CHAPTER 36

ON THE ROBUSTNESS AND FLEXIBILITY OF CLINICAL HEALTH INTERVENTIONS

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THE PSYCHOTHERAPY HERITAGE

Against the background of a client's usual performance variability, a therapist typically seeks to induce, via episodic contacts, a series of temporary disruptions in that client's preferred mode(s) of thinking, feeling, and/or behaving. Further, it is expected that, over time, certain permanent (nonreversible) adaptive changes will result in the content or pattern of cognition, affect, or actions—changes capable not only of sustaining current healthy adjustments, but of undergirding new ones. In popular clinical parlance, interventions (of whatever sort) are critically evaluated in terms of their ability to produce initial therapeutic change, to effect maintenance (persistence) of change over extended periods, and to ensure that the newly learned responses will be applied to different settings, in the company of different people, and toward the resolution of related, but distinct problems (generalization and transfer effects).

Because psychologists, psychiatrists, and social workers have been employed for many decades in medical hospitals and clinics, dealing with the so-called neurotic problems of the physically ill, the triad of concerns—change, maintenance, and transfer—naturally went with them. Today's health psychologist, whose agenda includes both illness management and health promotion, is expected to consider the need for durable and extendable interventions and to be mindful of the fact that these objectives are not easily attained (cf. Goldstein & Kanfer, 1979; Karoly & Steffen, 1980; Kazdin, 1989; Meichenbaum & Turk, 1987).

What can the health psychologist expect to find when turning to the psychotherapy literature for counsel and direction? To date, three approaches have been employed to deal with the issue of the persistence of therapy-based change. The first (and most common) strategy is to ignore the long-term effects of one's intervention because of (a) the difficulty and expense in monitoring posttreatment events, (b) strong theory-derived expectations (faith) that patient status at the end of treatment will automatically endure, or (c) the conviction that posttherapy recidivism or deterioration in patient functioning does not necessarily
reflect on the quality of initial care. Until consumers or insurance companies insist on a different course, begging the admittedly important question of durability of effects will probably suffice in the world of private practice.

A second, more responsive, approach is to consider maintenance and generalization to be technical or engineering problems. The behavioral engineering model is built on the deliberate manipulation of in-therapy or extratherapeutic events designed to render therapy-based learning as resistant as possible to extinction and as transferrable as clinical foresight permits (Goldstein, Lopez, & Greenleaf, 1979; Marholin & Touchette, 1979; Wildman & Wildman, 1980). The operant or applied behavior analysis framework has for many years been in the forefront of maintenance and generalization enhancement research (Karoly & Harris, 1986; Kazdin, 1989; Snyder, 1989).

A third perspective can be termed person-centered, as it involves a social learning theory-inspired emphasis on the individual’s cognitive construction of life events, as well as on individual differences in those mediational processes that ostensibly move (or fail to move) the individual through the various phases of treatment, including maintenance and transfer (cf. Haaga & Davison, 1986; Kanfer & Schefft, 1988; Karoly, 1980; Kirschenbaum & Tomarken, 1982; Kuhl, 1987; Marlatt & Gordon, 1985).

Although the aforementioned models dominate current thinking, two additional and promising frameworks are distinct enough from the first three to be listed and considered separately. A fourth point of departure for examining consistency in therapeutic learning might be termed ecological, because it pivots on the application of social network analysis to posttreatment environments in an effort to address the key questions of extratherapy maintenance and generalization (cf. Higginbotham, West, & Forsyth, 1988, chap. 7; Price, 1979).

Finally, a viewpoint I call a dynamic adaptive systems (DAS) model is needed to balance questions of treatment robustness (e.g., maintenance, generalization, and transfer of training) against considerations of the inevitability of environmental change, the continuous reorganization of adaptive patterns, and transitional aspects of performance. As a shorthand, I refer to this latter set of dimensions as open system constraints and assert that they set natural bounds on the effects of interventional strategies founded on the traditional “learn it, store it, use it” philosophy of training (models 2, 3, and 4 above).

ROBUSTNESS AND HEALTH PSYCHOLOGY

Who Cares About Persistence of Effect?

What do needle aversion, treatment-induced pain, obtaining a second surgical opinion, hospital-related stress, and tracheostomy dependence have in common? They are among the very few clinical targets in contemporary health psychology/behavioral medicine that are time limited or context bound. Almost every other domain of basic and applied work involves problematic patterns (relating to acute or chronic disease or health promotion) requiring continued vigilance, effort, and motivation on the part of the patient. Thus, as in traditional psychotherapy, a concern for the stability and carryover potential of all manner of interventions should be mandated.

To appreciate how widespread and compelling the mandate actually is, one has only to peruse the health psychology journals. In the area of high risk life-style change (e.g., treatment of cigarette smoking, alcoholism, obesity, and the like) almost no studies are published without a follow-up assessment, often in months, sometimes in years posttreatment. This attention to persistence of effects may be due to the known relapse proneness of individuals with addictive problems or to the nature of the interventions themselves (often involving self-management components designed to provide patients with the skills to actively and continuously treat themselves). In the analysis of compliance or adherence to chronic illness treatment regimens, it has likewise become de rigueur to determine whether patients are using newly gained knowledge or skills in their extratherapy environments, and whether they are doing so correctly and consistently enough to bring about a medical stabilization of their disorder (cf. Haynes, Taylor, & Sackett, 1979; Karoly, this volume; Meichenbaum & Turk, 1987).

The problem of adherence or compliance with physicians’ prescriptive or preventive instructions is often considered to be a variant of the maintenance problem (cf. Stuart, 1982). However, it is important to distinguish between the determinants of order- or instruction-following and the factors that contribute to the temporal persistence of learned and practiced behavior. In the former
case, there may have been no information transmitted, no intention to act, and no new learning taking place. If the patient fails to follow through on a physician's (often unrealistic) expectations, such a "failure" must be distinguished from failures of motivation/performance that have traditionally been investigated within learning and social-cognitive theory.

Nevertheless, studies investigating a novel intervention, or those mainly concerned with short-term effects, continue to be published without benefit of continuity analysis. Recent interventive research on such topics as weight loss by means of worksite competition (Cohen, Stunkard, & Felix, 1987), biofeedback-assisted relaxation for high blood pressure (McGrady, Woerner, Bernal, & Higgins, 1987), compliance with cancer therapy (Richardson et al., 1987), self-directed hemodialysis (Kirschenbaum, Sherman, & Penrod, 1987), and feedback training for the self-control of tinnitus (Ince, Greene, Alba, & Zaretsky, 1987) all failed to incorporate a follow-up assessment. In each case, the effects noted from pretreatment to the termination of the clinical program could hardly be expected to persist or generalize automatically or perfectly.

Thus, a focus on the robustness of effects is widespread in health psychology, although not yet uniform. Considering the relative youth of the field, it is not entirely surprising that the experimental demonstration of a treatment's initial impact over any notably intractable problem is worthy of publication, irrespective of the staying power of the changes engendered.

However, the critical question at hand is not how much attention should ideally be paid to treatment robustness, but whether health-related interventions have yet proven themselves capable of yielding long-lasting and generalizable results when follow-up assessments are conducted. Unfortunately, this question is not an easy one to answer (or to answer with a simple yes or no).

**Methodological Issues**

All psychosocial interventions designed to enhance patient control over illness or illness risk are predicated on the assumed correctness and potency of the prescribed medical regimen, that "doing as instructed" relates in a predictable fashion to health status. When prescriptive potency is weak or moderate (as is apparently the case in many chronic illnesses; cf. Haynes et al., 1979), the effects of treatment are confounded with the vagaries of neurobiology. The failure to note this possibility has no doubt yielded frequent Type I and II errors in the analysis of treatment efficacy.

However, even if there were a definite linear relation between health (including medication-taking) behavior and biologic status, interpretive problems would still arise. Consider, for example, the diversity of assessment questions and measurement methods available in health psychology. Different investigators undertaking a determination of whether treatment X yields strong and durable effects as applied to disease Y might (a) select different samples and sampling methods, (b) deliver and schedule treatment X differently, (c) examine divergent forms of program adherence (e.g., attendance at aftercare meetings vs. continued implementation of self-management strategies) via divergent means (e.g., self-report, observer ratings, etc.), (d) assess clinical (disease) end points differently, or (e) utilize disparate data analytic strategies (cf. Grady & Wallston, 1988; Karoly, 1985). Further, if the investigator wishes to pinpoint the determinants of nonadherence he or she may elect to study passive elements (forgetting), active resistance (missed appointments), or unconscious forces (self-deception). Variability in such strategic decision-making will impact differentially on the internal and external validity of the research, making it unlikely that a ready consensus will be obtained in regard to the original question ("Are the effects of treatment X maintained?").

Some unique methodological and conceptual issues are likewise associated with robustness studies. The analysis of maintenance or generalization of effects requires one or more follow-up assessments. The expense of such measurement operations often leads to compromise and inconsistency; for example, when face-to-face contact is sacrificed for telephone interviewing, when standardized measures are discontinued, or when single measures are utilized in place of multidimensional indices (capable of providing convergent evidence for the lastingness of treatment effects) (cf. Mash & Terdal, 1980). Further, when contacting program participants is difficult (e.g., locating patients released from alcohol treatment programs), the tendency is to analyze data from participants who may be unrepresentative of the original sample. Indeed, some evidence suggests that better follow-up data (indicative of continued adaptive success) come from the easy-to-locate subjects (Lee & Owen, 1986).
In addition, some forms of generalization of health-relevant changes do not easily yield to analysis. While the study of temporal and spatial persistence (generalization over time and across settings) has been frequently attempted, response generalization—changes in responses similar to but not identical with those originally targeted for treatment—has rarely been investigated in health psychology applications. Perhaps this is because theoretical guidelines for what to expect are lacking or inconsistent. For example, if a person learns to give up cigarettes, can we reasonably expect him or her to be better able to control overeating or the abuse of alcohol? Similarly, if a person is trained to manage one aspect of a complex medical regimen, can we expect that other regimen demands will be likewise improved? Patterns of covariation among diverse health or illness behaviors are complex and not readily linked to common external or internal mediators (Carmody, Brischetto, Matarazzo, O'Donnell, & Connor, 1985; Harris & Guten, 1979; Mechanic & Cleary, 1980; Orme & Binik, 1989).

In view of (a) the apparent failure of conventional and behavioral interventions to permanently curb health-risk patterns, (b) the alarming picture of widespread patient nonadherence to chronic illness management regimens initiated within the traditional physician-patient exchange, and (c) the known methodological limitations within the field, a strongly cautious tone has been set for the fledgling enterprise of health psychology. The operative mode is to assume that psychosocial interventions (from group therapy to primary prevention) do not normally produce durable or transferrable effects unless special attention (both substantive and methodological) is directed to these considerations.

And what if this special attention is paid? As yet, it appears that investigators are still divided as to how best to specifically enhance their treatments to attain robust outcomes, and the division tends to be along "party" lines. Further, researchers tend to be disease or problem specific as well as method specific. We, therefore, must be content to render our critical judgments one disease, one intervention, one theory, and often one research team at a time.

In view of the nascent state of knowledge about treatment potency in health, I shall rely on the previously noted conceptual frameworks from the field of psychotherapy to provide an analytic frame of reference. Beginning with a discussion of the application of the behavioral engineering approach to the problems of health promotion and illness adjustment, I shall concisely and selectively review contemporary perspectives on the robustness of clinical health interventions.

**BEHAVIORAL ENGINEERING**

As noted previously, some may feel justified in ignoring questions of robustness by asserting that life is complex, and that events that follow therapy-based change can and will act capriciously to undermine learning and motivation. Yet, it is but a small step to the position that learning and performance are complex, and that transfer and generalization should be planned rather than lamented.

One avenue for acknowledging the complexity inherent in skilled action is to assume domain, task, or setting specificity. This view (popular within educational and human factors psychology) is predicated on the assumption that articulate performance is highly context dependent (rather than being solely practice dependent). Consider, for example, the seemingly simple act of taking one's medication every 6 hours. All that is apparently required is access to a watch or clock, a supply of pills, and the availability of water to facilitate swallowing. On the surface, it would appear that the skill of pill-taking could be trained in the doctor's office and would be readily transferrable to most other settings—work, home, indoors and out, night and day. Yet we know that at least one third of prescribed medications are not taken or are taken incorrectly (Haynes et al., 1979). Therefore, taking a pill might profitably be seen as an act strongly tied to environmental contingencies, as well as under the functional control of distinct stimulus conditions. Cues that remind the patient of the appropriate time to take a pill may not be as easily discernible at night as they are during the day, at work relative to home, or in the company of others versus when the patient is alone. The social response to pill-taking might likewise vary: One's spouse regards it with approval, but one's boss views it with suspicion. In addition, the sequence of behavioral steps necessary to follow through on doctor's orders may differ considerably depending on one's locale, especially if certain settings present real or perceived obstacles to task completion. Thus, an individual may well remember to take his pills at work and be reinforced for so doing, but find it logistically difficult to stop what he is doing, retrieve his medi-
cine, and take it without impairing his job performance or concentration.

An important pragmatic implication follows from this line of reasoning: A thorough task analysis is a prerequisite to skills training, and involves the construction of a normative model of necessary actions and decisions as well as a set of modified models matched to the unique demands of important and expectable situations.

After carefully analyzing the task requirements, monitoring ongoing performance, and instigating health-engendering behavior changes via contingent reinforcement, modeling (observational learning), extinction, time-out, contingency contracting, and similar training methods (see Kanfer & Goldstein, 1986), the behavioral engineer may have actually accomplished only half of his or her therapeutic mission. When powerful change-inducing procedures are withdrawn, client responses can revert to preprogram levels because the natural contingencies may favor old (maladaptive) behaviors and because the client can usually discriminate between the payoffs associated with the treatment and posttreatment environments (Karoly & Harris, 1986). Several practical methods of redress follow from this state of affairs.

To promote persistence (maintenance), generalization, and/or spread (transfer) of training, the behavior analyst relies on the fact that stimuli that resemble training stimuli come to acquire a degree of functional control over new learning in proportion to their sharing of common characteristics. Therefore, the programming of generalization (over time or across settings) can be deliberately implemented through procedures that allow a wide array of setting events to become associated with correct (reinforced) responding. Such procedures are directed at transcending the differentiation and specificity of learning processes that, although a tribute to our innate capacity to make fine stimulus and response distinctions, are clearly antithetical to generalization. In a sense, generalization occurs when discrimination (specificity) breaks down.

Table 36.1 lists several commonly employed strategies for enhancing the persistence and transfer potential of behaviors acquired by means of operant and/or classical conditioning or observational learning methods. Each attempts to render newly learned responses “extinction proof.” The utilization of such procedures within health psychology appears to be expanding. However, the findings to date concerning the effectiveness of behaviorally engineered health behavior training have been mixed.

In a well-known recent study, Lund and Kegeles (1984) examined the maintenance process in the context of a preventive dental program for seventh-graders. In prior experiments, the authors had shown that contingent rewards could increase daily fluoride rinsing in children. To forestall a return to baseline rates of rinsing, the authors instituted two maintenance strategies: partial reward scheduling and self-management instruction. Seven hundred thirty-two boys and girls, almost equally divided into urban and suburban schools in eight different locales, participated in either partial or saturated reward programs with half also receiving self-management training or no additional instruction. Rewarded youngsters received prizes for frequency of mouth-rinsing and those instructed in self-management were allowed to chart (self-monitor) their own progress, select their own prizes, and were encouraged to associate mouth-rinsing with a high-frequency behavior.

Compliance with monitoring procedures (persistence of training) declined over time and dropped off sharply after rewards were initially discontinued, as would be expected. However, neither the partial schedule, nor the instruction in self-management, yielded any differential rates of maintenance. The failure of the partial reinforcement extinction effect clearly disconfirms scores of laboratory studies. Further, interpreting the ineffectiveness of the self-management program is complicated by the fact that the instruction seemed to assist urban students while actually being detrimental to suburban participants. The authors concluded that “If the goal is to obtain long-term behavior change through relatively short-term education/intervention, it is clear that we do not currently know how to achieve it, notwithstanding expressions of confidence in the power of psychological knowledge” (p. 366).

While it would be premature to conclude that behavioral methods for enhancing maintenance have been oversold, it seems reasonable to conclude that their complexity and subtlety have been insufficiently appreciated.

In commenting on the Lund and Kegeles results, Suls (1984) suggested that the level of analysis employed may have been too narrow. The dental rinsing behavior of the young participants may have interfered with other aspects of their daily health routines, may have been incompatible with broader goals, or may have already been well es-
Table 36.1. Some Procedures for Promoting Maintenance and Transfer Within a Behavioral Engineering Perspective

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>PRACTICE</th>
</tr>
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<tbody>
<tr>
<td>Method of Sufficient Exemplars</td>
<td>Introducing enough samples of diverse settings and responses to permit the learner to function skilfully under different (even unforeseeable) circumstances. Expanded stimulus control permits the pill-taker (see text) greater freedom of action.</td>
</tr>
<tr>
<td>Method of Common Stimuli</td>
<td>Determining what stimuli or events will occur in the client's natural environment (generalization setting) and systematically introducing them during training (where possible).</td>
</tr>
<tr>
<td>Programming Natural Reinforcers</td>
<td>Utilizing real-life, normally available rewards and reward agents to strengthen desirable behavior. For example, it is insufficient for the dentist to reward a child's flossing; parent-provided praise can sustain the health-promoting actions far longer. Peers are also useful natural response facilitators.</td>
</tr>
<tr>
<td>Maximizing Response Availability</td>
<td>Training to criterion and allowing sufficient practice will ensure that the desired response (e.g., cigarette refusal) is available across contexts and times.</td>
</tr>
<tr>
<td>Intermittent Schedules and Schedule Thinning</td>
<td>Arranging to use less frequent reward subsequent to skill acquisition in order to enhance resistance to extinction. Rewards can likewise be delayed in delivery or gradually faded out altogether in order to strengthen performance under real-world conditions.</td>
</tr>
<tr>
<td>Method of Mediated Generalization</td>
<td>The operant equivalent of self-control. Learners are taught a verbal or cognitive technique to use either as a cue or reinforcer for themselves. The mediator helps maintain the adaptive response (but what maintains the mediator?).</td>
</tr>
<tr>
<td>Use of “Booster” Sessions</td>
<td>Denying the arbitrary dividing line between treatment and follow-up, clinicians provide periodic retraining and new training opportunities.</td>
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Note. Adapted from Baer (1982); Goldstein, Lopez, and Greenleaf (1979); and Kazdin (1989).

tablished but with a different brand of fluoride rinse. Thus, the interventive methods may have been adequate, but applied without benefit of necessary collateral knowledge. O'Leary (1984) inquired into the reinforcing power of the rewards (gliders, pens, yo-yos) used and also questioned both the immediate and long-term value of the target, fluoride rinsing, with adolescents. Again, it is not the utility of the behavioral or social learning models that is at issue, but their mode of application in the specific context of adolescent dental rinsing behavior.

Closer examination of the self-management intervention employed by Lund and Kegeles (1984) may shed further light on the meaning of the findings. As noted in my chapter on self-management earlier in this volume, the researcher must distinguish between exposure to self-management-based procedures (many of which are covert and designed to be carried out outside the surveillance of clinicians) and their acceptance and use by program participants. In this particular case, it is even doubtful whether the terms “training” or “treatment” are appropriate to describe the didactic portion of the intervention (the children were guided or encouraged rather than taught to use certain strategies). However, my aim is not to defend the behavioral engineering framework (indeed, self-management is more correctly considered a person-centered approach), but rather to suggest that careful pretraining assessment, treatment tailoring, and the intensive analysis of learning and motivation over the course of therapy and beyond are frequently lacking in large-scale, group comparison studies.

My reading of the literature suggests that single-case (or small N) experimental analyses of behavioral engineering technologies applied to health behavior maintenance often yield more encouraging outcomes than do large N experiments such as the one carefully conducted by Lund and Kegeles (1984). As I have noted, careful attention to the details of assessment and training may simply be more common in small N research. However, it is also possible that, in single case designs, the participants are more highly motivated, less dysfunctional, and more likely to benefit from the heightened professional attention than those randomly assigned to standardized treatments in group studies. Therefore, until we can rationally decide whether the technology, its manner of application, or the clinical target are to blame for occa-
sional maintenance failures, we also must attend to the periodic successes of behavioral engineering.

The inclusion of parents as natural reinforcers subsequent to traditional behavioral training has, for example, been shown to be a useful strategy for maintaining regimen compliance in juvenile diabetics (Epstein, Beck et al., 1981; Lowe & Lutzker, 1979). Unlike the approach taken in the Lund and Kegeles (1984) study (and in other attempts to manipulate in-therapy events to promote subsequent persistence of learning), these investigators did not make sharp distinctions between treatment and follow-up, assuming that the programming of maintenance involves, as Mash and Terdal (1980) have noted,

`provision of ongoing, contemporaneous, and presumably measurable contextual events that serve to influence behavior. Both initial effects and later effects (sometimes referred to as maintenance) should be directly related to continued representation of this programming. (p. 116)`

Another means of transcending the distinction between treatment per se and follow-up involves the provision of additional professional treatment at periodic intervals subsequent to the formal termination of therapy. Popular in the domain of addictive disorders, the use of “booster sessions” has yielded mixed results (cf. Brandon, Zelman, & Baker, 1987; Perri et al., 1988). Because these sessions rarely involve additional trials of operant or classical conditioning interventions, the mechanism(s) behind “behavioral” boosters remain difficult to determine or evaluate. Multicomponent boosters (including cognitive and social psychological interventions) are, in fact, more the norm.

Programming reinforcers for health behavior at the worksite represents another means of extending the power of contingencies for the sake of achieving durable change. Cigarette smoking, weight control, dental health, stress management, and occupational safety are among the common targets of programs utilizing operant principles to induce both change and maintenance (Cataldo & Coates, 1986; Fisher, Lowe, Levenkron, & Newman, 1982). Results are promising, although often inconsistent insofar as long-term behavior change is concerned. As in all new applications, program variability is great. Further, many programs involve combinations of behavioral engineering, educational, and attitude modification elements (precluding specific assessment of the power of any single modality).

Finally, many behaviorally based studies of chronic health problems such as pain, eating disorders, asthma, elimination disorders, arthritis, and the like that did not specifically attempt to train for maintenance, have nonetheless found evidence of significant persistence at follow-up (cf. Siegel, 1983; Snyder, 1989; Varni, 1983). However, despite the success of token economies and contingency contracts in bringing about apparently robust changes, the majority of behavioral investigators still eschew the “train and hope” strategy in favor of explicit maintenance programming (Baer, 1982; Wildman & Wildman, 1980).

In sum, while not unequivocally positive and not without their interpretive difficulties, studies of maintenance that have been based presumably on learning principles have opened new vistas for acute and chronic illness management as well as for health promotion. Particularly when combined with other training methods, the behavioral engineering approach to clinical robustness merits continued investigation.

**PERSON-CENTERED PERSPECTIVES**

In recent years, epidemiological and sociopolitical trends have underscored the role of the individual in health-care and illness prevention (Matarazzo, 1984). Whereas the behavioral engineering approach just discussed does not ignore individual differences (indeed, behavioral clinicians have often been acutely sensitive to the need to particularize their interventions), it does not penetrate conceptually or procedurally to the level of mediation or to the active internal processes wherein personal and environmental events are detected, stored, and transformed over the course of adaptation. Personality portrays the learner (rather than the techniques of learning) as pivotal to the long-term display of health-promoting behavior.

Relatively stable aspects of functioning, in the form of personality traits and demographic characteristics, have long been popular in the literature on maintenance and compliance, probably because they can be expeditiously assessed. Data on trait and demographic differences have been employed to determine treatment assignment (matching) and to predict (or postdict) long-range outcomes (which in turn permits better therapy-patient matching). Psychosomatic models (circa 1950) and some contemporary personality conceptions (e.g., the hardness concept, the coronary-prone [Type A] pattern, etc.) invoke
etiological hypotheses as well, with indirect implications for treatment persistence.

In their classic review of medical adherence, Haynes et al. (1979) tabulated general patient characteristics (e.g., attitudes, knowledge, etc.), sociodemographics, psychosocial factors (e.g., family size and stability), and psychological factors (e.g., self-concept, dependency, locus of control, etc.) in terms of their positive, negative, or null associations with indices of compliance. Despite problems with "box score" sorts of outcome summaries, implications of the Haynes et al. review are widely cited (cf. Phillips, 1988) as suggesting that static person-centered concepts yield equivocal findings, with more "encouraging" patterns deriving from indices touching on family and related interpersonal processes.

On the other hand, it has been suggested (Kasl, 1975; Meichenbaum & Turk, 1987) that patient variables may prove to be useful predictors of adherence when considered in combination, that is, when aggregated into high-risk profiles. Swanum and McAdoo (1989), employing the 13 validity and clinical scales of the Minnesota Multiphasic Personality Inventory (MMPI), matched "rapid relapers" and short-term successes following a residential chemical dependency treatment program, and found, for example, that maintenance failure in patients with clinical elevations could be accounted for by a profile of factors involving "psychological turmoil" (i.e., depression, anxiety, and sleep problems). Multivariate procedures are likely to prove instructive, and should be pursued in the future. However, I would suggest that, in addition to employing multitrait profiles, investigators pursue the interactive effects of personality patterns and treatment modes, as well as the three-way interaction between trait profile, treatment type, and the explicit type of maintenance training in the prediction of long-term adherence.

Being pathology centered, the MMPI and other popular clinical measures may not be the best or only multidimensional assessment tools to aid in the prediction of long-term health outcomes (cf. Leon, Finn, Murray, & Bailey, 1988). The NEO Personality Inventory (NEO-PI; Costa & McCrae, 1985) and the Hogan Personality Inventory (HPI; Hogan, 1986) are both designed to tap the "big five" personality dimensions (neuroticism, extraversion, openness to experience, agreeableness/sociability, and conscientiousness, as they are variously called) and consequently may prove to be more generally useful. For example, using a battery of basic physical fitness tests (indirect indices of the persistence of individuals' health-promoting behaviors), Hogan (1989) showed that the HPI provided better and clearer predictive patterns than did the MMPI. She found, among other things, that physical endurance is the most predictable fitness variable and is most closely related to the conscientiousness dimension (labeled "prudence" in the HPI). McCrae and Costa (1989) likewise argued that their NEO-PI can predict the extended outcomes of psychoactive interventions.

Trait-like variables, when statistically related to adherence patterns, sometimes tend to evoke pessimistic prognostic verdicts owing to the widespread belief that durable characteristics (especially demographics) are not amenable to change. When employed cross-sectionally, trait concepts are also subject to misleading causal interpretations and to the effects of measurement artifacts (cf. Friedman & DiMatteo, 1989; Krantz & Hedges, 1987). Therefore, caution is advised for those who rely on traditional personality constructs, especially because medical system backlash can be the ultimate consequence of too heavy an emphasis on descriptive behavioral science in a functionalist biologic discipline (Angell, 1985).

An alternate model of person-centered analysis in health psychology is associated with a cognitive social learning perspective (Bandura, 1986; Kanfer & Karoly, 1972; Mischel, 1973). Traits are replaced by person variables, which are not expected to predict cross-situational consistencies. Rather, as Mischel (1986) noted, these constructs

... suggest useful ways of conceptualizing and studying specifically how the qualities of the person influence the impact of stimuli ("environments", "situations", "treatments") and how each person generates distinctive complex behavior patterns in interaction with the conditions of his or her life. (p. 307)

Five types of person variables have been proposed by Mischel, including (a) the competencies involved in generating intellectual and behavioral responses, (b) categorization (encoding) strategies for unitizing events and construing self and others, (c) expectancies associated with behavior-outcome and stimulus-outcome relations, (d) subjective values (incentives and aversions), and (e) self-regulatory systems and plans. All of these person variables could conceivably be related to the processes through which patients achieve long-term control over aspects of acute and chronic illness and over risk-reducing and health-promot-
ing behavior. Most have been studied empirically, either by themselves or as part of multidimensional intervention programs. Because several notable person-variable domains have been reviewed in depth elsewhere in this volume (e.g., problem-solving competencies, self and social cognition, self-efficacy expectations, and self-regulation), I shall devote the bulk of my attention to the multicomponent relapse prevention (RP) model, which seeks to integrate most, if not all, of the five social-learning functions articulated by Mischel (1973, 1986).

However, before addressing RP concepts and health applications, I turn briefly to a person variable that has been somewhat overshadowed by the others—the area of subjective values. Preferences and aversions (positive and negative incentives) are said to energize an individual's actions, providing the motivational impetus not only for short-term change, but for long-term maintenance of change. A person may well possess health-engendering thoughts and self-appraisals and the requisite health-promoting behavioral skills and still lack the motivational arousal necessary to overcome the inevitable physical and psychic obstacles that life sets forth along the bumpy path to success.

Arousal or action potential has traditionally been thought to depend on such factors as needs (internal states of deprivation), values associated with sought-after outcomes, and the perceived probabilities (expectancies) of success. These dimensions have recently been conceptualized, according to a model of energization developed by Brehm and his colleagues (cf. Brehm, Wright, Solomon, Silka, & Greenberg, 1983; Ford & Brehm, 1987; Wright, 1987; Wright & Brehm, 1989), as constituting potential motivation that offers an insufficient account of the conditions necessary to explain action. In the energization formulation, potential motivation represents an upper limit to arousal, which is translated into actual motivation only through the additional mediational link provided by the individual's appraisal of how much effort is necessary, possible, and warranted in the situation in order to obtain the outcome. Brehm and his colleagues argue that effort underlying instrumental behavior is related to, but partially independent of, the situation's potential motivation (needs, values, and expectancies). The joint effect of task difficulty and potential motivation needs to be determined when seeking to predict action because the degree of energization and the attractiveness of the goal (its valence) are interactive products rather than main effects.

The energization hypothesis predicts that individuals will not be aroused by easy tasks, no matter how much they need or value a potential outcome, nor will they be aroused if the effort required for goal pursuit outweighs the importance (value) of the incentive. Such a viewpoint can be readily applied to explain the maintenance failure reported by Lund and Kegeles (1984) in their fluoride rinsing study (e.g., the response was simply too easy) and, perhaps, to the uncountable clinical failures that result when nonvoluntary patients are subjected to treatments that they neither truly desire nor comprehend.

A similar effort-centered model has been pursued by Eisenberger and his colleagues (cf. Eisenberger & Masterson, 1983; Eisenberger, Mitchell, & Masterson, 1985; Eisenberger, Mitchell, McDermitt, & Masterson, 1984; Eisenberger & Shank, 1985) and expressly addresses questions of persistence following learning. These investigators consider the investment of effort in a task as a response capable of being directly trained (reinforced), the so-called learned effort hypothesis, and one that pays dividends in terms of increased moral responding as well as enhanced robustness (maintenance and transfer).

The energization and learned-effort perspectives clearly deserve the attention of health psychologists interested in assessing motivation before the fact and assisting their patients to work persistently toward illness management or health promotion goals.

A perspective that has already changed the face of clinical intervention is the relapse prevention approach of Marlatt and his associates (cf. Marlatt & Parks, 1982; Marlatt & Gordon, 1985). Originally developed as a self-control-oriented, persistence-training intervention to combat relapse among people with addictive disorders (typically alcoholism, obesity, or cigarette smoking), the RP approach is broadly applicable to chronic disease management and to health promotion efforts—indeed to any domain in which disengagement from complex, health-facilitative tasks is a possibility (cf. Kirkley & Fisher, 1988; Meichenbaum & Turk, 1987).

Rather than asking how to make treatment more lasting, Marlatt and his colleagues have sought to identify the point in the posttherapy stream when learning or motivation break down and the conditions that surround that event. Be-
cause, in the addictions, most relapses occur within 90 days of treatment termination, Marlatt expected that a set of common elements might be found across habitual smoking, alcoholism, or heroin addiction. Although in his early work with chronic alcoholics Marlatt found that social stress and frustration were highly associated with recidivism, his RP model focuses on both situational factors and the cognitive interpretations that attend a lapse or relapse episode. Because I am here dealing with person-centered constructs, I shall focus on the latter set of elements.

Expectancies figure prominently in the RP framework. Relapse is a process that is seen as highly sensitive to three "interlocking cognitive mediators": self-efficacy, outcome expectancies, and attributions of causality. It is assumed that while an individual is voluntarily abstinent (that is, acting in accordance with an imposed set of rules governing the target behavior), he or she experiences a sense of self-efficacy. The sense of personal control continues until a high-risk situation is encountered (typically involving negative emotional states, interpersonal conflict, or social pressure). If a coping response is emitted, self-efficacy is enhanced. But if the person lacks the skills to cope, efficacy is diminished. Further, if the individual holds positive expectancies concerning the consequences of the prohibited or forbidden substance, relapse or lapse probability is heightened. If a lapse (a single slip or transgression) actually occurs, the possibility of total program cessation is further strengthened if the person additionally subscribes to an all-or-nothing attributional pattern called the abstinence violation effect (AVE). The AVE reflects guilt, self-blame, and loss of personal control as well as a cognitive dissonance component ("I can't be an abstainer if I just let myself indulge; thus, I must not want to abstain").

Combating the forces that press for relapse, then, requires a multicomponent program, drawing on a variety of cognitive, self-managemental, and behavioral skills training modalities and touching on the full range of Miscelhanous person variables. Both specific and global intervention strategies are involved, including self-monitoring to determine predictable high-risk contexts (based on previous lapses), coping skills training to deal with interpersonal stressors, educational and decision-making interventions to offset positive expectancies about the rule-violating behavior, and programmed relapse and cognitive restructuring to defuse the AVE. To help develop a more adaptive life-style that can displace the addictive or unhealthful activity, RP also includes exposure to "positive addictions" (e.g., running, meditation, etc.), practicing a detached attitude toward one's urges, and stimulus control methods that seek to eliminate situational cues to problem behavior.

The effectiveness of RP methods and their variants in facilitating the robustness of training is impressive, despite the relative newness of the approach and its apparent complexity (cf. Brownell, Marlatt, Lichtenstein, & Wilson's 1986 review).

Relative to the behavioral engineering methods previously discussed, RP and other person-centered modalities are more time consuming, require greater patient involvement and psychological mindedness, and rely to a greater extent on patient self-report in both diagnosis and case management. Further, RP interventions in particular have not always been conducted such that their allegiance to Marlatt's formulations could be readily discerned. In addition, as Brownell, Marlatt, Lichtenstein, and Wilson (1986) have noted, some studies can be faulted for small sample sizes, short follow-up periods, modest treatment effects, and so forth. . . . However, the studies with results in favor of relapse prevention out-number those with negative results; therefore, at the very least, more vigorous testing of the model is warranted. (p. 778)

ECOLOGICAL APPROACHES

Despite the measurable, if inconsistent, successes of the health maintenance programmers, relapse nonetheless continues to occur. After failing to improve smoking abstinence rates subsequent to establishing several maintenance-enhancement training programs, Brandon et al. (1987) reached the sobering conclusion that maintenance sessions prolonged abstinence only as long as such sessions were ongoing. This result is consistent with the fact that continual social support and contact is at the heart of effective self-help programs such as Alcoholics Anonymous. (p. 782)

Indeed, the assumption that the social and physical environment exerts a powerful influence (for better or for worse) over health practices has led investigators toward a rediscovery of ecological models of behavior control.

The critical role of the behavior setting is, of course, inherent in operant and other learning-based perspectives and is widely accepted within transactional or "reciprocal determinist" views of
personality (Bandura, 1986; Kanfer & Karoly, 1972; Mischel, 1986). However, working in and with the environment to affect lasting personal change and targeting populations and the interactional network patterns, represents a relatively nontraditional approach for most clinicians. If spouses, friends, families, or communities are going to be included in the process of achieving durable health-relevant changes, new models, or at least extensions of existing frameworks, are required.

After reviewing attempts to extend learning theories toward a conceptualization of differential environmental impact, Higginbotham et al. (1988) characterized the resultant clinical case formulations as “coarse and inadequate,” with settings seen as collections of either stimuli or significant others operating unilaterally or as reciprocal sources of stimulus control. Citing O'Donnell (1977), Higginbotham et al. (1988) averred that the generalization, maintenance, and transfer questions were not being formulated properly. As these investigators posed them, the key questions are, “Why has the natural environment not developed or supported the desired behavior?” and/or “Why are our procedures not readily adopted in natural settings?” They believe the answers are to be found not just in the clients or in the training, but within the settings and their specific transactional norms (cf. Heller's 1979 discussion of social support and Price's 1979 analysis of social ecological models as applied to issues of robustness).

Higginbotham et al. (1988) offered network analysis as a comprehensive guiding conceptual model for deciphering the structural organization of environments and for uncovering their capacities to strengthen (or weaken) individual behavior change. Among the basic propositions of a network approach are (a) the notion that while individuals freely choose to enter most social contexts, their opportunities and resources are constrained by their assigned or assumed position in the social system and by demographic factors; (b) the idea that networks can be characterized according to the individual’s objectives (to obtain social support, to achieve a time-limited concrete goal, or to attain a long-term collective goal); and (c) the assumption that networks can be described along the dimensions of capacity (for providing support), resource exchange style (frequency, duration, and channel of delivery of support), and network intensity (or the degree to which the person is bound by ties and obligations).

Higginbotham et al. (1988) presented a series of intriguing hypotheses about deviance maintaining and aversive networks and about change-enhancing systems that apply as well to the health psychologist's clinical interests as they do to the concerns of the psychotherapist. For example, their Hypothesis 7.2 states that “Client network capacity characterized by weak delivery system infrastructure, i.e. small size, only one or two dense clusters, low reachability, and structural instability, will fail to provide social exchange resources capable of sustaining behavior change” (p. 189). Not only can such a social network structure be a direct source of stress, but, for individuals who are particularly dependent (the seriously chronically ill, the wheelchair bound) or inadequately skillful, it can exacerbate their existing problems, placing them at increased risk for illness, injury, and for medical noncompliance.

Problem-solving and self-regulatory capacities, among the most important of Mischel's (1973) person variables and among the most sought-after clinical commodities in health psychology (Holroyd & Creer, 1986; Karoly, this volume; Mahoney & Arnkoff, 1979), are themselves subject to disruptive environmental influences, as reflected in Higginbotham et al.'s Hypothesis 7.3:

Client networks manifesting a resource exchange style dominated by nonreciprocal interactions and lacking multiplex ties decrease social support capacity over time while increasing dependency and powerlessness. Such conditions are devoid of opportunities for clients to initiate self-control procedures or receive social reinforcement for clinical behavior change. (p. 192)

The authors also describe hypotheses concerning the nature of networks capable of empowering the individual and sustaining therapeutic change (and interested readers are urged to consult the original source).

While the health literature has not yet been explicitly influenced by Higginbotham et al.'s (1988) hypotheses, the general trend in research has certainly been consistent with the fundamental tenet of network theory: that social contexts can create or constrain opportunities for the long-term implementation of health- and illness-management skills and motives. Applications differ with regard to how deeply they delve into structural and functional network characteristics and how extensively they analyze maintenance.

For example, McCrady (1989) has noted that the RP model tends to focus on coping at the
individual level, but can logically be extended to consider significant others as sources of stress and as relapse prevention agents. She proposes that support network quality, the density of reinforcement received from family members for abstinence, and the probability of reward withdrawal from family contingent on misbehavior all combine to influence likelihood of successful maintenance. Similarly, spouse cognition (expectancy, attribution, self-efficacy beliefs, etc.) can influence coping probability for both self and patient. McCrady (1989) conjectured that the model becomes increasingly complex as it looks beyond the spouse to include family, friends, coworkers, and members of self-help groups.

Indeed, perhaps the unwieldy nature of network diagnosis and manipulation has worked to limit the kinds of interventions thus far attempted. In their studies of childhood obesity treatment, Epstein and his colleagues (Epstein, Wing, Koeske, Andrasik, & Ossip, 1981; Epstein, Wing, Koeske, & Valoski, 1987) have opted to treat obese children and obese parents together. This approach not only makes for cost-effective use of professional effort, but capitalizes on the modeling and reinforcing power of parents. A 5-year follow-up of this program (Epstein et al., 1987) revealed that maintenance of weight loss was best for children treated with their parents as compared with children treated alone or in a control group. Interestingly, when Perri and his associates (Perri et al., 1987) sought to use peers as supporters for adult obese patients, the evidence at 18-months' follow-up failed to confirm the incremental utility of a social network maintenance enhancer. Thus, it remains unclear precisely for whom (child vs. adults) network input is best applied and how far from home clinicians can look for support.

Moving away from high-risk addictive disorders to problems of medical regimen adherence, the work of Kaplan and Hartwell (1987) provides additional perspectives on the utility of a network model. Adults with non-insulin-dependent diabetes were randomly assigned to one of four treatments (diet, exercise, diet plus exercise, or diabetes education). Independent of their group assignment, patients provided data relevant to their support system by completing the Social Support Questionnaire (Sarason, Levine, Basham, & Sarason, 1983) when they entered the study. Employing diabetes control (assessed via glycosylated hemoglobin assay) as an index of maintenance, Kaplan and Hartwell found differential patterns of relations between support dimensions (network size and satisfaction) and blood glucose for men and women. For women, the size of the support network varied directly with failure to attend sessions and failure to complete a diary, whereas network satisfaction was positively correlated with good metabolic control. For men, high social network satisfaction was associated with poor metabolic control. The authors argued that social support may serve as a stress buffer to a greater degree for women than for men, although acknowledging that the complex pattern of findings renders their explanations tentative.

It is noteworthy that Kaplan and Higginbotham (1987) discovered ecological factors to be differentially associated with gender, a person-centered variable. Other investigators (Cohen, 1988; Higginbotham et al., 1988) have likewise outlined mediational models wherein social systems are seen to affect health status indirectly through their influence on cognitive processes, emotional states, habit patterns, or aspects of psychophysiological individuality. Higginbotham et al. (1988), for example, conclude that maintenance and generalization of treatment gains depend on the operation of a cognitive "meta-skill" consisting of three competencies: (a) awareness of how network characteristics facilitate or impede empowerment, (b) the capacity to self-monitor network configurations, and (c) behavioral skills for achieving favorable network characteristics when disruptions occur. This formulation bears a close resemblance to Mischel's (1973) person variables and to an early cognitive-behavioral account (Karoly, 1981) of self-regulation and its subcomponents. Therefore, insofar as treatment is concerned, the most cost-effective locus of intervention is still the individual.

I am not suggesting (nor were Higginbotham et al.) that ecological models are literally reducible to person-centered ones. On the contrary, I believe that interventions at the macro level should be pursued, and that linear formulations of causation in the analysis of robustness must eventually give way to truly transactional renderings, wherein serious account is taken of the qualities of the individual as well as of the situation (cf. Ford, 1987; Powers, 1973).

**DYNAMIC ADAPTIVE SYSTEMS**

We come now to the final conceptual framework, one that differs from the others in that it is offered primarily in the spirit of hypothesis gener-
ation, with only piecemeal empirical support. It is, however, a perspective capable of consolidating previous concepts concerning performance stability (maintenance) with models of patterned (predictable) variability, growth, and adaptive change.

I begin with an admonition for most (but by no means all) purveyors of psychosocial treatment. When psychotherapists or health psychologists speak of supporting patient change, what they really seem to mean is supporting patient constancy (albeit a supposedly “healthy” constancy). The model, with slight variation, is that the patient is being helped to stop doing X, which is psychically or physically inappropriate, and to start doing Y, which is defined as healthful and adaptive. On the assumption that X has become easy and familiar (preferred), highly likely to be reinforced in the short run, and/or automatic (overlearned) and therefore resistant to change, the clinician must bring sophisticated and subtly powerful methods to the task of displacing X and establishing Y (which is usually more difficult and less preferred for the patient, at least initially). Behaviors such as X would presumably persist indefinitely without intervention, whereas Y-like activities need considerable and continued psychological and social sustenance. It is, therefore, only the change from X to Y that is supported. Once Y is in place, the clinician and the patient would have it remain in effect for as long as possible, generalize to other settings and people, and assist in the learning of new Y-like responses (transfer of training). In essence, the goal is to infuse Y with the same sort of “psychological inertia” that X was said to possess.

Unfortunately, the aim of establishing a behavior or behavior pattern (and its accompanying affect and cognition) as a durable, change-resistant, inertially guided, or otherwise permanent dimension of one’s life runs into both practical and conceptual difficulties. At the most fundamental theoretical level, what I have called open system constraints, such as time, situational forces, and internal growth processes, must be held constant for the notion of a fixed, adaptive habit pattern to make any real sense for mobile, proactive creatures living in an everchanging environment. Human action in the real world (outside the laboratory or consulting room) derives its meaning from the goals that push it, the contingencies that pull it, the settings that compel its form, duration, or intensity, and the idiosyncratic cognitive operations that link it both to the past and to the intended future. Because life’s background variables are in flux everywhere (except in test tubes or artificially controlled settings), a person’s hierarchically ordered goals move into and out of a dominant position in focal awareness as a result of being either temporarily satisfied or situationally postponed. Thus, no single action or action pattern—whether it be positively valenced (taking one’s medication, engaging in physical exercise, monitoring one’s blood sugar) or negatively valenced (avoiding alcohol, refusing cigarettes, etc.)—can retain invariant adaptive significance. At best, therapeutic goals can achieve periodic adaptive relevance. Therefore, it may be a serious tactical mistake to define compliance or adherence strictly in terms of strict rule-following or absolute behavioral continuity.

The concept of periodic adaptive relevance should not be taken to imply that health outcomes or health status vary in their importance. The threat of lung cancer is always real for the cigarette smoker, just as the threat of death or systemic damage is always relevant for the diabetic or asthmatic who fails to take needed medication. However, the specific actions that patients engage in during the normal course of self-care or self-directed risk reduction should not be thought of as rigidly scheduled or fixed in terms of their healing potential. The dieter, smoker, or diabetic is unlikely to remain committed to his or her health objectives if, during those times when eating, smoking, or taking insulin are not at issue, he or she remains nonetheless concerned, worried, or mindful of “staying on the program” (but see Kirschenbaum & Tomarken, 1982, for an opposing point of view).

I believe that most clinicians and their clients have an intuitive, if not explicit, understanding of the situation I have just described. Many instances of relapse, resistance, dropout, defaulting, and the like can readily be interpreted as reflecting goal or contextual realignments that may or may not threaten the patient’s medical status. Although this relativistic point of view is implicitly appreciated, I contend that when disengagements from the therapeutic path do occur, most of us continue to operate as though the client has somehow lost sight of an unassailable objective, and that the only feasible clinical task is to seek to reinstate it.

The alternative I propose is that, in addition to focusing on X and Y and the psychological states or outcomes that they represent, we must also (a) consider the variables that control the transitions or oscillations between states and (b) learn to determine when these transitions are adaptive or
maladaptive. Hence, in addition to training our clients in how to manage or control their states (of mind, affect, or behavior) we should seek to train them in the complex skill (or metaskill) of state transition management. This approach is predicated on the belief that variability (or change) is as fundamental in defining a person and his or her life circumstances as are the stable, prototypical elements. That we have considerable difficulty in adopting this mindset was expressed over a half century ago by Ralph Barton Perry (1938), a student of William James. Perry observed that

The practically habituated mind flies from perch to perch, and is aware of the perch rather than the passage. This is James's famous distinction between transitive and substantive states. . . . The discovery of James is that these transitive states, despite their obscurity, are none the less there, for the sensitive and practised eye. (p. 81)

Although contemporary psychologists are actively investigating transitional phenomena, their emphasis has been on rather molar events, such as the so-called midlife crisis or the stress-engendering transitions from junior high to high school, from childlessness to childrearing, or from productive work life to retirement. I am merely suggesting that day-to-day, moment-by-moment transitions, typically orchestrated around specific goal pursuits, is a unit of study likewise worth pursuing. Further, such an undertaking may enhance our ability to assist clients to adjust in adaptive ways to the changing circumstances of their lives, whether the purpose is the long-term assurance of physical or of psychological health.

Paralleling the discipline-wide emphasis on experiential states (which produces an inordinate interest in stability) is the didactic focus on the content of learning, a practice many believe creates in clients a declarative knowledge base, but not necessarily a procedural one (Anderson, 1983; Kanfer & Scheff, 1988). Our interventions, in other words, teach what to do, but not often do they convey why or offer a dynamic representation of how. Consequently, action is inflexible because it is bound to rigid rules rather than to self-correcting principles or programs. Furthermore, the accentuation of imperatives minimizes the affective component of learning and motivation that depends on a hierarchy of personalized values or preferences (Goldstein, 1981). Thus, the person who takes up jogging because it is "the thing to do" is less apt to persist (particularly in the face of obstacles) or to experiment with other forms of exercise than is the person who has adopted health as a value or as an essential component of identity, and who thinks in terms of dynamic means-end relations rather than in terms of fixed sequences of means and ends (cf. Dweck, 1986; Resnick, 1987, for similar arguments applied to the field of education).

**Toward Therapeutic Flexibility**

In the space remaining, I shall illustrate how "open system constraints" can potentially be addressed in our interventive work, as opposed to being widely ignored under the *ceteris paribus* assumption of scientific inquiry.

Essentially, I shall assert (somewhat boldly some might say) that state transition management be considered a sixth person variable, on a par with the five important constructs proposed by Mischel (1973, 1986) and intensively investigated by social learning theorists over the past several decades. Although strongly related to what Mischel has called construction competencies and self-regulatory systems, the mechanisms of state transition management are meant to transcend the acquisition and use of fixed rules, knowledge systems, personal attainments (skill-driven outcomes), and/or motives, which, not incidentally, have been the primary targets of most structured interventions in both clinical and health psychology.

Simply stated, I believe that there is an upper limit to the achievable robustness of any treatment program based solely on the inculcation of knowledge, rules, behavioral competencies, or specific attitudes—an upper limit that can nonetheless be extended via a consideration of the elaborative, inductive, or self-programming capacities of the human information processor. Such a consideration requires an appreciation of the importance of nonequilibrium forces operating in concert with stabilizing forces. The essence of a state transition model, then, is the recognition that the world is constantly changing, and that what is important about people is not how they typically act, think, feel, or believe (a summary description constructed by editing out transitional events), but rather how they seek to create stability out of the continuous changes in their states and how they likewise seek to create change at times of relative stabilization. In this context, neither stability nor change is more basic or essential than the other. (Another noteworthy characteristic of a state-transition management perspective is that, as ap-
plied in the domain of personality psychology, it defines stylistic change or the alteration of behavioral output to be an occurrence that is just as normative as the display of behavioral constancy. Few personality theories address variability and stability by means of similar mechanisms.) Further, the individual must be "in charge of" the state transition process, deliberately countering either forced movements away from prior states (e.g., seeking stability) or countering forced movements toward prior states (e.g., seeking change). Forced movements reflect the action of stressful life events, stimulus overload or underload, bodily or biochemical trauma, failure feedback, interpersonal pressures, and the like. Finally, it should be noted that the individual's periodic need to counteract constancy will, according to this formulation, inevitably run afoul of the clinician's desire to establish a permanent personality or life-style program. Because self-directed behavioral revision/change is misunderstood and understudied relative to self-stabilization (the subject of most personality research) and because I believe that teaching people how to effectively enlarge their repertoires can enhance the power of health-relevant interventions, I shall focus on two major contributors to personal flexibility: goal cognition and inductive rule systems.

First, it may be useful for me to offer a tentative definition of flexibility, as I use the term. Although control theorists employ terms like reorganization, self-construction, autopoises, second-order change, and the like (e.g., Ford, 1987; Powers, 1973), the word "flexibility" has a certain down-to-earth, familiar quality that better captures the essence of the intended meaning. Flexibility refers to both a process and state of mind underlying the pursuit of life goals that can be characterized, generally, as an openness to and a capacity to learn from experience. It refers, specifically, to the use of inductive models that include mechanisms for both revising and refining old rules and for generating new ones, particularly under conditions of novelty and uncertainty (cf. Holland, Holyoak, Nisbett, & Thagard, 1986, especially chap. 3). As a set of cognitive operations, flexibility falls midway between the obsessive use of rules, on the one hand, and automaticity (mindlessness) on the other. It is assumed that individuals possess some direct, conscious access to what transpires under the banner of flexible thinking. Despite its heavy cognitive patina, flexible problem-solving is seen as being triggered by external (environmental) as well as internal factors, especially uncontrollable setting changes and/or the immediate failure of current programs. Thus, flexibility is not a trait or static disposition, but rather a negotiated construction, requiring environmental activation and support. Finally, it should be noted that the forces working toward robustness (stability) of learning and those operating in the service of flexibility are complementary rather than antagonistic. Flexibility undergirds stability by allowing people to select alternate routes to the same (or similar) ends. Likewise, stability in the form of situationally activated scripts, schemas, or implicit theories facilitates adaptive choice by selectively restricting one's access to information, presumably filtering out irrelevancies.

Goal Cognition

Within the framework of contemporary social cognition, flexibility in the interpretation of experience is believed to be directed by goals or personal strivings (Emmons, 1989; Karoly, in press; Little, 1983; Showers & Cantor, 1985). Goals have a particularly powerful role to play in assisting individuals to grow and to retain their freedom of movement (hopefully, therefore, imparting some immunity from the obsolescence of fixed habit patterns). This growth-enhancing role is connected to what has been called the feed forward function of goals. That is, as representations of possible future states of self and/or world, goals can prevent us from resting on our prior accomplishments or relying too strongly on action-outcome expectancies or rule systems that have, with the passing of time, outlived their usefulness. Whereas feedback permits us to match standards, feed forward allows us to set and reset personal objectives as circumstances and new learning warrant. Goals can, therefore, act as a destabilizing force capable of balancing the natural pressures toward homeostasis (cf. Ford, 1987; my chapter on self-management in this volume for further discussions of the feed forward function of personal goals).

Although the specific content focus of goals can be critical in terms of their adaptive significance, the interpretive dimensions by means of which goals are cognitively construed and the dynamic processes by which goal attainment is evaluated are particularly important as precursors of flexibility. For example, in their self-regulatory approach to medical compliance, Leventhal, Zim-
merman, and Gutmann (1984) noted that the goal of health promotion is often evaluated by people in terms of attributions of control over risk factors. Thus, whether individuals make concerted efforts to restructure their lives so as to avoid the possibility of cancer or heart disease is determined, in part, by how they envision such health goals.

**Inductive Rule Systems**

Teaching our patients how to think about their health, as opposed to what to think (or do or believe) is another mechanism for transcending outmoded therapeutic objectives and achieving some degree of inactive flexibility. As noted earlier in this chapter, the link between conscious control and health-relevant action is far from perfectly understood. Similarly, the relation between health-relevant action and medical status is often imperfect. Under such conditions, it would not only be impractical to press patients to rigidly follow predetermined illness management or health-promotion plans, it would raise serious ethical questions as well.

Cognitive scientists and educators concerned with producing learning styles that are self correcting and capable of guiding adaptation even under conditions of change, instability, imperfect skill development, and uncertainty have recently focused on the individual's construction and use of mental models. These models, though dependent on the prior acquisition of information, values, and behavioral capacities, are flexibly attuned to current situational constraints and to future possibilities. As Holland, Holyoak, Nisbett, and Thagard (1986) noted,

> Because mental models are built by integrating knowledge in novel ways in order to achieve the system's goals, model construction provides the opportunity for new ideas to arise by recombination and as a consequence of disconfirmation of model-based predictions. (p. 14)

Induction refers to the process whereby the constituents of mental models are revised (updated) or totally replaced. The ability of inductive systems to not only rework existing adaptive patterns but to build new ones is a particularly powerful weapon in the fight against obsolescence of traditional “learn it, store it, use it”-based therapies.

The practical matter of teaching inductive processing is, of course, complex and unlikely to yield to the force of memorization, contingent reward of “correct” responses, social pressure, or other robustness builders. Extrapolating from nonclinical (often computer simulation) contexts, the fundamentals of flexible reasoning would include, among many other features, an emphasis on (a) if-then (condition-action) units capable of representing one's environment in a tentative (open) rather than a fixed manner; (b) process-oriented thinking; (c) rules that include default options and exceptions under special circumstances; (d) the person's ability to allow alternate rules to compete for retention by attending to how well the rules work in current situations; (e) the person's ability to detect covariation among current goals, situational demands, and feedback concerning state changes and to apply this information to the selection or generation of new rules; (f) a willingness to think counterfactually (in “what if” terms); (g) the ability to organize knowledge efficiently; and (h) the avoidance of both the mindless (automatic) or highly abstract processing of events and relations among events (cf. Holland et al., 1986; Showers & Cantor, 1985).

One of the major challenges in health life-style research centers on how to assess patients' inferential processes and how to design interventions that enhance rather than limit their operating range. As noted previously, many different therapeutic modalities (behavioral, cognitive, or environmental) may be potentially potent (yielding robust outcomes) only to the extent that flexibility is built in at the program level. Patients must be free to change their direction in pursuit of health-relevant objectives, to achieve consistency by managing patterns of variability, and to restore their preferred psychological states subsequent to disruption only when these prior states are again adaptively relevant in situational context and not in accordance with fixed prescriptions or schedules.

When working toward the goal of durable treatment effects and low rates of disengagement from therapeutic programs, clinicians are advised to consider robustness (maintenance potential) to be only one relevant consideration for judging success. Flexibility represents a second and orthogonal dimension. That is, program adherence can sometimes be bought through power of coercion, heavy surveillance, the rote accumulation of declarative knowledge, and powerful contingencies of reward or punishment, or contrariwise, through the inculcation of goal-directedness, a sensitivity to transitional phenomena, and tactical/procedural learning. Flexible adherence is preferrable to inflexible adherence. In addition, flex-
ible nonadherence may well prove to be a better way to fall than nonadherence attendant to heavy-handed interventions.

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