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Chapter 16

Behavioral applications of the restricted environmental stimulation technique

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Historical Introduction

The first documented use of reduced sensory stimulation in psychotherapy occurred several thousand years ago. Both at Delphi and at Trophonius, the oracle was approached by entering a cave in which the supplicant was isolated and sensorially deprived. While the major purpose for consulting the oracle was to divine the future, there apparently were instances of psychological problems being treated (Kouretas, 1967; Papageorgiou, 1975). A number of non-Western cultures have also used stimulus reduction in connection with psychotherapy. Among such methods are the rituals of native healers in sub-Saharan Africa (Margetts, 1968) and the northwest coast of America (Jilek, 1974).

When 'sensory deprivation' became a popular research technique among Western psychologists in the early 1950s, among the earliest suggested applications was its use in a therapeutic context. A team of researchers at Allan Memorial Institute in Montreal found schizophrenic, depressive, and neurotic patients exhibiting improvement after several days of sensory deprivation (Azima and Cramer-Azima, 1956, 1957). One review (Suedfeld, 1980) cites reports of successful treatment using this technique in cases of schizophrenia, stuttering, snake phobia, childhood autism, and anorexia nervosa. Conditions closely related to stimulus restriction have been useful in the treatment of manic and depressed patients (Fitzgerald and Long, 1973), acting-out children (Pendergrass, 1971) and colicky infants (Wilcox, 1957). Various other investigators have found that sensory reduction, either by itself or in conjunction with appropriate messages, resulted in improved scores on measures of such characteristics as state anxiety (Antista and Jones, 1975) and ego strength (Gibby *et al.*, 1960; Kammerman, 1977). These and the

more recent applications of the technique are now usually categorized under the term Restricted Environmental Stimulation Therapy (REST).

Work using stimulus restriction in a clinical context can be divided into four major categories. The first is the use of input-restricting methods in what one may call quasi-therapeutic situations; that is, those involving spiritual experiences, promoting creativity, enhancing self-esteeem, and heightening awareness. The second is in the treatment of behavioral disturbances exhibited by children. The third is seclusion and stimulus reduction with hospitalized psychiatric patients. The last application, which is the most closely related both to social psychology and to behavioral medicine, is in the modification of health-dysfunctional habits and conditions such as smoking and obesity.

Until recently it was very difficult to find any single source that discussed all of the uses of environmental restriction in therapeutic and quasi-therapeutic contexts. Specific users or participants have written about their own experiences and findings, referring perhaps to some of the most obviously relevant literature but without integrating their approach into the larger pattern of research and application. We have not only had a diversity of uses, as mentioned in the previous paragraph, but there have also been many methodological variations. Some of the more frequently used techniques have included being left alone in one's room; sitting alone facing a blank wall; lying on a bed in a dark, quiet room; floating in a tank of water (sometimes mixed with chemicals to the consistency of a gel); being continously stimulated by diffuse light and white noise; and combinations and variants of all of these. Obviously, it is difficult to obtain highly replicable data with this kind of variability, particularly since on any measurable dimension that is conceptually relevant these techniques produce different results. There is some doubt as to whether the diffuse light–white noise procedure is at all compatible with the others. This procedure provides a constant and at least moderately high level of input even though that input is unpatterned; in contrast, most of the other techniques involve substantial reductions of the absolute level of stimulation. Similar inconsistencies are found when one looks at other procedural factors such as different types of briefing and debriefing, confinement duration, measures of the dependent variable, timing and type of follow-up, and so on. And, of course, this situation is further complicated by the fact that much of the literature is anecdotal, autobiographical, and in some cases purely historical.

One other, rather interesting, source of diversity is the theoretical or conceptual model upon which the use of stimulus restriction is based in a particular instance. What I find intriguing about this is that so many approaches have led to the same general prescription; the reduction of input. The rest of this chapter describes some of the major conceptual sources that

have led to the application of REST to personal betterment. It also discusses the specific types of situations in which this kind of treatment has been considered appropriate by the proponents of the various models.

Conceptual Bases of the Use of REST

The application of REST in different situations has been based on various traditions and ideas. Among these have been the spiritual–religious model, which uses REST as a road to transcendental experiences and personal insights, and psychotherapeutic models deriving from learning theory and depth psychology. For this chapter, however, the most relevant sources are those rooted in cognitive and social psychology. One of these is the proposal that stimulus reduction serves as a 'reverse quarantine' situation, in which individuals are removed from excessive stimulation and information loads that are endemic in their normal environments. The theory is that this removal enables them to develop or learn more adaptive ways of behaving. The other is a persuasion model, which argues that the REST environment makes participants more open to new information and more capable of considering such information without becoming defensive. If the information provided advocates changes in habits and attitudes related to health, such changes may be more likely to occur as a result of this heightened persuasibilty and motivation to change.

The Spiritual–Religious Model

Perhaps the oldest root of the restricted environmental stimulation technique is the realization of the religious, spiritual, mystical qualities that experience can accrue under such conditions. As has already been mentioned, specifically therapeutic uses on a religious model were noted millennia ago, and were considered to be ancient even by the Romans (Garrison, 1921). It should be noted that the therapeutic aspect of stimulus reduction was a relatively minor one in this context; the more important events were those that led to contact with the deity.

Social isolation, usually in a monotonous and not highly stimulating environment, has been an established practice for those seeking transcendental experiences throughout many centuries and in many places. As one example, we may note the role that isolation in the wilderness has played in the development of the major contemporary religions. Moses first encountered God and was inspired to return to Egypt and free his people during a prolonged sojourn in the wilderness. During a similar period of wandering, Jesus rejected the temptations of Satan and returned to carry out his ministry.

Mohammed withdrew to a cave to find his vocation. The Buddha achieved the great insights that would form the basis of his teachings while contemplating, solitary, in the forest. Many other saints and prophets emerged from the deserts, mountain-tops, jungles, and prairies; and thousands of monks, hermits, mystics, and meditators sought out these environments as being the most conducive to their spiritual exercises and devotions (see, for example, Potter, 1958).

One interesting aspect of all of this is that the specific object of the quest, transcendental experience, apparently occurs with equal facility in deserts, forests, jungles, ice fields, and grassy plains. The crucial characteristics are the relative homogeneity and unchangingness of the environment. Similarly, what one finds appears to be extremely variable. It can be an encounter with a supernatural being (including a totemic animal, a spirit, or God), the learning—or making up, depending on how one looks at it—of a magic song or formula; the dreaming of a meaningful and magical dream; a peak experience of oneness with the universe; or enlightening discoveries within the inner self. This literature is closely related to the relatively recent but increasingly popular use of water-immersion tanks (Lilly, 1977) to facilitate fantasy, creativity, and self-exploration. This model—as well as 'reverse quarantine', which is discussed later in this chapter—also brings to mind the massive amount of autobiographical evidence that solitude, preferably in a relatively monotonous environment, is highly conducive to the incubation of creative ideas in science, philosophy, literature, and the arts.

To be sure, the spiritual–religious model has been adapted to psychotherapy in the narrower sense. Morita therapy (see Reynolds, 1976), developed in Japan, has its roots in Zen meditation techniques. However, whereas the meditator seeks solitude in order to reach enlightenment beyond that which rationality can bring, the patient in Morita therapy and other 'quiet' therapies uses the setting to obtain a better understanding of his own maladaptive reactions. It is for this reason that patients participating in such treatments spend up to a week alone in a mildly to moderately stimulus-impoverished environment. Very positive effects have been reported with various kinds of behavioral problems, although the transferability of these methods to Western cultures is questionable.

Therapeutic REST may also be seen as a rite of passage by clients in systematic projects, just as it is by adolescent tribesmen and religious seekers. Many participants in our own smoking-cessation and weight-reduction studies, described later in this chapter, have had this reaction. They repeatedly refer to their REST experience as a marker that delineated their earlier self from the new, healthier, self-efficacious individual who is successfully coping with problems that previously left him helpless. In this sense, some kind of rebirth can occur in REST, just as it can happen to people who undergo ritual stimulus-reduction in other cultures.

The Conditioning Model

This approach to the use of reduced stimulation, derived from simple learning theories, uses stimulus attenuation as an aversive or as a negative reinforcer. People who behave in ways that are inappropriate by some standard are 'punished' by being put into situations that are relatively low in general stimulation and usually completely lacking in social stimulation. Since this is presumed to be an unpleasant experience, the knowledge that misbehavior will lead to isolation is expected to reduce the probability of misbehavior occurring in the future. Solitary confinement in prisons, seclusion in psychiatric hospitals and educational institutions, 'time out from positive reinforcement' in the treatment of behaviorally disturbed children and mentally retarded adults, and being sent to one's room by parents are some common examples of this punitive approach.

In general, there seems to be no evidence that the likelihood of undesired behavior really is diminished by such treatment. Most segregation cells in prisons are populated by people who have been there before and recidivism is similarly high in the other instances. This is not surprising, given the generally unconvincing evidence about the long-term effectiveness of aversive reinforcement.

What is more interesting is the fact that, if one looks beneath the surface, the supposedly aversive condition frequently turns out to have been deliberately chosen. In a series of interviews with convicts who had had experience in isolation, we have found several who claimed that they had repeatedly violated institutional regulations precisely in order to be put into solitary confinement. They periodically felt that this environment was much more tolerable than the regimen of the general prison population (Suedfeld *et al.*, 1976). Similar experiences have been noted by administrators of such 'punishment' in other settings (see Suedfeld, 1980). In fact, one might argue that where seclusion and stimulus reduction do have the effect of restoring self-control, calmness, and appropriate behavior, they do so not necessarily because the individual is motivated to avoid the restricted environment in the future. No doubt there are some cases where this is true, since there are people for whom low stimulation levels are stressful; but it seems likely that the beneficial effects occur because negative features of the normal environment which had been the antecedent causal conditions for tension and misbehavior have now in fact been removed. This argument would imply that, from a conditioning viewpoint, restriction is actually a positive reinforcer, and therefore its use as punishment would increase the undesired behaviors. The conditions under which this may be true have not been explored; my guess is that they are quite specific and rare, and that a simplistic operant conditioning explanation of the effects of isolation and monotony is inadequate.

The Psychodynamic Model

Clinicians who proceed from a psychodynamic theoretical standpoint have described the REST situation as one in which childhood experiences are vividly relived. Among such theorists have been a team led by the late Hassan Azima (e.g. Azima *et al.*, 1961). These workers hypothesized that stimulus reduction could be used in what they called 'anaclitic therapy', a therapeutic procedure in which regression was fostered by returning the patient to a childlike condition. This consisted of the patient's dependence on the experimenter for food, approval, social contact, and stimulation, supposedly in the same way as very young children are dependent upon their parents for these things. Furthermore, the body schema hypothetically becomes disorganized and fluid in reduced stimulation just as it was in childhood. In using this technique with psychiatric patients, Azima's team did note evidence of regression (e.g. changes in figure drawings). Furthermore, they found better rapport with a therapist and improvement in symptomatology in a substantial proportion of these patients. On the other hand, the technique appeared to be counterproductive with obsessive–compulsive neurotics. A few such patients manifested psychotic symptoms during the session and were given electroconvulsive shock treatment to counteract the effect.

A somewhat different version of the theory has been used by Janov (1970), who recommends the use of a day or more of isolation and sensory restriction for patients beginning primal therapy. Coupled with sleeplessness, and sometimes with food-deprivation, this experience is supposedly so stressful as to facilitate the letting-down of cognitive controls and thus initiates the regression that is the hallmark of this school of therapy. 'Rebirthing', a new and not very well tested therapeutic procedure, accomplishes sensory restriction by the technique of water-immersion to regress the individual to the experience of birth. Unlike the original experience, this situation is carefully made low in stress, so that the after-effects of traumata that were induced during the actual birth of the individual are extinguished. Incidentally, the Leboyer (1976) method of obstetrics, if universally adopted, may spell the end of rebirthing since the use of greatly reduced stimulation in the delivery room would presumably just about eliminate the unpleasant experiences that rebirthing attempts to rectify.

In a derivation from ego psychology, Goldberger and Holt (e.g. 1961) argue that regression in the service of the ego, a shift in emphasis from secondary to primary process, is an adaptive response to stimulus-impoverished situations. Such a shift may encourage dreaming and fantasizing, which may be turned to therapeutic use. There has not been a good test of the therapeutic utility of this idea, but there has been considerable support for the prediction that individuals who can relax and enjoy primary process functioning, or can continue to control it even in REST, are those who

tolerate the condition best and experience it as least aversive. There seems to be no doubt that daydreaming, fantasy, vivid dreams, and other forms of imagery are especially vivid and frequent under REST conditions, and that for some subjects they are a source of serious stress (Zuckerman, 1969). Given the recent interest in the use of imagery by therapists (e.g. Singer, 1974), it is high time that attempts be made to use the impact of REST on such phenomena in a clinically beneficial way.

The Cognitive–Social Models

The two major cognitive–social models that have been used to explain the beneficial effects of REST are discussed below. The reader will note that one is based on information-processing capacities and intrinsic motivation, while the other emphasizes the cognitive aspects of belief and opinion change. Thus, both of the theoretical positions are essentially cognitive, fitting handily into current trends within social psychological theory-building. In fact, they are not alternative but rather complementary positions. This approach is clearly the most closely related to the two themes of this book. It views REST as a form of applied social psychology, and the problems to which it has been applied are the most likely to be included under the rubric of behavioral medicine as opposed to the more traditional concerns of practitioners in psychiatry, clinical psychology, and the mental health field in general. Even so, the reader will note that large areas of behavioral medicine to which REST logically seems applicable have been untouched, so that there is great scope for innovative research and application in this area.

The Reverse Quarantine Model

By 'reverse quarantine' I mean the idea that stimulus reduction works through the removal of the individual from environmental conditions that trigger clinical symptoms or other adverse behavior, or that prevent better functioning by flooding the information-processing channels. A considerable body of literature has accumulated which either explicitly states or implicitly assumes that the stimulus levels commonly encountered in modern society are too much for some people to handle, that maladaptive reactions to the situation of overload will occur, and that these reactions can be avoided, reduced, or eliminated by taking the individual out of the environment and putting him into a less demanding one. This conceptual model is related to the one emphasizing persuasion (see next section), since the processing of information is a crucial part of both the information-overload problem and the destabilization of the attitude structure. However, there is one major theoretical and procedural difference. The persuasion model uses the effects of REST to increase the potency of other treatment techniques; in the reverse

quarantine approach, REST in itself is considered to be sufficient to obtain the desirable results. One relevant theory is that certain types of psychopathology involve the malfunctioning of the information-processing system. More specifically, there is a breakdown in that part of the system which is responsible for selecting portions of the total environmental data array for further consideration. As a consequence, the cognitive mechanisms are flooded with an excess of stimulation and informational input, with which they are unable to cope adaptively. It has been proposed that schizophrenia and childhood autism, among other forms of disturbance, are based on this sequence. It is logical that a severe reduction in the amount of environmental stimulation should be beneficial in such cases, and REST has in fact been shown to be effective in the treatment of this kind of patient (see Suedfeld, 1980).

The use of REST as reverse quarantine has been successful in serious and difficult cases. 'Time-out', which is commonly defined by theorists as an essentially punitive technique, is viewed very differently by many patients and practitioners. In fact, it may serve as a welcome period of escape from overload, enabling the individual to calm down and restore self-control. REST has been used in this way for a long time (see e.g. Dercum, 1917; Suedfeld, 1980), and it continues to be used because it is an effective, economical, and safe procedure. In more ambitious studies with young patients, several projects have reported that the use of prolonged periods of stimulus reduction and partial social isolation has had good long-term effects in the treatment of autistic children (e.g. Schechter *et al.*, 1969) as well as with some mentally retarded patients and with children suffering from learning and behavioral disturbances (e.g. Cohen, 1963; Glynn, 1957; Janz, 1978; Suedfeld, 1980).

It is this aspect of REST that probably makes it a useful treatment for people going through episodes of drug-induced psychosis. This effect has been most saliently noted in cases of PCP (phencyclidine) overdose for which darkness, silence, and social isolation constitute the treatment of choice (Luisada, 1978). LSD psychosis has been successfully treated in the same way (Adams, 1980).

Therapeutic success with adult psychiatric patients has been reported in several studies. Harris (1959) used very brief exposures to stimulus restriction on two successive days with schizophrenic in-patients, most of whom reacted positively to the situation and some of whom manifested reduced symptomatology. Similar findings were reported by Luby *et al.* (1962) and by Smith *et al.* (1961).

However, the most extensive series of studies with hospitalized patients was performed by a clinical research group in Virginia (summarized in Adams, 1980). Using individuals in a variety of diagnostic categories, these investigators reported that 6 hours of stimulus reduction (lying in a bed with

eyes covered, ears plugged with cotton, and head wrapped in gauze) led to significantly more reductions than increases in symptomatology, with the beneficial changes persisting through the 1-week follow-up while the adverse ones disappeared. This result was interpreted as indicating that there were adaptive and durable mental reorganizations during the session while increased symptoms reflected temporary arousal of anxiety and emotional disturbance. In formal interviews before and after the session, the effects of REST were reported to include an increased desire for social contacts and therapeutic relationships, greater awareness of internal conflicts, and better insight about personal difficulties and the patient's own responsibility for his problems. Repressive and inhibitory defences were used less rigidly. In addition to these effects, testing showed increases in ego strength and in IQ score.

In a second study, using only 3 hours of stimulus reduction and adding a matched control goup, the researchers found more symptom-reduction in the REST group, which—unlike the controls—often showed better ego functioning, self-acceptance, and utilization of defence mechanisms. It was also reported that, as in the pilot study, those patients who had been the most severely disturbed prior to the session seemed to benefit the most from the treatment.

In the next step (Adams *et al.*, 1966), the REST without message treatment was used as a control condition. Patients undergoing this treatment did show significant improvements on dominance, ego strength, depression, self-acceptance, and signs of increased personal adequacy. It should be noted here that the group that received messages while in REST also showed positive reactions, but their major areas of improvement were more concentrated on conscious insight and self-awareness. An attempt to use monotonous rather than reduced stimulation in the same way (Cleveland *et al.*, 1963) found no positive results with a group of schizophrenics; neither did an experiment by Moran (1969), who added a social isolation condition as a comparison with monotonous stimulation.

Using a somewhat different design, Cooper *et al.* (1975) systematically manipulated interviewer behavior prior to a brief period of REST. They found that this treatment resulted in increased dominance and affiliation in the subject's interaction with the interviewer afterward. There were also long-term improvements on various behavioral rating scales and a significant reduction in hypochondriacal complaints.

In the context of habit-modification, this model served as the basis of one of the comparison conditions in two studies on smoking cessation (Suedfeld *et al.*, 1972; Suedfeld and Ikard, 1974). In both of these studies the treatment of major interest combined REST and messages. Groups receiving REST without messages, messages without REST, and no treatment at all were included in the design. The authors were quite surprised to find that

significant long-term reductions in cigarette smoking were reported by individuals who had spent 24 hours in the stimulus-reduction chamber without receiving any persuasive or informational inputs about smoking. In fact, in neither case was there a statistically significant difference between the REST–message and REST–no message groups. Both demonstrated significant decreases in smoking rate over as long as 2 years, in contrast to the non-confined groups who indicated little if any alteration in smoking.

Recent work in environmental psychology (Mehrabian and Russell, 1974; Russell and Pratt, 1980) has identified the qualities of arousal and pleasantness to be major polarities in environmental assessment. It appears quite likely that, in the absence of anxiety-arousing set, sensory reduction would be placed in the relaxed (low-arousal) and pleasant quadrant of such a two-dimensional space. In this, it has commonalities with the various kinds of relaxation and meditation training. There are similar parallels with the environmental circumstances that are considered to be conducive to the success of other treatment procedures. These factors are common to techniques of traditional psychotherapy, such as psychoanalysis; behavior-modification, as in systematic desensitization; and behavioral medicine, including biofeedback and relaxation training. To the extent that these conditions foster refocusing of attention, one would expect that individuals undergoing reduced stimulation would become more aware of, and perhaps more able to cope with, their behavioral problems.

In support of this hypothesis, several studies have shown that REST by itself, not combined with any other form of intervention, has had significant positive effects on self-concept. Antista and Jones (1975) found that university students undergoing as little as 45 minutes of stimulus reduction became less anxious and showed a significant reduction in the discrepancy between their perception of their actual and ideal selves. This demonstration of improvement in self-acceptance is supplemented by the findings of Kammerman (1977), whose water-immersion subjects manifested increased enthusiasm and optimism, greater feelings that they were able to cope with threatening and novel experiences, and a possible increase in ego strength, findings that are highly compatible with the positive self-reports of participants in both flotation and chamber confinement.

Some of the other applications of this model are closely related to the spiritual quests discussed elsewhere in this chapter. In fact, the model may serve as a scientifically more orthodox equivalent of the spiritual explanation of REST effects. If we reject the idea that the isolated monk or mystic opens himself to actual contact with an external supernatural force, we may hypothesize that he is becoming more aware of internal affects, motives, and intuitions. These are usually submerged because of the need to cope with the constant input of information from the normal environment. Another way of looking at it is that there is some optimal level of information and stimulation.

When the everyday world provides a very high level of these needs, internal sources are ignored, but when the individual leaves that situation for a more homogeneous and quiet one, internal sources will claim more attention and will be more likely to surpass some kind of attention threshold. For this reason, the relevant consequence of REST has also been identified as relaxation, refocusing of attention, and cognitive restructuring (Suedfeld, 1980).

The specific applications of this model in health psychology have included the use of flotation tanks. These have become very popular; tanks (or kits with which to build tanks) can be bought, and tank time rented, in many major cities throughout North America. The procedure usually consists of having the client floating in a shallow tank of water heavily loaded with Epsom salts to induce a feeling of weightlessness. The tank is completely enclosed, dark, and soundproof. Thus, a very low level of stimulation from the outside world is available. There has been relatively little systematic research done in this context, although many anecdotal reports have been published. Participants have described experiences of self actualization, increased creativity, improved self-esteem, deeper and better understanding of personal problems, and so on (e.g., Lilly, 1977). It appears probable that the commerical success of this approach, in the absence of major advertising campaigns or of an obvious vital need, must be based on the satisfaction and favorable recommendation of participants.

Early experiments using the immersion procedure reported it to be relatively stressful, and to be associated with disturbances of cognitive functioning, affect, and imagery. It can be supposed that, like the more standard chamber-confinement techniques, the immersion procedure was accompanied by experimental artifacts that induced anxiety and a negative set in the subjects (Suedfeld, 1980). The strangeness of the tank situation is quite likely to exacerbate these problems beyond the level that is usually found in REST chambers. On the other hand, appropriate expectations and instructions can apparently induce feelings of great relaxation and enjoyment, both in the chamber and in the immersion tank.

Introspective reports in these studies, as well as in the tank reports mentioned, support the view that a massive reduction in environmental stimulation leads to increased focusing on internal information-processing. Many participants in reduced-stimulation experiments have emphasized that they experienced an unusual ability to delve into their problems and concerns while in the chamber, an ability that went much further and deeper than that manifested in the normal environment (see for example, Suedfeld and Best, 1977). This, incidentally, may be one reason why monotonous stimulation is less effective as a therapeutic tool than reduced stimulation: it is quite possible that the relatively high levels of input, even if that input is meaningless, homogeneous, and unpatterned, provide enough of a load on the

processing system to prevent any significant shifting of attentional focus toward internal productions. Although more data should be collected in which the refocusing and relaxation experiences are explicitly measured, there seems to be good reason even now to include REST as having much in common with relaxation and re-orienting techniques in psychotherapy and behavioral medicine (Suedfeld, 1980).

The Persuasion Model

The basic assumptions of this explanatory system lie in the various ways that REST can enhance the processing of information that is incompatible with the recipient's existing beliefs, opinions, and behavior patterns. Individuals normally ward off, dismiss, or rationalize away such information even against their own best interests.

The fact that stimulus restriction increases persuasibility was reported in the original set of experiments dealing with the experimental use of stimulus-poor environments with human subjects (Bexton, 1953). In succeeding years, when one after another of the more dramatic findings reported by early researchers was found to be non-replicable, contaminated with artifact, or greatly restricted in scope, this particular one continued to be consistently supported by the vast majority of relevant evidence. Experiments have shown increased suggestibility in the motor and perceptual realms, using such measures as body-sway, the autokinetic effect, and figure-copying. Much of the literature on visual 'hallucinations' appears also to have been reporting the after-effects of suggestion (Suedfeld, 1969).

There were early attempts to turn this phenomenon to practical use in clinical applications. Adams and his co-workers at the Richmond VA Hospital moved on from a model implicitly based on the reverse quarantine idea that underlay their earliest studies to a series of experiments (summarized in Adams, 1980) in which they presented messages to hospitalized psychiatric patients during a REST session lasting from 2 to 4 hours. This portion of the work of Adams *et al.* was based on an hypothesis that environmental reduction aroused a state of stimulus hunger (Lilly, 1956). Stimulus hunger would make the individual more open to information that would normally be avoided, a prediction that has been supported with great consistency in a number of studies (see Zubek, 1969). The relevant inference is that therapeutic messages, which may normally be warded off by some patients, would also become more acceptable and therefore presumably more potent.

The messages differed from study to study. In some cases a standard message was presented to all subjects; in others individual presentations were designed for each patient on the basis of his own symptoms and background. With standardized messages whose goal was to improve the patient's self-concept, the combined treatment was significantly more successful in obtain-

ing change than was either REST without a message or the message presented in less restrictive conditions (Gibby and Adams, 1961). The effect was consistent across four separate sets of self-concept ratings. An experiment using a standardized message directed at improving the ability of patients to make decisions (Hogan, 1963) again showed significantly more positive change with the REST–message combination.

Adams *et al.* (1966) prepared individually designed messages, based on patients' patterns of responses to the MMPI and the Leary Interpersonal Check List. The messages described the patient's interpersonal behavior, his self-description, his covert attitudes, his concept of what the ideal person is like, and the meaning of discrepancies among these four factors. The messages also presented a preview of the therapeutic procedures that would be followed after the REST treatment. Messages took approximately 15 minutes. The individuals who heard the message during a 2-hour REST session showed improved realism of ideals, fewer symptoms, better internal controls, and less defensiveness and repression than the other groups. As mentioned in the previous section, a treatment group undergoing REST only, without the message, also demonstrated some improvements.

Another study with individualized messages (Robertson, 1964) used three brief REST sessions, with a different message heard during each. The usual message-only, REST-only, and no-treatment controls were included. In this study all three treated groups did better than the controls but there were no significant differences among treatment effects. A long time-interval between various measures of change may have been responsible for this failure to replicate earlier findings (Adams, 1980); but if this is in fact the correct explanation, one may wonder about the long-range therapeutic effectiveness of these procedures. No delayed follow-ups were performed by Adams or his co-workers. There seem to be good reasons to think that such effects may actually be obtained, although the short duration of REST in most of these studies (2–4 hours) should perhaps be extended for maximal impact. Incidentally, it should be noted that positive findings were again obtained only in studies using reduced stimulation (darkness and silence). Several attempts to obtain clinical improvement under monotonous-stimulation conditions (diffuse light, white noise) were unsuccessful.

One other series of studies designed to take advantage of stimulus hunger in a therapeutic way was effective in reducing fear of snakes. In this design, snake phobic subjects spent 5 hours in REST and then were permitted to press a button in order to view slides of snakes. The hypotheses were that stimulus hunger would induce the subjects to expose themselves to stimuli that would normally arouse fear; that because of stimulus hunger the stimuli would be less aversive after REST; and that this reduction in aversiveness would be further enhanced by the need to eliminate cognitive dissonance (the knowledge that they had chosen to view these slides would be dissonant with the knowledge that they were afraid of snakes, a situation that could be

reduced by the changed cognition that they were not really afraid). The results showed a high degree of success, with significant changes in the direction of lowered fear both on self-report measures and on actual approach to a live 2-meter boa constrictor. Psychophysiological changes were significantly correlated with the other measures (e.g. Suedfeld and Hare, 1977).

Stimulus hunger is one component of Suedfeld's (1972) two-factor theory. This theory argues that while REST may indeed arouse a desire for stimulation and therefore a greater receptivity to messages designed to teach new ways of thinking, feeling, and acting, the impact of persuasive inputs is heightened primarily by a destabilization of belief systems which occurs under stimulus-reduction. This destabilization is the result of the impairment of complex cognitive functioning that has been found in REST (see Suedfeld, 1969). One cognitive theory of attitude change (Koslin *et al.*, 1971) proposes that change is a function of the extent to which a particular message (or any other factor) reduces the individual's ability to integrate new inputs into his existing belief system. To the extent that REST disrupts complex cognitive performance in general, it would also disorganize this process in particular.

In terms of Lewin's (1952) classic analysis of opinion change, the two-factor theory would argue that REST acts as an unfreezer of the existing attitude structure. Change is then brought about by the messages that are presented, as well as by the subject's own cognitions and motivation, by material that is remembered from previous exposures, and so on. Refreezing in the new pattern probably comes about after release from REST. In the behavioral medicine context, refreezing needs to be specifically fostered in order to avoid relapse, the fatal flaw of most clinical techniques in this area.

Unfreezing, the necessary first step, is a function of the amount of confusion and instability induced in the belief system. This variable can be measured by a scaling technique that indicates the degree to which respondents are clear about the implications of various attitude-related statements (Koslin *et al.*, 1971). The one experiment that has been performed so far specifically testing the role of REST as an unfreezer showed that it does indeed significantly increase the amount of measured belief instability, even when no persuasive message has been presented during the session (Tetlock and Suedfeld, 1976).

The persuasion hypothesis has been the basis of a number of habit-alteration projects. In three pilot studies:

(1) relaxation training followed by REST led to substantial drops in the blood pressure of three hypertensive patients (Suedfeld *et al.*, 1981);
(2) a derogatory message emphasizing the personal shortcomings of people who depend on alcohol was successful in reducing the alcohol intake of heavy social drinkers who heard the presentation during REST (Cooper *et al.*, 1977); and

(3) a very brief and mundane message presented toward the end of 24 hours of REST was associated with a 38 percent reduction in smoking rate on a 3-month follow-up.

In another, more elaborate, procedure, psychologically addicted smokers showed significant decreases in the use of cigarettes throughout a 2-year follow-up (Suedfeld *et al.*, 1972; Suedfeld and Ikard, 1974). However, the theory was not differentially supported as compared to the reverse quarantine model, since REST-only treatment groups in both of these studies showed reductions in smoking rate essentially identical to those of the clients receiving REST plus messages. Non-confined subjects failed to show significant improvement in either study. Clearer support for the persuasion model specifically was obtained in a study by Borrie and Suedfeld (1980). In this experiment messages teaching relaxation and self-management techniques, and presented toward the beginning and near the end of a 24-hour REST situation, represented the only condition that led to significant and continued weight loss throughout a 6-month follow-up.

Although no specific test has been made, it is plausible to use unfreezing as a mediating construct in the ability of REST to increase the potency of other treatment techniques. Aside from the literature cited earlier, in which stimulus-reduction was combined with such standard procedures as psychoanalyis and behavior-modification, there have been two specific studies confirming this phenomenon. In one of these, grossly obese patients who received stimulus-reduction, appropriate messages, and prolonged individual follow-up therapy (primarily behavior-modification techniques promoting self-management) evidenced significant weight loss, with reductions of well over a pound a week for as long as 6 months (Borrie and Suedfeld, 1980; Suedfeld, 1980). In the other study (Best and Suedfeld, in preparation; Suedfeld, and Best, 1977), REST and messages were combined with satiation smoking and behavioral self-management instructions to constitute one of the most highly successful smoking cessation techniques ever reported. Six months after the treatment, 75 percent of the participants were completely abstinent from cigarettes. It seems logical to argue that the greater openness to information and instruction that results from REST can extend not only to the messages presented during the session but also to material that is presented as part of the same treatment package and is designed to help the client to reach his or her therapeutic goal.

To leave the discussion at this level is, I think, somewhat inadequate. The fact is that subjective reports of individuals emerging from the REST treatment indicate a much deeper impact than one would infer from paper-and-pencil measures of attitude or of belief instability. There appears to be a major change in motivation. Facts that were previously known but whose implications were never drawn in relation to the individual's own life

become central in awareness, strong resolutions are made (and, as it turns out, maintained) concerning self-protective changes in habits and lifestyle, and clients come out expressing amazement at their previous lack of involvement with these obviously very important issues.

It should be recalled that normally anxiety-arousing stimuli apparently may become less so in REST. The impact of this phenomenon has been noted in this chapter as it related to visual stimuli in the case of snake phobia. However, it is also important for understanding the possible reasons that explain the increase both in persuasibility and in concentration on, and insight into, personal problems. As a general rule, messages arguing that one's important behavioral patterns are destructive (as in the case of anti-smoking campaigns for cigarette users, or exercise/dieting arguments in the case of the overweight) are anxiety-arousing. People therefore prefer to avoid thinking for any prolonged period of time or in any depth about their own self-damaging behaviors. For this reason most individuals who are confronted by such presentations tend to take advantage of the many distractions that are available in the normal environment and switch their attention from the unpleasant issue of health-dysfunctional habits. In REST, there are few, if any, good distractors, and none that is pressing enough to justify the ignoring of the central purpose for which the individual is undergoing the treatment.

These reports imply that the openness to new response patterns based on previously ignored information, and the willingness to restructure one's behavior in accordance with these patterns, may be based on a combination of unfreezing and the refocusing of attention. REST seems to promote a cognitive restructuring process which is more inner-directed, in which emotions are more appropriately attached to health-endangering habit patterns than is normally the case, and which enables the client to derive conclusions that lead to drastically modified behaviors. Obviously, the technique is not a panacea. It does not work for every problem, nor for every participant; but it does seem to provide one of the most powerful demonstrations of the importance of environmental and informational characteristics in the role that cognitive factors (including attitudes) can play when one is trying to solve problems in the area of behavioral medicine. Cognitive restructuring has been recognized from the beginning as a central part of the health psychology–behavioral medicine approach; REST may be a way to achieve such restructuring more efficiently and thoroughly than many of those currently in use.

Conclusion

A recent review of the literature on REST, with an emphasis on its clinical uses (Suedfeld, 1980), has shown that reduced stimulation is indeed a powerful and flexible therapeutic tool. Only a portion of these findings was reviewed here, but even these suffice to establish REST as a technique whose

effectiveness has been at least as well documented as that of many more widely used treatments. In addition, it has been shown to have essentially no serious risks of major side- or after-effects, to be quite acceptable to the great majority of participants, and to be remarkably cost-effective in time and money. REST is also capable of increasing the power of other treatment procedures. The fact that it has not been more widely adopted is probably due to the unfamiliarity of most clinicians and researchers with its past successes and with the ease of application, and perhaps partly to an aura of strangeness and mystery that has clung to it. It is to be hoped that the myths with which the technique has been surrounded will not be permitted to keep behavioral medicine from using a valuable and readily available procedure.

The widely disparate theoretical and methodological backgrounds that have led to the use of this technique are impressive. However, this diversity of origins does point to one problem with adopting a theoretical approach to the literature. None of the theories has been stated in specific enough terms to permit the deduction of hypotheses that could be pitted against each other in a strong inference chain. Thus, the fact that REST leads to better rapport with the therapist can be equally well explained by the conditioning model, the psychoanalytic model, or the social-cognition model. There is probably not a single datum in the literature reviewed here that would have been predicted (or at least could be explained) by only one of the theories.

Although this chapter was organized to show the historical–conceptual roots that have converged in the adaptation of reduced-stimulation procedures to therapy, this is only one possible taxonomy. One could just as easily analyze the material in terms of the kinds of behavioral problems treated, including psychotic states, neuroses, mild difficulties of adaptation, habit control, and so on; on the basis of client type, by age, demographic characteristics, and personality traits; or by procedure, including confinement duration, specific type of stimulus alteration, and the use of other components such as messages or more orthodox psychotherapeutic techniques. The findings, obviously, would remain the same regardless of how one chose to categorize them. The clinical application of REST in psychotherapy and behavioral medicine tends to be largely pragmatic: the technique works, even if there are several widely different explanations of why that should be so. This may be adequate for the practitioner, but the development of more sophisticated theories and more definitive tests of theories is important not only for a better understanding of what is actually happening, but also for designing better applications.

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