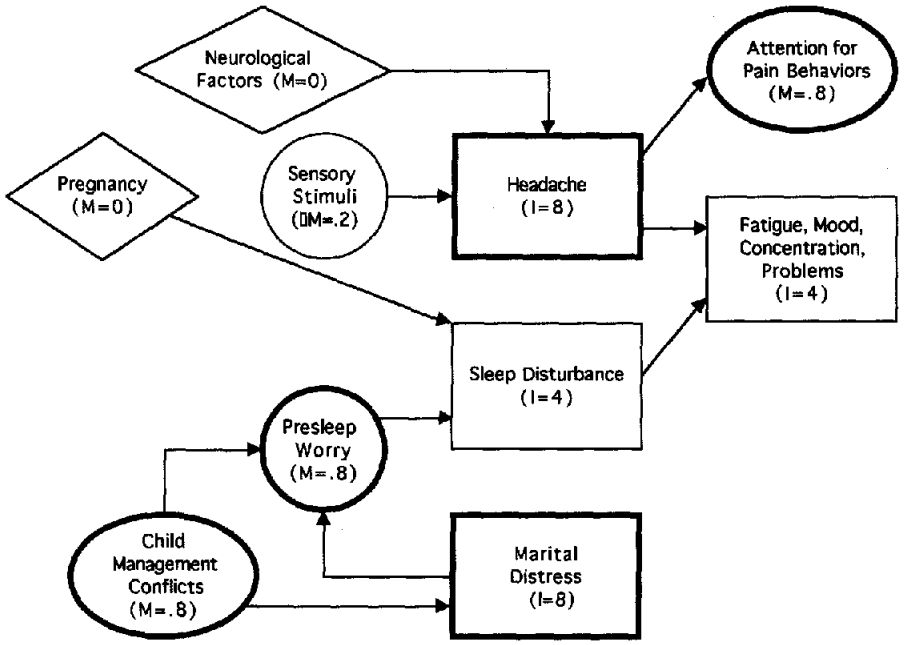

Figure 1. A functional analytic clinical case model of Mrs. M based on data available after the first assessment session. *M* = estimated modifiability; *I* = estimated importance; arrows indicate direction of causal relationships; □ = identified behavior problem; *O* = identified causal variable; line widths vary with estimated strength of relationships, modifiability, and importance.

ment targets because they cannot be affected to a clinically useful degree.

Unmodifiable causal variables, however, often have modifiable *sequelae.* For example, a history of childhood sex abuse may be an important causal factor for an adult client's mood and marital difficulties. Although this early learning experience cannot be altered, a clinician may be able to modify sequelae to the experience that function as more contiguous causal variables: Conditioned fears of physical intimacy or feelings of guilt may be modifiable sequelae to childhood sexual abuse experiences. These sequelae function as *mediators* of the effects of the original causal variable and are important components of FACCMs.

The estimated modifiability of a causal variable plays a major role in estimating the magnitude of effect of targeting that variable in treatment. A causal variable that is only weakly related to a behavior problem may have a larger estimated magnitude of effect than a causal variable that is strongly related to the behavior problem when the weaker variable is significantly more modifiable. The estimated modifiability of a causal variable is represented in FACCMs by a coefficient between 0 and 1; 0 indicates a causal variable that cannot be modified and 1 indicates a causal variable that is totally modifiable.[10]

Decisions regarding the best initial treatment focus for clients with multiple behavior problems are also affected by the clinician's estimates of the relative importance of the behavior problems for clients (see discussions in Evans, 1993; Hawkins, 1986; Mash & Hunsley, 1990). Importance estimates may reflect the severity of the behavior problem (e.g., occasional vs. frequent or severe vs. mild), the degree to which the behavior problem is dangerous to the patient (e.g., head banging vs. stereotypic movements in an autistic child), the likelihood that it can lead to harm for others (e.g., physically violent vs. verbally critical behaviors), the degree to which it is reported by the client to be distressing, or the degree to which it is central to the patient's quality of life and happiness.

Judgments about the importance of behavior problems are indicated by values associated with problem behaviors (see Figure 1). Because FACCMs are idiographic, the scale used to depict relative importance of behavior problems (as with other scales in the FACCM) is arbitrary but must be consistent within an FACCM so that estimates of the relative importance of multiple behavior problems are comparable. The importance represents a rating. A behavior problem with an estimated importance of 8 has been judged by the clinician to be more important than one with an estimated value of 4, and the rating does not necessarily represent true parameters of the behavior problem (e.g., frequency of self-injury; score on a depression scale). Consequently, the relative indices of multiple behavior problems, rather than their absolute values, influence the relative magnitude of effect estimates.

When there is a single route between a causal variable and a behavior problem, the estimated magnitude of effect of the causal variable in an FACCM is a multiplicative function of (a) all path coefficients leading from the causal variable, (b) the

[10] Modifiability coefficients can be estimated from the results of clinical research, the clinician's skills with a particular treatment strategy, and other moderating variables (e.g., degree of cooperation by the client, the client's partners, and institutional staff).

importance rating of the downstream behavior problems, (c) the modifiability of the causal variable, (d) the importance ratings of behavior problem sequelae, and (e) the strength of relationships among behavior problems and their sequela.[11] Thus, the sum of coefficients of paths emanating from a variable is an estimate of the treatment-related importance of that variable to contiguous downstream variables.

As noted in Figure 1, there can be multiple routes between a causal variable and a behavior problem. The total magnitude of effect of a causal variable is the sum of the products of the coefficients of all routes between the causal variable and connected behavior problems. The magnitude of effect associated with a causal variable is useful only when contrasted with the estimated magnitudes of effects associated with other causal variables for the same client.

An FACCM route can have multiple components. A variable on a route interposed between a causal variable and a behavior problem can be considered a mediating variable (Asher, 1976; Hyland, 1981)—a variable that accounts for or explains a causal relationship. Multiple causal routes and paths reflect the fact that many causal variables operate on other causal variables and sometimes form causal chains. (In the case of Mrs. M, presented later in Figure 2, marital communication problems affect marital distress directly through increased child management conflicts.)

Thus, for two causal routes (a, b), each of which contains multiple coefficients (e.g., *X1pa, X2pa*) from a causal variable (*X1*), to a behavior problem (*BP1*) and sequelae behavior problem (*BP2*), and each route with a mediating variable (*X2*, *X3*), the magnitude of effect (*E*) will be:

$$E_{x1} = (\text{magnitude of Route a for } BP1) + (\text{magnitude of Route a for } BP2) + (\text{magnitude of Route b for } BP1) + (\text{magnitude of Route b for } BP2);$$

Magnitude of effect for Route a (for *BP1*)

$$= X1_m \times X1pa \times X2_m \times X2pa \times BP1;$$

Magnitude of effect for Route a (for *BP2*)

$$= X1_m \times X1pa \times X2_m \times X2pa \times 1 \times BP1pa \times BP2,$$

where m = estimated modifiability of causal variables; a, b = estimated correlations between connected variables; BP = behavior problem importance rating (and *BP1* set at 1 when calculating magnitudes of effects on its sequelae, *BP2*). Treatment decisions are guided by the differences in the magnitudes of effects for E_{x1}, E_{x2}, E_{x3}, and so forth. Given the measurement imprecision and inferential errors inherent in the FACCM estimates, the clinician can be more confident in deriving treatment inferences from magnitudes of effects that are very different than from magnitudes of effects that are only somewhat different.

Additional Limitations of the Functional Analysis and FACCMs

FACCMs are limited in several ways. First, the numerical values in an FACCM can appear "pseudoprecise," that is, they can erroneously imply measurement precision and power that are unwarranted by current assessment methods. The estimates of FACCM path and variable coefficients and variable weights are derived from imperfect assessment instruments, guided by imperfect measurement models, and incorporate clinical judgment errors and biases: FACCMs are subjective estimates of imprecisely measured variables and relationships. They quantify and illustrate only the clinician's assessment-guided judgments and should be viewed cautiously.

FACCMs also take time to construct.[12] Consequently, the utility of the FACCM covaries with the complexity of the clinical case, the purpose of the clinical case conceptualization, the impact of judgment errors, and the probability of a positive outcome with a standardized treatment program that can be implemented independently of a functional analysis. Treatment decisions are particularly challenging with clients who have multiple interacting behavior problems with multiple sources of causation. For these clients, the multiple variables and causal routes make it difficult to select the treatment targets that will maximize treatment effects.

The risk to the client of making treatment decisions without a functional analysis varies across treatments, behavior problems, and clients. As Groden (1989) noted, some treatments are aversive for clients (e.g., time-out, restraint, and imaginal flooding) and should not be initiated without a functional analysis that supports the causal importance of the variables affected by such interventions.

However, sometimes the negative consequences for an invalid functional analysis, or for initiating treatment independent of a functional analysis, are minimal. Consider the minimal negative consequences of using well-researched interventions such as relaxation training for a client with tension headaches, exposure-based treatment for a client with panic episodes, or self-monitoring of diet and gentle aerobic exercise for a client with essential hypertension (e.g., Gatchel & Blanchard, 1993). These treatments have been shown to be effective for many people with the targeted behavior problems, and a treatment–functional analysis mismatch presents little risk of harm to the client (although delaying positive effects of appropriate treatment may be viewed as "harmful"). Thus, the cost-effectiveness of a functional analysis is directly related to the complexity of a clinical case, the aversiveness of potential treatments, and the risk associated with erroneous treatment.

For clients with focal behavior problems for which well-established treatments are available, FACCMS may be most

[11] Other concepts, such as nonlinear relationships, state-phase functions, catastrophic causal relationships, moderating variables, and bidirectional causal relationships, are also relevant to the functional analysis, but they are outside the domain of this discussion (see Haynes, 1992, for a discussion of these concepts). We presume that the variables in an FACCM are most of the important causal variables operating for a client's behavior problems. However, we also presume that there are other variables and relationships not shown in an FACCM that can account for some observed relationships and effects.

[12] Haynes, Richard, O'Brien, and Grant have developed an interactive computer program to help construct an FACCM and calculate magnitudes of effects. Information about this program is available from Stephen N. Haynes.

useful when initial treatment efforts have failed (Mash & Hunsley, 1993). In such cases, a functional analysis may help the clinician rethink the case conceptualization and refocus treatment.

Constructing an FACCM: The Case of Mrs. M

Referral and Initial Contact

Mrs. M was a 35-year-old Caucasian woman referred by a neurologist for psychological treatment of recurrent headaches and sleep problems.[13] Mrs. M lived with her husband of 15 years and her 12-year-old son. She was in her 28th week of pregnancy and unemployed. Her neurologist recommended nonpharmacological interventions because she was pregnant, she did not respond positively to medications in the past, no indication of organic etiology, and a history of significant medication side effects.

In the sections that follow we describe: (a) the behavioral assessment methods used with Mrs. M, (b) how the strategies of assessment were guided by principles from the behavioral assessment paradigm and the evolving functional analysis, (c) how the assessment data affected the FACCM, and (d) the empirical basis of behavioral assessment strategies and clinical case formulations.

Assessment Session 1

Unstructured interview. One goal of an initial assessment session is to survey for and to specify behavior problems other than the referral complaint or complaints. As discussed earlier, the client's behavior problems and their interrelationships can affect the initial focus of treatment (Anderson et al., 1996; Linehan, 1993). An unstructured interview was used to elicit information on the range of Mrs. M's concerns and treatment goals (see discussions in Hodges & Zeman, 1993; Sarwer & Sayers, in press; Tanaka-Matsumi, Seiden, & Lam, 1996; Turkat, 1986). Congruent with the emphasis of the behavioral assessment paradigm, the interviews were designed to obtain specific, molecular, quantitative, and qualitative information about behavior problems and treatment goals while maintaining a positive and supportive relationship with the client (Haynes, 1997; in press-b). The specification of functional relationships among behavior problems is a particularly important goal.

During the unstructured interview, Mrs. M reported that she was also concerned about her marriage. She noted that she and her husband were having frequent, prolonged, and distressing arguments revolving around several recurring problems. These conflicts often centered on the discipline of their son, who was increasingly oppositional and noncompliant.

Because treatment focus is affected by estimates of the relative importance of behavior problems, Mrs. M was asked to rate the importance of headaches, sleep disturbance, marital distress, and child discipline. On a 10-point scale (1 = *least severe;* 10 = *most severe*), Mrs. M rated her headaches and her marital distress as an 8 and the sleep disturbance and child discipline problems as a 4.

Semistructured interviews. Semistructured interviews (e.g., Blanchard & Andrasik, 1985; Morin, 1993) were conducted to gather more specific data on the modes and parameters of concerns identified in the unstructured interviews and to identify possible causal factors. Mrs. M reported that her headaches had been increasing in frequency and severity over the last 3 years. Headaches now occurred almost continuously, with very intense headaches lasting 2 to 4 hr every day. Mrs. M reported that severe headaches were often precipitated by intense environmental stimuli, such as loud voices and bright light, but not by other daily stressors. Mrs. M reported that the major consequences of her headaches were impaired concentration abilities, fatigue, and depressed mood. Mrs. M also reported that her husband was more helpful and attentive when the headaches were severe. She expressed concern that his helpful behaviors would diminish if her headache condition significantly improved, suggesting that her marital relationship may be a contributing factor and should be assessed.

Mrs. M's sleep problems began about the same time as her headaches became a problem. She reported that it usually took about 1 hr to fall asleep and that her sleep was fragmented and shallow, with periodic awakenings. Mrs. M was asked about factors often associated with sleep disturbance (including the role of sleep environment, sleep habits, diet, exercise, and presleep worry; Lichstein & Riedel, 1994; Morin, 1993). Mrs. M reported that when she went to bed at night, she worried about her headaches and any negative interactions she had had during the day with her husband or her son. She reported worrying nearly every night (i.e., $\geq$ 5 nights per week) before falling asleep and often (i.e., about 75% of the time) when she awoke during the night. In addition, Mrs. M reported that the weight gain and frequent urination associated with her pregnancy had exacerbated her sleep problems.

Mrs. M reported that Mr. M did not fully understand the difficulties she experienced in disciplining their son and that he sometimes undermined her discipline efforts. Mrs. M was also distressed by her husband's failure to help around the house and to be sufficiently attentive, complimentary, and supportive, particularly during her pregnancy.

Homework assignments. As part of a multimethod assessment, clients are often asked to complete assessment tasks outside the sessions. Data from these tasks help to quantify the specific behavior problems and to identify important, controllable, and causal variables. Mrs. M rated her headaches every hour on a 5-point scale (0 = *no headache;* 5 = *very severe headache*) for the next 2 weeks. During the same time, Mrs. M also kept a sleep diary in which she recorded latency to sleep onset, number of nightly awakenings, amount of sleep lost during the night, and time of morning awakening. For each assessment session, Mrs. M was to bring that week's self-monitoring data for review and recording.

Finally, both Mr. and Mrs. M completed the Dyadic Adjustment Scale, the Spouse Verbal Problem Checklist, and the Marital Attitudes Questionnaire at home. The Dyadic Adjustment Scale (DAS; Spanier, 1976) provides a global assessment of adjustment to marriage. The Spouse Verbal Problem Checklist (SVPC; adapted from Carter & Thomas, 1973) was adminis-

[13] This FACCM was modified from one developed by Akiko Lau, University of Hawai'i at Manoa, and briefly discussed in Haynes (1997).

tered to assess the couple's satisfaction with their communication. All marital questionnaires were completed by each spouse separately, and Mr. and Mrs. M were told that the questionnaire results would be discussed in the following session. Mr. M also agreed to participate in the second session to assess marital satisfaction and interaction.

The FACCM in Figure 1 depicts the hypothesized functional analysis of Mrs. M on the basis of information available after Session 1. It includes the behavior problems identified by Mrs. M, her estimate of their relative importance, and hypothesized functionally related variables. Several functional relationships were identified, but estimates of the strength of the relationships were postponed until more assessment data were available after the second assessment session.

Estimated magnitude of effect. The preliminary clinical judgments, based on data available after the first assessment session and guided by prior research, are illustrated in Figure 1. The estimated magnitudes of effects from this FACCM suggest that a treatment program targeting "child management conflicts" is predicted to have the largest magnitude of effect (2.60) compared with "sensory stimuli" (.76) and "presleep worry" (.59). Note, again, that these values were based on subjective component judgments and useful only for relative comparisons of treatment targets within an FACCM (because of insufficient data, strengths of relationships were not estimated and considered equal).

Assessment Session 2

The goals of the second session were to collect additional data on many of the variables and relationships depicted in the FACCM and to survey for additional variables and functional relationships. Because the marital relationship seemed to be an important concern, and was also presumed to be a possible causal variable for some of Mrs. M's other problems, it was a major focus of session two. Both Mr. and Mrs. M participated in the second session.

Depression assessment. Several studies have demonstrated that clients with chronic pain, sleep disturbances, marital distress, or child behavior management problems may also experience mood disturbances (e.g., Banks & Kerns, 1996; Beach, Sandeen, & O'Leary, 1990). Consequently, the Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1988) was administered to both Mr. and Mrs. M at the beginning of the second interview. Mrs. M's total score of 12 indicated mild depression (Mr. M scored 2, well within the nondepressed range). However, an item analysis suggested that Mrs. M's elevated score reflected mostly pain-related items rather than mood- or cognition-related items; a finding congruent with her report during the interview of minimal depression.[14]

Self-monitoring of headaches and sleep. Self-monitoring data on headache frequency and severity were congruent with Mrs. M's interview report: She reported no headache-free hours during the previous week. Headache peaks (rated 3 or above on a 5-point scale) occurred at various times of the day; severe headaches (rated at 4 or 5) occurred mostly in the morning hours (6 to 10 a.m.). Daily average severity scores increased during the latter part of the week. Self-monitoring data on sleep behavior yielded a nightly pattern of sleep characterized by a 1.25-hr sleep latency and two to five awakenings with headaches, per night, lasting several minutes each. Self-monitoring data also showed that headaches had a strong influence on sleep and that headaches were worse on days following disturbed sleep (suggesting a reciprocal causal relationship).

Marital satisfaction questionnaires. Mr. and Mrs. M's DAS scores were 107 and 97, respectively. With a cut-off score of 100 indicating marital satisfaction, Mr. M's score placed him in the satisfied range, whereas Mrs. M's score placed her slightly below that cutoff. The only marked discrepancy between the couple's responses was on the item querying the frequency of stimulating exchanges of ideas; whereas Mr. M reported such exchanges as occurring more than once a day, Mrs. M reported that they occurred less than once a month. The couple's average score on the SVPC was 67 (Mr. M = 60 and Mrs. M = 74), which was more than one standard deviation above the mean of 46. Mrs. M's perceived problem areas in their verbal communication included Mr. M's frequent interruption, criticism, and lack of compliments. Mr. M reported that his wife frequently talked too loud, became emotional during discussions, and dwelled excessively on one topic.

Unstructured marital interview with Mr. M. An unstructured interview was conducted with Mr. M to examine his perceptions of the relationship difficulties and possible causal factors. Mr. M reported that the discipline of their son was a constant source of marital tension and could be attributed to his wife's "deep-down hatred" toward the son and her overreaction to the son's behavior. He also stated that his wife tended to talk too much, particularly when explaining her actions in reference to their son. This made Mr. M "frustrated" and less supportive.

Semistructured marital interview with both spouses. A semistructured interview consisting of four questions was given to both Mr. and Mrs. M. The specific questions covered positive qualities, behaviors to increase, behaviors to decrease, and methods to improve the relationship (Haynes, Jensen, Wise, & Sherman, 1981).

While both Mr. and Mrs. M indicated that the other had positive qualities, Mr. M could not state any specific ones, whereas Mrs. M readily listed several positive characteristics of her husband. While Mr. M also did not identify anything he wanted Mrs. M to do more, Mrs. M stated that she wanted Mr. M to do more fun things with her as a couple, to show her more affection, to compliment her on specific, attractive features, and to help more with housework. Mrs. M also reported her concern that her husband was increasing the frequency and quantity of his alcohol consumption again (i.e., 4 to 6 beers daily), after a period of limited consumption (i.e., 2 to 4 beers a week). Specifically, Mrs. M reported that he was more withdrawn, sullen, and less helpful while drinking.

Mr. M indicated that he wanted Mrs. M not to argue so much with the son, and Mrs. M wanted Mr. M to drink less often and to criticize her less. To improve the relationship, Mr. M suggested that he could argue less about their son and "give more love" (e.g., compliment and be more affectionate) to his wife.

[14] Several nomothetic studies have controlled for item contamination (elevated depression scores attributable to physical symptom items) and noted significant independent covariance between depression and other behavior or medical problems (e.g., Banks & Kerns, 1996).

Mrs. M suggested that she talk less and not "overexplain" her actions. She also stated that she could inform her husband of their son's behavior in a more neutral way, rather than complain and use this to start an argument.

Analogue marital interaction observation. To observe the problem-solving interaction between Mr. and Mrs. M, the couple was asked to discuss, for 10 min, a topic that frequently generated arguments at home (e.g., discipline of their son). The session was audiotaped, and the assessor and another rater independently rated the couple's verbal interactions using several behavioral codes derived from the Marital Interaction Coding System (Weiss & Heyman, 1990). The tape was also reviewed for qualitative impressions.

Results of this analogue observation showed that Mr. and Mrs. M's interactions were characterized by high rates of both positive and negative verbalizations by Mrs. M, low rates of problem-solving statements by both, and mostly negative verbalizations (e.g., disapproval, criticisms, and interruptions) by Mr. M.

Figure 2 presents the estimated FACCM, following the second assessment session. Self-monitoring revealed a reciprocal causal relationship between sleep difficulties and headaches and is represented by the double-headed arrow between the two target variables. With more data on the interaction between Mr. and Mrs. M, alcohol use by Mr. M, and insufficient attention from Mr. M were added to the FACCM. With the more systematic and quantifiable data obtained in this session (i.e., questionnaire results, self-monitoring data, structured interviews, and analogue observations), the path coefficients represented in this modified FACCM were more specifically estimated.

The changes in the FACCM, after additional assessment data were gathered, illustrate the dynamic nature of the functional analysis. Because past research has found that depression often covaries with sleep disturbance, headaches, and marital distress, it was evaluated even though it was not one of Mrs. M's presenting complaints. In this case, depression was not an important variable, causal or dependent, and it was not added to the FACCM.

Estimated magnitude of effect. There were important changes from Session 1 to Session 2 in the estimated relative magnitudes of effects for targeting the causal variables in treatment. Given the clinical judgments based on data available after

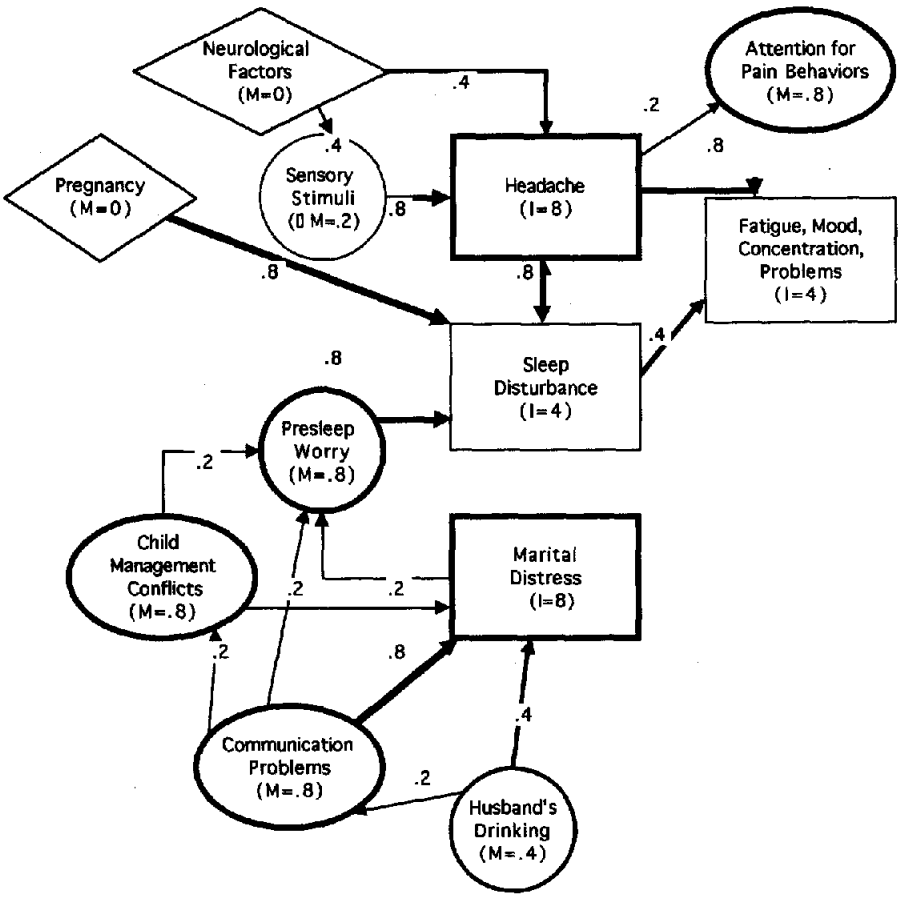

Figure 2. A functional analytic clinical case model of Mrs. M based on data available after the second assessment session. *M* = estimated modifiability; *I* = estimated importance; arrows indicate direction of causal relationships; □ = identified behavior problem; *O* = identified causal variable; line widths vary with estimated strength of relationships, modifiability, and importance.

Table 2
Studies on the Relationship Between Functional Analysis (FA) and Treatment Outcome

Reference	Sample/behavior problem	Method of assessment for FA	Assessment–treatment relationship
Chapman et al. (1993)	Drug overdose in an individual with autism and mental retardation	Systematic observation of client in school and work activities with access to various (placebo) pills associated with different consequences	Treatment targeting maintaining variables resulted in a reduction in pill ingestion from 11.05 to 0.01 times per minute, a decrease in positive toxicity screens from 85% to 11% (covert measure), and a decrease in emergency room visits from 6 to 0.
Chorpita et al. (1996)	School refusal of children and adolescents	Parent and child interviews to determine escape, avoidance, attention seeking, and reinforcement functions of school refusal	Treatments specific for each of the maintaining variables identified in the assessment resulted in the alleviation of school refusal.
Day et al. (1994)	Disruptive behaviors in individuals with severe intellectual disabilities	Systematic observation during discrete training trials	Treatment was successful only when both maintaining variables (access to tangible objects and escape from difficult tasks) were treated.
Iwata et al. (1994)	Self-injurious behaviors of people with developmental disabilities	Systematic observation of response to experimenter behavior; contingency manipulation	Of treatments based on FA, 80% were successful; those not based on FA had minimal effects.
Kearney & Silverman (1990)	School refusal of children and adolescents	Parent and child interviews for escape, avoidance, attention seeking, and reinforcement behaviors	Treatments specific to the most significant maintaining variables for each subject yielded mixed results (children were only treated for one category of maintaining variables even though there were multiple variables for most children).
Kennedy & Souza (1995)	Eye-poking in a child with a developmental disability	Systematic observation across four response contingency conditions: (a) no attention, (b) attention, (c) demand, and (d) recreation	Treatment specifically targeting the maintaining variables resulted in a reduction in eye-poking from 6 times to less than once per hour.
Kern et al. (1994)	Disruptive behaviors in a child with emotional and behavioral problems	Direct observation, questionnaires, and Student-Assisted Functional Assessment Interview	Treatment specifically targeting the function of disruptive behavior significantly reduced problem behavior and improved academic performance.
Kern et al. (1995)	Breath holding in an individual with severe mental retardation	Systematic observation and monitoring of blood oxygen levels in five conditions (e.g., attention)	When treatment was matched to the conditions identified in the FA, frequency of breath holding was reduced from 14 to 1 time per session
Kotses et al. (1991)	Asthma	Risk factor analysis	Decrease of 22% in number of attacks in experimental group where self-management based on specific symptom-provoking stimuli was used.
Lalli & Casey (1996)	Developmental delays and aggression in child with developmental delays	Observation; systematic, response-contingent presentation and removal of attention, escape, and materials	Treatments specific for the function of behavior resulted in significant decreases in aggressive behavior.
Lalli et al. (1996)	Eye-poking in an individual with a severe developmental disability	Systematic observation in four response contingency conditions: (a) sensory stimulation, (b) social reinforcement, (c) response blocking, and (d) alternative blocking	Treatment was based on maintaining variable (finger–eye contact) significantly reduced rates of eye-poking.

Table 2 (*continued*)

Reference	Sample/behavior problem	Method of assessment for FA	Assessment–treatment relationship
Luiselli (1996)	Destructive and aggressive behavior of a physically abused adolescent	Classroom observation of aggression, property destruction, and throwing and sweeping objects	Treatments were matched to the function of behavior significantly eliminated challenging behaviors and increased positive behaviors that were not targeted for treatment.
McKnight et al. (1992)	Depression in adults	Role play and questionnaires	Interventions specific to the participant's deficit (i.e., social skills deficits, irrational cognitions, or both) resulted in greater reductions in depressive symptoms
Michelson (1986)	Agoraphobia in adults	Self-report; clinician ratings, Standardized Behavioral Avoidance Course (SUDS, heart rate, continuous cognitions monitoring)	Treatments matched to greatest area of dysfunction achieved better results than mismatched ones
O'Reilly (1995)	Aggression and sleep deprivation in an individual with severe mental retardation	Systematic observation in attention and demand conditions in home and facility; monitoring of sleep deprivation	Consistent with FA, time spent acting aggressively decreased from a mean of 20% in home and 23% in facility to 1.5% and 0.8%, respectively; maintained at 7-month follow-up
Ost et al. (1981)	Social phobia in adults	Videotaped social interaction test; heart rate; self-report	Improved results were obtained when treatment targeted the participant's mode of phobic response (i.e., behavioral or physiological).
Ost et al. (1984)	Agoraphobic in adults	Behavioral test using fear hierarchy; heart rate; self-report	Improved results were obtained when treatment targeted the participant's mode of phobic response (i.e., behavioral or physiological).
Ost et al. (1982)	Claustrophobia in adults	Videotaped in small, phobic-inducing test chamber; heart rate; self-report	Improved results were obtained when treatment targeted the participant's mode of phobic response (i.e., behavioral or physiological).
Piazza et al. (1996)	Cigarette pica in an individual with autism and mental retardation	Systematic observation in three response-contingent analogue conditions (social attention, alone, and toy play)	Treatment was based on maintaining variables eliminated cigarette butt pick-ups and pica.
Repp & Karsh (1994)	Tantrum behavior in individuals with developmental disabilities	Structured observation of students and teacher; teacher interview	Treatment targeting the maintaining variables resulted in a reduction in tantrum frequency from 22 times per day to once a day; there were no occurrences during follow-up.

Note. Studies were drawn from various behavioral assessment journals (e.g., *Journal of Applied Behavioral Analysis, Behavior Research and Therapy, Journal of Behavior Therapy and Experimental Psychiatry, Behavior Modification, Behaviour Research and Therapy, Cognitive and Behavioral Practice*). Selection criteria included the implementation of treatment tailored to the results of a functional analysis. Studies that involved group comparisons, standardized treatment packages, or battery assessments did not meet eligibility criteria for inclusion.

the second assessment session, the highest estimated relative magnitudes of effects were now associated with "communication problems" (> 6). In contrast, the magnitude of effect associated with "child management problems" was estimated to be < 3. Note in Figure 2 that communication problems are associated with a high estimated magnitude of effect, in part because it affects several behavior problems through several routes.

Empirical Basis and Incremental Utility of the Functional Analysis: Final Comments

The functional analysis and FACCM are logical but insufficiently investigated strategies for clinical case conceptualization and treatment decision making. Functional analytic concepts and methods are in a nascent stage and are likely to change with the acquisition of additional data and the refinement of assessment methods. The clinical applicability of the functional analysis will be particularly strengthened by research on (a) methods of estimating causal relationships in clinical assessment; (b) classes of causal variables that are important for specific behavior problems; (c) clinical judgment errors, biases, and strategies; (d) quantitatively based treatment decision-making strategies; (e) the differential effectiveness of treatment strategies for modifying specific causal variables; and (f) client–moderator variables for treatment outcome.

The incremental utility of the functional analysis, compared with the use of standardized treatment protocols, has also been insufficiently investigated (see Table 2) and is likely to depend on several factors, many of which were discussed earlier in this article. First, the utility of the functional analysis will depend on the validity and cost-efficiency of the technology for estimating functional relationships in clinical assessment. Many of the most powerful assessment methods, such as time-series measurement in the natural environment, are costly. Other powerful but more efficient methods, such as behavioral observation in structured environments, are in early stages of development. Most of the cost-efficient methods involve self-reports, such as client estimates of functional relationships during an interview, which are less powerful and associated with multiple sources of error.

The functional analysis is likely to be more cost-effective for some behavior problems than for others. We assume that the incremental utility of the functional analysis (i.e., the increase in magnitude of treatment effects) warrants the application of functional analytic strategies, but this is a conditional assumption. The functional analysis is least likely to be cost-effective when (a) a particular behavior problem is affected by a single or limited domain of causal variables, (b) causal variables do not vary across persons with the same disorder, (c) multiple behavior problems do not co-occur, (d) powerful and efficient methods for assessing a particular behavior problem or causal variable are unavailable, (e) there is no method for modifying causal variables identified in the functional analysis, and (f) a standardized treatment regime effectively and efficiently addresses the causal variables for a particular behavior problem (e.g., when diagnosis provides a sufficient guide for treatment decisions). Given these caveats, important objectives for research are to determine the behavior problems, client, conditions, and assessment methods that will strengthen the treatment utility of a functional analytic strategy. Additional research is needed on the relative utility of FACCM and alternative models for clinical case conceptualization, such as that proposed by Nezu and Nezu (1989).

In view of this matrix of necessary conditions, it is not surprising that the recently published literature, outlined in Table 2, provides only preliminary support for the treatment utility of the functional analysis. The incremental utility of the functional analysis has reliably been demonstrated for self-injurious behaviors. For other behavior problems, the clinical utility of the functional analysis is frequently supported by testimony but is infrequently the object of research. In sum, the functional analysis and FACCM are promising strategies for clinical case conceptualization. The FACCM is congruent with the behavioral assessment paradigm and an empirical approach to clinical judgment, likely to be refined with additional research and likely to be conditionally useful, and warrants further investigation.

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