THE BEHAVIOR ANALYST TODAY

A Context for Science with a Commitment to Behavior Change

VOLUME 6, ISSUE 3

ISSN: 1539-4352

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THE BEHAVIOR ANALYST TODAY

PUBLISHER'S STATEMENT

VOLUME NUMBER 6, ISSUE NUMBER 3

ISSN: 1539-4352

Published: October 20, 2005

The Behavior Analyst Today (BAT) is published quarterly by Joseph Cautilli. BAT is an online,electronic publication of general circulation to the scientific community. BAT's mission is to provide a concentrated behavior analytic voice among voices which are more cognitive and structural. BAT emphasizes functionalism and behavioral approaches to verbal behavior. Additionally, BAT hopes to highlight the importance of conducting research from a strong theoretical base. BAT areas of interest include, but are not limited to Clinical Behavior Analysis, Behavior Models of Child Development, and Community based behavioral analytic interventions, and Behavioral Philosophy. BAT is an independent publication and is in no way affiliated with any other publications.

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Erratum:

Ommission from Cautilli et al. BAT 6.2 (2005) on Verbal conditioning - The following reference was missing:

Ryan, T.A & Krumboltz, J.D.(1964). Effects of planned reinforcement counseling on client decision-making behavior. *Journal of Counseling Psychology, 11*, 315-323.

Staff

SUBMISSION INFORMATION

Most contributions are by invitation and all are then peer-reviewed and edited. The editors, however, welcome unsolicited manuscripts, in which case, we suggest potential authors send an abstract or short summary of contents and we will respond as to our interest in a full manuscript submission. In all cases, manuscripts should be submitted electronically saved in "rich text format" (.rtf) to BOTH Michael Weinberg at Michael.Weinberg@po.state.ct.us and Joe Cautilli at jcautill@astro.temple.edu. Please adhere to APA format and use "Times New Roman" font in 11 pt. throughout. In references, however, please italicize the places where APA format would have you underline. Abstracts and keywords must be included, as well as full contact information for all authors.

The above are only the bare bones submission guidelines. Please visit the BAT site for full information regarding submissions: http://www.behavior-analyst-today.com/submissions.html

OUR MISSION

The Behavior Analyst Today is committed to increasing the communication between the sub disciplines within behavior analysis, such as behavioral assessment, work with various populations, basic and applied research. Through achieving this goal, we hope to see less fractionation and greater cohesion within the field. The Behavior Analyst Today strives to be a high quality journal, which also brings up to the minute information on current developments wihin the field to those who can benefit from those developments. Founded as a newsletter for master level practitioners in Pennsylvania and those represented in the clinical behavior analysis SIG at ABA and those who comprised the BA SIG at the Association for the Advancement of Behavior Therapy, BAT has evolved to being a primary form of communication between researchers and practitioners, as well as a primary form of communication for those outside behavior analysis. Thus the Behavior Analyst Today will continue to publish original research, reviews of sub disciplines, theoretical and conceptual work, applied research, program descriptions, research in organizations and the community, clinical work, and curriculum developments. In short, we strive to publish all which is behavior analytic. Our vision is to become the voice of the behavioral community.

THE EMPEROR'S NEW ANTHROPOMORPHISM

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Anthropomorphism – the attribution to nonhuman species of human mental qualities – originated in the search for psychological continuity between species following the publication of Darwin's theory of evolution by natural selection. Eclipsed by Behaviorism and classical ethology, mentalistic anthropomorphism has undergone a recent revival. I argue that Watson and Skinner's reasons for rejecting anthropomorphism remain valid today. Mentalistic explanations involve explanatory fictions, they imply a mental homunculus, they rely on introspection, and they are not parsimonious. Though analogies are often useful in any branch of science, to use folk psychological notions of human psychology in attempting to understand animal behavior cannot be constructive.

Key words: Anthropomorphism, mentalism, behaviorism

The use of the word "Anthropomorphism" to describe the ascription of human qualities to nonhuman species is a product of the Darwinian revolution. The original sense of this word (and still the only one listed in the *Encyclopedia Britannica,* 2005) is the attribution of human form to a deity. According to the Oxford English Dictionary (1989), the extension of the word to animals is due to George Henry Lewes in his 1858 book, "Seaside Studies." Lewes, believing that mollusks have eyes but only a rudimentary sensitivity to light, wrote that, "…we speak with large latitude of anthropomorphism when we speak of the 'vision' of these animals." (Lewes, 1862, p. 359.) Lewes' book was first published the year before Darwin's "Origin of Species" (1859). Lewes and Darwin were acquainted with each other, and clearly it was Darwin's emphasis on psychological continuity between humans and other species, especially as developed in "The Descent of Man and Selection in Relation to Sex" (1871) and "The Expression of Emotions in Animals and Men" (1872) that created a niche for the use of "anthropomorphism" in this new sense. Though Darwin wrote that there was "no fundamental difference between man and the higher mammals in their mental faculties" (Darwin, 1882, p. 66) he never used the term "anthropomorphism" in his published writings. It was his protégé, George Romanes, who gave the term wider currency by making "inverted anthropomorphism" his method in, "Animal Intelligence" (1884).

… Just as the theologians tell us—and logically enough— that if there is a Divine Mind, the best, and indeed only, conception we can form of it is that which is formed on the analogy, however imperfect, supplied by the human mind; so with 'inverted anthropomorphism' we must apply a similar consideration with a similar conclusion to the animal mind. The mental states of an insect may be widely different from those of a man, and yet most probably the nearest conception that we can form of their true nature is that which we form by assimilating them to the pattern of the only mental states with which we are actually acquainted. (Romanes, 1884, p. 10).

Skinner (1938) would later write that it was Conway Lloyd Morgan who, "with his law of parsimony, dispensed with [mental faculties in animals] in a reasonably successful attempt to account for characteristic animal behavior without them." (1938, p. 4). However, Skinner's characterization of Morgan's "Canon" (or "basal principle" as he called it, 1894, p. 53) was substantially in error. Morgan's intent was not in any way to banish mentalistic explanation from the study of animal psychology. His 1894 work, "An Introduction to Comparative Psychology" commences with fulsome praise of the recently deceased Romanes. Morgan's argument was not with Romanes' anthropomorphic method – the method of inferring animal mentation by analogy with human mental life. Morgan's only concern was that the interpretation be constrained by some principles of parsimony.

In his oft-quoted maxim, Morgan stated; "*In no case may we interpret an action as the outcome of the exercise* of *a higher psychical faculty, if it can be interpreted as the outcome* of *the exercise of one which stands lower in the psychological scale*." (p. 53). He did not explicitly state what he meant by "psychical faculty" except to say that he did not intend to ally himself with "faculty psychology" – rather the term was a synonym for "psychological processes." In the second edition he added, "To this, however, it should be added, lest the range of the principle be misunderstood, that the canon by no means excludes the interpretation of a particular activity in terms of the higher processes, if we already have independent

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evidence of the occurrence of these higher processes in the animal under observation." (1903, p. 59). Morgan does say that his method is the "least anthropomorphic" of the alternatives available to him. However it is abundantly clear (in statements such as, "we are forced, as men, to gauge the psychical level of the animal in terms of the only mind of which we have first-hand knowledge, namely the human mind." p. 55) that Morgan was not attempting to free comparative psychology from its mentalistic origins. George Miller (1962) summed up Morgan's position accurately when he wrote that, "all that Morgan hoped for were a few reasonable rules for playing the anthropomorphic game." The parsimony Morgan sought was a parsimony within mentalism, not one that that eschewed mentalism.

That step – the departure from mentalism in animal psychology – was taken by Edward Thorndike. In his "Animal Intelligence" (1911) Thorndike raged against the wild over-interpretations of animal behavior that had characterized the field of comparative psychology up to that time. He complained that prior books "do not give us a psychology, but rather a *eulogy* of animals. They have all been about animal *intelligence*, never about animal *stupidity*…. The history of books on animals' minds a furnishes an illustration of the well-nigh universal tendencies in human nature to find the marvelous wherever it can." (p. 22). Even Thorndike's anti-mentalism should not be exaggerated however. In a less-frequently cited passage in the same book, when discussing problem-solving in capuchin monkeys, Thorndike wrote: "Monkeys seem to enjoy strange places; they revel, if I may be permitted an anthropomorphism, in novel objects. They like to have feelings as they do to make movements. The fact of mental life is to them its own reward." (p. 238).

The final nails were driven home into the coffin of mentalistic anthropomorphism by John B. Watson. The reasoning by analogy from human introspected mental life to animal mental life that seemed so reasonable to Romanes and Lloyd Morgan (and permissible under limited circumstances to Thorndike), struck Watson (1913) as positively "absurd:"

Any other hypothesis than that which admits the independent value of behavior material, regardless of any bearing such material may have upon consciousness, will inevitably force us to the absurd position of attempting to construct *the conscious content of the animal whose behavior we have been studying… Surely this doctrine which calls for an analogical interpretation of all behavior data may be shown to be false: the position that the standing of an observation upon behavior is determined by its fruitfulness in yielding results which are interpretable only in the narrow realm of (really human) consciousness. (1913, p. 159)*

Watson's proscription of anthropomorphism was picked up by Skinner and became mainstream in animal psychology. Even the rise of ethology in Europe did not seriously challenge the anti-mentalistic tone that Watson had set. The classical ethologists (e.g. Tinbergen, 1951) differed from animal psychologists is emphasizing the study of instinctive behavior over learned, and the study of animals in their natural habitats rather than laboratories. But on the question of mentalistic anthropomorphism the founders of ethology strayed little from the line that Watson had laid down.

THE QUESTION OF ANIMAL AWARENESS

All that changed in 1976 with the publication of Donald R. Griffin's "The Question of Animal Awareness." Griffin strove to decouple a mentalistic attitude to animals from the accusation of anthropomorphism:

Against the notion that animals have mental experiences, it is often objected that such thinking is anthropomorphic… But consider the alternative hypothesis – that mental experiences, like other attributes of animals and men, exhibit a continuity of variation and are not typologically discrete, all-or-nothing qualities totally restricted to a single species. There is no reason to believe that any mental experiences that animals may have must be identical to our own…
It is actually no more anthropomorphic, strictly speaking, to postulate mental experiences in another species than to compare its bony structure, nervous system, or antibodies with our own… The prevailing view implies that only our species can have any sort of conscious awareness or that, should animals have mental experiences, they must be identical with ours, since there can be no other kind. It is this conceit which is truly anthropomorphic, because it assumes a species monopoly of an important quality." (p. 68-9).

Griffin, impressed by the discovery of previously unsuspected perceptual and cognitive skills in nonhumans, returned the argument about mentalism and anthropomorphism to its *status quo ante* of around a century earlier. Evolutionary continuity implies psychological continuity between humans and other species. Consequently if we accept mental terms in a science of human psychology then they must have some range of applicability to nonhumans also.

Griffin's rallying call for a return to mentalism clearly struck a chord with some ethologists, though the move in recent years has been towards a more constrained anthropomorphism that maintains the assumption of mental continuity between species while leaving space for parsimony.

Gordon Burghardt (1991) coined the term "critical anthropomorphism" to distinguish the inevitable ("naïve") anthropomorphic impulses that human beings uncritically bring to other species, from a sophisticated (critical) anthropomorphism that uses the assumption that animals have private experiences as an "heuristic method to formulate research agendas that result in publicly verifiable data that move our understanding of behavior forward." (Burghardt, 1991 p. 86).

Burghardt's distinction between critical and naïve anthropomorphism is similar to Frans de Waal's (1999) division of anthropomorphism into "animal-centered" and "anthropocentric" varieties. De Waal argued that it is as great an error to deny human-like mentation in cases where its assumption is justified as to apply mental concepts anthropomorphically where they are not warranted. Consequently de Waal coined the term "anthrodenial" to identify "… a blindness to the human-like characteristics of animals, or the animal-like characteristics of ourselves." (De Waal 1999. p. 258).

Burghardt and De Waal, like Griffin before them, point to examples of surprising complexity and human-like social behaviors, such as deception, as supporting the application of "critical" or "animal-centered" anthropomorphism. De Waal (1999) offers his own research on reconciliation in chimpanzees as an example of the utility of animal-centered anthropomorphism. Prior studies, not informed by anthropomorphism, had viewed the function of aggression within a group of monkeys as one of maintaining spacing. When individuals get too close they engage in agonist interactions the consequence of which is reduced contact between individuals. De Waal anthropomorphically predicted that a need for social cohesion would lead to reconciliation after conflicts: A prediction confirmed by an increased rate of affiliative contact between combatants after aggression.

Philosopher Daniel Dennett (1983) supported the position of Griffin, Burghardt and de Waal that appeals to mentalistic intentional states can be appropriate in a scientific animal psychology. He argued that anthropomorphic accounts can be more parsimonious than "an abstemiously behavioristic story of unimaginable complexity." (Dennett, 1983, p. 347).

TIME FOR A NEW ANTHROPOMORPHISM?

In addressing the current resurgence in anthropomorphism in animal behavior studies, at least three issues must be addressed. First is the question of parsimony. Given that parsimony is a basic tenant of scientific explanation, are explanations of behavior that eschew mentalistic anthropomorphism actually more parsimonious than those that don't? Second is the issue of mentalism. Anthropomorphism necessarily implies mentalism. Do the arguments of Watson (e.g., 1913) and Skinner (e.g., 1945, 1963) against mentalism still hold? Third is the question of evolutionary continuity. Does evolution demand that mentalistic explanations be entertained when attempting to account for animal behavior?

I believe the first two questions can be answered in the affirmative and consequently the third question is void. The fact of evolution does not demand that scientific animal behavior studies entertain mentalism because mentalism is not a scientific account even of human behavior.

Parsimony

Explanations of behavior that eschew anthropomorphism are indeed more parsimonious than those that don't – even if the explanation itself may be far longer and more elaborate in its more parsimonious form. The law of parsimony is not a principle of simplicity in the sense of brevity. Rather it states "that no more causes or forces should be assumed than are necessary to account for the facts." (Oxford English Dictionary, 1989). This principle, also known as Ocham's razor, is widely accepted and its appropriateness for scientific explanations need not be rehearsed here. Accounts of complex behavior in terms of underlying mechanisms that assume no more causes than are actually necessary can indeed become highly convoluted. But to attempt to argue that mentalistic accounts are more parsimonious is, as Mark Blumberg and Ed Wasserman (1995) point out, to commit the nominal fallacy – to believe that giving something a name is the same as explaining it.

Mentalism

Skinner presented a trenchant and effective critique of mentalism. He outlined three major reasons why mentalism should be rejected from the explanations of psychology.

First Skinner's argued that mental states are 'explanatory fictions' (Skinner, 1963). Suppose there are mental states and these mental states cause behavior then (given that psychology is a deterministic science) these states must be the products, ultimately, of external environmental stimulation. Thus, the environment produces mental states, and they in turn produces behavior. If we accept these two premises then the mental states are a superfluous middle link. Every action that is expressed as the outcome of a mental event could be recast as the outcome of a set of environmental events.

Second, Skinner (1963) argued that appeals to mental

states as a cause of behavior transfer causality to a hidden realm. In this realm, the mind is usually described as being motivated like a human being – in effect the mind is a homunculus. Consequently the use of the mind as an explanatory principle implies an infinite regress of homunculi within homunculi and can have no explanatory power.

Third, the knowledge we believe we have of our own minds is not reliable. The results of introspection are the product of social conditioning, and consequently particularly unreliable sources of information about the causation of our behavior (Skinner, 1945).

CONCLUSIONS

Anthropomorphism remains as inappropriate to a science of animal behavior today as it has ever been. The main problem with anthropomorphism is that it is based on mentalism. Mentalism is not a scientific theory of human psychology, rather it is informal folk psychology. Consequently it is no more use to a scientific observer of animal (or human) behavior than is folk physics to a scientific physicist.

Consider, for example, the dance language of honeybees. As is well known, foraging bees communicate the direction, distance and quality of a nectar source to their hive-mates (von Frisch, 1967). By analogy with the conscious awareness that humans experience when we use language, Griffin (2001) suggested that the dance communication system of bees be viewed as possible evidence of conscious awareness in bees. The 'language' of bees, however, is much more limited than human language. Honeybees communicate only three dimensions of experience and only about two things (nectar sources and potential hive sites). Human communication is in principle unlimited in the number of dimensions of experience it can convey. To point out that if people were to communicate about nectar sources we would do so consciously offers no help in understanding how bees communicate and their state of awareness while doing so. Analogies at least as useful in understanding honeybee communication can be found in the activity of networked computers (presumably unconsciously) establishing communication protocols.

As I have argued at greater length elsewhere (Wynne, 2004), the complexity of animal behavior naturally prompts the use of terms familiar from everyday descriptions of our own actions. Since creative science often progresses by taking well-developed ideas in one field and applying them in another, such borrowing isn't necessarily bad. The study of animal behavior cannot afford to reject analogies from any source. But progress will surely be most rapid when we adopt explanatory frameworks that are concrete and unambiguous: anthropomorphism, even-critical or animal-centered, cannot offer that constructive basis.

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TREATING CHALLENGING BEHAVIORS: THE IMPACT OF METHODOLOGICAL AND CONCEPTUAL ADVANCES IN APPLIED BEHAVIOR ANALYSIS

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The state-of-the-art treatment of challenging behaviors is discussed in terms of methodological and conceptual advances in applied behavior analysis. A protocol for addressing these behaviors is presented that includes a functional analysis, preference assessment, empirically validated treatment with assessments of both inter-observer agreement and procedural integrity, and assessment of outcome generality and maintenance.

Key words: Challenging behaviors, preference assessment, functional analysis, establishing operations, behavioral momentum

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Challenging behaviors are challenging because they are highly resistant to change. In addition, they are often harmful to the people who exhibit them or to others, a factor that substantially increases clinical concern. In the past decade, applied behavior analysts have become increasingly well-equipped to respond to challenging behaviors. Refined methodologies such as functional analyses and preferences assessments now help them to empirically determine variables maintaining the problem behaviors and to identify effective reinforcers for individuals who need treatment. With this information in hand, applied behavior analysts can develop treatment procedures that are more likely to be effective than they might be able to do otherwise. Additional refinements in principles including the differentiation between establishing operations and discriminative stimuli (Michael, 1982), and the exploration of applied use of concepts such as behavioral momentum (Nevin, 1996) have broadened the assessment and intervention procedures available to treat clinical problems.

From the applied behavioral research, a protocol emerges for addressing challenging behaviors that captures the new developments in the field. It includes, with some variation, (a) a functional analysis, (b) a preference assessment, (c) a treatment plan based on the functional analysis, (d) an empirically validated treatment implementation with assessments of both inter-observer agreement and procedural integrity, and (e) an assessment of outcome generality and maintenance.

FUNCTIONAL ANALYSIS

It is easy to assume that all behavioral interventions are based on an examination of the contingencies related to the behaviors of concern. This, however, is not always the case. Quite often applied behavior analysts simply control behaviors by employing powerful reinforcers or punishers that override the existing maintaining relationships. Such an approach can be problematic because it increases the likelihood that any behavior changes realized might not be sustained once the consequences are removed. The powerful contingency may only suppress, but not weaken, the maintaining relationships. As a result, once the potent reinforcer or punisher is no longer provided, the discriminative stimuli that previously occasioned the behavior may resume their function, which allows former consequences to re-establish control. If this occurs, it necessitates development of procedures to ensure maintenance of treatment gains, or indefinite implementation of treatment.

When a functional analysis is included in the standard treatment protocol for addressing challenging behaviors, it directs the applied behavior analyst's attention away from treatments involving powerful consequences to those that change how the challenging behavior functions for the individual who exhibits it. By observing and collecting data on the relationship between antecedent events, behaviors, and consequences, the applied behavior analysts learns how the environment is maintaining the behavior in question. Treatment, then, involves changing the relationship of those contingencies and making them no longer effective.

Iwata and colleagues advance functional analysis procedures that typically call for a multi-element analysis in which several contingencies are evaluated in succession. These contingencies usually represent negative, positive, and automatic reinforcement; however, establishing operations and other antecedent events may also be manipulated. Specific procedures used may include positive and

negative social attention, escape from demands, toy play, and access to tangible items. Particulars of the functional analysis methodology, its applications, and the experimental investigations that have been associated with it can be found in Hanley, Iwata, and McCord (2003). This review also responds to criticisms of the functional analysis and suggests areas for future research.

PREFERENCE ASSESSMENT

All deceleration procedures typically include a positive reinforcement component, usually differential reinforcement of either the absence of the challenging behavior or a behavior that is an alternative to or incompatible with the challenging behavior. Before more formal assessment methods were developed, applied behavior analysts determined individuals' preferences by interviews or questionnaires, or by informal observations. Stimuli such as food, activities, or attention that emerged as preferred were then assumed to be reinforcers and they were used as consequences for desired behaviors. Although easy to implement, research has shown that interviews, questionnaires, and informal observations do not accurately or reliably identify an individual's preferences (Green, Reid, Canipe & Gardner, 1991). More systematic assessments in which the individual to be treated is required to approach a stimulus (Pace, Ivancic, Edwards, Iwata & Page, 1985) or select among two (Fisher, Piazza, Hagopian, Owens & Slevin, 1992) or more stimuli (Windsor, Piche & Locke, 1994; DeLeon & Iwata, 1996) yield more useful results. Typically stimuli identified as preferred by these methods are later shown to function as reinforcers and are therefore effective elements of treatment. Critical, however, to appropriately using preference assessment data is the knowledge that preferences often change and as a result they must be reassessed periodically. Often this is done by conducting brief tests that determine that a stimulus is still preferred.

TREATMENT BASED ON THE FUNCTIONAL ANALYSIS

In designing an intervention based on functional analysis, the applied behavior analyst's task is to alter the existing contingencies so that the behavior no longer leads to the event that reinforced it, whether it is attention, escape from demands, self-stimulation or some other consequence. This approach to treatment development is in contrast to one based on consequence potency in which the applied behavior analyst's task is to identify a stimulus that the individual prefers (or wishes to avoid) so greatly that he or she will do virtually anything to gain (or avoid) it. If a multi-element design is used in the functional analysis, it allows simultaneous comparison of two or more potential treatment procedures, which is not only efficient but also experimentally sound. When the results are clearly differentiated between or among procedures, it is a relatively easy task to apply the most effective treatment to all circumstances. Undifferentiated results, while prolonging the assessment phase, are not without merit since they eliminate assumptions regarding the variables influencing the behavior and provide a baseline for exploring additional options. Among these options are the effects of establishing operations.

Establishing operations are those events or conditions that alter a reinforcer's effectiveness and momentarily change the frequency of the behaviors associated with that reinforcer (Michael, 1982). For example, if a child does not have access to a particular toy for several days, that child may spend much more time playing with it the next time it is available than he or she would have otherwise. It is also likely that the toy will function as a reinforcer for the child and that the child will complete nonpreferred tasks in order to access it. In this example, the state of deprivation from the toy (no access), increases the toy's reinforcing potency.

In his earlier papers, Michael (1993) distinguishes between two primary types of operations, establishing and abolishing. An establishing operation increases a reinforcer's effectiveness and the momentary frequency of behavior associated with it, such as in the example just provided. An abolishing operation, on the other hand, decreases a reinforcer's effectiveness and the momentary frequency of the behaviors associated with it. For example, a teenage girl enjoys her best friend's company and will complete her chores quickly in order to go out with the friend. However, immediately after attending camp with the friend, the teenager is less likely to speed through her chores in order to visit with that person. In essence, the teenager has satiated on the friend's company, at least temporarily. These concepts also apply to punishers as well as reinforcers and result in similar increases and decreases in potency and response rates. In this regard, it should be noted that the terminology associated with establishing operations is undergoing refinement and new language is being proposed (Laraway, Snycerski, Michael, & Poling, 2003). This new language not only clarifies existing concepts, but also reformulates them so that motivational variables may be considered in new ways.

Several authors present overviews of establishing operations in which they describe the various types and functions of establishing operations, present conceptual issues, and discuss the applications of establishing operations to clinical assessment and treatment (McGill, 1999; Iwata, Smith, & Michael, 2000; Michael, 2000;

Laraway et al., 2003). It is quite possible that the influence of establishing operations may account for some of the variability seen in the data pertaining to challenging behaviors. Additionally, manipulation establishing operations offer the applied behavior analyst another treatment option. It is important, however, to realize that the effect of an establishing operation is to temporarily alter the reinforcing (or aversive) properties of a stimulus. Therefore, changes in behavior that result from changes in the establishing operation can be expected to be transitory. For example, if a child is less aggressive following a nap, one can expect the child's aggression to return to previous levels when the child again becomes tired. Additionally, recent research suggests that manipulation of the establishing operation may also produce generalized effects. Horner, Day, and Day (1997) noted that manipulation of the establishing operation may simultaneously increase the value of the reinforcer for one behavior while decreasing the value of the reinforcer for the competing behavior. The authors encourage the routinely evaluating the role of establishing operations as part of the functional analysis.

EMPIRICAL VALIDATION

In applied behavior analysis, treatment effects are validated through an empirical demonstration of cause and effect. The behavior of interest is objectively defined, measured, and single subject experimental designs are used to assess the relationship of the independent to dependent variable. Because the measurements are generally collected by human observers, assessment of the reliability of those measurements is a critical aspect of any treatment or research protocol. Typically two observers simultaneously, but independently, record the data. Their records are then compared to see if they agree on the occurrence and non-occurrence of the behaviors of interest. This information allows the applied behavior analyst to determine whether the behaviors have been well defined and whether or not the observers have been adequately trained and are executing their jobs appropriately. In many treatment settings, procedures for assessing the reliability of measurements are a standard part of the clinical routine. Not so standard, however, are procedures for assessing the reliability of treatment delivery. This is unfortunate, since even the most carefully designed treatment plan can be implemented incorrectly. Incorrect implementation of the treatment is particularly likely if the behavior is not only challenging but also dangerous. Therapists may be trying to deliver treatment simultaneously with protecting themselves and others from harm. As a result the opportunity for error is great. Cooper, Heron, and Heward (1987) discuss the importance of assessing the occurrence and non-occurrence of the treatment. The authors suggest that applied behavior analysts follow the same procedures with regard to the independent variable that they do with the dependent variable. Therapists' behaviors should be quantified, measured, and compared to the treatment protocol. As with the problem behaviors, low reliability scores suggest problems with the description of treatment or with therapist training and recommend corrective steps.

GENERALITY ASSESSMENT

Generalization has two forms: response and stimulus. In response generalization, changes in a treated response are associated with changes in other untreated responses. Stimulus generalization, on the other hand, refers to the spread of reinforcement effects to stimuli not previously correlated with reinforcement (Lalli, Mace, Livezey, & Kates, 1998). For example, a young child who is reinforced for calling his or her bearded father "Daddy" may then call all other men with beards "Daddy." While response generalization is certainly welcomed, the applied behavior analyst is often most concerned with stimulus generalization. That is, the applied behavior analyst wants to know if the individual with the problem behavior will exhibit the effects of treatment in circumstances other than those present during treatment. To answer this question, treatment effects are typically assessed in environments and in the presence of people who are unrelated to treatment; however, responses in the presence of other stimuli such as different toys or work materials are equally part of generalization.

In some cases, applied behavior analysts simply treat the behavior and then hope for generalization. Tests under generalization conditions may be conducted, but no specific planning for generalization occurs. This approach leaves the outcome to chance and may not produce the best results. As an alternative, Stokes and Baer (1977) suggest procedures for facilitating generalization that include programming of common stimuli and training sufficient exemplars. In the example of the bearded father provided above, the common stimulus is most likely the father's beard. Although an unlikely goal, if such generalization were to be programmed, the child would be reinforced for calling several men with beards (exemplars) "Daddy" and then tested to see if he or she calls other men with beards who were not part of training "Daddy." If generalization does not occur, more exemplars could be included in training and the test with additional bearded men repeated. The Stokes and Baer generalization procedures have been used successfully to generalize a variety of behaviors including academic performances (Carr, 2003) and social skills (Ducharme &

Holborn, 1997). Control of the child's attention to the common element of the stimulus, however, may be a critical aspect of the procedures and important to their success. If such control appears to be lacking, it is possible to add an observing response to the training (Dube & McIlvane, 1999) to assure that the child has attended to the relevant aspect of the stimulus; in the present example, the child might be required to stroke the beard to demonstrate that it has been seen.

Factors that apply to the generalization of behavior also apply to its maintenance. When new behavior is occasioned by a variety of appropriate stimuli, it is more likely that the new behavior will be reinforced by naturally occurring events. Thus, programmed consequences; that is, artificial events planned by the applied behavior analyst, become unnecessary.

BORROWING FROM BASIC RESEARCH

Some innovative practices for addressing challenging behavior have been derived from basic research. For example, applied interventions have been based laboratory investigations of behavioral momentum. Nevin (1996) describes the metaphor of behavioral momentum as the mathematical product of rate of responding and the behavior's resistance to change when conditions change. A behavior that has high momentum is one that is likely to occur at a high rate, and is also likely to persist when conditions change, for example, when reinforcement is discontinued. One common application of this concept is increasing and maintaining compliance with demands (e.g., Mace et al. 1988; Mace & Belfiore, 1990). The typical application of behavioral momentum involves identifying (a) activities for which compliance is highly probable, referred to as high-p demands; and (b) activities for which compliance is improbable, referred to as low-p demands. Several high-p demands are given to establish momentum of the response class "compliance" and then a low-p demand is given. If adequate behavioral momentum is established with the high-p demands, then the response class of compliance will persist when the low-p demand is given, and overall levels of compliance will increase. Concurrently behavior that results in escape from demands, such as aggression or self-abuse, will decrease. Despite the imperfect match between laboratory procedures used to investigate behavioral momentum and the applied interventions derived from them (see Houlihan & Brandon, 1996), the metaphor of behavioral momentum has generated a substantial number of successful treatments.

DISCUSSION

Often in papers regarding the state-of-the-art treatments, one finds a catalogue of specific interventions organized by behaviors being treated, characteristics of the individuals exhibiting the behaviors, or settings in which the behaviors occur. In the present paper methodology has been discussed instead. This is because it is advances in behavioral methodology that have had a fundamental impact on the way clinicians address challenging behaviors. Preference assessments and functional analyses provide an empirical basis for clinical decisions that were previously based on assumptions about behavior. Similarly, use of the stimulus control technology has increased likelihood that behavior change is generalized and maintained, outcomes that historically have been left to chance. Concepts such as establishing operations and behavioral momentum have broadened our understanding of the mechanisms of behavior and have provided new treatment options. As a result, applied behavior analysts are able to understand and treat challenging behavior more effectively. Although knowledge of specific interventions that decelerate challenging behavior may be useful, that usefulness is determined by the correspondence between a particular intervention the prevailing contingencies of reinforcement.

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BRIEF REPORT: THE REINFORCING EFFECTS OF PATERNAL VERBAL STIMULATION AND GENTLE PUSHING ON KICKING BEHAVIOR IN A 35 WEEK OLD IN-UTERO FETUS

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Several studies have shown that new borne infants can respond to paternal verbalization and this stimulation can serve as a reinforcer to increase behavior. To date no studies exist demonstrating operant behavior prenatally. This study looks at the possible reinforcing effects of parental stimulation and gentle pushing on a 35 week old in-utero fetus. Using an ABAB reversal design, the experimenters observed the rate of kicking behavior over a four successive three minute periods. The results indicate that verbal statements combined with gentle touch can serve as a reinforcer for in utero fetus to kick.

Key words: Prenatal, operant conditioning, kicking response, continuous reinforcement

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While some studies exist of operant conditioning in neonates, no studies could be found of operant conditioning of prenatal fetuses. Neonate studies do imply a role for prenatal learning (Krueger, Holditch-Davis, Quint & DeCasper, 2004). Using the orienting response, DeCasper offers evidence neonates can differentiate their mother's voices from other female voices and that maternal voice is a more effective reinforcer when compared to other female voices (DeCasper & Fifer, 1980; DeCasper & Spence, 1986; Spence & DeCasper, 1987). Infant's discrimination between passages with content read by mother in uterus were analyzed post natal. In addition, neonates prefer the familiar passage over the novel passage. This occurs regardless of whether the passage is recited by the infant's mother or an unfamiliar woman (DeCasper & Spence, 1986). Finally, while father's voice has not been shown to function as a reinforcer, neonates can differentiate their father's voice from other male voices (DeCasper & Prescott, 1984). Each of the previous examples of preference could be achieved through simple prenatal respondent conditioning.

In new born infants extensive work has been conducted using operant conditioning procedures (Perez, & Gewirtz, 1999, May). One example, remembering in infants was studied using operant methods such as mobile conjugate reinforcement (Merriman, Rovee-Collier & Wilk, 1997). Another example and one that has some relevance to this study, the kicking behavior has shown to have operant characteristics (Galloway & Thelen, 2004). Researchers have developed improved methods of exploring the kicking response in neonates (Kraebel, Fable & Gerhardstein, 2004).

The current study came about after several sessions of playing by parents informally, using similar procedures to the procedure reported in the method section of this study. This study would add to the literature by extending the operant conditioning process to prenatal infants.

METHODS

Participants

Parents are Caucasian male and female both in late 30's. Both parents have advanced degrees in behavior analysis. The fetus is female and in her 35th week of development. The fetus is typically developing and at the time of the study was oriented into the upside down position for birthing. The infant has regular periods of activity in which it kicks/stretches.

Design

After several informal sessions of contingent touching of the fetus's foot and stating "baby, baby, boom-boom" parents decided to formally try to explore the relationship between contingent touch, plus vocal sound, and kicking behavior. Mother sat in a reclining position. Father placed his hand lightly above the skin to be able to feel the kicking. Previous sessions had shown that touching more then lightly prevented mother from being able to identify infant kicking. Father's mouth was one inch from skin in the proximate position where the head would be. The sessions were continuous. Each session lasted for three minutes. In phase one, the fetus's kicking was observed and counted. Only kicks that stretched the skin and could be seen and felt by parents were counted. In phase two, fetus was on a continuous reinforcement

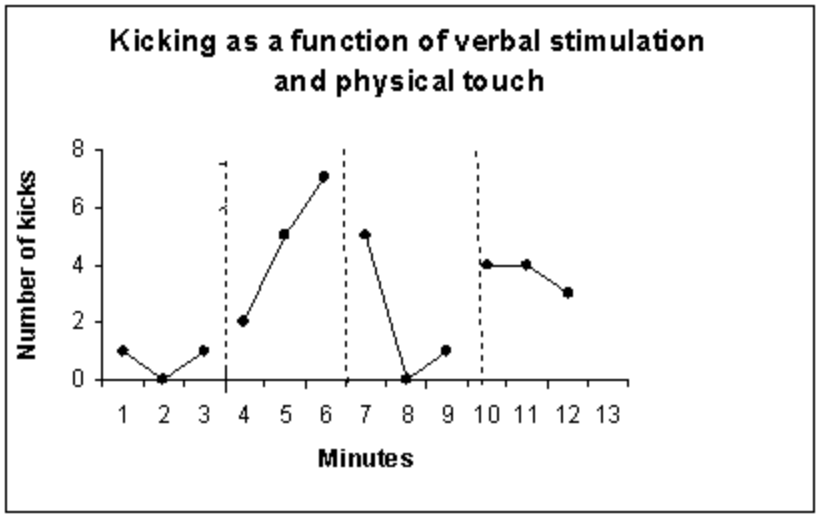

Figure 1- Depicts kicking behavior as a function of paternal vocal stimulation and gentle touch.

schedule. After each kick, the area of kick was gently touched, so that indirect contact was made with the foot (through the skin) and the father stated "baby, baby boom-boom." After three minutes, phase three began. In phase three, a return to baseline occurred in which the response was placed on extinction. After three minutes, phase four began. In this phase, the fetus was once again placed on a continuous reinforcement for kicking behavior. This creates an ABAB reversal design.

Interobserver agreement

Interobserver agreement can be calculated as the number of agreements divided by the number of agreements plus disagreements. Parents were in agreement on 30 of 34 kicking responses. This gives an adequate 88% interobserver agreement.

RESULTS/ DISCUSSION

In phase one, the mean response rate was .67 kicks/ minute. In phase two, the mean response rate was 4.66 kicks/ minute. In phase three, the mean response rate was 2 kicks /minute. In phase 4, it was 3.67 kicks/minutes. This demonstrates a clear functional relationship between the package of combined parent statement and touch and fetus kicking responses. No evidence of an extinction burst was found. As to the practice both parent reported it as "fun"; however, it should be noted that the mother reported the procedure as "somewhat annoying." Later that evening mother reported increased activity of the fetus.

The discovery of functional relationships is critical for both developmental and behavioral accounts (Rovee-Collier, 1996; Novak & Pelez, 2005). The discovery of functional relationships is more important then just cataloging which behaviors occur when (Rovee-Collier, 1996). Future research should be conducted to replicate this study and also answer the question of why operant behavior should emerge in the prenatal. It would seem more beneficial for operant behavior to only emerge after birth. One reason might be that kicking prior to birth would be unencumbered by weight, where as kicking after birth takes more muscle strength.

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BRIEF REPORT: THE REINFORCING EFFECTS OF PATERNAL VERBAL STIMULATION AND GENTLE PUSHING ON KICKING BEHAVIOR IN A 36 WEEK OLD IN-UTERO FETUS: A PARTIAL REPLICATION AND A CAUTIONARY NOTE

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Cautill & Dzeiwolska (in press) used an ABAB reversal design; the experimenters observed the rate of kicking behavior over a four successive three minute periods. The results indicate that verbal statements combined with gentle touch can serve as a reinforcer for in utero fetus to kick. This study looked at the same prenatal fetus and attempted to replicate the previous findings. In this study, we evidenced a clear extinction burst. Implications of the finding are discussed. The second B phase was not initiated and a cautionary note is added because mother became nauseous during the session.

Key words: Prenatal operant conditioning, replication, extinction and kicking response

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Serial replication is the core of behavior analytic work (Fixen, Blasé, Timbers, & Wolf, 2001; Wolf, Kirigin, Fixsen, Blasé, & Brukmann, 1995; Baer, Wolf, & Risely, 1968). It is through serial replication that external validity of findings is produced (Novak & Pelaez, 2004; Baer, Wolf, and Risely, 1968). In a previous study, Cautilli and Dziewolska (in press) showed that prenatal infant kicking response can function as operant behavior. In their study, kicking responses clearly increased in relation to touch through the skin of the kick and fathers voice. The determination of a functional relationship between kicking and paternal voice is the youngest finding of human operant behavior to date.

The current replication came about in response to several questions raised in the original study. In particular, we wished to determine whether or not the effect of prenatal infant kicking could be replicated. This study would add to the literature by extending the operant conditioning process to prenatal infants.

METHODS

Participants

Parents are Caucasian male and female both in late 30's. Both parents have advanced degrees in behavior analysis. The fetus is healthy, typically developing female and in her 36th week of development. At the time of the study, the fetus was oriented into the upside down position for birthing. The infant has regular periods of activity in which it kicks/stretches. As with the original study, this study was conducted in a period normally of low activity.

Design

This design is a replication of the one used by Cautilli & Dziewolska (in press). The procedure entails contingent touching of the fetus's foot through the skin and stating "baby, baby, boom- boom" based on the kicking behavior reflex. Mother sat in a reclining position. Father placed his hand lightly above the skin to be able to feel the kicking. Previous sessions had shown that touching more then lightly prevented mother from being able to identify infant kicking. Father's mouth was one inch from skin in the proximate position where the head would be. The sessions were continuous. Each of the first two session lasted for three minutes. In phase one, the fetus's kicking was observed and counted. Only kicks that stretched the skin and could be seen and felt by parents were counted. In phase two, fetus was on a continuous reinforcement schedule. After each kick, the area of kick was gently touched, so that indirect contact was made with the foot (through the skin) and the father stated "baby, baby boom-boom." After three minutes, phase three began. In phase three, a return to baseline occurred in which the response was placed on extinction. It was originally planned that after three minutes, phase four would begin; however, due to maternal nausea, the phase was discontinued. The actual length of the phase was seven minutes to ensure that the prenatal infant returned to baseline rates of the kicking. Thus the study has a clear ABA design.

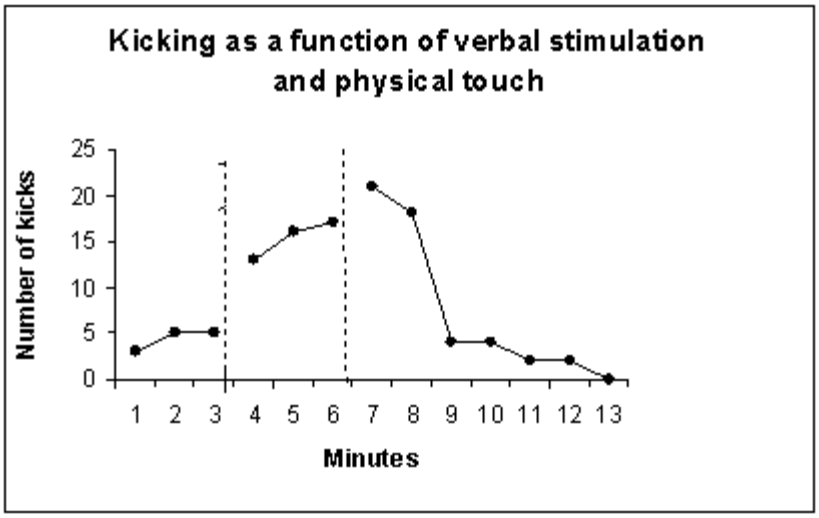

Figure 1- Depicts kicking behavior as a function of paternal vocal stimulation and gentle touch.

Interobserver agreement

Interobserver agreement can be calculated as the number of agreements divided by the number of agreements plus disagreements. Parents were in agreement on 96 of 110 kicking responses. This gives an adequate 87% interobserver agreement.

RESULTS AND DISCUSSION

In phase one, the mean response rate was 4.3 kicks/ minute. In phase two, the mean response rate was 15.3 kicks/ minute. In phase three, the mean response rate was 7.3 kicks /minute. A clear pattern of extinction was evident. The fetus kicked repeatedly in the first two minutes of the extinction phase. The kicks were sustained longer and more pronounced. Due to maternal nausea it was decided to discontinue the procedure and not to run a second intervention phase.

The replication of the acquisition phase with this infant shows that operant conditioning parentally is a sound phenomena. However, the authors must add a cautionary note about the procedure. The extinction burst of the child was very strong, enough to concern the parents that the fetus might hurt itself or injure the mother. In addition, it seems that the kicking behavior was strong enough to upset the stomach of the mother.

Several questions arise from this replication. The infants kicking rate was much higher than previous session from the first touch. This might be explainable by previous history and contemporaneous factors acting together (Gewirtz, 1972; Morris, 1992). A second question might be raised as to why no extinction burst in the first study, then in this second study, one week later a very pronounced and strong extinction burst. One reason might be that the fetus fatigued quicker in the early study. Other variables might also account for this factor, such as alternative sources of reinforcement and level of deprivation. It is unclear as to factors that make extinction burst more or less likely in general. Greater study of basic process of extinction would be helpful here.

The determination of functional relationships is critical to developmental sciences (Rovee-Collier, 1996). This replication shows that kicking behavior in prenatal infants can develop an operant component. Replication of these findings with other infants would be helpful to determine the generality of the results.

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FUNCTIONAL BEHAVIOR ANALYSIS OF ANOREXIA NERVOSA: APPLICATIONS TO CLINICAL PRACTICE

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Anorexia nervosa is a difficult and often life-threatening eating disorder with a prevalence of about one per cent of young women. Our intention in this article is to present facts, possibilities, and hypotheses for clinical applications of functional behavioral analysis in anorexic clients. Many clinical applications based on behavioral principles and processes for a functional analysis of "anorectic behavior" are presented. These principles include respondent, operant, and rule-governed behavior as well as Relational Frame Theory. Also, behavioral processes categorized through aversion learning, and complex schedules of reinforcement could be applied during the analysis. Further, the behavior analytic view helps us to understand problems with actual eating behavior and problems with the initiation of eating, as well as how physiological states of the body may be included in the behavioral analysis. In addition, contingencies of survival may have produced genetic tendencies for some behaviors to emerge more easily than others. Understanding the functions of "anorectic behavior" is a challenge, because it is a result of a multi-faceted interaction between genetically influenced and learned behaviors affected by a cultural context.

Key words: anorexia nervosa, functional analysis, behavior analysis, eating behavior, clinical applications

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Anorexia nervosa is a severe and often life-threatening eating disorder that is difficult to treat. The clinical features of anorexia presented in DSM-IV (American Psychiatric Association, 1994) include refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss leading to maintenance of body weight less than 85 % of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85 % of that expected). Further, anorexia is associated with intense fear of gaining weight or becoming fat, even though underweight is part of the problem; disturbance in the way, in which body weight or shape is experienced; undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight. In females, the absences of at least three consecutive menstrual cycles are included in the criteria of anorexia. An anorexic client can also engage in binge-eating or purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas).

The prevalence of anorexia nervosa is 0.5 – 1.0 % among young women (Crisp, Palmer, & Kalucy, 1976; Pope, Hudson, & Yurgelun-Todd, 1984; Roth & Fonagy, 2005), but other, less severe, eating disordered, behaviors are much more common (Drewnowski, Hopkins, & Kessler, 1988; Mintz & Betz, 1988). Approximately 1000 adults, from 15 European Union (EU) member states were selected to complete an interview-assisted face-to-face questionnaire. Overall the results suggested that only half of the European population is within the normal weight range. The number of respondents who were at least slightly underweight (defined as Body Mass Index less than 20) was approximately 10 % (A Pan-EU survey on consumer attitudes to physical activity, body-weight, and health, 1998). This figure is an estimate since the measurements were self-reported. However, the study points to a fairly alarming tendency that almost a fifth of underweight people are in the process of losing more weight (Lappalainen, Tuomisto, Giachetti, Dámicis, & Paquet, 1999). Thus, several million people in Europe have anorectic behavioral tendencies. Because the number of people having anorectic responses is large, and the number of people seeking treatment for these problems is also large, it is important to understand the phenomenon of anorexia.

From the functional or behavioral point of view there are several problems with using diagnoses in clinical practice. Although a diagnosis is often needed when transferring information between professionals within the health care system or for the clients to be able to receive reimbursement from health care authorities, it does not give enough information for understanding and treating the disorder effectively. Furthermore, a diagnosis includes too abstract and too general descriptions of eating, and gives little information on what behaviors are actually performed and how they vary between situations or how different contexts influence them. Also, explanations associated with diagnosis in clinical practice are often based

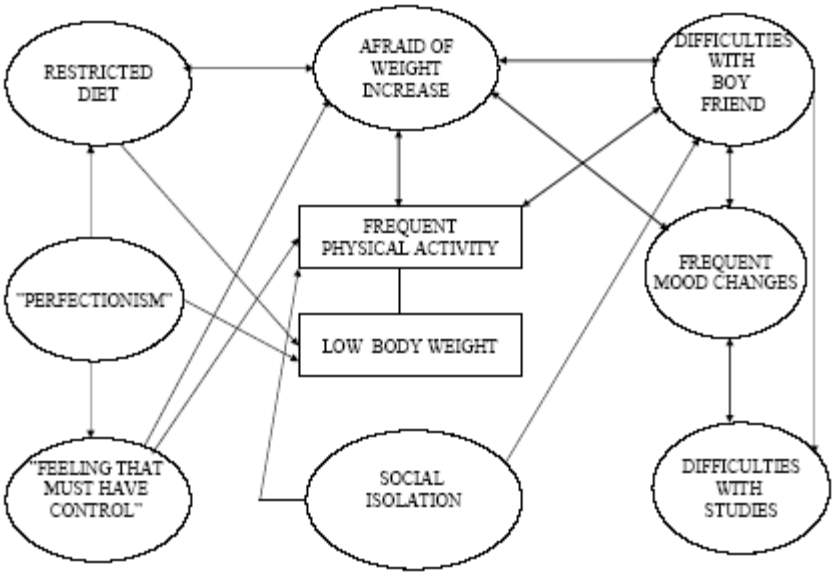

Figure 1. Example of global or general functional behavior analysis of anorexia nervosa

on circular reasoning. For example, an observation is made that an anorexic client eats very small amounts of food. This observation is denoted: "She is anorexic". The term anorexic is then used to explain the observation "she refuses the food and eats very little". This kind of reasoning may give clinicians a false feeling of understanding. One of the purposes of this article is to give "tools" to understand anorexia nervosa and other eating disorders more individually in order to tail treatment more closely to each client.

Interestingly, it could be argued that the current view of anorexia nervosa is becoming a more functional or behavior analytic view. Fairburn, Cooper, and Shafran (2003) have proposed a transdiagnostic theory and treatment of eating disorders. They show support for that anorexia nervosa, bulimia nervosa, and atypical eating disorder share the same distinctive and characteristic clinical features, and clients move between these diagnostic states over time. They claim that the major difference between the disorders lies in the relative balance of the under-eating and over-eating behavior, and its effect on body weight. Thus, in clinical practice individual behavioral analysis is needed.

Many articles deal with anorexia nervosa on a macro level of analysis, but few include hypotheses about behavior (e.g., Shoemaker, 1997). Thus, the aim of this paper is to clarify anorexia nervosa from the behavior analytic point of view. We believe that application of a functional approach and application of the results from basic studies of eating may facilitate the treatment of anorexia. We want to present some possible applications of general functional analyses that might be helpful for those dealing with this difficult eating disorder and that might precede specific applied behavior analyses using single-case designs. Another purpose of this article is to stimulate behavioral research on anorexia nervosa.

FUNCTIONAL ANALYTIC CLINICAL CASE MODEL

Functional analytic clinical case model (FACCM) proposed by Stephen N. Haynes and co-workers (e.g., Haynes & O'Brien, 2000) could be used as a first step in a clinical functional analysis. FACCM is a vector-graphic diagram of a functional analysis. The analysis includes problem behaviors (often complaints of the client), the importance of and relations among behavior problems, the strength and direction of causal functional relations, and the modifiability of causal variables. FACCM organizes general information of a client's problem behaviors and their hypothesized or observed causes as well as other variables associated with the problem behaviors

(Figure 1). FACCM guides decisions about which variables should be analyzed more closely and which variables should be selected as treatment targets for an individual client. Because an anorexic client does not have one single problem, but instead a large constellation of

problems, it is very useful both for the therapist and for the client to organize all the collected information in a systematic way. FACCM serves also as a motivational tool by connecting the anorexic client to the treatment process from the beginning of the treatment. Furthermore, the model also shows both to the therapist and to the client that there are several paths that could be followed in the treatment. During the treatment, the analysis based on a vector-graphic diagram could be repeated (for example, after 6-8 sessions). Because functional analysis is a cumulative process running simultaneously with the treatment, new information may change the analysis or verify the hypothesis made at the beginning of the treatment.

In addition to global or general analysis, more specific analysis on chains of respondent behaviors (e.g., emotional responses to food), operant behaviors (e.g., actual eating behaviors), and derived relational behavior or responding (e.g., verbal behavior associated with food, eating, and body image) need to be done. The "chain analysis" points out important antecedent and reinforcing stimuli for critical behaviors. An example of chain analysis is presented below:

1. Food at the table, unpleasant thoughts associated with weight increase
2. Anxiety and unpleasant thoughts associated with weight increase
3. Eating of a small portion; anxiety and fear during eating
4. Unpleasant feelings and thoughts decrease after eating
5. Feelings of disappointment

It is usually very useful to do both the general analysis and the chain analysis in close co-operation with the anorexic client. It is a big advantage if the client understands that the point is to come up with several hypotheses of causal relations, and then test them in practice. At this phase, specific applied behavior analyses with single-case designs are possible to do. The scientist-practitioner model involves both the therapists and the client. In order to describe the analysis, and plan the treatment, a lot of information of the anorectic eating behavior is needed. Below we describe possible variables that could be observed during the data collection.

Hunger and craving

A general principle in the functional analysis of anorexia nervosa as in the analysis of any behavioral problem is to describe interactions between the individual and her environment. One possible interaction can be described in terms of respondent behavior. That is, some responses related to eating behavior of an anorectic client are elicited by conditioned stimuli. These responses often include emotional and physiological reactions prior and during eating. Feelings of hunger, craving, fear, and anxiety are examples of these often verbally reported reactions.

Hunger and craving are usually associated with initiation of eating (Tuomisto, Tuomisto, Hetherington, & Lappalainen, 1998). Reactivity to food-related cues has been repeatedly observed in humans (Rodin, 1985; Wardle, 1990). Thus, a cue that has been repeatedly paired with eating can elicit salivation or insulin release even before the actual eating behavior is taking place. These responses—sometimes called cephalic phase responses—may play an important role by preparing the individual for food ingestion (Powley & Berthoud, 1985). Accordingly, it could be hypothesized that many physiological responses such as insulin, glucose, and free fatty acid levels prior eating could be altered during the development of anorexia nervosa. Because the anorectic client is eating a very limited number of foods and has often decreased the number of eating occasions, an extinction process of conditioned anticipatory responses associated with food intake may have occurred. As a result, an extinction of the process preparing the anorectic client for food ingestion may influence meal initiation. In line with this, it has been shown that long exposure to food cues while not tasting the exposed food at all resulted in a decreased salivation response to these cues (Lappalainen, Sjödén, Karhunen, Gladh, & Lesinska, 1994). Thus, physiological and sensory responses (e.g., salivation and hunger) elicited by food cues can be controlled by a technique consisting of total prevention of tasting the food during cue exposure, that is response prevention (Lappalainen et al., 1994). The anorectic client may "successfully" use this procedure for a large number of food items. It has also been observed that anorexia patients with a highly restrained eating style salivated less to food than unrestrained controls (LeGoff, Leichner, & Spigelman, 1988). However, it should be noted that "cue-reactivity" is a complicated phenomenon affected, for example, by restricted or binge-eating in a certain situation or context: The anorectic client may restrict her eating while eating with her parents, but binge-eat when depressed and being alone. Self-observation of hunger and craving may give information on how the client is reacting to food cues or to a specific context. The therapist could also show pictures of foods or meals to the client and discuss emotional responses the client experiences. In addition, her avoidance behavior could be decreased by doing this.

If an anorexia client is not eating in regular hours or is eating relatively seldom, and consuming a very limited number of food items, an approach based on respondent analysis could be applied. One simple application is regular eating times using the same room (context) every time (see Table 1). Within few days (conditioned) cues in that environment could elicit hunger and salivation responses, and make it easier for the client to initiate eating.

Starting eating may also be affected by other conditioned responses taking place some time prior to eating. For example, a few minutes before the mealtime a verbal cue (e.g., "The dinner will be ready within 5 minutes") or a sound of a bell at a hospital unit could be presented regularly in order to elicit 'cephalic phase responses' (e.g., salivation and insulin release). After presenting the verbal cue several times prior to eating, the cue may acquire an ability to elicit hunger feelings through associations with food related cues via Pavlovian processes, and eating may be more easily initiated. That is, the treatment plan should include planning of large number of conditioned stimuli associated with eating.

The purpose of regular eating times is to increase the possibility that the anorectic client actually starts eating, and maintains this habit after the treatment. It must be remembered that this procedure is based on the finding that the conditioned associations are formed not just between the primary events presented, but with the whole context in which they are presented (Rescorla, 1988). In other words, associations with a whole context may be needed in order to maintain the changes in the treatment. This must be taken into account in treatment planning. For example, at a clinic the client could first eat together with her own therapist, but later other therapists could be involved in treatment. It should also be remembered that the context could be verbal behavior and covert. Thus, thoughts and feelings associated with meal initiation may serve as discriminative stimuli either increasing or decreasing the possibility for meal initiation. For example, negative thoughts (such as "They try to get me to eat more and I am becoming fat") in the context of eating with her family may be important to be analyzed and modified during the treatment. Possibly, photos or videotapes from family members and from places where she has been eating could be used to facilitate discussion of these topics. Simultaneously, aversive responses to family members that originate from their trials of getting the client to eat, might be reduced.

Food aversions and disliking

Food aversions refer to a dislike or avoidance of foods. Foods are rejected or accepted because of their sensory effects, anticipated consequences, and knowledge of what they are or where they come from (Rozin, 1984). Humans easily associate upper gastrointestinal discomfort (nausea) with food items that have been consumed some time before the aversive responses (e.g., Fredrikson et al., 1993; Garb & Stunkard, 1974). It is not necessary that these responses have been caused by the food items in order for a food aversion to develop and to be persistent. In anorectic clients the aversive gastrointestinal responses may have originated from the state of energy depletion or poor health status of the body. The appearance of aversive gastrointestinal responses could shift the hedonic value of the food to a negative direction. Thus, the anorectic client may be feeling ill as a direct result of energy restriction or she may feel discomfort after eating. The gastrointestinal discomfort (i.e., the aversive responses) could be associated with the food eaten, as well as with verbal descriptions of food. It should be remembered that the association could happen even when there is a several hours' delay between the eating occasion and the responses. The individual can start avoiding the food anticipating distaste or nausea. The result could be a very limited number of food items in the menu. Learned food aversions are difficult to extinguish. Thus, it could be hypothesized that anorexia could be associated with a large number of food aversions or aversive reactions towards many food items. It is also possible that the responses are not caused directly by the consumption of food, but instead result from the low body weight. However, also in this case there is a possibility for aversion learning.

Lappalainen and Sjödén (1992) have pointed out that food aversion learning is not only dependent on associations between unconditioned and conditioned stimuli, but the context in which the acquisition or extinction takes place also enters into the associative relationships. Background or contextual stimuli may exert a major control over food aversion learning (Archer, Sjödén, & Nilsson, 1985). Today Relational Frame Theory or derived relational behavior may partly explain these phenomena in humans (Hayes, Barnes-Holmes, & Roche, 2001). There is evidence in animals that if the background context present during a phase of food aversion extinction differs from those of the acquisition context, the extinction process will be accomplished in one trial (Archer, Sjödén, Nilsson, & Carter, 1979). This one-trial extinction is independent of the number of acquisition trials (Sjödén & Archer, 1989). This raises an interesting possibility that

the negative emotional responses that the anorectic client experiences could be more changed by changing the context, in which the client is consuming the food. For example, under a certain time period eating could take place in another setting (e.g., at a hospital setting, in another place at home or eating with other people than usually), and some changes could be made in the kitchen to facilitate the food aversion extinction process. Furthermore, derived relational behavior associated with food aversions (e.g., evaluative verbal behavior associated with food) may be altered by altering the context in which it appears.

Food preferences and liking

One possible reason why an anorexic client prefers some foods over others is that non-preferred food has previously been consumed only rarely. This phenomenon is called food neo-phobia (Logue, 2004). Thus, the anorexic client may hesitate to consume new, rarely used food items. It has been proposed that exposure to a food item can result in increased preference for that item. In addition genetic taste preferences may influence the development of food preferences. However, little is known about the effects of these genetic preferences. Birch and Marlin (1982) showed a direct relationship between how many times children had eaten a certain food item and their preference, choice, and consumption of that item. Thus, it is possible that frequent eating of a food is related to frequent positive postingestive experiences of that food.

Respondent conditioning may play a role in the development of liking. Pairing a relatively neutral flavor with a positive flavor (sugar) can increase the liking for the less liked flavor (Zellner et al., 1983). Highly preferred food items (possibly including some food items high in sugar such as chocolate, for which many individuals have a preference) could be used in order to facilitate the process. Thus, an otherwise “addictive” or highly preferred food (e.g., Tuomisto et al., 1999) may be useful for increasing appetite in this difficult eating problem. In practice, the therapist could test whether giving an opportunity to choose among a variety of foods including preferred and not preferred foods could facilitate eating.

There is evidence that positive attention or verbal comments from other people while an individual is eating will increase her preferences for the foods eaten (Birch, Zimmerman, & Hind, 1980). Thus, liking may be affected by positive attention. Unfortunately, the anorectic client and her eating habits may initiate an aversive interaction process while eating. This may not facilitate changes in preferences. For example, studies on children suggest that ”instrumental consumption of foods” (”Eat the food and you are allowed to watch TV”) may lead to a decrease in preference for the food eaten (Birch, Birch, Marlin, & Kramer, 1982). In the future, Relational Frame Theory might explain many of these kinds of phenomena (Hayes, Barnes-Holmes, & Roche, 2001). Contingencies of this kind should be observed during the treatment, and specific attention should be devoted to create a positive context while eating, because the acceptability of any food is determined in part by context (Rozin & Tuorila, 1993). Overall, it could be a good practice for a therapist to eat together with the client to understand more about what is happening when the anorexic client is eating.

Further, it has been shown that mere exposure to a food item (eating a very small amount of food) can result in increased preference for that item. The strength of the actual liking for a food may be a function of the degree of exposure (Birch & Marlin, 1982; Crandall, 1984). Thus, based on these findings in normal subjects it could be hypothesized that liking also among anorectic clients may be affected by repeatedly eating the same item (Table 1). From the functional point of view it could be suggested that in order to increase preference for certain food items they should be eaten repeatedly in small amounts during the treatment. Changes in preferences should not be expected after eating the food only a few times, because the change in preference is a result of “repeatedly getting new experiences of food.” The process could be initiated by just tasting the food, and a small amount of food could be eaten later. The client could also be allowed to choose one food to which she could test this procedure.

Satiety and cessation of eating

There is evidence that humans do not have the ability to experience the calorie contents of food during a meal (Bellisle, 1979; Booth, 1985). However, most people have the ability to keep a relatively constant body weight. The mechanism that is probably responsible for most of this might be called anticipatory satiety responses. Learned satiety has been described in terms of respondent conditioning of aversion responses that result in a decrease of appetite for a specific food during the later part of a meal (Booth, 1985; see also Lappalainen & Sjödén, 1992). It could be said that humans learn to anticipate the effects of different foods. Delayed satiety appears 35-40 minutes after eating a meal, and affects eating when that food is eaten the next time. Delayed satiety responses are associated with the sight, smell, and taste of food (Birch & Deysher, 1985). Thus, the anorexic client has probably

altered her anticipatory satiety responses.

The anorexic client is probably altering food intake by limiting the variety of food items. Thus, a large variation of food items could be presented during the meal instead of a very limited number that the anorectic client usually uses. This suggestion is based on the observation that the variety of foods during a meal may affect how much people eat. It has been shown that sensory-specific satiety–this is the mechanism explaining variety–is an important determinant of human food intake, and variety is an important factor in determining the amount of food eaten (e.g., Rolls, 1994). Hence, increased number of food items may lead to increased intake of energy (Rolls, 1985).

Some anorectic clients may drink large amounts of liquids either between meals, at the beginning of a meal, or during the meal. This behavior must be taken into account during the analysis and treatment. It has been shown that drinking water affects self-reported feelings of hunger and satiety during a meal (Lappalainen, Mennen, van Weert, & Mykkänen, 1993). Thus, this suggests that feelings of hunger and satiety can be altered during a meal by using liquids. Further, it may be that feelings of hunger and satiety are affected independently of the energy content of the drink or food consumed. Consequently, we suggest that self-observation of hunger, satiety, and other feelings may be a useful part of the treatment. For example, Tuomisto et al. (1998) observed that tension was reduced by eating, and suggested that changes in affects during eating may be important discriminative stimuli to consider in programs for eating disorders.

Rule-governed behavior

Eating behavior can also be affected by the expressed experience of others, that is, by rules (Hayes, 1989). Accordingly, anorexia nervosa has often been called self-starvation. The anorectic individual may "promise herself" to eat as little as possible. Also, the mass media and friends may give instructions about how much or what to eat. The anorectic individual may later use these rules (instructions or promises). The treatment should include the analysis of thoughts and verbal descriptions of foods, eating, and the anorectic client's own verbal descriptions of the contingencies of her behavior (i.e., her reasons for her anorectic behavior). These behaviors are important, because they are often a part of a behavior chain leading to food intake or avoidance of intake. Use of diaries and talking aloud during an eating occasion or discussion while looking at pictures of underweight, normal, and overweight clients could be clinical applications of rule-governed behavior (Table 1). Barnes-Holmes, Hayes, and Dymond (2001) provide a Relational Frame Theory analysis of self-directed rules.

There are many other applications for change in rule-governed behavior. For example, many rules given in a therapeutic relationship do not have an effect on the client's behavior, because the effects they describe are in conflict with the individual's own experience (contingencies of reinforcement). For example, the therapist may inform the anorectic client that she will be feeling better if she increases food intake. The actual experience of the anorectic client may be the opposite. In some cases it might be wise to inform the client of the actual consequences of eating or to employ self-observation to observe actual consequences of eating. Eating might cause pain or other aversive consequences for some clients (e.g., some clients may freeze after a meal). The therapist and the client may possibly find some ways of decreasing this aversive state or alternatively, they may find another way to deal with or to tolerate them. For example, Acceptance and Commitment Therapy (based on Relational Frame Theory) presents alternatives about how to train the client in advance to tolerate aversive private states (e.g., the observer exercise; see Hayes & Strosahl, 2004).

Also, the rules described during the session, that is, the instructions given, may not be effective, because they are too far removed from the actual eating behavior and eating situation. These problems should be taken into account and discussed during the treatment.

Private states of the body or motivating operations

Physiological states and changes in those states or motivating operations can influence eating as well as affective responses (e.g., liking) to food do. A change of a specific state may function as a reinforcer (reinforcing stimulus) for the consumption or non-consumption of certain foods (Lappalainen & Sjödén, 1992). Thus, when the anorectic client is using a very limited number of food items and is consuming little energy, powerful effects will follow consumption of any food in that state. Eating in a state of energy depletion, for example, dried fish or using any other strange diet will be followed by a rapid increase of the blood sugar level. This rapid positive change in the physiological state can establish the sight, smell, or thought of these foods as cues for the subsequent use of them. These cues may also elicit positive affective responses (discriminative stimuli) increasing the likelihood for meal initiation. This process could explain why some anorectic clients use strange diets (e.g., frozen fruits or dried fish). Foods that are followed by a rapid increase of blood sugar level (foods high in sugar, e.g., chocolate or some fruits) may be items that are highly preferred by anorectic clients. The client may need help

in regulating eating of these foods. Possibly, a problem solving approach could be applied, in which the client and the therapist together produce alternatives to increasing self-management. Such alternatives could include acceptance of the inability of self-management, slowing down of eating, or talking aloud instruction of self-management.

Aversive respondent behavior such as feelings of anxiety or thoughts about overweight could function as discriminative stimuli and increase avoidance of high-fat foods. If anxiety or aversive thoughts about weight gain are associated with foods high in fat (e.g., in food stores, restaurants, and kitchens), they can later function as negative reinforcers for behavior such as "choosing a food high in fat" or "eating more" or for the verbal behavior "No, thank you, I prefer foods low in fat". Thus, an anorectic client may say "No, thank you, I prefer foods low in fat," because the effect of this verbal behavior is a decrease in an aversive emotional state. According to this analysis, an exposure and response prevention procedure could be applied. The exposure could include visits to food stores and restaurants while the client is withholding her normal responses of avoidance. This procedure must be preceded by a careful analysis of the actual behaviors, stimuli preceding negative emotions, and an analysis of avoidance behaviors. For example, the client and the therapist could visit a food store, record the level of anxiety (or other relevant emotional responses) before going in to the store, while going around in the store, and while looking at different food items. During the visit, the therapist should observe any responses of avoidance, such as avoidance of looking at some food items or verbal behavior such as "I hate that" or "I do not want to eat that…". The client could be asked to explain more about her experiences and thoughts, and possibly to do something that she normally has not been doing (for example, saying something else instead of "I hate that"). Possibly an acceptance procedure could be applied, in which the client is asked to accept the fact that she actually hates the food. The same procedure could be applied to a restaurant. It is important throughout the exposure procedure that it is done in good co-operation with the client, and that the client is aware of the rationale of the procedure. This example shows clearly that many of the behavioral methods applied to the treatment of anxiety disorders could also be applied to the treatment of anorexia nervosa.

Early experiences of the anorectic client define which private stimuli enter into a functional relationship with eating. Certain private events (such as negative emotions) can function as antecedents (or discriminative stimuli) for not-eating for some persons, while the same privatestates are antecedents for eating for others. Thus, private states such as hunger may be experienced and reported verbally very differently by different individuals. This is particularly true for the anorexic client. In clinical practice this means that information of private events is often needed for functional analysis, and possibly specific training may also be needed for reporting different private events.

The anorectic client may have difficulties in defining and describing private states such as hunger, satiety, anxiety, and fear. The functional analysis of verbal behavior suggests that the concept and term tact, and procedures associated with it could be used in training. The problem of this kind of training is stated clearly by Catania (1992): "Such tacts depend on the verbal community for their establishment and maintenance, but the problem for a behavior analysis is how the verbal community can establish and maintain these responses when it does not have access to the stimuli". For example, therapist could "tact" private states to the client (e.g., "I understand that you feel anxious about …"). Kohlenberg and Tsai (1991) have done a behavioral analysis of the self, and suggested how the principle of tact could be used in therapy. They describe stages of verbal behavior development that result in "I". They suggest, for example, how statements such as "I am", "I feel", "I want", and "I see" develop from smaller functional units. This procedure could possibly be the same with behaviors among anorectic clients. For example, the anorectic client could be asked to describe (e.g., during the session or after using self-observation methods) what she is doing and what she is eating ("I am…"), what she is feeling during the discussion or when she is watching TV or when she is eating ("I feel…"), and what she wants to do or wants to eat ("I want…"). This kind of "verbal procedure" could be employed in training of the body image of the client, for example, when the client is looking herself in a mirror ("I see…").

On a line with this view, a mindfulness and acceptance training approach dealing with private events is described by Wilson (2004). The client stands in front of a mirror and describes her body. She is instructed to observe her body (the whole body), to describe it, to be nonjudgmental, and to stay in the present. For example, the client may have a tendency to selectively look at certain parts of the body and describe herself in negative terms. Information on private events may also be obtained through mindfulness exercises. Heffner and Eifert (2004) have given examples how an anorexic client can be taught to be an observer of private events.

Tacting or describing private states or events is important because it gives useful information for the functional analysis, and for the treatment. However, as pointed out, for example, by Hayes, Strosahl, and Wilson (1999) from a functional contextualistic perspective, only events external to behavior can "cause" behavior. If we say that the feeling ("the client feels anxious") causes an action (eating small amounts of food), we are saying that a dependent variable causes a dependent variable (Hayes, Strosahl, & Wilson, 1999). Private events, such as feelings or thoughts, can participate in causal relationships even if they may not be regarded as causes of behavior (Hayes, 1995). But additional variables need to be looked for, for example, when trying to change private events.

The act of eating may serve as conditioned stimuli for anxiety and fear of gaining weight. Thus, thoughts of eating and putting food into the mouth could be associated with strong negative feelings. These negative feelings could be decreased by gradually increasing the amount of food eaten, and by creating eating situations that are non-aversive.

Complex schedules of reinforcement

An analysis of complex schedules of reinforcement could also be applied to the treatment. Concurrent schedules of reinforcement have been used to analyze the process of choice among reinforcing events (Buskist & Miller, 1981; Catania, 1998). The principle of concurrent schedules can be applied, because the anorectic client is having choices between eating different foods, eating or doing something else, or perhaps vomiting, and other activities during the treatment. Understanding these choices might require understanding complex schedules of reinforcement.

Activity anorexia. Studies of concurrent schedules in humans show that the response rates and allocation of time are sensitive to different response-reinforcer contingency relationships. The response rate of a given response alternative varies reciprocally with the reinforcement rate obtained for responding to a second alternative (e.g., Lappalainen & Sjödén, 1992). It has been observed in normal weight participants that when the requirements (e.g., work) for the food were increased under deprivation conditions, participants decreased their responding with food as the reinforcer and increased responding to an alternative reinforcer (Lappalainen & Epstein, 1990). In other words, alternative reinforcers can compete with the reinforcing value of food even in deprivation. Thus, for the anorectic clients, alternative reinforcers (such as physical activity) may be competing with the reinforcing value of food, and when more effort is required for eating ("eating is more difficult," because of the aversive consequences of eating), the anorectic client may decrease eating and allocate more time for physical or other activities. This may lead to "activity anorexia", in which activity is a central feature of the disorder and interferes with eating and not a secondary correlate or "symptom". Epling and Pierce (1992) suggested: "Food deprivation increases the reinforcement effectiveness of physical activity. Spontaneous or forced activity decreases the reinforcement effectiveness of food. These two relationships explain the occurrence of activity anorexia." In our view, also escape- or avoidance-based rules (e.g., "If I will exercise more I will be less fat") could be added to these relationships.

A constructional treatment strategy for anorexia. The point is that changing alternative reinforcers might change the reinforcing value of food. That is, the target for treatment might not be the "anorectic eating behavior" itself, but also behaviors that are functionally related to eating (via the complex schedules). This may be accomplished through a constructional treatment strategy (Goldiamond, 1974). For example, it is often seen in clinical practice that for some clients, food is too "reinforcing". The client can be occupied with eating and food even when she is consuming little energy. Increasing the value of alternative reinforcers might change the situation. Limiting physical activity or increasing alternative activities, increasing alternative verbal behaviors and thoughts, and dealing little with eating might be the solution. The anorectic client may have limited her activities, resulting in a value increase of food and eating. For example, planning pleasant activities using weekly plans, participating in social activities, doing studies, going to movies, or seeing sports could decrease the value of food and eating. Thus, an increase in concurrent activities may automatically affect eating. The principal focus of the treatment should be on the issue of self-management (Fairburn, Shafran, & Cooper, 1999). To facilitate self-management, the analysis of complex schedules of reinforcement in anorexia may be central. It could be hypothesized that self-control may be increased, not by concentrating on food and eating, but by concentrating on alternative activities, over which the anorectic client has control. The analysis of complex schedules of reinforcement provides interesting possibilities for further applications.

CONCLUSIONS

The behavior analytic view of anorexia nervosa is complex, because eating behavior is defined by a large number of variables. This view leads to many clinical applications presented in Table 1. The described applications

Table 1. Summary of some clinical applications of the functional behavioral analysis of anorexia nervosa.

Behavioral principle or process	Examples of related clinical applications
Hunger and craving	Plan and use regular eating times. Use same context while eating. Use clear cues predicting the start of the meal. Use self-observation of feelings of hunger and craving during a meal. Bring food cues into the session (e.g., pictures of food) and discuss them. Expose the client to food cues in natural environment (e.g., visit food store).
Food aversions and disliking	Inform the client of the possibility that some negative responses might be a result of energy restriction. Inform the client of the possibility that she/he avoids some foods anticipating distaste or nausea. Analyze consumption of avoided foods, make a hierarchy of difficulty. Plan and practice repeated consumption of avoided, aversive foods (use small amounts). Give an opportunity to taste different foods. Give an opportunity to choose (and taste) among a variety of foods including preferred and non-preferred foods. Increase gradually the amount of food eaten in order to avoid aversive consequences. Change context of eating at the beginning of the treatment.
Food preferences and liking	Arrange situations, in which the client repeatedly eats food items that she has been avoiding earlier. Use very small amounts of food each time. Pair preferred food items with less preferred items. When eating together with the client, give positive attention during eating. When eating together with the client, avoid negative comments and negative discussion topics during eating. Inform family members eating together with the client about this issue.
Satiety and cessation of eating	Increase the variety of foods during the meal. Observe and limit the excessive use of liquids. Use self-observation of feelings of satiety during a meal.
Rule-governed behavior	Describe and analyze the rules (thoughts and verbal description) used by the client of the food and eating. Describe and analyze the rules used by the client of the physical activity. Use contracts. When using them, give possibility to choose among some alternatives. Inform about the aversive consequences of eating too much. Inform about the importance of gradually increasing the amount of food eaten. Describe and analyze methods used by the client to make changes in the past.
Private states of the body or motivating operations	Use self-observation of feelings of anxiety and fear during a meal. Ask questions of private states during a treatment session.

should not be seen as established procedures, but instead as possible hypothesis to be tested in each individual anorectic client even if many of them have at least some empirical support. The importance of an individual analysis should not be underestimated. Because anorexic eating behavior is highly context dependent, it might be important to analyze eating disordered behavior in two different contexts: when the food is not present (during "normal" treatment session), and when the food is present (while eating). Thus, behavior analysis during eating might be critical in order to understand the function of anorexic eating behavior. As we have seen, understanding the functions of "anorectic eating behavior" is complicated, because it is a result of contingencies of survival and contingencies of reinforcement, and an interaction of these two.

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Continuing Education Questions for BCBAs and BCABAs:
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1. From the functional or behavior point of view, the author finds several problems with using diagnoses in clinical practice. List two of these specific problems.

2. The authors name four objectives they wish to achieve with the paper. Name two of them.

3. The authors suggest functional analytic clinical case model (FACCM) as a first step in a clinical functional analysis. Name three of the four elements included in this model according to the author.

4. The authors indicate that learned satiety has been described in terms of respondent conditioning of aversion responses that result in a decrease of appetite for a specific food during the later part of a meal (Booth, 1985). They report that delayed satiety appears __-__ minutes after eating a meal.

5. The authors note that specific analysis is needed, beyond general evaluation. List three specific types of behavior she proposes to analyze.

6. The authors propose that _____ associated with food aversions (e.g., evaluative verbal behavior associated with food) may be altered by altering the context in which it appears.

7. According to the author, a cephalic phase response
   a. prepares the individual for food ingestion
   b. is elicited by a specific cue that has been repeatedly paired with the eating of food
   c. can be salivation
   d. can be the release of insulin
   e. all of the above
   f. none of the above

8. Based on the understanding of the cephalic phase response, what physiological responses (prior to eating) does the author hypothesize could be altered

during the development of anorexia nervosa? Name at least two.

9. Name two of the possible stimuli the author suggests that may affect the initiation of eating for the anorexic client (positively or negatively).

10. Based on the authors' proposal that antecedent verbal cues such as announcing when dinner is being served, such stimuli may come to function as a _____ stimulus, that may acquire an ability to elicit hunger feelings through associations with food related cues… and eating may be more easily initiated.

11. There is evidence in animals that if the _____ present during a phase of food aversion extinction differs from that of the acquisition, the extinction process will be accomplished in one trial.

12. A treatment approach for anorexia that may possibly find some ways of decreasing the aversive state or alternatively, they finding another way to deal with or to tolerate aversive private states, is known as _____Therapy (based on Relational Frame Theory).

13. Indicate two possible reasons for the occurrence of food aversions in anorexics according to the authors.

14. Briefly explain how the authors use research on choice (i.e. matching law) to account for "activity anorexia."

15. Identify three (3) treatment approaches for treating anorexia proposed by the authors.

STORY ANALYSIS AND THE LITERARY METHOD

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Behavioral perspectives on stories are described and the use of stories as a method of inquiry is proposed. Two analyses of stories are discussed, Todorov's altered equilibrium approach to the description of the minimal plot and Grant's functional analysis. Todorov's altered equilibrium model brings out important correspondences between stories and behavioral steady-state approaches to research. Grant's functional analysis uses behavioral concepts, including motivating operations, escape contingencies and response-dependent outcomes to account for the appeal of stories. The altered equilibrium model permits an understanding of the story as a conflict between forces for behavioral change and resistance to change. The functional analysis approach permits an understanding of the contingency structures responsible for the audience appeal of stories. One potential consequence of an improved understanding of the nature and contingency structure of stories is the use of stories as a method of inquiry, and this methodological use of stories is advocated as a complement to standard experimental analysis.

Key words: fiction, literature, stories, steady states, equilibrium states, establishing operation, motivating operation, escape conditioning

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Traditionally defined, a story is a sequence of events in which characters encounter a problem, goal-directed efforts are made to solve the problem, and eventually the problem is resolved in some way (Winner, 1982). Stories are the basis of various forms of popular entertainment as well as serious literature, in which universal human problems are exemplified. Nonfiction stories are also the means by which historians and biographers transform raw historical and personal records into a form that can be more readily understood and comprehended (Danto, 1985; Klein, 1997). Because stories are important as forms of entertainment, as a means of describing and exploring human nature, and as a mechanism for the transmission of historical data, the behavioral processes that underlie stories merit the same kind of conceptual and experimental analyses applied to other important forms of behavior. Although behavior analysts have examined various aspects of verbal behavior in imaginative literature (e.g. Skinner, 1939, 1941, 1957), the focus on literature has been either on using literary sources of examples of functional units of behavior or analyzing the operation of specific literary devices such as alliteration and metaphor.

The purpose of the present paper is to describe two approaches to the analysis of the story, Todorov's (1977) altered equilibrium model of the minimal plot and Grant's (in press) functional story analysis. Both approaches demystify and dementalize the story, and bring the fields of behavior analysis and imaginative literature into closer kinship with one another. A potential consequence of this kinship is the recognition of stories as a method of inquiry and the implications and advantages of this are described.

THE ALTERED EQUILIBRIUM MODEL

An improvement on the traditional definition of a story defined above that meshes well with certain features of behavior analysis is Todorov's (1977) description of a story plot in terms of states of equilibrium and transition/disequilibrium:

> *The minimal complete plot consists in the passage from one equilibrium to another. An "ideal" narrative begins with a stable situation which is disturbed by some power or force. There results a state of disequilibrium; by the action of a force directed in the opposite direction, the equilibrium is re-established; the second equilibrium is similar to the first, but the two are never identical. (p. 111)*

For purposes of consistency, I will refer to Todorov's definition of a minimal plot as the *altered equilibrium model*, to the initial state of equilibrium as *baseline equilibrium*, to the event that disturbs "by some power or force" as a disrupter event and the second altered state of equilibrium as *final equilibrium*. A story, according to this model, consists of the chronological sequence baseline equilibrium —> disrupter event —> transition state —> final equilibrium, in which the disrupter event causes or functions to induce the transition state as well as the eventual final equilibrium. The altered equilibrium model applies to the plot of the story, not to the order of events in which the story is told. A story can begin to be told at any point, before or after the occurrence of the disrupter event, so the chronological sequence of the plot does not always mirror the sequence in which the story is narrated.

The altered equilibrium model can be illustrated using the story of Persephone (Bullfinch, 2004), a well-known Greek myth that was used in ancient times to explain the change in the seasons. Persephone was the daughter of Demeter who lived with her mother and companions in a world in which there was a perpetual spring with the earth always covered in thriving plant life. While gathering flowers one day, Persephone is abducted into the underworld by Hades, god of the underworld. This upsets Demeter so much that she ceases making the earth fertile, creating famine. She seeks the help of Zeus, the king of the gods, who insists that Hades return Persephone. In the meantime though, Persephone has accepted food, a pomegranate, from Hades, an act that ties her to the underworld. From that time on, Persephone reigns as queen of the underworld for one third of the year, the winter, and during this time Demeter refuses to let anything grow until she returns to her in the spring. As an explanation for the change in seasons, the story of Persephone has been replaced by the discovery that the earth is tilted on its axis as it orbits the sun, which in Greece's location in the northern hemisphere, provides more sunlight during the spring and summer and less in the fall and winter, which in turn produces the seasonal cycles of plant life.

During baseline equilibrium, Persephone lives in a stable situation with her mother, Demeter, the goddess of the harvest. Although Todorov does not define equilibrium explicitly, we can do so using a behavioral measure like time allocation to different activities. During baseline equilibrium, the characters in the story can be presumed to allocate their time in consistent patterns. Persephone allocates her time to collecting flowers, talking to her mother, preparing meals of ambrosia and nectar, etc. Likewise, Demeter, Zeus and the mortals engage in similarly stable patterns of behavioral time allocation, with Demeter making the earth fertile and talking to Persephone; with Zeus presiding over meetings with the other gods; and with the mortals tending their crops. This baseline equilibrium is altered when Hades abducts Persephone.

Persephone's abduction acts as the disrupter event that initiates a state of disequilibrium/transition in which the characters' time allocation is immediately altered. In the underworld, Persephone cannot collect flowers or talk to her mother and friends. Demeter spends her time seeking Persephone, and, when she learns of her whereabouts, protests the abduction to Zeus, and ceases making the earth fertile. The mortals cannot grow crops and eat according to their normal patterns. Zeus now has to allocate his time to considering what to do to restore order. He insists that Hades return Persephone but Persephone's acceptance of the pomegranate has tied her to the underworld.

At this point in the story the transition state ceases and the final equilibrium occurs in which behavioral time allocation resumes a new stable, though altered pattern: Persephone reigns as queen of the underworld for one third of the year, the winter, during which time Demeter refuses to let anything grow until Persephone returns from the underworld in the spring As Todorov maintains, this final equilibrium is a stable state like the initial baseline equilibrium, but is not identical. For example, in baseline equilibrium there is eternal spring, but in final equilibrium there is cyclic seasonal change.

The altered equilibrium model facilitates the application of several behavior-analysis research concepts to story description and analysis. Just as steady-state baselines in behavioral research serve to make the effects of the introduction of the independent variable sharply apparent (Johnston & Pennypacker, 1993; Sidman, 1960), the stable baseline equilibrium in a story serves to make the impact of the disrupter event more dramatic for the characters, as well as for the audience. Just as the examination of moment-to-moment changes in a transition state allows the researcher to more fully understand the effects of the independent variable, the description of the transition state in a story gives the audience a detailed account of how the disrupter event impacts the behavior of the characters. Just as the attainment of a new steady state in research allows the researcher to determine the final state of behavior after the introduction of an independent variable, the final equilibrium in a story allows the audience to see how the disrupter event's influence reaches completeness and becomes incorporated into the contingencies that have an enduring influence on the behavior of the characters. In addition, the final equilibrium, both in research and in stories, provides a contrast to the disequilibrium of the transition state. In research this contrast retrospectively defines and highlights the transitional effect of the independent variable, whereas in a story it retrospectively heightens the dramatic effect of the disrupter event relative to the stable conditions of final equilibrium. As illustrated by these similarities, behavior analysts and storytellers share an interest in describing and understanding the functional impact of events, although the methodologies differ. Behavioral research uses quantitative description of actual events, story description uses verbal description of hypothetical events. Behavioral research often makes effective use of reductionistic methods in which clearly defined elemental behaviors are examined in simplified environments, whereas stories are

descriptions of constructed contingencies in relatively complex environments.

The altered equilibrium model also predicts that following the occurrence of the disrupter event, there will be a counterforce, or antidisrupter, to restore the baseline equilibrium. In the Persephone story, the actions of Demeter represent this counterforce. She attempts to find Persephone, return her to her, and restore the contingencies that prevailed prior to her abduction. The counterforce is a kind of resistance to the change against the disrupter event. In behavior analysis the concept of resistance to change has been described in terms of behavioral momentum (Nevin, 1992). *Resistance to change*, as used here, does not meet the formal criteria for behavioral momentum (Nevin, 1996). Although the metaphor of behavioral momentum has some intuitive appeal to describe Todorov's counterforce, behavioral momentum is defined in terms of the relative invariance of the *same* response in a multiple schedule, when challenged by a disrupter event. In the resistance to change that Demeter exemplifies, she engages in *different* responses (i.e., different than those of baseline equilibrium), such as enlisting the help of Zeus, in an attempt to reinstate the conditions prevailing during baseline equilibrium, when she and Persephone lived together happily. Demeter's behavior is presumable due to the high reinforcement density associated with a mother-child relationship, and this density is the variable responsible for both the degree of behavioral momentum (Nevin, 1996) and the intensity of Demeter's efforts to restore the conditions of baseline equilibrium, so there is this common feature of behavioral momentum and Todorov's counterforce. It may be useful, especially in literary contexts in which metaphors are at home, to identify actions like those of Demeter as exemplifying a type of behavioral momentum, in an expanded sense that includes generalization of strong baseline equilibrium responding to topographically dissimilar responses that have the same functional effects as Todorov's counterforce, the reinstatement of baseline contingencies/equilibrium. In stories, the counterforce, the antidisrupter, usually involves novel or creative attempts to change the environment so as to restore the contingencies of baseline equilibrium rather than the simple persistence of baseline equilibrium responses following occurrence of the disrupter event.

Other simple stories represent this conflict between a force for change due to the disrupter event and a force for resistance to change. In Cinderella, Sleeping Beauty, Rapunzel, for example, the young female protagonists all begin in a baseline equilibrium consisting of a happy family life that is displaced due to a disrupter event, the intercession of a witch-type character. Ultimately, the protagonists all resist the disrupter event more-or-less successfully, and reach a final equilibrium in which they join with a prince, restoring a happy family life. Here too the final equilibrium is similar to but not identical to baseline equilibrium because in baseline equilibrium the protagonists are daughters in a happy family whereas in final equilibrium they are wives.

Todorov proposed the altered equilibrium approach as a means of describing the minimal plots of a story. More complex stories add subplots and subthemes that add interest to stories. Todorov's approach is useful in defining the components of more complex stories as well as those with minimal plots. In Romeo and Juliet, for example there is a stable baseline state of interfamily dispute that is disrupted by the love of two young people for each another, an event that initiates the transition state. During the transition state, the force of continued violence competes with love, a force for cessation of conflict. Final equilibrium consists of tragic death, though coupled with resolution of the conflict. In Hamlet, the baseline equilibrium of a happy and stable kingdom is disrupted by Claudius' murder of the King, Hamlet's father, and a transition state ensues in which Hamlet is torn by a responsibility to avenge his father, restoring the prevailing justice of baseline equilibrium, or to do nothing, accepting the disrupter event. Final equilibrium consists of the slaying of several characters, and a new equilibrium in which the disrupter event has been removed and a new stable ruling order prevails.

The altered equilibrium model of minimal plots is an improvement on the traditional definition of a story in part because it applies the concept of states: Plots begin and end with stable steady states, between which is an unstable state or state of disequilibrium In addition, the altered equilibrium model invokes the notion of forces and counterforces that conflict, causing the state of disequilibrium/transition. The notion of the story as goal-directed problem-solving, in contrast, does not recognize the progression of states of equilibrium and disequilibrium in stories and does not capture the conflict between the disrupter event as a force for change and the stability (and reinforcement density) of the baseline equilibrium as a force for resistance to change.

The traditional definition of a story designates that a conscious goal-directed problem-solving process occurs in stories. In the problem-solving definition of a story, which has been emphasized in cognitive psychology, protagonists are like eager junior executives in a corporate brainstorming workshop in which problems are recognized and alternative solutions are generated. Generation

of verbal behavior consisting of proposed solutions to problems often occurs in stories, but frequently the story protagonists do not consciously identify the disrupter events and do not set goals to overcome the disrupters. A common theme in literature is that illusions are responsible for people's behavior, and that as a result of these illusions people often *fail* to recognize and solve their problems. For example, in Luis Bunuel's film, *The Exterminating Angel*, the guests at a dinner party find they cannot leave the room they are in, yet do not know why they cannot leave. The guests' own inability to leave the room is the problem, the disrupter event of the story, but the guests do not recognize this. This lack of identification of the problem supports the theme of the story, that society imposes artificial and irrational restrictions on behavior that ultimately lead to a kind of self-imprisonment. Similarly, in Carson McCullers' *The Heart is a Lonely Hunter*, several protagonists are thwarted in communicating with others and are drawn to a deaf-mute man who unwittingly gives them the notion that he understands them. This apparent understanding is an illusion, fostered by the kindly and sympathetic demeanor of the man. The problem of the story is that the protagonists are isolated and cannot successfully communicate with others, but they only partially recognize this and instead of consciously formulating goals and engaging in activities that would solve this problem, they rely on the deaf-mute man as a communication link to the external world even though his apparent understanding is an illusion. There are many other stories of this type, in which the theme itself is that the protagonists do not identify or only partially identify their life problems and cannot or do not attempt to solve them. The altered equilibrium approach surmounts these difficulties of the traditional problem-solving definition of a story. The altered equilibrium model maintains only that there is a disrupter event that initiates a general disequilibrium/transition state and does not invoke a necessary conscious goal-directed problem-solving process as an essential feature of a story. In this way the altered equilibrium approach is a more encompassing improvement on the traditional definition.

THE FUNCTIONAL ANALYSIS OF THE BEHAVIOR OF THE AUDIENCE

The altered equilibrium approach is a helpful means of describing the internal structure of the events in a story. The approach deals with behavioral processes by portraying the story as metaconflict between forces for behavior change and resistance to change, but it does not address the participation of the reader or listener to explain why stories appeal to the audience. Grant (in press) proposed a functional analysis of stories with respect to the behavior of the audience. In this functional analysis, the conflict between the disrupter event and the antidisrupter (i.e., the problem or conflict of the story in the traditional definition) functions as a conditioned motivating operation (Laraway, Syncerski, Michael, & Poling, 2003; Michael, 1993; Michael, 2004) that both introduces a state of aversive stimulation for the reader and sets up reinforcement, to be provided at or near the end of the story, in the form of removal of the aversive stimulation. As such, stories work on the basis of escape contingencies in which the reader's discovery of the outcome of the story removes the aversive stimulation. The central source of aversive stimulation in a story is best described as *tension*, a form of aversive stimulation that is a source of interest to the reader and is milder than typical aversive stimuli used in traditional behavior analysis research and application (e.g., reprimands, time-out, shock, etc). The motivating operation in a story can be termed a *literary motivating operation or story motivating operation to* (a) differentiate it from motivating operations that are not a part of stories; (b) distinguish the special property of the aversive stimulus as being a source of interest to the reader; and (c) specify that the aversive stimulus is temporary and will be removed or resolved by the outcome of the story. Typically, the tension in a story is maintained during the course of the story as the protagonist responds to the conflict in the story. Authors often augment the tension in a story and at higher intensities we refer to the tension as *suspense*.

In stories in which the protagonist is sympathetic to the reader, reading can be reinforced by a happy ending in which the protagonist successfully overcomes a challenge and removes the source of aversive stimulation. In such stories the protagonist can either represent a force for resistance to change, in which the challenge posed by the disrupter event is overcome, or represent a force for change, in which the protagonist sets off the disrupter event and an aversive state of baseline equilibrium is overcome. Creating protagonists that are sympathetic, that the reader cares about, is a key ingredient to much successful fiction because it makes the conflicts the protagonist encounters more aversive, in turn making the literary motivating operation more effective. In stories in which the protagonist is not sympathetic, as with many anti-heroes, the tension in the story consists of the uncertainty of the protagonist's situation, and this tension can be removed by discovering what happens to the protagonist at the end of the story. (In ordinary language, people say that the story outcome satisfies the reader's curiosity, but this usage places the functions of the story moti-

vating operation and the story outcome/reinforcer inside the reader.) Similarly, in tragic stories with unhappy endings that occur to a sympathetic protagonist, the ending of the story provides some reinforcement merely in the form of removal of the tension associated with the uncertainty of what happens to the protagonist, but reinforcement in such stories is normally also provided by the theme of the story. In tragedies, reinforcement by means of the happy ending is unavailable, subordinated to reinforcement in the form of the wisdom of the theme. An important challenge of literary education is to establish the themes of stories as reinforcers so that the maintenance of reading will not be exclusively reliant on happy endings.

The story of Persephone can be used to illustrate the functional aspects of a story with respect to the reader. The *conflict* between the force for change, represented by Hades, and the force for resistance to change, represented by the stable contingencies of baseline equilibrium, is the story motivating operation for the reader, and this conflict is dramatically represented in the abduction. The abduction produces tension, a relatively mild source of aversive stimulation on the part of the typical reader. This tension is further augmented when Demeter refuses to make the earth's soil fertile. The tension in the story induces the reader to continue reading to remove the tension. The tension is terminated at the end when Zeus' order, combined with Persephone's consumption of the pomegranate, leaves us with a compromise outcome in which Persephone is bound to the underworld during the winter and may leave in the spring. Demeter, Hades, Persephone, and Zeus receive at least some of what they desire. The ancient reader received reinforcement in the form of the removal of the tension as well as an ostensible explanation for the change in seasons. The story remains pleasing to modern readers as a story-based metaphor for seasonal transitions.

Grant cited the story of Scheherazade as a kind of reinforcement-contingency template for understanding the effect of stories on the reader. In the story of Scheherazade, a sultan marries a young girl every day, but executes her the next day as a means of enforcing her fidelity. Scheherazde marries the sultan and tells him interesting stories every night, interrupting the unfinished stories at dawn. The interruptions prevent the sultan from learning the outcome of the story, causing him to postpone Scheherazade's execution one additional day so that she could continue the story. Scheherazade essentially used story motivating operations to establish the effectiveness of the outcome of the stories as reinforcers, and then made the outcomes of the stories, finding out what happens to the protagonists, dependent on the daily postponements of her execution, and in this way she reinforced both the sultan's postponements of her execution and his continued attention to the story line. Grant maintained that all authors of imaginative literature who use the story form make use of reinforcement contingencies in much the same way that Scheherazade did. At the outset of stories, authors create effective literary motivating operations that establish the effectiveness of a reinforcer, then make that reinforcer dependent on the reader's completion the story.

An ostensible paradox of Grant's approach is that reading stories is analyzed in terms of the operation of aversive contingencies, whereas reading fictional stories, as well as many nonfiction stories, is normally considered a source of pleasure (Dorris & Buchwald, 1997; Fraser, 1992). Part of the resolution of this apparent paradox is simply that it is incorrect to equate aversive contingencies with the occurrence of subjective displeasure. Even though many behavior analysis textbooks are careful to define aversive contingencies functionally, the consistent use of unambiguously unpleasant aversive stimuli in behavior analysis research and practice has effectively imbued terms like "aversive" and "escape conditioning" with the connotation of subjective displeasure, and this in turn causes difficulties in understanding that mild aversive contingencies of the type used in stories can contribute to subjective feelings of pleasure, or at least be compatible with them. A second part of the resolution of the paradox is that there are many reinforcers for reading, such as the pleasing sound patterns of words, the use of literary devices such as irony, poignant descriptions of scenes, being able to learn about interesting characters, comprehending the theme of the story, etc., and these reinforcers contribute to the subjective pleasure readers obtain from stories. A third part of the resolution is that the encapsulated story format guarantees that the aversive stimulation associated with the story motivating operation is temporary and will be removed by the end of the story. Audiences, even young children, easily discriminate the story pattern and the associated transitory nature of the aversive stimulation.

THE LITERARY METHOD IN BEHAVIOR ANALYSIS

The altered equilibrium approach to defining the plot of a story and the functional analysis of the behavior of the reader/audience are each helpful in bringing behavior analysis closer to an understanding of imaginative literature. The altered equilibrium model does this by highlighting the nature of the stable and unstable states of a

story and the correspondences between behavioral research and the plots of fiction. The functional analysis of the behavior of the audience suggests how reinforcement contingencies are built in to stories and provide for the motivation of the reader and reinforcement of reading. Both perspectives permit us to demystify the story, to understand what it is and how it functions in behavioral terms. One question that arises is: If stories can be understood in these terms, can behavior analysis in turn make use of stories in a methodological sense?

The correspondences between the altered equilibrium model and behavioral research, especially steady-state research, are striking and suggest that the task of the author and the behavioral researcher have more in common than is generally supposed. Both authors and researchers examine the functional effects of events and variables. Authors do this by using the story form to (a) set forth a set of stable conditions to establish a baseline equilibrium; (b) introduce a disrupter event; (c) describe a set of effects of the disrupter event during the ensuing transition state, which can be understood as a conflict between the disrupter event as a force for change and the contingencies of baseline equilibrium as a force for resistance to change; and (d) conclude the story by specifying an outcome in which the two forces reconcile themselves in final equilibrium, a steady state that incorporates the enduring effects of the disrupter event.

Is the story format then a type of research? Any suggestion that the author's use of the story form as a type of research will be properly met by the objection that at each stage of the story, the author sets forth invented hypothetical antecedents, behaviors, consequences, disrupter events, etc., and that these inventions are the opposite of what much of science aspires to, the description of real events and discovery of functional relationships among them. Yet, the authors of literary fiction are not simply inventing hypothetical events randomly or haphazardly, but are subject to criteria of honesty, plausibility, and authenticity in constructing a story line and that these criteria are often similar to the criteria the scientific community uses to judge the methodological quality and usefulness of experimental research. In judging an experiment showing an effect of an independent variable on a dependent measure, the scientific community essentially applies specialized criteria of plausibility and authenticity, considerations sometimes referred to as the internal and external validity of experimental research. Some parts of the literary community similarly enforce standards of plausibility and authenticity in evaluating literary works. Authors are trained to write what they know about, which promotes plausibility and authenticity. In evaluating literary works, the literary community asks of a story: Could this story have happened? Why or why not? If the story is deemed plausible and authentic, other questions arise: What are the practical and theoretical consequences of the functional relationships (e.g., the described effects of the disrupter event) described in the story? Does the story reveal defects in the contingency arrangements in our world? If so, what can we do about these problems? If the story is not judged plausible and authentic, the literary community, at least that segment of the the literary community concerned with honesty and authenticity, begins an interesting critical examination of the reasons why the story represents a departure from plausibility. Authenticity and plausibility in this context refer to the critical features of the story line rather than to all the literal description in a story. For example in surrealistic fiction, such as in Kafka's work or in many of Bunuel's films, certain features of reality are magnified to make them more conspicuous. In one sense Kafka's *The Trial* describes a distorted and unrealistic world in which an unresponsive bureaucracy is magnified and overwhelms everything else in the protagonist's environment, but this magnification permits an intensified focus on the bureaucratic aspects of the modern world that are all too authentic. Likewise, literary forms like satire introduce distortions of some aspects of reality, but in order to highlight other aspects.

The literary method can best be classified and understood as a method of inquiry that shares some of the features of research. The literary and experimental methods of examining behavior should be considered complementary in the sense that each has advantages that compensate for the disadvantages of the other (Lindauer, 1984). For example, the examination of functional relationships through the literary method has the advantage of describing a fuller range of effects of a disrupter event on many dependent measures, on thoughts, private events, emotions, on different people, and over an extended time frame, even over generations. In contrast, in an experiment the researcher normally is limited to observing only a few dependent variables at best. Whereas the literary method provides wide-angle and long-term views of functional relationships, the experimental method usually gives us a more restricted focus. The experimental method has the advantages of quantitative precision, which permits accurate descriptions of steady states and transition states, but the literary method permits many functional nuances to be verbally described and appreciated even if they are recalcitrant to quantification. The experimental method also has the advantage that the scientific community's criteria for plausibility and authenticity are

stricter more readily self-correcting than those of the literary community. Hypothesized functional relationships can be quickly and clearly falsified, as well as established, through experimental observation. Although the literary community applies criteria for plausibility and authenticity and has self-corrective mechanisms, they are weaker, resulting in more errors and greater persistence of errors.

The impulse to dismiss the literary method from partnership with experimental methods in behavior analysis and the other sciences foregoes the opportunity to recognize and encourage mutually beneficial connections between behavioral science and the literary arts. When authors of imaginative literature are knowledgeable in scientific topics and scientific behavior (e.g., Barrett, 1996, Skinner, 1948), they can make use of the literary genre to pose important questions about science that can appeal to scientists and, for example, induce them to conceive of their enterprise in larger terms than the absorbing miniature puzzles that characterize so much day-to-day research. At the same time, accurate portrayals the nature of scientific work in literature can provide nonscientists with a feeling for the nature of scientific reasoning, inquiry, and passion. Through these portrayals, students can understand the appeal of science and avoid accepting the misrepresentations of science that Dawkins (1998) and Koertge (1998) have documented.

In some respects the question of whether the literary method should be recognized as a useful auxiliary technique within behavior analysis parallels the question of whether private events ought to be included in a natural science. Skinner's (1961) position on this was that private stimuli and behavior ought to be included as legitimate objects of study in behavior analysis, but recognizing the nature of privacy and the associated problems of access, by both the verbal and scientific communities. Likewise, the literary method ought to be considered a legitimate means of proposing plausible functional relationships, but recognizing that the hypothetical nature of those relationships poses special interpretive problems relative to direct experimental analysis. The literary method is especially applicable in cases in which a potential independent variable is inaccessible or intractable, for various reasons, to experimental manipulation. For example, how would one go about experimentally examining the consequences of insincere flattery, insincere social reinforcement, as an independent variable? A researcher could perhaps set up an experimental analog in which the flattery is overly embellished or inconsistent with other verbal behavior, but a more full-bodied way is to do what Shakespeare did in King Lear, and examine the plausible yet hypothetical way in which Lear's daughters' insincere flattery functions. How would one go about examining inherent human isolation and attendant difficulties in communication? Experimental analogs could be used here too, but none could likely bring out the range and character of such difficulties in the way that McCullers did. Essentially, the literary method permits a wider range of different questions to be posed and reflected upon, though it provides a relatively weaker set of techniques for answering those questions. But that weakness is no worse that the reader's reflective judgment.

Skinner's authorship of *Walden Two* should be recognized as an example of the literary method and as a useful adjunct to the experimental methods he and his colleagues devised. He describes an elaborate hypothetical world where behavioral principles are used to restructure social, economic, and political organization. In doing so he permitted us to make determinations regarding the plausibility of the causal sequences of events he described and the honesty and genuineness of his plot and characterizations. As with any other novel, we can find fault with various aspects of the work on these grounds, but because we have the work available to us we have open an avenue by which we can pursue inquiries about the full spectrum of implications of the advent of behavior analysis that would not be possible with reference to only the experimental literature. Is Walden Two plausible? If so, or if partially so, what are the practical and theoretical implications of this? How should it alter our current practices? The literary method of proposing a hypothetical reality as a means of initiating and sustaining scientific inquiry should be recognized as a type of methodology in behavior analysis. Skinner contemplated writing a second novel in which he planned to use the literary method to examine the implications of describing a protagonist's behavior without the use of fictional inner causes (Skinner, 1972). What Skinner apparently planned was an experimental novel that replaced mentalistic narrative description with a functional narrative counterpart as a means of telling a story, understanding character motivation, etc. There are clearly many different uses of the literary method that are helpful in advancing the goals and purposes of behavior analysis.

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A MULTICULTURAL FEMINIST ANALYSIS OF WALDEN TWO

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Feminist and multicultural analyses are largely absent from behavior analysis. This lack is especially problematic in the area of cultural design. The analysis of the social contingencies of reinforcement is incomplete without an examination of race, class, and gender. This paper asks: "Are behavioral societies good for women," along with the follow-up question, "If so, for which women?" A critique of Walden Two from a multicultural feminist perspective demonstrates the kind of inquiry that might lead to answers to these questions, and to greater efficacy in cultural design.

Key words: behavior analysis, cultural practices, feminism, multicultural, Walden Two

Behavior analysts have a long tradition of working for social change. Findings from the laboratory have been applied to schools, clinics, prisons, businesses, and community programs. Moreover, following Skinner's lead with *Walden Two* (1947) and *Science and Human Behavior* (1953), there is a long history of interest in the design of cultures. However, with few exceptions, little attention has been paid to gender (Ruiz, 1995, 2003). Therefore, it might be time for behaviorists to ask a basic question: "Are behavioral societies good for women?" And since contemporary feminist research is multicultural, a follow-up question might be: "If so, for which women?"

Ruiz (1995) and Landrine (1995) have expressed concern over the exclusion of both feminist and multicultural issues in psychology. They suggest that radical behaviorism is contextualistic, and as such is well suited for examining feminist concerns. Chiesa (1992) writes, "Radical behaviorism's explanatory system focuses on relations between the behaving persons, the setting conditions of behavior, and its consequences—behavior in its context." (p.1298). Further, Ruiz (1995) explains, "This view categorically rejects any attempt to understand human action outside the boundaries of personal life experience and current circumstance…(and sees) the reciprocal interdependency between the individual and her context as the key to creating and changing cultural practices" (pp. 169-170).

The categories of gender, race, class, and sexuality as understood by feminists are socially constructed and critical to understanding context. Examining the role they play in the contingencies of reinforcement would increase our efficacy, and if we exclude these important controlling variables from our analysis, we make successful intervention less likely. Since we live in a gendered and racialized world, we ignore our privileges at our peril. Rothenberg (2002) writes, "History tells us that, in the end, an unjust and inequitable distribution of resources and opportunities leads to terrible violence…In this sense, all of us, both the victims and beneficiaries of racism (and other oppressions) pay a terrible price" (p.4). We cannot solve our problems by ignoring important controlling variables. In a similar vein, Audre Lorde (1984) exhorts us to examine our differences for the sake of change:

> *There are very real differences between us of race, age, and sex. But it is not those differences between us that are separating us. It is rather our refusal to recognize those differences, and to examine the distortion which result from our misnaming them and* their effects upon human behavior *and expectation. (Italics mine) (p.115)*

This paper critiques *Walden Two* from a multicultural feminist perspective to demonstrate the kind of inquiry that might lead to more effective change.

Although a visionary, Skinner was a product of his time and as such he reflects an androcentric, Euroamerican point of view. A similar inconsistency is described by hooks (1994) writing about Freire:

> *There has never been a moment... that I have not remained aware of not only the sexism of the language but the way he…constructs a phallocentric paradigm of liberation –wherein freedom and the experience of patriarchal manhood are always linked as though they are one and the same. For me this is always a source of anguish for it represents a blind spot in the vision of men who have profound insight. And yet, I never wish to see a critique of this blind spot overshadow anyone's …capacity to learn from the insights. (p.49)*

Indeed, though written 60 years ago, *Walden Two* is still a powerful polemic. Both enthusiasts and detractors alike have used it as a definitive statement of the possibilities of behavioral engineering. There are several be-

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havioral reviews of *Walden Two* that address a wide range of issues and practices, but they do not use a multicultural or feminist focus (Dinsmoor, 1991, 1992; Newman, 1993; Baum, 1994). For example, critiques have not included a discussion of race or sexuality in Walden Two. Whiteness and heterosexuality are not examined; they are understood as normative.

There are eight main characters in the novel. All are heterosexual white adults, six of whom visit *Walden Two*, a small, rural, white middleclass homogeneous community in the Midwest. Their visit serves as a vehicle for Skinner, in the role of Frazier, Walden's founder, to demonstrate the possibilities of cultural engineering in his community. The visiting group consists of two young couples who accompany two male academics from a university also in the Midwest. One couple consists of working class people who join the Marxist utopia towards the end of the novel, believing that all their needs and desires will be met there. The other couple consists of a working class man who feels that Walden Two has everything he could ever want, and his upper class fiancée who wants a "maid". This couple does not join the community. The two women are generally called by their names when referred to separately; otherwise they are referred to as "girls". The academics are Burris (also a reflection of Skinner) a former graduate school acquaintance of Frazier's, and Castle, a philosophy professor from the university, and the novel's straight, that is straw man. A Mrs. Rachel Meyerson is Frazier's understated "love interest". She reappears in Mattaini's (1991) fanciful utopia "Walden 1.9" which is set in New York City.

Skinner wrote *Walden Two* in 1945 to address what he believed were problems of gender and class. In the introduction to the reissued edition, "Walden Two Revisited" (1976), Skinner wrote, "the dissatisfactions which led me to write *Walden Two* were personal…I had seen my wife and her friends struggling to save themselves from domesticity, wincing as they printed 'housewife' in those blanks asking for occupation" (p.v). Skinner as Frazier says, "The significant history of our times is the story of… the struggle for equality for women, including their right to select professions other than housewife or nursemaid" (p.128). As such he anticipated by decades Friedan's *The Feminine Mystique* (1970), considered a primary discourse of second wave feminist thought.

However, the focus on white middle class women is extremely problematic and such hegemony should be interrogated. As Hooks writes (1984):

Friedan never wondered whether or not the plight of college-educated, white housewives was an adequate reference point by which to gauge the impact of sexism or sexist oppression on the lives of women in American society… Like Friedan before them, white women who dominated feminist discourse today rarely question whether or not their perspective on women's reality is true to the lived experiences of women as a collective group. Nor are they aware of the extent to which their perspectives reflect race and class biases…Yet class structure in American society has been shaped by the racial politic of white supremacy; it is only by analyzing racism and its function in a capitalist society that a thorough understanding of class relationships can emerge. (p. 2, 3)

The point is well taken; coercion limits both the oppressor and the oppressed. Do we behavior analysts question our own white privilege? Can we truly understand behavior without doing so? Can we be effective agents for change if we ignore a whole set of important social contingencies?

Skinner focuses on domestic gender roles when discussing the important changes for women in Walden Two citing, the "tradition of slavery" (p.135) inherent in being a middleclass mother and housewife. Frazier comparing the outside world to Walden Two explains:

We educate our women as if they were equal, and promise them equality… The good wife is told to consider it an honor and a privilege to work in the kitchen, to make the beds every day, to watch the children… She knows very well that someone else could make the beds and get the meals and wash the clothes, and her family wouldn't know the difference"... (Here), each of us is necessary as a person to the extent that he (italics mine) is loved as a person. No woman gets much satisfaction out of feeling that she will be missed as one misses a departed cook or scrub woman. (p.136)

Skinner's call for "domestic technology" and "industrializing housewifery" (p.42-43) anticipates Davis's (1983) essay, "The Approaching Obsolescence of Housework: A Working Class Perspective" in which she proposes that the chores of the housewife become part of the industrial economy.

Nonetheless, Skinner's utopian community while eliminating all socially constructed gender roles was designed for a small minority of white middleclass women who had been positioned by a sexist society to be unfulfilled housewives. The fact that the white homogeneity is never tacted (mentioned) is important. Race is mentioned only once. Its invisibility is an indication of unconscious racism in our society. Skinner's description about showing children the outside world is an example. Frazier says:

Once in a while we give a group of children a sort of detective assignment. The game is to establish a connection in the short-

est possible time between any given bit of luxury and some piece of poverty or depravity. Children may start with a fine residence, for example. By going in the service drive they may be able to speak to a black laundress hanging out clothes. They induce her to let them drive her home. That's enough. (p. 192)

Thus the only mention of race is in an offhand example. Both race and class are trivialized in this account. Skinner has created a world without poverty, but it is a world for whites only.

Given the current state of world affairs, for example, the exploitation of women in agribusiness, factories, and the sex trade, perhaps the greatest strength of *Walden Two* is the unequivocal stand against time spent in horrific work or even drudgery. Likewise, the need for leisure and rest are vital. Skinner also stresses the importance of limited production and consumption of goods. People earn labor credits, doing limited amounts of work at jobs that are needed by the community, but are not necessarily pleasing to the individual. This frees everyone to pursue her interests, including her need to rest. Although the choice of leisure activities reflects Skinner's elitist values, for example: classical music, art, and science; his call for time spent in activities that are naturally, actively, and intrinsically reinforcing is invaluable.

Skinner's design for labor and leisure stands in stark contrast to our mass-market culture in which people are either commodities or consumers, and where there is little satisfaction in work. Moreover, in our corporate consumer economy, purchases are rule-governed rather than contingency based. For the most part, we are *told* what we want and need , (what has reinforcement value); we do not *experience* what we want and need. Both Skinner and Lorde call for engaged activity. Lorde (1984) writes:
The principle horror of any system which defines the good in terms of profit rather than in terms of human need, …is that it robs our work of its erotic power (deep, unexpressed feeling) and life appeal and fulfillment. Such a system reduces work to a travesty of necessities, a duty by which we earn bread or oblivion for ourselves, and those we love. (p.55)

Skinner suggests that activities, which have both "pleasing" and "strengthening" properties of reinforcement, are good for both the individual and her community. He answers his own question, "What is Wrong with Daily Life in the Western World?" (1987) by explaining,

"The aversive consequences of labor are saved, but the reinforcing ones are lost" (p. 20). "It is not that it has too many reinforcers, but that the reinforcers are not contingent upon the kind of behavior that sustain the individual or promote the survival of the culture or species" (p. 24). "The cultural practices we have examined weaken behavior in a special way. They change the temporal relation between behavior and its consequences, especially through the use of conditioned and generalized reinforcers" (p. 27). The most pervasive and insidious of these is, of course, money.

Skinner's belief in the power of well-designed education is ubiquitous in Skinner's writings, and it is one of *Walden Two's* greatest achievements. Young children are taught behaviors for getting along in a communal society. Dominant and aggressive behaviors, such as jealousy and competition are conditioned out of the culture, as are their emotional correlates, through carefully arranged contingencies of reinforcement. Frazier explains, "we introduce discouragement as carefully as we introduce any other emotional situation, beginning at about six months" (p.130). One of the most serious problems we face as a culture is our desire for immediate reinforcers at the expense of long range punishers. With Forbidden Soup, and lollipops, children in *Walden Two* learn patience and understanding through design rather than accident. While Skinner's work to eliminate behaviors that harm others is praiseworthy, a feminist analysis might interrogate the absence of systematic opportunities to learn prosocial behaviors. Love, affection, and tolerance are mentioned, but the education of the children does not systematically occasion their response

The reinforcers available at Walden Two reflect Skinner's value system. Reinforcing activities related to intellect are mentioned often and in some detail, while those related to the body or emotional relationships are infrequent, awkward and superficial. For example, Skinner refers to love as an "abiding personal affection". This seems inadequate, as liking is also "abiding personal affection" (p. 130). Skinner's discourse surrounding sex and affection is immersed in stereotypes. For example, adolescent girls and women are placed in the passive role of being desired rather than desiring. Frazier explains, "When a man strikes up an acquaintance with a woman he does not worry about falling to make advances, and the woman isn't hurt if advances aren't made" (p.130).

Sexual aggression is a function of deprivation according to Skinner. Therefore, to eliminate it, people in Walden Two are encouraged to mate in adolescence. It is important that Skinner addresses sexual aggression given its prevalence in society. However, by proposing that it is "no more natural than quarrelsomeness" (p.122) he dismisses its pervasiveness, and should explore the relationship between sex and aggression more closely. In addition, there is tacit ageism, for example, sexual activity is primarily for adolescents. Finally, Skinner's treatment of sex and relationships is exclusively heterosexual. All of

these elements are indicative of Skinner's non-feminist frame of reference.

Skinner's discussion of childbearing seems problematic, and extremely limited. After bearing four children, a woman of "twenty-three will find herself as young in body and sprit as if she had spent the same years unmarried. Her adult life opens up to her with many interesting prospects. For one thing, she is then *quite on a par with men…(*and*)* has made the special contribution which is either the duty or the privilege of woman, (she) can take her place *without distinction of sex*" (italics mine) (p. 122-123). Frazier is bragging about equality while making invisible, negating, and dismissing the complex set of individual and social behaviors of a woman having borne four children. Skinner writes, that both the girl and *boy* are ready for *childbearing*. There is no mention at all of the social contingencies during the nine months of pregnancy or of giving birth itself. There is no discussion of what the girls/women or their partners are doing during those four years.

In *Walden Two* the community replaces the family and the woman's traditional role as mother and housewife. The goal is to "have every child think of every adult as a parent" (p. 132). This is good for the children who can be loved by many, for the mothers who have a community of help, and for the childless who have as many children as there are children. However, this radical revisioning of family class may be a function of a distorted elitist perception. Compare Skinner's ideas for transforming family life with hook's (1984) remarks in *Feminist Theory from Margin to Center* (1984):

Devaluation of family life in feminist discussion often reflects the class nature of the movement. Individuals from privileged classes rely on a number of institutional and social structures to affirm and protect their interests. The bourgeois woman can repudiate family without believing that by so doing she relinquishes the possibility of relationship, care, and protection. If all else fails, she can buy care. Since many bourgeois women active in feminist movements were raised in the modern nuclear household, they were particularly subject to the perversion of family life created by sexist oppression. They may have had material privilege and no experience of abiding family love, and care. (p.37)

All the same, Skinner has designed a system that meets most of the needs of both woman and children. Given rampant childhood hunger, abuse, and homelessness (Schwartz, 2002) this is no small feat.

The "good life" according to Skinner speaking through Frazier, consists of "health…the exercise of talents and abilities… intimate and satisfying personal contacts and relaxation and rest" (p.146-148, 156). It is achieved using positive reinforcement, what Dinsmoor (1992) calls the radical proposition of this utopia, and Rakos, (1992), "nonpolitical empiricism." If any adult in *Walden Two* does not find a contingency reinforcing, she does not act. This is freedom; selection through positive reinforcement rather than force or the threat of force. There is no need for aggression, no need for coercion, and no need for countercontrol.

As Baum (1994) suggests, the particulars of *Walden Two* are not as important as its call for experimentation. However, Skinner as Frazier is not particularly concerned with method; it is the monitoring of applications for the happiness of the community that is important. Skinner's system of Planners and Managers is a hierarchical reflection of the masculinist perspective of how science is done. But this approach is not intrinsic to experimentation. Feminist critics of science might suggest broadening the inquiry to include multiple ways of investigating, for example, using qualitative research methods.

Keller (1985) notes that the work of scientists, "like any other communal practice can be perceived only through the lens of difference, by stepping outside the community" (p.12). A multicultural feminist verbal community under the control of different social contingencies would come up with different questions regarding the practices of *Walden Two*, different designs to test those practices, and different interpretations of the results. The feminist epistemological notion of constructed knowing (Belenky, Clinchy, Goldberger, and Tarule, 1986), "a position in which women view all knowledge as contextual, experience themselves as creators of knowledge, and value both subjective and objective strategies for knowing" (p.15), could enhance understanding and practice, as could Gilligan's (1982) assertion about relationships, that "the realization that self and other are interdependent and that life, however valuable in itself, can only be sustained by care in relationships" (p.127).

Science as a tool is only as good as the questions it asks. For this it helps to be "other". Environments are invisible to the privileged in them; we do not see what we do not see. Western science is not value-free; it has mostly asked the questions of patriarchy. We need to ask different questions, and for that, working class women, women of color, lesbians, very young women, and old women, differently abled, and those not in the academy, need access. Women need to be heard not as people who are now equal in patriarchy but who are leading a postmodern, postcolonial liberatory world.

The absence of multicultural feminism in the behavior analysis of cultural practices seems paradoxical for a

field interested in social justice, yet it speaks to the power of rule-governed ideology. Without multicultural feminism we are left with unasked questions and unsolved problems in a dangerous world. Skinner (1987) writes, "Governments, religions, and capitalistic systems, control most of the reinforcers of daily life, and they have nothing to gain by relinquishing power" (p.7). He proposes two scenarios to this dilemma to explain, "Why We are Acting to Save the World." In the first he writes, "Eventually people no longer worried about the future because there were no people;" in the second, "A science and a technology of behavior emerged that were free of governmental, religious and economic ideologies. Better cultural practices were designed…The species survived for many thousands of years" (p. 14). These practices need to be free of our own privileged biases as well.

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BEHAVIOR ANALYSIS OF EPILEPSY: CONDITIONING MECHANISMS, BEHAVIOR TECHNOLOGY AND THE CONTRIBUTION OF ACT

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The conditioning mechanisms involved in the epileptic seizure behavior along with subsequent effective behavioral treatment have been known for more than a half a century. The behavior technology of seizure control provides low-cost, drug free treatment alternative for individual already suffering from seizures and the stigmatization of epilepsy. Despite this substantial amount of research, behavior therapy for seizures is not available to most people. This aim of this paper is to present the history of the behavior analysis and therapy developed in the last century. In addition to the established behavioral technology, a third wave contextual behavior therapy, Acceptance and Commitment therapy is shown in a recent study to contribute to new dimensions of treatment. Whereas, previous behavioral treatment regimens have aimed at seizure control, ACT aims at creating psychological flexibility around all of the experiential avoidance patterns associated with epilepsy and builds repertoire towards the individuals valued life. A treatment model that includes both the behavioral analysis and seizure control techniques along with ACT components: acceptance, defusion skills, mindfulness, and committed action in valued direction may have greater success than behavioral treatments alone. While behavioral control strategies may be used for preventing, predicting and actually interrupting seizure behavior, acceptance-based skills are used for creating flexibility around "resistance" to having seizures. While more research is needed, this combination represents a viable alternative and or compliment to drug and surgical therapy.

Key words: Epilepsy, applied behavior analysis, Acceptance and Commitment Therapy, third wave contextual behavior therapy

EARLY DOCUMENTATION OF CONDITIONING USED TO STOP SEIZURES

Among the earliest medical documentations of epileptic seizures we find stories of conditioning mechanisms and how they can be used to control seizures. Already in ancient Greek medicine, Galen, describes seizures as a process or predicable chain of behavior that can be interrupted by different stimulation to the body (Temkin, 1945). Much later, the British Neurologist Gowers (1881) is the first to classify epilepsy: grand mal, petit mal, and hysteroid and he publishes case studies where behavioral techniques are applied and successfully stop seizures. Epileptic seizure behavior is carefully documented and treatment interventions entail different ways of stimulating around the area of the seizure start. Both specific and general stimulation are described. In one example a specific stimuli like pressure is put on the hand where the seizure starts and in other more general, strong smells are used to evoke a general arousal contingent on seizure start. A French physician/physiologist presents a review of cases studies (Brown-Sequard, 1858) also demonstrating how seizures can be successfully aborted by the use of stimulating contingent on seizure start. Documentation of these behavioral interventions continues into the 19th century with a renown epileptologist, Jackson, who describes certain seizures as a "march" throughout the body and how it is brought to a halt by vigorous rubbing of that affect limb (Jackson, 1931).

From these early studies the principle of competitive recruitment evolves. At this point, based on clinical observations, the assumption is that by localizing hyper excitable brain areas, competitive recruitment stimulated in relatively normal brain areas will increase normal activity and reduce synchronization and prevent seizures. In other words, if you can identify an early link in the chain of seizure behavior, and either apply stimulation around that area or initiate a "general arousal" you are likely to stop the seizure.

Drug industry: conditioning and behavioral know-how gets lost by the wayside

At the turn of the century, the drug industry enters the scene with the promise of a chemical solution to stop seizures. Antiepileptic drug treatment (AED) is based on the pathology model. Seizures are seen as the behavioral manifestation of an underlying temporary aberration of electrical activity. Causes of this organic dysfunction are usually attributed to improper alterations in neurotransmitter function or the dynamics of membrane ionic currents. One-way causation between pathology and symptom is assumed and no consideration to conditioning in terms of precipatory or inhibiting factors is implied.

In behavioral terms, the seizure is seen as an uncondi-

tioned response to a group of "out of control" neurons that now and again for some reason get rowdy and recruit any willing neighbor neurons in sight and cause bedlam.

Anticonvulsant drugs, turns out to be a lucrative affair for the multinational drug industries and they, in turn, generously get involved with the medical education and conferences spreading information about AED as the treatment of choice for epilepsy. The general principle of AED's is to generally reduce neuronal brain activity, making the spread of epileptogenic activity less likely. None of the AED's produced thus far have any specific effect on the epileptogenic neurons causing the seizures but rather, slow down all brain cell reactivity. The drugs developed throughout the 20th century do, indeed, reduce seizure frequency for most people with epilepsy. Not all but about 67 percent of persons with epilepsy using anticonvulsants attain seizure freedom. Not, however, without a cost

In a review by Loring and Meador (2001) the effects of AED's on cognitive and behavior is significant. They report that the most common AED cognitive effects include psychomotor slowing, reduced vigilance and impairments in memory. Phenobarbital and benzodiazepines showed the most aversive cognitive effects. The most commonly used AEDs carbamazepine, ?phenytoin and valproate showed adverse effects influencing psychomotor speed, memory and mood. The AEDs produced in the last decade like Gabapetin, Lamotrigine, levetracetam, Oxcarbazepine, Tiagabine and Topirmate may have fewer effects but no long term follow-ups have yet been done. Loring and Meador conclude that patients report that quality of life is more adversely affected by the side effects of the AED's than of seizure frequency.

So what looked the solution to seizure control turned out to be a significant contribution to the puzzle but is far from the answer? And the cheap simple, free of side effects behavioral treatments are at best a curiosa from the past.

On a more personal side, many of the clients I worked with who were developmentally disabled were better off with an occasional seizure than the dulling effects of poly drug therapy commonly used for this group. Most of my clients felt their sense of integrity erode from the side effects of memory loss and weight gain. Most were left mentally and emotionally foggy and slow. While these are not life threatening, they do undermine a sense of confidence and competence. Life quality is reduced. The neurologist Oliver Sacks (1992) sums up the use of these drugs in a personal account from the New Yorker; "The surgeon cannot tolerate the drugs that would reduce his symptoms of uncontrollable movement and gestures because they reduce him as well so that he no longer feels fully himself".

Everyone doesn't worship the golden calf: Dissatisfaction is weathered

Epileptologists around the world raise their voices in protest against the over simplistic pathological model and the sole use of antiepileptic drugs as the treatment of choice. The main arguments against, is that the medical model doesn't explain the peculiar patterns of seizure behavior, how they are triggered and how they are inhibited. Complaints regarding the antiepileptic drugs concern the new problems they create. In addition, there are considerable theoretical inconsistencies regarding the lack of correlation between the pathology and the presenting symptoms.

Already, in 1968, Rodin, an epileptologist criticizes the pathological model and the associated medical research as being too simplistic and inadequate. "The great majority of neurochemical investigations still deal with the epileptic neuron. These are important studies but they are likely to be insufficient in providing the final answer to the problem. One should also ask, what are the factors responsible for the spread of abnormal electrical activity in this particular patient. Even more important would be the question, how does the patient's condition differ on the five days of the week when he is seizure free from the 6th day when he has an attack" (Rodin, 1968, p 343). In 1989, Engel, makes an appeal for alternatives: "Epileptologists have relied heavily on pharmacological therapy, which is us is usually nonspecific and associated with disturbing side effects. Both basic and clinical research should focus on improving present alternative therapeutic approaches and finding new ones that may interfere more directly with precipitating and predisposing factors to prevent epileptic seizures without producing additional symptoms" (Engel, 1989, p)

Pediatric neurologists (Kuhn, Allen & Shiver, 1995) publish guidelines for primary care physicians treating children called "Behavioral Management of children's seizure activity" where behavioral interventions are outlined as a viable alternative or compliment to drugs. Clearly, physicians have been aware of conditioning factors and open to behavioral treatment as a compliment or alternative to anticonvulsant drugs.

Theoretical problems with the pathology model show up in the discrepancies pertaining to causal effects. Seizures are proposed to be secondary or "caused" by repeated abnormal electrical discharges from the neural

aggregates in the brain. The behavior of the seizure would, accordingly, be characterized depending on the location of the "epileptic focus" in the brain as well as the extent of the spread of the neuronal discharges over the cortex. One of the difficulties is that in as many as 70% of cases of epilepsy, the etiology of the seizure symptoms remains unknown (Ross 1994). In addition, a significant percent of the "normal" population with no seizures, display epileptogenic activity on the EEG. There are seizures presented with no epileptogenic correlate visible on the EEG. Clearly, the evidence does not support a one-to-one correlation or causal relationship between the pathology of the "epileptic neuron" and seizure occurrence. The known pathology of the epileptogenic neurons set the stage for epilepsy but does not cause them to occur. In order to understand eliciting and inhibitory mechanisms of the epileptic seizures, conditioning must be understood.

Conditioning mechanisms in epilepsy and first in human application

The conditioning process of how epileptogenic activity is spread and interrupted is described between 1940-1950 by behavioral scientists studying animals (Eriksson, 1940; Gelhorn, 1947 Leao, 1944a, 1944b, 1947; McCulloch, 1949). These studies illustrate how epileptogenic discharges can be interrupted systematically through the use of contingent stimulation of different sorts.

By 1957, a case study is published by Efron, (1957) showing how seizures are arrested using second order conditioning of an olfactory stimulus to a bracelet and finally, just thinking about a bracelet to arrest an ongoing seizure. Efron, a behavioral clinician is treating an internationally known jazz singer who has seizures on stage while performing and is desperate for help to control them. He analyses the chain of her seizure behavior and sees that seizures are triggered by an increase in cortical activity as she winds up to perform. He introduces the idea of competing response knowing that the singer associates the smell of jasmine with calmness. Efron's idea is to break the chain of increased excitation triggering the seizure and introduce a "calming" competing response. The woman practices smelling her jasmine scent contingent upon any sign of seizure start and immediately the seizures subside. Efron goes further and conditions the smell of jasmine to a bracelet and finally to the thought of a bracelet. Following this training, the singer is able to perform by simply thinking about her smell, counteracting any seizure start. This classical study marks the beginning of the use of conditioning procedures in the understanding and treatment of people suffering from epilepsy in this century.

A quiet revolution

The technology of the EEG labs enables new breakthroughs in the understanding of the conditioning mechanisms. Forster, a neurologist spends more than three decade mapping out the process of conditioning and evaluating the habituating process of reflex seizures using continuous EEG's and video monitoring. Reflex epilepsy is seen as the cleanest form of an unconditioned stimuli (seizure trigger) and unconditioned response (seizure) since the seizure response acts reliably as a reflex to the stimuli. In 1964, Forster and his co-workers (Forster, Ptacek, Peterson, Chun & Bengzon, 1964) publish a study showing that it is possible to alter the seizure threshold through the process of habituation. In his EEG lab Forster and his team study the details of persons with reflex epilepsy and are able to discriminate exactly the level and frequency of the seizure trigger stimuli. Through the use of prolonged exposure close to the triggering frequency, Forster is able to demonstrate a habituation effect. This means simply that the child suffering from reflex seizures is no longer sensitive to the seizure triggering stimuli and thus experiences fewer seizures.

A few years later, another team publishes a report showing that seizures can actually be extinguished using desensitization and competing responses (Forster, Paulsen & Baughman, 1969), also here using continuous EEG and video recordings. Based on an individual seizure behavior analysis, young adults with reflex epilepsy are exposed to their identified seizure triggering stimuli and at the same time are instructed to perform a distracting ritual. These procedures result in nearly full seizure control and are verified by significant reductions in the epileptogenic activity on the continuous EEG recordings. By 1977, Forster presents data from over 30 single subjects designs of young people with varied forms of reflex epilepsy, using continuous EEG video monitoring and shows how the desensitization process essentially de-conditions all seizures activity and in addition reduces the epileptogenic activity.

Forster's research only dealt with "reflex" seizures which constitutes only 5% of those suffering from epilepsy but his work is a major contribution to how we understand the conditioning mechanisms and how they can be used to help people to control seizures with no drugs. Several of his findings are, in the least to say, disturbing if not revolutionary for the medical model. The mere name "reflex epilepsy" implies that the seizure is an unconditioned response. That, in fact, is the definition of a reflex. Every time the seizure trigger is presented as

in a light flicker, sudden sound, reading, laughing, sudden movement and so on, the seizure is eliciting 100% of the times. It may have looked that way but Forster shows that these so called "reflex" seizures responses are, in fact, conditioned responses that can be de-conditioned.

How conditioning mechanisms are explained by the medical model

How do physicians with little education in conditioning mechanisms process these anomalies to the medical model? I remember listening to a Norwegian neurologist and epileptologist from the National Center for Epilepsy speaking to an international audience about reflex epilepsy. "I have found a very unusual case of reflex epilepsy that I actually have on a EEG video to show you today". "Believe it or not, it is a case of a refrigerator reflex epilepsy". Thinking to myself "how in God's name could a refrigerator be an unconditioned stimuli". Sure enough, the neurologist had a young woman on tape hooked up to online video EEG. The woman was speaking to the same neurologist and telling him that all she had to do was to look at the refrigerator and she got a seizure. A small refrigerator had been placed in the room earlier and was covered by a blanket. The woman seemed anxious to demonstrate her unusual form of "reflex epilepsy" to the doubting neurologist. She tells him to remove the blanket, which he does. She takes one look at the refrigerator, closes her eyes and, sure enough, within 10 seconds she has a full-blown tonic clonic generalized seizure verified by EEG as authentic. The neurologists in the audience agree that this is, indeed, an unusual form of reflex epilepsy. Obviously, the refrigerator was a conditioned stimulus, but how does a lonely operant psychologist from Venus talk about that a room full of medical model guys from Mars.

The operant psychologist understands conditioning has taken place. The sight of the refrigerator has become a seizure trigger that the woman herself predictably elicits. Anyone with behavioral training can help this woman with exposure, to desensitize herself to the sight of the refrigerator. Habituation training, similar to that which Forster applied would simply involve exposure training to the conditioned stimuli while keeping an eye on the EEG. The woman is exposed to the CS as long as there is no epileptogenic response. It was also interesting to note on the video that this woman did not look at the refrigerator and then get a seizure. She looked at the refrigerator, shut her eyes and 10 seconds later had the seizure. What happened when she shut her eyes? We know that for persons with epileptogenic activity, there is almost always an increase in paroxysmal activity when the eyes are shut. What would have happened if she simply kept her eyes open and looked at the refrigerator? These are the types of analysis of seizure chains and behavioral experiments that operant psychologists do.

In contrast, the neurologist finding predictable seizure triggers follows the pathological model and advises this woman to AVOID the sight of the refrigerator. Unfortunately, advising individuals with epilepsy to avoid whatever might be associated with epilepsy is common practice. You and I know what that leads to. As if it isn't enough to have epileptic seizures and suffer the side effects of AED's the established health care system reinforces seizure phobia and life quality narrows.

More revolution: Results of EEG biofeedback studies

At the same time, different groups of behavior researchers show how operant conditioning mechanisms can be used to develop antiepileptic brain waves and protect against seizure activity. Two larger pockets of research teams develop EEG biofeedback techniques aimed at helping individuals to normalize brain wave activity by learning a state of cerebral activity assumed to elevate seizure threshold. The Sterman group publish a number of studies (Sterman, 1993; Lantz & Sterman, 1988) between 1970-1981 showing evidence both in cats and with humans with epilepsy that a specific rhythm, called sensory motor rhythm, SMR, functions in an antiepileptic fashion. These studies show seizure frequency reductions between 35 and 50% at a one-year follow-up. The behavior correlate to SMR is observed to be an active inhibition of peripheral motor activity and mental state described as a concentrated alertness.

Another group led by Birbaumer (Birbaumer, Lutzenberg, Rockstroh, & Elbert, 1992; Rockstroh, Birbaumer, Elbert, & Lutsenberger, 1984) presents evidence of how instrumental conditioning of slow cortical potentials (SCP) reduce epileptogenic activity. Functional analyses are performed on the EEG behavior and these researchers redefine epilepsy as an inability to control cortical excitability. This team present evidence for a hypothesis of the mechanisms of epilepsy and conditioning that show how behavioral programs can be set up.

Birbaumer and co-workers show that all organisms have a tendency to seize as the brain fluctuates in cortical activity. Normally, feedback mechanisms within the brain control these transitions in excitability. Individuals with epilepsy show over excitability of cortical tissue due to a failure of these down-regulating mechanisms, which lead to an explosive chain reaction of excitation among the neuronal networks. The sort of seizure symptom, which presents itself, depends on where and how much

of the network is involved. Treatment with SCP biofeedback trains the person with epilepsy to shift his or her cortical excitability and thus reduce the risk of a seizure. This SCP research is built on a functional analysis of behavior as compared to the other biofeedback studies. The SMR studies aimed at teaching one kind of antiepileptic brain rhythm intended to protect the individual in much the same way as drug therapy. The SCP training is built on an awareness of the chain of seizure behavior and requires the individual to generate up or down-going responses of cortical activity depending on the baseline.

A theory of conditioning and the epileptic seizure

Fenwick (1994) steps up to the challenge and presents a theoretical framework as a possible platform for the behavioral treatments. Fenwick presents evidence from animal studies that he claims clearly shows the close interrelation between seizure activity and behavior. He goes on to say that seizures do not occur in a vacuum and are not merely the result of pathological activity. Fenwick points out that from the animal research, available today, there is an understanding of the epileptic focus and its connections to surrounding cerebral systems showing, clearly, that the seizure process is significantly influenced by the behavior of the organism.

Fenwick states that epileptic seizures should not be thought of as arising randomly but rather, act in predictable manners. He describes focal seizures as occurring when pools of neurons surrounding the focus are sufficiently excited and generalized seizures occurring when the level of cortical excitability has reached a point at which thalamic recruiting volleys generalize and spread. Fenwick, not only presents a plausible theory for conditioning, he also describes a functional analysis of the chain of seizure behavior and how a behavioral treatment can be created. Fenwick suggests to treating physicians to make a detailed clinical history of the "aura" or start of the seizure along with details of the characteristic spread of the seizure. He advices the medical professionals that this information provides the "engine" which drives the creation of a counter measure and is likely to stop seizures. He says that the functional analysis of the seizure chain is the heart of this behavioral treatment and will define those aspects of behavior that both trigger and inhibit seizure activity. In conclusion, Fenwick states to the medical community, that a complete treatment of epilepsy not only involves medication but includes teaching the patient about their brain and its functioning and how they can use their feelings, thinking and behavior to control their epilepsy (Fenwick, 1994).

Fenwick bases this model on the animal research of Lockard and Ward (1980). This theoretical model is far from the one-way pathology—symptom. It suggests that pathology or a set of dysfunctional neurons only sets the stage for epilepsy but does not cause it to occur. Lockard and Ward call the pathological epileptogenic pace maker set of neurons for group one. They are clearly the troublemakers, but they can't cause an epileptic seizure unless they can mobilize recruits among the neighboring "group two" neurons who mostly act in the normal functional manner. But occasionally, the group two neurons either let down their guard, get drowsy or over excited and quick as a cross-fire, the group one's have caught the two's and are on their way exploding across the neuronal network. As soon as group one passes over to group two, the individual notices that something is going on. Depending on the location of the group one "hold up", and where they make their "dash" the individual will feel sensations of the explosions. In the animal studies, Lockard and Ward using EEG video recordings observed how the brain damaged monkeys appeared to notice the spread and how some of them responded by getting active while others did not. One of the significant observations was that although the monkeys' brains had been damaged in exactly the same place, and all showed abnormal EEGS from the group one neurons, only some of them developed epileptic seizures. The conclusion was that while damaged neurons create a predisposition for epilepsy, the behavioral response to the dysfunction is critical. Lockard and Ward speculate that the monkeys who got active at the first signs of spreading of the dysfunctional signals counteracted and stopped the spread of the "would be" seizure.

What this theory means is that if the individual can detect the first signs of the seizure development, it is possible to "counter" the seizure by mobilizing the healthy neurons which are in the vast majority and stop the seizure. Most simply, any activity eliciting a general arousal done in time contingent on the first sign of the seizure is likely to stop it.

A new concept of epilepsy is born and with it new possibilities for treatment. Epilepsy is approached behaviorally as a complex consisting of an organic predisposition to seize, and intrinsic and extrinsic factors that influence the probability of seizure occurrence. Understanding how those factors work to increase or decrease the likelihood of a seizure response falls clearly under the behavior therapist profession.

Recently, Wolf, (2005) summarizes the rational for the new paradigm of conditioning.

"Epileptic seizures can be triggered by both nonspecific facilitating factors such as sleep withdrawal, fever, or excessive

alcohol intake, and specific reflex epileptic mechanisms. These consist of sensory or cognitive inputs activating circumscribed cortical areas or functional anatomic systems that, due to some functional instability, respond with an epileptic discharge. Interruption of seizure activity at the stage of the aura (i.e., locally restricted discharge) also can be achieved by nonspecific (e.g., relaxation or concentration techniques or vagal nerve stimulation) or by specific focus-targeted sensory or cognitive inputs. The latter, again, activate circumscribed cortical areas. Intriguingly, in some patients, the same stimulus can either precipitate or abort a seizure. The response depends on the state of cortical activation: seizure precipitation occurs in the resting condition, and seizure interruption occurs when the epileptic discharge has begun close to the activated area. These relations can be understood on the background of experimental data showing that an intermediate state of neuronal activation is a precondition for the generation of paroxysmal depolarization shifts, whereas a hyperpolarized neuron will remain sub threshold, and a depolarized neuron that already produces action potentials is not recruitable for other activity. Sensory input meeting an intermediately activated pool of potentially epileptic neurons is adequate to produce a seizure. In another condition, the same stimulus can depolarize a neuron pool in the same area sufficiently to block the further propagation of nearby epileptic activity. Understanding these interactions facilitates the development of successful nonpharmaceutical therapeutic interventions for epilepsy" (Wolf, 2005, p 15).

Wolf demonstrates the paradigm shift from the pathology model to a paradigm that is built on the principles of conditioning. Epilepsy is seen here as a predisposition that can be both triggered and inhibited by certain interactions and behaviors and cognitions. It is interesting to note that Wolf shows an understanding of the complexity of the behavior analysis in his description that directly follows the Slow cortical potential feedback evidence of how to interrupt a seizure. Depending on the baseline of the "state of cortical excitation" a stimulus can both trigger and inhibit a seizure. Wolf states the importance of doing careful experimental data in order to generate hypotheses regarding the relationship of the contingencies for each seizure.

From theory to practice: behavioral treatment guidelines

Based on the functional analysis treatment strategies is tailor-made to help the individual with epilepsy to *predict* the seizure response by discrimination of intrinsic and extrinsic factors associated with seizure start, to *prevent* seizure occurrence by applying exposure procedures to "high" risk situations or activities associated with seizure occurrence*; interrupt or counteract* an ongoing seizure response by initiating an appropriate "correcting", competing response and *reinforce* oneself for doing so. Details for how to do functional analyses and tailored treatment procedures are presented in a handbook for behavioral treatment of epilepsy, Dahl, 1992). Just as a matter of information, there are basically two categories of seizures, generalized and focal seizures. Generalized seizures occur when the level of cortical excitability, has reached a point at which thalamic recruiting volleys generalize and start to spread. Focal seizures when the pools of neurons surrounding the epilepsy focus are sufficiently excited for seizure activity to spread.

Discriminating "high risk" factors and early seizure signs, so as to *predict*, is done using seizure dairies, seizure behavior observations, and if possible using EEG video recordings. Antecedents can be specific factors that enhance excitation and synchronization in discrete areas of the brain uniquely receptive to these particular influences like certain frequencies of light, sounds or patterns. On the other hand the triggers may be non-specific feelings that also generally enhance shifts in neuronal excitation like anticipation, stress, conflict, fear or physical exertion. The most reliable way to identify the discriminative stimuli is to check how the individual relates to, responds to what they believe to be the trigger.

Another given antecedent is the physical sensation at the start of the seizure. Not all seizures have a clear-cut sign. In the case of the simple partial and complex partial, it is fairly easy to identify the first sign of the seizure. The seizure response itself has often been observed a number of times and may be on video. In the case of the generalized seizure, antecedents will be found in associated emotional, physical or environmental factors. In a study by Spector and co-workers (Spector, Goldstein, Cull, & Fenwick, 1994) 88% of individuals with epilepsy were able to reliably identify seizure precipitory factors.

Several studies (Spector, et al, 1994) have shown evidence that fear and stress increase the risk for seizure occurrence and consequently, *preventive* treatment studies have targeted these reactions. Several studies have evaluated the effect of teaching relaxation techniques (Dahl, Melin, & Lund, 1987; Tan, & Bruni, 1986; Pushkarich, Whitman, Dell, Hughes, Rosen, & Hermann, 1992) and yoga (Ramaratnam, & Sridharan, 1999) to provide a general protection from the stress response. In nearly all of these studies, the relaxation, breathing or yoga positions are taught generally and not contingent on the seizure occurrence.

Interrupting an ongoing seizure may sound bizarre but in fact most individuals with epilepsy have at some time already done this either by consciously experiment-

ing or by accident (Antebi & Bird, 1993; Cull, Fowler, & Brown, 1996; Dahl, 1992). Influencing the seizure process can mean for example: postponing, getting to a safe place, triggering at the time and place of your choice, nipping it in the bud, and or shortening or lengthening the course of the response. Figures vary but reports show between 23% (Finkler, Lozar & Fenwick, 1990) and 53% (Spector et al 1994) has experience of aborting a seizure. The most common ways individuals do this is simply by increasing or decreasing cortical activity depending on the upward or downward shift of the antecedent (Dahl, Melin & Leissner, 1988; Dahl, 1992; Spector, et al, 1994). The functional analysis would help the individual to determine in each situation, which direction the counter-measure should aim for. In other words, if the trigger is characterized by a high excitation, the counter measure would be a slow transition downward, and if the trigger, this time is a drowsy state, the counter-measure would warrant a soft increase in neuronal excitement. In several studies (Dahl, Brorson, & Melin, 1992; Dahl, Melin, Brorson, Schollin, 1985; Wolf, 2005) a menu of tools for changing cortical activity were taught so that the individual could choose appropriate counter measures depending on the particular situation. It should be noted that in cases where of developmentally challenged individuals, caretakers to help interrupt seizures could use counter measures. Examples of "up-going" counter-measures used are; whistles, strong smells like a raw onion, strong tastes in the mouth like fresh ginger, singing, shouting, tactile stimulating with massage or pinching oneself, jumping up and down. Examples of down-going counter-measures used are breathing exercises, inducing muscle relaxation, focusing concentration on a song, a mathematical problem or a calming picture. Betts and co-workers (Betts, Fox, & MacCallum, 1995; Betts, 1995b) present several studies of how aromas are used to stimulate a general arousal contingent on seizure resulting in immediate halt to seizure activity.

Seizure triggers and seizure response are constantly changing along with the infinitive variations of contingencies. The art of the analysis and therapy is to teach the individual with epilepsy the principles of a seizure behavioral analysis and how to apply the behavioral analysis swiftly at the start of each seizure and generate an appropriate counter measure. There is also an obvious difference in "self efficacy" with regard to how the individual relates to epilepsy. On the one hand, epilepsy is seen as an uncontrollable illness and seizures threatening and unpredictable, where medication is the only alternative, and on the other epilepsy is viewed as a tendency to seize and where seizures are predictable and controllable.

The trickiest part of behavior therapy in particular for seizures is the analysis and treatment of the *function* of the epilepsy and seizure behavior. At first glance, an epileptic seizure would probably not be viewed as functional. In fact, when medical professionals use the word functional seizures, they mean "non-epileptic" seizures or pseudo-seizures. In the operant way of thinking all seizures would be called functional since they all "function" or operate on the environment in some way. To the observer, seizure behavior looks scary, painful, embarrassing, and to say the least, unattractive. Larger seizures are likely to be brain damaging. To the observer, neither the seizures themselves, nor their effects on the environment would seem to have any reinforcing qualities. Think again. While parents, caretakers, teachers and physicians may want to get rid of seizures, most children report wanting to keep at least some seizures. Why? Can you think of a better way to effectively influence your environment? Seizures scare the living daylights out of most people while the person having the seizure hardly notices it. Children and young people report positive reinforcement like receiving; special privileges, special attention, physical contact, being someone special, and that the seizures themselves are experienced as stimulating, a rush and as a euphoric experience. Young people and adults also report seizures leading to negative reinforcement such as a means of escaping non-desirable situations, reducing anxiety and tension. Dostoyevski describes his seizure experience as follows " the air was filled with a big noise and I tried to move. I felt the heaven was going down upon the earth and that it had engulfed me. I have really touched God. He came into me myself. Yes, God exists. I cried, and I don't remember anything else. You all, healthy people… can't imagine the happiness we epileptics feel during the second before our fit… I don't know if this felicity lasts for seconds, hours, or months but believe me, for all the joys that life may bring, I would not exchange this one (Alajouanine, 1963)."

In a long-term follow- up of children with drug refractory seizures (Dahl, 1992) it was found that social skill competency was inversely related to seizure frequency in social situations. The better the social skills, the less the seizures occurred in social situations. Children reported that seizures led to desirable social consequences such as being held, being seen, being the center of attention. Seizures that were reported as stimulating were often maintained while others were controlled. It was also found that seizures for adults that led to anxiety reduction were maintained.

This collage of the possible functions of a seizure

shows how complicated and sophisticated the functional analysis must be. If the individual's seizures function in a desirable direction or effectively reduce something undesirable, no treatment is going to stop the seizures. The issue of function is a difficult one for all treating professionals. Do people choose to have seizures? In our experience, people can influence the probability of a seizure occurring, and once it starts, they can choose to some degree the course it will take. The job of the behavior therapist is to find out the nature of the function and to help find better alternatives to serve these functions.

A behavioral technology for seizure control

More evidence about conditioning comes from clinical and the laboratories during the 70's and 80's. A clinical study, 1975 is published by Zlutnick, Mayville and Moffat (1975) presenting a series of single subject design. These behavioral clinicians find plausible seizure antecedents and, in each individual case, show how establishing a competing response, interrupts the chain of seizure behavior. The study shows how individuals suffering from frequent drug refractory seizures of several different kinds, become essentially seizure free.

Studies evaluating behavior therapy as a treatment for epilepsy have presented and reviewed at a number of times in the past 3 decades. Sixty studies were reviewed 1977 (Mostofsky and Balaschak, 1977), Kraft and Poling (1982), reviewed an additional 11 studies from 1960-1980), Goldstein (1990) reviewed the studies published from 1980-1990 and most recently the Cochrane library reviews psychological treatment of epilepsy (Ramaratnam, Baker, & Goldstein, 2003). Methodological inadequacies from the first reviews discussed focus on low number of subjects used, lack of blood serum levels showing the consistency of anticonvulsants during treatment phases, lack of objective physiological measures and in many case using self-rating as the only measure. Goldstein summarizes the studies in the 1980-1990 showing improvements in experimental designs, and including objective dependent measures. She presents 7 studies which she regards as fulfilling evidenced based qualifications as for example: using experimental group designs with EEG verifications, use of blood serum controls, sufficient number of subjects, one-year follow-ups and reliable use of statistical methods (Dahl, et al 1985; 1987; Fried, Rubin Carton & Fox, 1984; Lindsay & Baty, 1986; Montgomery & Epsie, 1986; Rosseau, Hermann, & Whitman, 1985; Tan & Bruni, 1986). These studies also include measures unique to CBT, like seizure diary including seizure frequency and duration, Situation, Response and Consequence. Social skills and coping skills are rated as well. Most dependent measures are tracked over a 10-week baseline providing the information for the seizure behavioral analysis. In these studies the treatment is tailored on each individual behavioral analysis but includes the principles of preventive exercises, discrimination of seizure triggers, training in seizure counter measures and contingency management.

In the most recent review for the Cochrane Library, (Ramaratnam, Baker, & Goldstein, 2003) all randomized or quasi-randomized studies assessing one or more types of psychological or behavior modification techniques for people with epilepsy are assessed. Using the strict criteria comparable to medical studies, this meta-analysis found all trials to be too small, methodology too weak and conclude that due to these methodological deficiencies and limited number of individuals studied, there is no reliable evidence to support the use of these treatments and further trials are needed.

"Learning history" as pathology

Behavior medicine evolves in the 1970's as an application of behavior analysis to the treatment of unhealthy long-term symptoms. Behavior medicine develops essentially as a compliment to traditional medicine. Usually, it was considered when all else failed. The integration of the medical model and the behavior medicine, despite what might seem different was fairly simple. While behavior therapy interventions are executed at the level of person/environmental interaction, the aim and focus is similar to that of the medical model, control and management of the symptoms. The first wave of traditional behavior therapy, and the second way, cognitive behavior therapy both adopted the position that psychological health is inversely related to the number and intensity of complaints (Hayes, in press). Whereas the medical model focus on biological malfunction, infectious agent or toxic insult, behavior therapists focus on pathogenic learning histories that generate negative thoughts, emotions, physiological responses and self-destructive behavior patterns. These are the behavioral equivalents of tumors, viruses and bacterial that must be ousted in order for good psychological health to return.

Understanding the conditioning mechanisms of the epileptic seizure and teaching people to control their seizures is a significant step forward. In principle, these behavior interventions focus on providing the individual with a new learning history that stops or reduces the seizure process in seizure-producing contexts. A central aspect in these programs is systematic exposure to feared events that were associated with seizures. These applications of behavioral medicine are based on the behavioral

principles of classical and operant conditioning and in more recent times on cognitive concepts. In the earlier behavior therapy interventions, the goal was to reinforce productive behavior and to stop the negative reinforcement of avoidant behavior and reduce the spread of epileptogenic activity through classical conditioning.

Exposure based treatments reinforced individuals to get closer to previously avoided situations, activities, thoughts and feelings believed to be seizure triggers. In the CBT approaches, the targets of intervention expand to include negative feelings and thoughts together with the traditional seizure triggering behavior. Newson, Goldstein and Fitzpatrick (1998) for example find that negative thoughts and feelings of fear are commonly conditioned to seizures and probably responsible for deterioration of the skills needed for self-management of seizures. Many of the more recent CBT program included, relaxation, meditation, stress management, and cognitive restructuring Goldstein, 1990). Due to the methodological difficulties, there is little empirical support for the role of cognitive mechanisms in CBT had any advantage over the traditional behavior therapy without cognitive components.

In both the medical and the behavior medicine models, pathology and symptom reduction is in focus. This know-how is essential but what if the pathology and presenting symptoms, actually function as avoidance or positive reinforcers. What happens in the case where focusing on seizure control becomes an occupation. How many of us haven't heard the client say, "If I could only get my seizures under control, I could start living my life". What do you do with a client who puts "living life" on hold in the service of controlling seizures? What happens to the client's life quality, when battling seizures is the purpose of life. The answer to all of these questions is that the seizures obtain a powerful position and life quality narrows. Our job as psychologists is not merely to lessen suffering, it is also to help our clients to live the valued, meaningful life of their choice, if seizures were not stopping them.

Acceptance and Commitment Therapy and behavior technology in seizure control.

Recently an ACT protocol including the behavior technology of seizure management was created, and evaluated for groups of individuals with refractory epileptic seizures in India and in South Africa. These countries were chosen due to the author's chairmanship in a commission for development of psychological treatment of epilepsy in the International bureau of Epilepsy working in cooperation with the World Health Organization. In these countries, the majority of people with epilepsy will not have access to anticonvulsant drugs and cheap, assessable alternative treatment is essential to develop. The results of these studies will not be presented here, but rather a summarizing description is provided.

The design of both studies is randomized controlled group with two conditions, ACT and a control condition. Essentially the same ACT treatment protocol was used in the studies in both countries. Participants include young adults with verified refractory and frequent epileptic seizures. Treatment entailed only 4 sessions in the following order: one individual session, two group sessions, and one final individual session, for a total of 10 therapy hours.

The principles of the ACT approach are: acceptance, defusion, values, contact with present moment, and self as context. These concepts are discussed extensively in the ACT literature (Hayes, & Strosahl, 2005). Only ACT as it is used in this protocol is presented here. Acceptance as a concept is used here to mean, accepting the parts of having epilepsy that you cannot change. And at the same time learning how to change what you are able to change. In this ACT protocol, the clients learn to accept the predisposition, or tendency to seize and all the fears and negative thoughts and emotions associated with epilepsy, rather than going to war with them. The terms clean and dirty epilepsy are used. Whereas clean epilepsy is the tendency to seize when conditioned thoughts and reactions occur, dirty epilepsy would be the entire struggle against everything conditioned to epilepsy. Preventing, avoiding, or interrupting the seizures itself is a skillful and desirable thing to do but avoiding everything associated with epilepsy is not. The first may save you life and the second may handicap you for life. Learning how to control seizures is a life skill and makes having a seizure a choice. Fighting against yourself is a war where you lose. Learning how to accept the risk of having seizures and live life fully together with that risk is also a life skill.

An example of the power of acceptance and its effect on seizures, and one, which many with epilepsy have experienced, is that which happens in EEG examinations. Both the client and the neurologist prefer to see a seizure with EEG correlates to verify the diagnosis of epilepsy. In this situation, most clients "try" to have seizures and it is exactly this "trying" or acceptance that usually leads to NO SEIZURES even among those with very frequent seizures. When this happens at the Norwegian Center for Epilepsy, they have a special trick. The lab assistant and neurologist tell the client that the examination is over and they are no longer filming, although they are. When

the client stops "trying" to have a seizure and returns back to "normal", seizures are usually forthcoming. It seems that acceptance of a seizure and even trying to have it, lessens the probability of it, while fear and avoidance increase the probability.

Defusion in the application of epilepsy involves learning to see thoughts as an ongoing process rather than a window on reality. Thoughts, stigmatization and rules about epilepsy and seizures are looked at rather than looked from. The client learns to use thoughts and the thinking process when it is helpful and just notice it when it is not. Mapping out the rules, client associated with epilepsy as well as their function is an essential part of the analysis.

Contact with the present moment meant helping the individuals to get present to positive reinforcement right here and now. A common problem is that individuals struggling with epilepsy believe that they need to get somewhere else other than here to begin to live. Learning how to contact the here and now gives individuals a way to let go of the struggle with one's insides and start creating the life they want.

The most important of these processes in ACT may be values since values provide the motivation to step up to the difficulties and make changes. The common problem is that the more an individual struggles and organizes life around prevention, avoidance, control of the seizures, the less he or she is involved in valued life activities. As the avoidance agenda grows, life quality diminishes. Contacting constant valued directions provides a way forward toward a meaningful and vital life and shows the individual how far off course, avoiding seizures has taken them.

Results

The results of both studies are presently being processed and so far, at the one-year follow-up, dramatic improvements are being found in terms of seizure freedom, quality of life and experiential avoidance.

Discussion

Lets Gird up the loins, and move forward.

A plausible theory regarding the conditioning mechanisms involved the chain of seizure behavior is in place, as is substantial research supporting the behavior technology of seizure management. In addition, the third wave, contextual behavior therapy, here in the form of ACT helps the individual to gain psychological flexibility around handicapping avoidance patterns and take steps towards his or her valued life. The need for cheap, drug-free alternatives for individuals with epilepsy is great, especially in those countries where modern antiepileptic medication is not assessable. Even in the western countries where medication is assessable, this type of applied behavior analysis could help many individuals suffering from neurological dysfunctions to reduce medication and increase life quality.

Controlling the actual seizure symptoms by means of interrupting chains of behavior, based on the functional analysis is at the heart and soul of behavior therapy. The epileptic seizure is, in this way, no different than any other behavior. Learning to generate counter responses that compete with the seizure response, contingent on the discriminative stimuli, creates psychological flexibility around these patterns. The ability of being able to influence seizure development rather than simply being a victim to a disease, increases the sense of self-efficacy. For most individuals with epilepsy, seizures along with the risk of seizures have taken a significant amount of room in their lives. The long-term function of seizures and risk of seizures has often led to a great deal of avoidance in the service of reducing risk of seizure occurrence. ACT helps the individual to get into contact to the valued life that has been avoided and asks the question: Are you willing to take the risk of having seizures AND takes steps towards that life you want to live. Exposure towards the fear of seizure occurrence takes place naturally as the individual takes these steps.

On the surface, these two approaches may seem contradictory. On the one hand, behavior technology aims at seizure control, and on the other hand, ACT states that "control is the problem". In this study, both were combined in the order of : using values as the overall reference and acceptance of what you cannot control while using control strategies for what you can control. Practically, this means that the starting point for therapy is not the control of seizures but rather identifying life directions. As epileptic seizures are reported as the obstacles to taking steps, a discrimination is made between clean seizures (actual seizures) and dirty seizures (fear of seizures, resistance to having seizures). Acceptance-based skills are used for creating flexibility around "resistance" to having seizures and control strategies are used for the actual seizures. Seizure control strategies are taught later in the program. In this way, controlling a seizure becomes a choice made in the actual seizure situation, not on merely the risk for or fear of a possible on coming seizure. In the cases where the seizure itself acts as a positive reinforcement, the individual may choose to allow it to happen.

Providing seizure control strategies at the start of therapy may disturb the acceptance-based therapy since such strategies look similar to the medical solutions. They

may help to reduce seizures but they probably will not help the individual with all of the established experiential avoidance patterns built up around having epilepsy. Seizure reduction should be coupled with building repertoire towards a valued life. This study was the first of its kind to combine seizure control technology with an acceptance-based ACT therapy. Although more research is needed, this study indicates the promise of an approach that couples

seizure reduction with building a repertoire towards a valued life.The combination of re-identifying constant life values, taking steps towards those values, exposure to fears of seizures, seeing thoughts and rules as just thoughts rather than truths, learning how to stop a seizure and committing one-self to stepping up to a vital life appears to hit home.

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