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The Search for an Effective Clinical Behavior Analysis: The Nonlinear Thinking of Israel Goldiamond

T. V. Joe Layng
Headsprout

This paper has two purposes; the first is to reintroduce Goldiamond's constructional approach to clinical behavior analysis and to the field of behavior analysis as a whole, which, unfortunately, remains largely unaware of his nonlinear functional analysis and its implications. The approach is not simply a set of clinical techniques; instead it describes how basic, applied, and formal analyses may intersect to provide behavior-analytic solutions where the emphasis is on consequential selection. The paper takes the reader through a cumulative series of explorations, discoveries, and insights that hopefully brings the reader into contact with the power and comprehensiveness of Goldiamond's approach, and leads to an investigation of the original works cited. The second purpose is to provide the context of a life of scientific discovery that attempts to elucidate the variables and events that informed one of the most extraordinary scientific journeys in the history of behavior analysis, and expose the reader (especially young ones) to the exciting process of discovery followed by one of the field's most brilliant thinkers. One may perhaps consider this article a tribute to Goldiamond and his work, but the tribute is really to the process of scientific discovery over a professional lifetime.

Key words: Israel Goldiamond, nonlinear functional analysis, constructional approach

Israel Goldiamond must have become excited as he looked at his data. He and William Hawkins had just replicated results that had been obtained many times before. They had been very careful to follow the procedures precisely. The experimental subjects had been given a series of words made up of nonsense syllables to study. Some of the words were studied for a brief period of time, others for longer periods of time. Once studied, the stimuli were projected on a screen using a procedure known as the ascending method of

It has been over 10 years since the death of Israel Goldiamond. Unfortunately, references to his work are rare. This would not be such a concern if his work was not of such importance to behavior analysis as a field and clinical behavior analysis as a profession. Part of the reason for this lies in the non-behavior-analytic publications in which much of the work appeared, and part lies in the complexity of the work itself. Goldiamond was one of the earliest advocates of a functional analytic approach to behavior. Indeed, his 1967 textbook, which was recently published in slightly edited and revised form (2004, Andronis, Ed.) by the Cambridge Center for Behavioral Studies was titled *The Functional Analysis of Behavior*. He later extended that work to a very sophisticated nonlinear functional analysis that provides a unique perspective on understanding complex behavior, and particularly behavior of clinical significance. Equipped with this analysis, behavior analysts can understand, treat, and make sense of the seemingly irrational or maladaptive patterns observed in the clinic without resort to hypothetical mediating variables such as emotional avoidance, governance by self-generating misrules, or defective cognitions. This paper is an attempt to provide the foundation of the approach through the personal journey of Israel Goldiamond. It is necessarily circumspect, leaving out much of his work and interests in favor of emphasizing that which is most relevant to the current topic. (For a broader treatment of Goldiamond's impact on behavior analysis, see Gimenez, Layng, & Andronis, 2003.)

This is the scientific journey that led one of behavior analysis' greatest thinkers to his many discoveries, and to his scientifically derived and compassionate constructional approach to human problems based on a nonlinear contingency analysis. This nonlinear analysis provides the basis for sophisticated topical and systemic interpersonal, social, and societal interventions.

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Address correspondence to the author at 4705 S. Dakota St., Seattle, Washington 98118 (e-mail: joe@headsprout.com).

limits. In this procedure stimuli are presented at increasing intensity or at slower speeds until a response matches the stimulus presented, as indicated by a score sheet. The investigators recorded each utterance of a word, and each score-sheet entry that corresponded to a stimulus presentation was scored as a correct identification. The score sheet was carefully constructed such that it contained the nonsense words carefully studied as well as those only briefly examined. Perception appeared to improve as a function of the training, producing what psychophysicists refer to as lower thresholds. The more the training a subject received, the more frequently the studied responses matched the score sheet, a complete replication. Almost everything was the same. The nonsense words studied were the same, the presentation method was the same, the speed of presentation was the same, and the score sheet used by the experimenter was the same. In fact, they had produced the familiar logarithmic function relating frequency of prior exposure to recognition threshold.

Goldiamond and Hawkins had made only one change to the procedure. No nonsense words had ever been presented. The subjects had been presented only smudges. The increasingly correct identifications that occurred as a function of training, as measured by matches to the experimenter's score sheet, had been obtained in the total absence of nonsense words. The result could not be attributed to perception, for there was nothing there to perceive.

The Formative Years: Graduate Work at Chicago

Our story begins in the 1950s when Israel Goldiamond obtained a copy of Keller and Schoenfeld's (1950/1995) *Principles of Behavior*. It was his first in-depth introduction to what was then called operant psychology, and it would change his life. Goldiamond, a graduate student at the University of Chicago, had become keenly interested in perception and its study through what is called psychophysics. Psychophysics is one of the foundational areas of early experimental psychology. Great names in psychology such as Wundt, Fechner, Weber, and Stevens had led the way in building a behavioral science based on precise presentation of stimuli and equally precise measurement of human responses to those stimuli. Early on, it was referred to, often with a little hint of derogation, as "brass instrument psychology" because of the elaborate apparatus frequently required for work in the area.

Psychophysicists were carefully studying the relation between changes in stimuli and corresponding changes in behavior. The changes in behavior were taken to indicate changes in perception. The problem, however, was that the same stimuli appeared to be perceived differently as a function not only of a change in the stimulus but also of the way observers were asked to respond. One method of having an observer indicate whether or not a stimulus was seen frequently produced a different threshold from another method for exactly the same stimuli. A threshold was defined as a stimulus value, light intensity for example, at which 50% of the time an observer would say it was there and 50% of the time that it was not there. Often, unanticipated responses, considered errors by investigators, would occur. These errors required mathematical correction, specific to the procedure used, in order to get comparable results. For detailed reviews see Goldiamond (1958, 1962, 1964b) and Goldiamond and Thomas (1967/2004).

Further, two different response modalities, such as saying "yes" or "no" versus touching or not touching something, to indicate the presence or absence of a stimulus could produce

differing results for the same stimulus presentations. At times, an observer would not report, or even emphatically deny, seeing a stimulus, but other behavior in some way indicated that the stimulus had been perceived. When this happened, unconscious, or what was called *subliminal*, perception was defined. That is, there was a difference between the spoken indicator response and some other, typically nonverbal, indicator response.

Investigators were also interested in the role of emotion, state of mind, or motivation in determining perception. Was an internal perceptual world changed that then determined how one responded to the external world? Many studies seemed to indicate that this may be the case. A range of variables, such as drives, needs, or even training, could influence this internal world. A hungry person might be able to smell food-related odors at lower thresholds than another who had just eaten; a sex offender might be able to detect sexually suggestive words more rapidly than typical individuals; a person who was trained on nonsense syllables might see them at lower thresholds than words that had not been so well learned. Research into hypnosis was suggesting that somehow the instructions of the hypnotist could radically alter the perceptual world of the observer. Instructed that red would always now be yellow, observers would say yellow when presented with red objects. Apparently, their color perception had changed. Psychophysical methods began to be applied to a range of behaviors, including the private world of the observer. For example, anxiety indexes based on psychophysical scaling methods were constructed; these methods showed promise and rapidly expanded into a separate field of mental and emotional testing.

What Goldiamond immediately realized from his reading of Keller and Schoenfeld (1950/1995) was that the responses used to indicate perception were, of course, operant behavior (i.e., behavior whose rate and form were functions of its consequences). As such, these indicator responses were subject to consequential control whether or not the investigator explicitly manipulated the consequences. Goldiamond reasoned that perhaps the difference in outcomes obtained when different indicator responses were used was a function of differences in personal consequential histories, both inside and outside the experimental context. In a series of innovative experiments, he and his colleagues were able to show that many of the differences in outcome occurred because the consequences of responding were simply being overlooked.

Over a period of years in the mid-1950s to the early 1960s, Goldiamond and his colleagues experimentally investigated many classes of perceptual behavior. They demonstrated that training did not alter the ability to perceive stimuli, but simply increased the frequency of those responses in comparison to other responses, thus resulting in more matches to the experimenter's score sheet (Goldiamond & Hawkins, 1958). For example, in the study that opened this article, greater training on certain nonsense words resulted in a greater tendency for the experimental subjects to say those words, thus making score-sheet matches more likely (the analysis applies equally well to the effects of food deprivation on smelling food-related odors, or the effects of sexual arousal on detecting sexually suggestive words; see Goldiamond, 1964b). They showed that hypnosis did not alter perception, but simply brought the indicator behavior under the control of the hypnotist's instructions (Goldiamond & Malpass, 1961). This was convincingly shown when experimental observers responded to the true afterimage of the real color presented and not to the afterimage of the instructed color. It was also demonstrated that implic-

it consequences could alter self-reports of internal states: College students who had never been in the military scored nearly identically to Korean War fighter pilots on surveys of emotional responses to combat when told to respond as a commanding officer might expect one to respond (Azrin, Holz, & Goldiamond, 1961). They also pointed out procedural difficulties that may occur in attempts to reinforce or punish conversational content (Azrin, Holz, Ulrich, & Goldiamond, 1961).

If the perception (i.e., indicator responses) of explicitly presented external stimuli could be shown to be a function of its consequences and related variables and not entirely of what was reported to be perceived, what about responses to one's own behavior? In a series of clever experiments, subjects attributed newly acquired stuttering to anxiety produced in a test situation, when in fact it was a function of a shock-avoidance schedule of which the subjects were entirely unaware (Flanagan, Goldiamond, & Azrin, 1959). What they were aware of were explanations of stuttering as caused by anxiety. Unaware of the consequences of their behavior, the reasons given by the subjects corresponded to the reasons that tended to be accepted by the audience, just as had the college students' responses to the survey, and who knows, perhaps even the pilots' (for a more comprehensive discussion of how these early studies may contribute to an understanding of causation and behavioral complexity, see Layng, 1995).

Another approach to perception was gaining popularity at about the same time. This approach, which Goldiamond helped to pioneer, became known as signal-detection theory (SDT). SDT provided methods for disentangling those variables that influence responding not related to the stimulus (response bias) from those that were a direct function of the stimulus (discriminability). In other words, SDT was able to separate the effects of the consequences of behavior from the ability of an observer to see (hear, smell, etc.) a stimulus. Here was an approach to perception that explicitly considered the effects of consequences on behavior and shared many of its procedures with those of operant psychology (see Goldiamond, 1964b; Goldiamond & Thompson, 1967/2004).

In one of the early experiments in this area, Goldiamond (1964b) was able to show that unconscious perception, that is, perception without awareness, was a function of differential consequences attached to two different indicator responses. Observers were seated in front of two lighted plastic panels; a faint triangle was presented on one of the two panels. After the triangle had been presented, the observers were instructed to press the panel with the triangle and say, ''yes'' if the triangle was there or ''no'' if it was not. The observers touched the panel on which the triangle was projected more often than they said ''yes.'' Lower thresholds were obtained for panel presses than for ''yes.'' The difference in thresholds obtained for the two different responses indicated the degree of unconscious perception that existed. Because the observers were more accurate when pressing than they were when saying ''yes,'' their data indicated a subconscious perception of the triangle. That is, their spoken responses indicated that they did not see it, but their pressing responses indicated that they did. Goldiamond demonstrated that pressing a panel when a triangle was not there and saying ''yes'' when a triangle was not there may have different consequential histories, and that when procedures were put in place that reduced the effect of past consequences obtained outside the experiment for saying rather than doing, the thresholds converged. There was no subliminal perception (see also Goldiamond, 1958, 1959).

SDT also provided a basis for understanding the differences obtained using different psychophysical methods. It became evident that the probability of saying "yes" in the presence of the stimulus (a hit) was a function of the probability of saying "yes" in its absence (a false alarm). From the analysis of a 2×2 matrix, which has a minimum of two responses (yes and no) and a minimum of two states of the world (stimulus either absent or present), the effects of consequences and stimuli could be analyzed. By explicitly arranging consequences or payoffs, the likelihood of saying "yes" when the target stimulus was present and "no" when it was absent could be systematically controlled. When the payoff for saying "yes" with the target stimulus absent was manipulated, the frequency of saying "yes" with the target stimulus present would also change. This was observed even though the consequences for saying "yes" with the target stimulus present remained unchanged. Even as the false-alarm rate varies and the hit rate correspondingly covaries, the underlying discriminability of the stimulus remains unchanged. When one sees a low false-alarm rate, one also sees a low hit rate; a high false-alarm rate results in a high hit rate. That is, the ratio of false alarms to hits remains mostly unchanged as the consequences are changed for a given range of stimulus presentations.

SDT allowed the separate evaluation of two key aspects of perception, discriminability and response bias. *Discriminability* was defined by how discrepant the target stimulus was from other stimuli. *Response bias* was defined as a preference for saying "yes" or "no." Discriminability combined with response bias to determine the overall likelihood of saying "yes." Here was the answer to why there were differences in results given the different psychophysical procedures used for nearly a century. Each procedure engendered a slightly different response bias. SDT now allowed the separate evaluation of the contribution of each to an observer's overall score. False positives and false negatives were not errors, but instead were the logical and sensible outcome of their consequences (Goldiamond, 1964b; Goldiamond & Thompson, 1967/2004).

Experiments showed that the more ambiguous the situation, the more an observer's behavior was a function of its consequences (reflected as response bias) and less a function of the presence or absence of the stimulus. The important discovery that the probability of saying "yes" in the presence of a target stimulus was a function not only of its consequences but also of the consequences for saying "yes" in its absence was not overlooked by Goldiamond. He clearly saw that to fully understand complex behavior, one had to consider entire sets, or matrices, of contingencies, rather than focus on just one.

If reports of public events were so governed, then reports of private or inner events had to be similarly governed. And because, by their nature, private events were necessarily ambiguous, publicly speaking about those events was even more likely to be governed by their consequences. Goldiamond found that what people said about themselves, and the world around them, was not merely a function of past consequences for similar responses in those situations but was also a function of past consequences for saying something different on similar occasions.

It became clear that much of verbal behavior, particularly in ambiguous situations, was largely a function of its consequences and other related variables, and that the pure discrimination was indeed rare. Further, it was not enough to look at or arrange consequences for a target response; attention had to be paid to alternative responses as well. Speech content

as well as other behaviors were more likely to be guided by these alternative relations than not (Goldiamond, 1958, 1962, 1964b). This early work helped to provide the foundation for the search for a comprehensive behavior analysis that would continue the rest of Goldiamond's life.

Emerging Clinical Insights

While a graduate student at Chicago, Goldiamond had taken a course from the famous clinical psychologist Carl Rogers. Although he was not inspired by Rogers' approach, he became interested in how a consequential analysis could inform therapeutic practice. After graduation, Goldiamond began a two-pronged career, one that continued his pursuit of an experimental analysis of behavior, both human and animal, and also one that focused on behavior of clinical importance. The two interests often intersected and were treated with equal rigor.

Over the next few years, from the late 1950s to the late 1960s, while Goldiamond was at Southern Illinois University, Arizona State University, the Institute for Behavioral Research, and Johns Hopkins University, procedures were developed to analyze, understand, and intervene in behavior, often verbal, of clinical interest. Speech was reinstated in mute psychotics (Issacs, Thomas, & Goldiamond, 1960), stuttering was analyzed and treatment procedures were designed (Flanagan, Goldiamond, & Azrin, 1958, 1959; Goldiamond, 1965b; Goldiamond, Atkinson, & Bilger, 1962; Goldiamond & Flanagan, 1959; continuous research and development would yield a systematic program that eventually tought over 200 stutterers to speak fluently), methods of self-control were developed (Goldiamond, 1965a), psychotic hallucinations were analyzed in the context of psychophysical research (Goldiamond, 1964b), a behavioral approach to moral behavior was described (Goldiamond, 1968), and a functional analysis of the content of speech in therapeutic sessions was undertaken, as well as how behavioral interactions within a therapeutic session could result in changes outside the session (Goldiamond & Dyrud, 1968; Goldiamond, Dyrud, & Miller, 1965).

Together with colleagues such as Nate Azrin, behavioral psychoanalyst Jarl Dyrud, and many others, Goldiamond began to develop insights as to what constitutes an effective functional analytic approach to psychotherapy. Goldiamond and Azrin had a profound influence on one another. In giving his eulogy at Goldiamond's memorial service, Azrin described Goldiamond's influence on everything from the token economy to his own approach to marital therapy. Goldiamond would likely have had similar things to say about Azrin. Other work in the operant laboratory helped to elucidate variables that would be of considerable importance for clinical analysis and treatment.

Goldiamond often drew on these insights for his work with patients. Two in particular drew his attention. In 1960, Murray Sidman had published some of his observations about some possible normal sources of pathological behavior in an article published in *Science* (see also Sidman, 1958). Given certain arrangements, monkeys would apparently work to receive shocks. In a series of brilliantly designed experiments, Sidman demonstrated the important role of behavioral history and the interaction of concurrent consequential contingencies in understanding and making sense of seemingly paradoxical behavior. Estes and Skinner (1941) had shown that the presentation of a clicker paired with shock could suppress lever pressing on some interval schedules, but if a monkey had a history of pressing a lever to avoid shocks, the opposite happened;

the pressing was instead facilitated. Further, shock could be made contingent on lever pressing after the avoidance schedule had been terminated, and lever pressing would actually increase, producing more shocks. All the animal had to do was stop pressing and no shocks would be delivered. It was, in essence, trapped by its history of available alternatives. This was not psychopathology, but a sensible outcome of actions taken in the past to reduce shock frequency.

Sidman (1960) also showed how patterns maintained by two different consequences, in this case pressing a lever to avoid shock and pulling a chain to produce food, could become intertwined. He reasoned that if the two operants were indeed a function of their separate histories, discontinuing the shock-avoidance schedule and introducing unavoidable shocks should result in an increase in lever pressing and a decrease in chain pulling, in accord with his and Estes and Skinner's (1941) results. It did not turn out that way. Both responses' frequencies increased. One conventional interpretation was that the increases were a function of the underlying emotional response to the shock, a common pathological perspective. Sidman instead showed that the result was a function of an adventitious arrangement of the consequential contingencies and a sensible outcome of that arrangement. When schedules were changed such that the effects of lever pressing were clearly separated from the effects of chain pulling, the results were as predicted earlier. The important lesson inherent in these studies was that the consequential history of the behavior under investigation was critical to understanding current patterns, and that seemingly pathological behavior could occur as a function of quite sensible responding to quite prosaic behavioral processes. Further, simply considering the apparently pathological pattern, without reference to its alternatives and their consequential histories, would yield an incomplete picture at best, and result in a completely wrong analysis at worst.

Another set of experiments that further supported Goldiamond's emerging approach was a series of studies performed by Holz and Azrin (1961) showing that punishment could be a discriminative stimulus for reinforcement. From time to time, pecks to a disk mounted on a wall provided food to a hungry pigeon, but did so only if an electric shock followed each peck. Unshocked pecks to the disk did not result in food. The pigeons quickly learned that no shock meant no food, and that shock meant food. If they pecked and there was no shock, they would stop pecking, but if a shock were provided they would peck. The presence of electric shock occasioned the very behavior that produced it. If one were to only observe those pecks that produced shock and overlooked those that resulted in food, one might consider the pecking to be an indicator of psychopathology.

But why peck at all? The answer from the pigeons' point of view was unambiguous: peck, get shocked, eventually get fed; do something else, don't get shocked, starve. When one considered the alternatives available to the pigeon, the pecking for shock made absolute sense. Further, Goldiamond reasoned, one could arrange conditions in which pigeons would work to turn on the shock if it were absent. The pain of one's actions may be necessary to achieve an ultimate payoff. And, when available alternatives are considered, that pain, and the pursuit of those conditions or life contexts that result in such pain, may not be maladaptive at all. In fact, it may be considered quite adaptive and sensible. The therapeutic approach suggested here was to find or construct an alternative that could provide the same payoff, but without the pain.

The Extension of a Functional Behavior Analysis to Clinical Treatment

The promise of the rapidly growing operant literature, together with his own previous work, made Goldiamond's collaboration with the physician and psychoanalyst Jarl Dyrud an exciting opportunity to test the power of a functional analysis of behavior in the clinic. They began their collaboration in the mid-1960s while Goldiamond was executive director of the Institute for Behavioral Research. Goldiamond would sit in on Dyrud's therapy sessions taking notes, providing a contingency analysis of what transpired, and making suggestions. The two would remain lifelong friends.

Dyrud quickly came to see the power of the analysis Goldiamond provided. Some years later, Dyrud (1971) suggested that psychoanalysts should embrace behavioral functional analysis as the tool that they had been seeking all of these years in their effort to understand the unconscious. He wrote, "Our assumption is that seemingly erratic behavior is in fact consequential, often at a level below awareness, and that the elucidation of its consequences is our major vehicle for treatment (making the unconscious conscious)" (p. 302). In 1968, their collaboration resulted in a paper titled, "Some Applications and Implications of Behavioral Analysis for Psychotherapy." It, along with an earlier article (Goldiamond et al., 1965), were perhaps the first papers on the use of a consequential functional analysis for adult psychotherapy. This was not systematic desensitization, or token economies, or the direct reinforcement of verbal content, or the use of rewards and punishment to get someone to behave in ways the patient or therapist thought was good for them. Instead, it was the direct use of an explicit functional analysis to help individuals change their context for living, that is, their contingencies.

The Goldiamond and Dyrud collaboration also produced some very interesting clinical experiments; one in particular deserves elaboration. They placed a psychiatrist in one room and a patient in another. A type of one-way mirror separated the rooms such that the patient could see the psychiatrist as long as a light was directly shining on the therapist. They then linked the brightness of the light to speech rate. If the patient maintained a specified rate of speaking, the therapist remained visible; if the rate dropped off, the room would darken, making the therapist difficult to see. This relation was never described to the patient. By manipulating speech rate, they could change both affect and conversation content. High rate requirements produced statements of anger, frustration, and anxiety that the patient would attribute to his life situation; even higher rates could produce psychotic-like responding, with near delusional behavior, "word salad"-like responses, and often agitated roaming around the room. Access to the psychotherapist was a powerful reinforcer. It is doubtful that this experiment could be conducted today.[1]

It became clear to Goldiamond that clinically relevant behavior, including verbal content and affect, were all adaptively a function of consequential selection. It was also clear that consequences came in packages that contained both costs and benefits. Keeping the psychiatrist visible was a potent explicit reinforcer; however, it came at a cost of finding things of clinical relevance to say, an implicit requirement of con-

[1] A graduate student somehow lost the data for all but one of the subjects run by Goldiamond and Dyrud, so the results of these experiments would never be published. Still, they had had their effect on Goldiamond, which is why the description is included here. Goldiamond was fond of describing the precise details of these experiments, and there were some attempts to replicate them in nonpsychatric settings, but they were never completed.

tinued therapy. Extrapolating from his experience with SDT and work performed in the operant laboratory, Goldiamond surmised that these consequence packages had to be considered not only for the "symptom" but also for available alternative patterns. Goldiamond saw that once one examined both the relative costs and benefits for what he would later call the disturbing pattern and those for alternative patterns available to the patient, the function of the behavior was revealed; more than that, why the individual behaved as he or she did became clear.

Stimulus Classes and Abstractional, Instructional, and Dimensional Control in the Clinic

Goldiamond continued to publish on perception and how various stimuli interacted with behavior as a function of certain consequences. In 1962, he described how both stimulus and response classes could be formed and how these classes may be extended to include other stimuli or responses, and how, "once a class is established, contingencies applied to one member of a class tend to affect other members of the class" (p. 303).

In 1966 Goldiamond elaborated on the important distinction between dimensional and abstractional or instructional control, and how each could be transferred separately or together. To somewhat over simplify, dimensional control was *what* one responded to and abstractional control was *how* one responded to it. For instance, one may respond to an airplane by stating its color, its weight, the number of passengers carried, or a variety of other features. Responding to the plane (vs. something else) indicates dimensional control, and responding along any of a multitude of features represents abstractional control. One can transfer abstractional or relational responding across different stimuli that vary greatly in appearance. For example, color naming can be transferred from naming the color of an airplane to naming the color of a house. One can establish abstractional control by comparison (e.g., larger than); it can also be established through a common response (e.g., stopping at a railroad crossing, a stoplight, etc.) or by various forms of stimulus pairing. Both dimensional control and abstractional control can be transferred independently or together, as Goldiamond (1964a, 1966) demonstrated with a program that precisely sequenced a series of letters and words. As a result of the sequencing, observers who begin the sequence classifying letter groups or words by the presence of the letter B are led instead to classify by the presence of words that reflect male gender (and reject those words containing B if they do not reflect male gender), without hearing a verbal description of either relation. (During this period, Goldiamond & Thompson, 1967/2004, produced one half of a planned wide-ranging book on behavior analysis that included the most systematic treatment of stimulus control ever written.)

Goldiamond and Dyrud (1968) went on to postulate that some forms of the psychoanalytic concept of transference might have a basis in such relations. Talking about how interacting with one's wife is similar to how one interacted with one's mother may be an example of such control. But there was a twist. Such comparisons did not necessarily reveal that the relationship with the mother, or what happened in that relationship, was necessarily causally linked, but that, of all the thousands of interactions that had occurred, the patient had chosen this one to describe. A similar analysis could be made of remembered dreams. Both past interactions and recent dreams may speak to current contingencies. Each may help to elucidate current abstractional control and the consequences that maintain it.

Often, encouraging a change in abstractional control in a therapeutic session, that is, establishing a different way of responding to an event, could be transferred to events outside the session. They noted that the effectiveness of such transfer frequently depended on how patients responded to therapist-supplied stimuli and, in turn, how the therapist responds to the apparent abstractional control as it occurs. The therapist responds to the theme and not necessarily the precise words chosen by the patient. Accordingly, the role of metaphor in facilitating not only analysis but also transfer was described in the 1968 article and expanded on in later work in the 1970s. (See, e.g., Goldiamond, 1974a, 1975a. Two of Goldiamond's students, Layng & Andronis, 1984, later published an article that extensively discussed the use of metaphor interpretation in the treatment of delusions and hallucinations.)

Goldiamond and Dyrud (1968) considered potentiating variables, or what are now often called motivative or establishing operations, as critical to successful outcomes. They argued that understanding the sources of consequence potentiation is critical to successful therapy, and further, that yet other elements of the psychoanalytic concept of transference may be analyzed, in part, through a consideration of potentiation. Equally important was the potentiation of reinforcers that could maintain patient behavior within a session: "What may be a critical reinforcer in psychotherapy is change in referent behaviors outside. Events in the session that are related to such change may thereby become linked to them as reinforcers themselves" (p. 74).

As further work would continue to show (Goldiamond, 1969), the key to extension, and to meaningful change outside the therapeutic session, is how events in the session affect the consequential relations that maintain the disturbing patterns outside the session. Although it may be the case that "once a class is established, contingencies applied to one member of a class tend to affect other members of the class," as noted earlier such change is maintained only if it is supported by a change in the referent consequential contingencies.

The Return to Chicago: The Constructional Approach and Nonlinear Versus Linear Analysis

In 1968, Goldiamond accepted a position as professor in the Departments of Behavioral Sciences (Biopsychology), Psychiatry, Medicine and in the College (the undergraduate school) at the University of Chicago; Dyrud accepted an appointment in the Department of Psychiatry and ultimately became chair for a time while at Chicago. Years of clinical research, including a rigorous research program conducted at the Behavior Analysis Research Laboratory of the Department of Psychiatry ultimately led to the publication of what Goldiamond (1974b) called a "constructional approach." This was groundbreaking work, a functional analysis that considered the consequences and related variables not only of disturbing patterns but of their alternatives as well. Rather than simply considering a linear occasion-behavior-consequence sequence, this was a nonlinear approach in which the behavior being investigated was understood to be a function of multiple intersecting contingencies.[2]

[2] Several papers from this period describe applications of this emerging nonlinear approach; see for example, Goldiamond (1970, 1974a), Layng, Merley, Cohen, Andronis, and Layng (1976), and Merley and Layng (1976). Goldiamond encouraged his students to investigate other related behavior-analytic work from the period that could be considered to fall into a subcategory of his nonlinear formulation such as research into the matching law (Herrnstein, 1961) and its derivations (Baum, 1974). Goldiamond also encouraged his students to read work from other disci-

When investigators considered only the consequences for the disturbing behavior, it often seemed as though the disturbing pattern made no sense and must be a function of some type of internal emotional or cognitive state. However, an examination of the available alternative consequential contingencies, reminiscent of the payoff matrix of SDT, quickly dispelled this notion.[3] Further, Goldiamond and his students found that changes in reported emotions and cognitions tracked changes in the contingency matrix. Emotions and cognitions lost their causal status once the entire matrix was described. They did, however, remain an important source of information in helping to identify those relations of which the emotions themselves were also a function.

Goldiamond quickly came to understand that the goal of therapy was not to directly control, change, or suppress emotions or cognition, but instead to sensitize the patient to them, use them as indicators of the relevant consequential contingencies, and to build on their current repertoires so as to arrange new contingencies. Patients were taught that their disturbing patterns were quite sensible and often nearly heroic responses to the contingency matrix in which they found themselves, and that their behavior was neither maladaptive nor pathological. The approach is illustrated by an example provided by Goldiamond (1975b) about a woman with a debilitating phobia that often left her confined to her bed:

> She was immobilized thereby and her husband swept and cleaned the house every morning (to clear it of vermin), brought her breakfast in bed, and washed the dishes (to deter vermin) before leaving for work. Whenever she recovered somewhat, his attentiveness waned. The phobia was costly: she could not resume the professional work she had enjoyed, nor could they go out together at night; further her in-laws were suggesting divorce. The benefits to recovery are obvious, as is the matrix. There is a metaphor involved. Labeling the disturbing behavior as a psychiatric problem is essential to the matrix. The patient would not get the accruing benefits if she simply told her husband: "Look, you've been putting work ahead of me and everything else since we've been married. I've worked to keep this marriage together. How about you?" Indeed, earlier efforts in this direction had been extinguished. Numerous psychiatric problems have this legitimate labeling function. Labeling theorists who denounce such terms might reflect further on this metaphorical use for the patient, rather than upon the psychiatrist's benefits and the crippling effects of the label upon the patient. It is the contingency matrix that produces the disturbing effects and governs the behavior and the experienced emotions or thought patterns. (p. 43)

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plines that analyzed complex nonlinear relations; these included sociology's exchange theory (Homans, 1958), anthropology's transactionalism (Barth, 1969), economics' game theory (von Neuman & Morgenstern, 1944), and psychology's decision theory (Lee, 1973).

[3] Just as nondiscriminative avoidance may seem difficult to understand in the laboratory without postulating escape from increasing anxiety or fear, there is a similar appeal to employing escape from some internal feeling or thought as an explanation for some behaviors observed in the clinic. Both are predictable outcomes of a linear contingency analysis. But if one takes a nonlinear or alternative sets approach and asks, "What happens to the rat if the bar is not pressed?," one soon realizes that all behaviors other than bar pressing are candidates for shock, a form of differential punishment of other behavior (DPO), the converse of differential reinforcement of other behavior (DRO). In DRO, all behaviors other than the target behavior are candidates for reinforcement, and the target behavior decreases. A two-factor account of DRO might suggest that elation may build as the timer times down to consequence delivery, the occurrence of the target behavior interrupts the elation, thereby punishing the target behavior. To bring it into correspondence with more recent approaches, perhaps the target behavior comes to signal a period of no reinforcement, and that signal becomes the punisher. None of these explanations may be required when the pattern is considered to be a function of the joint effect of the consequential arrangement on all classes of behavior. A nonlinear contingency analysis leaves us with sensible rats: bar pressing yields no shock; doing something else receives shock (DPO); bar pressing yields no food, doing something else receives food (DRO). (For a more technical description of these relations and their relation to other laboratory observations see Goldiamond, 1975a.)

The Role of Emotion in Clinical Behavior Analysis

Emotion theorists had for some time argued about the role of emotions. Some argued that emotions could cause behavior. One is afraid, therefore, one flees; the fleeing may reduce the fear and thus reward running. Others argued that, no, one runs away from something and feels fear as a result of running, the behavior of running away causes the feeling of fear. Goldiamond saw from what was now years of work in the clinic and laboratory that neither explanation was adequate. Instead, he found that both fleeing and feeling fear were a function of the consequential contingencies; one did not cause the other. This was an important discovery. One does not run from the bear because one is afraid, and one is not afraid because one is running from the bear—one is both running and afraid because there is a bear close on one's heels. Fear describes a specific functional relation between behavior and its consequences. It describes the situation in which one's behavior is reinforced by putting distance between oneself and some other thing or event. Anger, which so often goes hand in hand with fear, describes those conditions in which one's behavior is reinforced by creating distance between oneself and an event by removing or driving off the event. Emotions, therefore, may be considered as describing or amplifying specific contingency relations, and specific contingencies can be described by specific emotions (Goldiamond, 1974b, 1975b, 1979b; Layng, 2006).[4]

The implications were stunning. It was becoming evident that our emotions evolved to aid us in navigating complex contingencies that are a part of a complex social world. We are oblivious to most of the contingencies that govern our day-to-day behavior. Nonetheless, it is important that we come in contact with them and act accordingly; we do this through our emotions. Clinically, emotions could be used to uncover those contingencies, to make the unconscious conscious, by making the implicit consequential contingencies explicit.

The Patient As Coinvestigator in Analyzing Nonlinear Relations and Planning Topical and Systemic Treatment

But how was this discovered? As part of the research protocol, patients were asked to keep records. These records, some of which were published in the appendix of Goldiamond (1974b), were filled out by the patient on a daily basis between visits. Understanding that record keeping and what was recorded are operant behaviors, it was important to make sure these records formed the basis of patient–therapist interactions. A great deal of time was devoted to examining and analyzing the daily logs in each session (see Goldiamond & Schwartz, 1975). If a log was brought to a session not filled out, session time was used to retroactively fill in the missing times. This joint evaluation led to many discoveries that might not otherwise have been made. For example, it was noticed that events on one day could potentiate reinforcers for different behaviors on another day. For instance, on some days phobic behavior may have no discernible consequence; however, at other times, the consequences, which ranged from control over the behavior of a spouse to avoiding an unpleasant task, were easily identified. It became apparent that if the phobic response occurred only on the occasions in which it obviously paid off, it would cease to

[4] This formulation overlaps with one described by Skinner (1953), which considers emotions as by-products of behaving under certain circumstances, but it differs in its specificity in regard to how changes in emotions precisely describe changes in contingencies, and in the distinction between emotion and emotional behavior.

work on those occasions. To potentiate the social consequences for the phobic response on one occasion, the behavior had to occur on other occasions in which there were no discernible social consequences or even when a cost might be observed. Just as shock had become discriminative for food in the Holz and Azrin (1961) experiments, the cost of the phobia may have to be evident if others are to provide the consequences that maintain phobic or other disturbing behavior. Chance (1994) fittingly called this Goldiamond's paradox (see also Layng & Andronis, 1984).

Records were not, however, simply indicators of disturbing patterns, but were used to find when things went right and why. Emphasis was placed on what was going on when the patient felt good, and how this was achieved. Each week there were goals to be achieved based on the previous week's successes. Setbacks were treated as expected outcomes of any worthwhile effort, and were occasions for further contingency analysis.

When the social consequences were no longer potent or when the best interests of the patient were served by giving up the symptom, it was easily understood why the patient was now seeking therapy. Patients' logs frequently showed that the disturbing pattern involved costs for others as well as for the patient. Those close to the patient might not easily accept an immediate dropping of the symptom. Also, it might be necessary to build certain skills for situations avoided in the past. When a phobia was involved, a simple intervention might involve understanding that the phobic feelings were likely to have occurred in situations in which there was no direct payoff, and to use those feelings as indicators to stop and examine the situation and see what one could do that, step by step, would lead to coming into contact with new experiences and new consequences. The phobic feelings were to be treated as a natural outcome of the individual's personal history. For many, this was all that was required.

If, say, spousal involvement was the critical consequence, and available alternative patterns in the patient's repertoire had not been successful in obtaining such involvement, ''topical'' interventions, directed exclusively at the presenting complaint (e.g., fear of cockroaches) are likely to be only minimally successful. These include working on the fear responses directly or on the avoidance of fearful emotions. Intervention has to be directed elsewhere. The relationship with the spouse must be the focus. As the relationship changes, and the consequences that maintain the phobia (spousal involvement) are either obtained elsewhere or are no longer potent, the phobic symptoms may simply drop out of the repertoire, or the change may allow a topical intervention to replace the phobia with other less troublesome patterns.

A range of specialty logs was developed, including social interaction logs, emotional responding logs, and others as required for a particular life situation. One's thoughts and personal observations were regularly included. Often, the records indicated incidents of application, or self-control, of what had been learned from the logs. From Goldiamond (1976a):

> I shall cite the report of an out-patient upon his return from vacation. He had had a history of hospitalization for schizophrenia and his brother was recently hospitalized for the same problem. During his vacation his wife walked out on him, leaving him alone in the motel. ''I found myself sitting in bed the whole morning, and staring at my rigid finger,'' he said. ''So I asked myself: 'Now what would Dr. Goldiamond say was the reason I was doing this?' He'd ask what consequences would ensue. And I'd say: 'Hospitalization.' And he'd say: 'That's right! Just keep it up and they'll take you away.' And then he'd say: 'But what would you be getting there that you're not getting now?' And I'd say: 'I'll be taken care of.' And he'd say: 'You're on target. But is there some way you can get this consequence

without going to the hospital and having another hospitalization on your record?' And then I'd think a while and say: 'Hey! My sister. She's a motherly type, and she lives a hundred miles away.'" He reported that he dragged himself together, packed, and hitch-hiked to his sister who took him in with open arms. The education occurred in the process of the analysis of several months of written records. (p. 33)

Increasingly, effective treatment required that for many symptoms, patterns other than the presenting complaint (the original symptoms) needed to be considered. Once these other patterns and their consequences were addressed, the symptom often dropped out with no need to attend directly to the disturbing pattern. This type of intervention would come to be called *systemic*, as distinguished from *topical*. Topical interventions directly address the presenting complaint. Both types of intervention may employ a nonlinear functional analysis and are not necessarily mutually exclusive (Goldiamond, 1979b, 1984; Layng & Andronis, 1984). For example, patients who engage in certain forms of obsessive compulsive behavior benefited from combining certain topical interventions similar to those found in habit reversal procedures (Azrin & Nunn, 1973) with a systemic intervention targeted toward building repertoires, the absence of which was the obsessive compulsive disorder.

The Importance of Verbal Behavior

Goldiamond's work with, and understanding of, verbal behavior was also important to the success of the approach. An interview strategy was developed that, with amazing regularity, often indicated the important nonlinear consequence relations that were maintaining the disturbing pattern. By focusing on outcomes to be achieved, rather than on deficits to be eliminated, contingencies were uncovered and new ones built that resulted in patients coming to control their own lives and plans for the future. Analysis and planning continue well after the initial interview. A poignant example was provided by Goldiamond (1974b):

Can one deliver reinforcement to behaviors such as hallucinations that are almost universally regarded as pathological? Indeed, they enter into the diagnosis of schizophrenia. The parents of a woman of 22, so classified, reported that she was hallucinating a husband and children at the dinner table and engaging them in extended conversation. If they ignored her (extinction), they knew she would escalate (e.g., hallucinate pregnancy, etc.) until they were forced to reply. If they were punitive, she might start screaming or might stay away from the table and undo their intense efforts to get her there. If they agreed or inquired after the "family" (reinforcement) this, too, might escalate the pattern. The tactics recommended were based on the following rationale. A child's report card has A's, C's and F's. The parents can complain about the failing grades, cite the A's to indicate she can do better, or simply praise heavily for the A's. The hallucinatory patterns were to be regarded in the same way: what is there about them that can be reinforced? Most 22-year-old women are married, and neighboring daughters were no exception. Her mother said, next time: "Sally, you don't know how delighted I am to hear you considering marriage just like — and —. Believe me, nothing would make father and me happier than," etc., "and that's why we're doing — and —, to make that day come sooner." The parents had to be as ingenious as their daughter in changing the words as they retained the theme to keep up with her changing presentations of the same theme (she had had considerably more experience). By the third week, hallucinations were replaced by conversations with the existent family. What the parents said was true, and she was treated with responses that respected her dignity and also moved the program along. (pp. 51–52; see also Layng & Andronis, 1984, for additional examples)

Informed by years of research on instructional and abstractional control, Goldiamond wrote extensively on the topic of rules and their role in understanding behavior. He was quick to point out that any consequentially governed behavior could be described as meeting contingency rules for reinforcement. That is, once criteria required for reinforcement were identified, one could describe the rule for reinforcement availability. This rule could then be provided

to others, and the behavior that ensued would be maintained as long as the behavior continued to provide potent consequences within its contingency context (Goldiamond, 1966; Goldiamond & Thompson, 1967/2004). Skinner (1966) alluded to this when he wrote of the "inspection of reinforcement contingencies." Goldiamond, however, cautioned that patterns, which may be overlooked by either patients or therapists, other than the ones established by the rule might provide more benefits with fewer costs. Regardless, Goldiamond (1978/1983) maintained that rule statement was irrelevant to contingency control, and that the statement of a rule by the patient or therapist was no guarantee that the contingencies were accurately being described. Rules do not cause behavior, nor does behavior cause rules or insight into them:

> In situations outside the laboratory, people often follow rules of conduct relatable to histories of Oc-(B→S) relations; they may then (or may not) explicitly state the induced rules to others and to themselves. … Thus, as used here, awareness, insight, and explicit induction of rules are not the epiphenomena to which operationism often assigns them. They do not linearly cause behavior (Oc→Awareness [etc.] → Behavior), nor do behaviors cause awareness, etc. (Oc→Behavior→Awareness). Both awareness (insight, explicit induction) and behavior are governed by the contingencies and their histories. The fact that one can occasionally precede the other indicates causality no more than it does in emotion and behavior. And, as in different classes of behavior with different histories, they should not be expected to have identical contingency relations. … If presence of insight, or awareness of contingencies, is irrelevant to control by contingencies, instructions on the nature of the present contingencies or of those to be instituted may facilitate occurrence of the required patterns, or may not, depending on the conditions. Among the critical conditions is whether or not consequences follow upon behavior in accord with instructions about the rule. (p. 14)

He noticed that patients might state rules for their patterns, or therapists might describe patient patterns in terms of rules or "misrules." It became obvious, however, that the rule stating and the patterns observed are both governed by alternative sets of consequential arrangements. That is, each may have its own consequences and alternatives. He noted a further caution: Rules may be abstracted from adventitious relations, where from time to time consequences may occur but may not be functionally related to the behavior. He admonished both patients and therapists to be cautious when stating rules that describe apparent consequential relations (Goldiamond, 1978/1983):

> Presentation of statements of contingencies may be used to induce rules which may then function instructionally. In any case of instruction-governed behavior, if the contingency rule applied is incongruent with the actual Oc-(B→S) arrangements, instructional control may be transient. However, precaution is necessary here. Adventitiously reinforced behavior is likely to be reinforced only intermittently. Related abstractions and instructions induced from these are, because of the adventitious reinforcement attached to behavior under their control, likely to be spurious. Because of the intermittency of the reinforcement, the spurious instructions are likely to be long-lived (cf. Skinner, 1977), despite the simultaneous availability of less spurious instructional and abstractional systems. (p. 15)

For the patient, this means that the putative controlling consequences observed may not be maintaining the disturbing patterns or may be maintaining them only adventitiously. As a result, alternatives may be available that either had been overlooked by the patient, or in the past have been unavailable, or might become available with a relatively small change in repertoire. A therapist might be tempted to suggest a patient may be following a defective rule or is insensitive to his or her consequential contingencies. As noted earlier, another approach is to consider the behavior to be the sensible outcome of a consequential history not unlike that described by Sidman (1960). It is a combination of

that history and current consequences within the contingency matrix that accounts for the pattern. Often, the alternative contingencies as experienced by the patient, and what Goldiamond called "developmental costs" (i.e., the effort involved in learning or transferring repertoires), may keep patients boxed in to their particular contingency matrix.

Other relations were noted as well. Disturbing patterns that apparently produced no consequences other than aversive ones were often found to be the lesser of two or more evils when available alternative relations were considered. The patterns appeared irrational or maladaptive only in a linear "lone contingency" framework. Overlooking the fact that a pattern can produce more than one consequence and thereby considering only the costs and ignoring the benefits, especially in terms of the available alternatives, was another outcome of a linear analysis. In addition, there was the recognition of "vestigial" patterns. These are patterns that at one time paid off but do so no longer, or are now maintained by sporadic adventitious consequences. These patterns are largely maintained by the cost of giving them up, as noted above.

No single rule, approach, procedure, or diagnostically based intervention is possible. Matching treatment to diagnostic topography may have limited success, except perhaps when the presenting complaint is a vestigial pattern, or when there has been a change in the contingency matrix prior to seeking therapy. Each individual's multiple contingency context, and the histories of those contingency relations, need to be examined. This is why Goldiamond (1974b) required his students to begin their case presentations like this:

A. Introduction
1. Identifying information
Brief description of patient and a few qualifying statements which are relevant to what follows.
2. Background for the program
Use A3 as the resolution toward which this presentation is directed. Weave in various items from questionnaire and other sources to present a coherent picture of a person functioning highly competently, given his circumstances and implicit or explicit goals. Present the history of the person as an example of such competence, giving evidence wherever available.
3. Symptom as costly operant
Infer how, as a result of A2, the patterns shaped and reinforced up to now are now too costly or otherwise jeopardizing the patient. Infer what reinforcers are presently maintaining patterns, sources, and type of jeopardy and its source. This should be brief and simply stated as what led up to this. (p. 80; for the rest of the case presentation guide, see Goldiamond, 1974b)

The therapeutic process always began by asking patients what it would be like for them 6 months after liberation day from their problems. Within the first few sessions, observable goals were described that both therapist and patient agreed to work to achieve. Sometimes these goals would change, but if so, they would be clearly stated in terms of observable outcomes. If a person came into therapy because of panic attacks, it would be ascertained what the individual would be doing if the attacks were gone. The goal would not be to eliminate the attacks, but to produce the outcomes achievable only if the attacks were gone. This was contrasted with the individual's current situation. Patient strengths and past successes were also investigated. This was the starting point for the program. An initial contingency analysis of the disturbing pattern and its alternatives was made from data obtained from the original interview and patient logs (and, at times, speaking with others). This analysis was presented to the patient; no records, notes, or other write-ups were kept from the individual seeking help. Every week subgoals based on the past week's successes and related to the program goals were identified and methods suggested, derived from the ongoing contingency analysis, for reaching them. As described above,

patient records in the form of the logs documented the application of the procedures, provided occasions for analysis, and showed what was successful and what was not. Success was defined by whether or not the patient achieved the stated observable outcomes (for a more detailed discussion of the processes, see Goldiamond, 1974b, 1975b, 1979b, 1984; Goldiamond & Schwartz, 1975; Layng, 2006; Merley & Layng, 1976).[5]

Extension and Application: Topical and Systemic Interventions

As the decade of the 1970s came to a close, research efforts were increasingly directed toward understanding the topical versus systemic intervention differences. Travis (1982) investigated what would happen if patients whose initial analysis indicated a topical intervention was sufficient were placed in a systemic intervention, and those whose initial analysis indicated a systemic intervention was necessary were placed in a topical-only intervention. The data were informative: As predicted, progress in therapy appeared to be contingent on the proper intervention.

The logs also pointed to another key distinction. This time it was the difference between emotions as contingency descriptors and emotional behavior. For instance, acting angrily or depressively might not always reflect contingencies that describe anger or feeling depressed. If a contingency that produced an emotion also produced related behavior, it could be selected by its consequences just like any other operant. If feeling angry and having the physiological indicators often associated with reports of such feeling were required to meet the consequential requirements, then they would occur. It became clear that physiological or organic responses could enter into the definition of the operant. This was highlighted when a case of stigmata (bleeding from the palms) was shown to be an operant and was successfully treated systemically by addressing marital relations, and when intense and uncontrollable blushing was successfully treated with a topical functional analysis (Goldiamond, 1974b). In the systemic case, marital issues needed attention; the stigmata themselves were not directly addressed. In the topical case, the patient was taught not to try to fight or control her blushing, but instead to heed it and use the early sensations as an indicator that she needed to intervene in a social situation that might lead to intense blushing. Special procedures were developed that helped to distinguish between emotions as contingency descriptors or amplifiers and emotional behavior as operants or, as in the case of blushing just cited, some of each (for a more recent and extensive discussion, see Layng, 2006).

Goldiamond (1975a) published a paper that formally described his nonlinear or alternative sets approach and its implications for behavioral formulations in general. Later (1976b) he gave an inside look at his personal use of this approach by describing its application to his own injury that left him in a wheelchair (see also Goldiamond, 1974a). He extended his nonlinear analysis to problems of social significance (1974b), and continued to do so through a series of publications that directly addressed

[5] No surveys, emotional indexes, or other mental tests were used. Years of psychophysical research have shown these indicators to be highly unreliable. The reader will recall the correspondence in the survey responses of college students to the survey responses of what pilots felt in combat. Patient verbal behavior can change such that words indicating satisfaction may increase in frequency and come to more closely correspond to survey entries indicating improvement (the score sheet). One form of therapy may be judged more successful than another if it produces more matches to a specified "measurement instrument" than another therapy. Change the score sheet, and the result might reverse. As Goldiamond was fond of saying, "insight is achieved when the patient describes his or her behavior as the therapist would."

those issues (Goldiamond, 1975c, 1976b, 1977). In 1978, Goldiamond's Midwestern Association of Behavior Analysis (which later became the Association for Behavior Analysis) presidential address formally provided a "Programming Contingency Analysis of Mental Health" (Goldiamond, 1978/1983). It was brilliant, and detailed a comprehensive behavior-analytic approach to understanding clinically relevant behavior, including the relations among behavior, genetics, and other physiological variables. He later submitted a revised and expanded version as a book chapter that was to be a part of a larger compilation, only later to withdraw it when the editors asked that it be shortened. Copies do exist of this work, and may yet be published. Goldiamond (1979a) first publicly described in print his discovery of the distinction between topical and systemic interventions.

Over the next several years, Goldiamond and his students would continue to refine and extend the nonlinear analysis, both in the clinic and in the laboratory. Schedules of reinforcement were shown to influence gastrointestinal behavior when schedule-induced defecation was discovered (Gimenez, Andronis, & Goldiamond, 1987; Rayfield, Segal, & Goldiamond, 1982). The implications for the treatment of irritable bowel syndrome and similar conditions were investigated in conjunction with physicians from the department of medicine. Changes in reinforcement schedules for key pecking were shown to result in the recurrence of extinguished head banging in pigeons, which replicated similar observations made in the clinic and suggested that relapse was a normal rather than pathological behavioral process (Layng, Andronis, & Goldiamond, 1999). Pigeon research showed how component repertoires that were a function of one set of consequences could combine and be selected by other consequences to serve an entirely different social function. Further, concepts such as empathy, projection, symbolic aggression, and taking another's perspective could all be traced to the combination and selection of repertoires by social contingencies that could be demonstrated in the pigeon (Andronis, 1987; Andronis, Layng, & Goldiamond, 1997). This brought new insights to understanding issues of symptom choice and the origination of disturbing patterns from nondisturbing components, including diathesis stress models (see, Zubin & Spring, 1977). Clinical practice informed laboratory investigation, and laboratory research, in turn, helped to improve clinical practice.

In 1984, Goldiamond published his last clinical paper that, in greater detail and with more refinement, described his nonlinear analysis and systemic approach. Other papers were published, including one by his students that described their work combining Goldiamond's nonlinear analysis with Skinner's (1957) approach to verbal behavior in the treatment of delusions and hallucinations (Layng & Andronis, 1984). Goldiamond retired in the late 1980s, but did not stop working and refining his approach.

Although there were no longer marathon lab meetings in which both experimental and clinical work were excitedly described, dissected, and analyzed, Goldiamond continued to collaborate with his students until his death in 1996. Unfortunately, after his death, countless files, case analyses, intervention details, and data sheets from carefully controlled research were destroyed, in accord with the privacy policy of the University of Chicago. Nevertheless, the results of Goldiamond's journey can provide the clinical behavior analyst with extraordinary research and treatment opportunities that may greatly broaden our knowledge of how selection by consequences can explain complex behavior, emotions, and

Israel Goldiamond wearing his "Frank Zappa" fishing cap given to him by Paul Andronis.

thought. To this end, his students have continued to refine and extend both his nonlinear analysis and his analysis of emotions and emotional behavior. This work is the subject of a larger work in preparation.

Conclusion

Sigrid Glenn (2002) in a retrospective commentary on Goldiamond's constructional approach eloquently observed,

> In reading again Israel Goldiamond's "Toward a Constructional Approach to Social Problems," I am reminded anew of the scope and power of the work of this great behavior analyst. … But most interesting, certainly to the clinician, is the reader's sense of being in the "presence" of a truly great clinician. The subtlety and sensitivity, the humor and the understanding, are omnipresent in the details of treatment that Goldiamond describes. It is interesting that we are able to detect that he fully understood and cared about the clients with whom he worked, while he consistently described his observations and tactics in scientific terms (with a few apologies for everyday language use). (p. 202)

Over many years, Goldiamond and his students helped hundreds of patients. A wide range of conditions were treated including stuttering, obsessive compulsive disorders, panic disorders, eating disorders, phobias, schizophrenia and related diagnoses, borderline syndrome, depression, anxiety, catatonia, drug addiction, posttraumatic stress disorder, brain injury, marital and family problems, and many others. In each case, the disturbing patterns were shown to be sensible outcomes of their nonlinear consequential contingencies, as was the rich and very productive thinking of Israel Goldiamond.

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