Expectancy Theory: A Two-Process Model of Alcohol Use and Abuse*

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ABSTRACT. In recent years, cognitive-behavioral approaches to drinking behavior have postulated the importance of alcohol expectancy and drinking refusal self-efficacy in the development and maintenance of problem drinking. However, despite a growing number of publications, the structure and role of these constructs have not been clearly explicated in theoretical terms to date. This article proposes a two-process theory of alcohol use and abuse. It is suggested that the acquisition and maintenance phases of drinking behavior are governed by different principles of learning and involve different decision-making processes. The acquisition phase is thought to be a time of instrumental learning, in which decision making involves controlled processing by means of a kind of "mental algebra." The maintenance phase is described as subject to the principles of classical conditioning, with automatic processing playing a major role in the making of decisions. Integral to both phases, though differing in structure and function from the first to the second, is the concept of alcohol expectancies. Another cognitive construct, drinking refusal self-efficacy, is also hypothesized to play a role in decisions to drink or not to drink. It is suggested that the development of drinking behavior is best explained in terms of associative models of learning and memory. Implications for prevention and treatment of problem drinking are discussed (*J. Stud. Alcohol* **55:** 525-534, 1994)

IN RECENT YEARS, cognitive-behavioral approaches to alcohol consumption have focused increasingly on the role of specific cognitions about the expected consequences of alcohol consumption (Brown, 1985; Oei and Jackson, 1984; Stacy et al., 1990). These cognitions have been hypothesized as playing a vital role in the development of drinking styles and, therefore, as having potential usefulness in prevention and treatment programs. Despite a growing number of review articles on the topic of alcohol expectancies (e.g., Connors and Maisto, 1988; Goldman et al., 1987; Hull and Bond, 1986; Leigh, 1989; Oei and Jones, 1986), the structure and role of the construct have not been clearly explicated in theoretical terms to date. Leigh (1989) goes so far as to describe expectancy research as "atheoretical" in approach, though Goldman and colleagues (1991) state that the expectancy concept derives from a "rich theoretical base." The explanation for this apparent contradiction may lie in the fact that, whereas several theoretical approaches have been applied to the expectancy construct in the alcohol literature, there has so far been no vigorous attempt to delineate first the content and second the process that contribute to alcohol expectancies. The primary aim of the current discussion is to address the issue of a theoretical framework for the expectancy construct in problem drinking. This article offers a theoretical model for the content of alcohol expectancies, maps the processes that may be involved in acquisition and maintenance of alcohol expectancies, and addresses several issues about the role of alcohol expectancies in drinking behavior. It is suggested that drinking behavior be conceptualized in two distinct phases, an acquisition phase and a maintenance phase, with alcohol expectancies playing a qualitatively different role from one phase to the other. In the context of this two-phase model, this article also examines drinking refusal self-efficacy beliefs, a cognitive construct related to alcohol expectancies that has, however, received much less research attention to date.

Increasingly, theorists recognize the importance of learning and memory as the framework from which decisions about behavior are made. Of particular relevance to alcohol expectancy theory are the principles of instrumental and classical conditioning, the notions of controlled and automatic processing and the issue of accessibility in memory. The early, or acquisition, phase of drinking behavior is seen as dominated by controlled processing, during which alcohol expectancies are acquired by the process of instrumental learning and decisions to drink or not to drink are made on the basis of these expectancies. Repeated association of drinking behavior with internal and external cues, however, produces classical conditioning of the response to the stimulus, such that decisions to drink no longer require conscious effortful thought but become incorporated into an automatic process. In this maintenance phase of drinking behavior, specific expectancies about reinforcement from drinking are no longer open to conscious scrutiny and refutation. Treatment involves motivation to change drinking behavior, breaking

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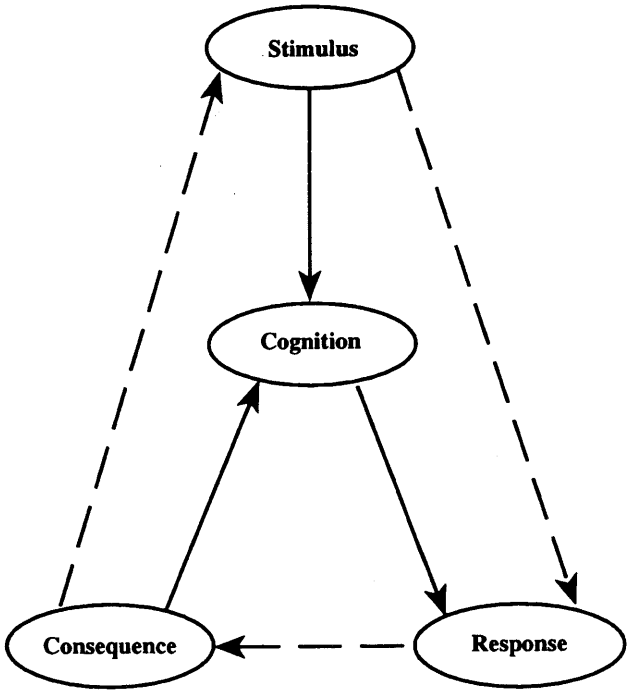

FIGURE 1. A conceptual model for the relationship of cognition and behavior. (Solid lines denote links between cognition and the stages of the learning formulation; dashed lines indicate the usual temporal sequence of these stages in behavioral models.)

the *physiological* pattern of alcohol's effects (i.e., through detoxification) and long-term disruption of the cognitive automatic process at as many points as possible to bring the drinking decision back under conscious control.

Acquisition Phase

Alcohol expectancies

Figure 1 presents a general conceptual model for the cognitive-behavioral approach to behavior. Specific stimulus conditions impact cognitively upon the individual, who must then choose a behavioral response option on the basis of consequences to be expected from that behavior in that situation. This kind of formulation has generally been termed an "if-then" or an "act-outcome" expectancy (Bolles, 1972), and the term alcohol expectancies (AE) refers specifically to the expected consequences of drinking behavior. Following performance of the behavioral response, consequences may be assessed and this information fed back to inform future expectations and, therefore, future decisions about behavior.

Originally, alcohol expectancies were conceptualized solely in terms of expectations of reinforcement; that is, only so-called positive expectancies were considered to play a role in decisions to drink (Brown et al., 1980). More recently, expectations about undesirable consequences (negative expectancies) have also received attention, with Leigh (1989) arguing that a decision to drink is made by weighing up the positive and negative expected consequences of drinking in a given situation. "Weighing up" processes are described by Goldman et al. (1991) as characteristic of "mental algebra" models of motivation, such as the theory of subjective expected utilities (Bauman and Bryan, 1980, after Edwards, 1954). Utility theory states that the likelihood of an individual performing a behavior is a function of the extent to which pleasant consequences are expected to outweigh unpleasant consequences. The individual's view of these consequences consists of two parts: the perceived probability that a consequence will occur and the desirability or undesirability of that consequence. Leigh (1989) has also pointed out that the positive-negative dimension of expectancies relates to the proximal-distal dimension; many of the short-term effects of drinking are positive while longer term effects are negative. Furthermore, discussion on the subject of how best to measure alcohol expectancies often raises the notion that individuals may hold different expectancies about how alcohol affects people "generally" and how alcohol will affect the individual personally (Oei et al., 1990).

Recent thought in the expectancy area has begun to highlight memory processes as the "final common pathway" between contributing factors and drinking behavior. The point has been made that, whereas theorists are at leisure to consider many different dimensions of the response-consequence link and perform "mental algebra" (Goldman et al., 1991) to arrive at decisions about drinking behavior, people normally make decisions in a much quicker and less exhaustive fashion. Accessibility in memory is seen as a key factor in decisions about behavior. Figure 2 presents a model of the drinking decision, in which the individual, presented with a "cue state" comprising a constellation of internal and external cues, must generate behavioral response options and choose which option(s) to pursue on the basis of expected consequences. For simplicity, Figure 2 presents drinking behavior as the only option that "comes to mind" in response to a cue state; in fact, several behavioral options may do so, or only one, or none at all, and the positive and negative expected consequences of each option will pass through at least a rudimentary process of "weighing up." Two kinds of cue state have been described in the alcohol literature; that is, cue states have been defined in terms of two kinds of goals. Theories that subscribe to an "approach positive" explanation of drinking behavior (Niaura et al., 1988) consider the cue state as reflecting some need, lack or excess in the drinker. For example, a drinker who is conscious of experiencing physical tension may be driven by a desire to relax or a drinker who feels inadequate in a social situation may seek enhanced social skills. On the other hand, theories that emphasize "avoid negative"

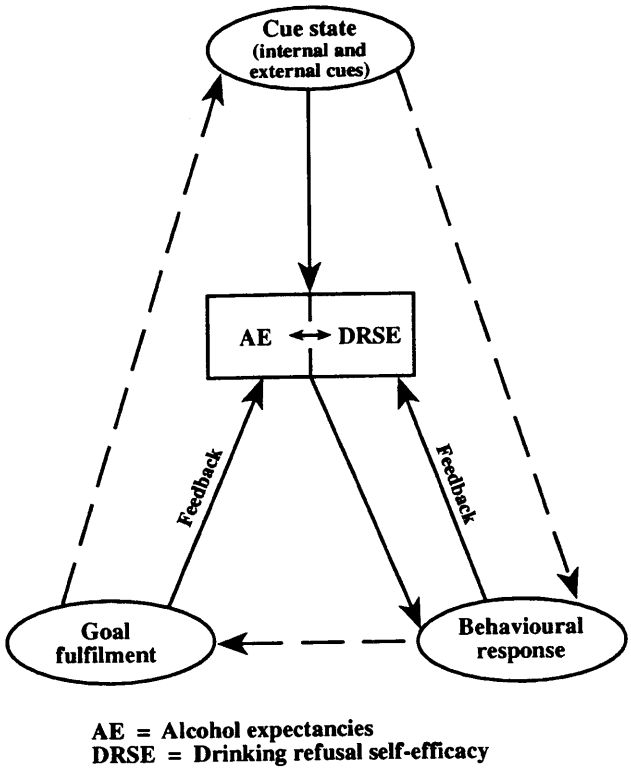

FIGURE 2. A conceptual two-process model of alcohol use and abuse. (Solid lines denote links between cognitive constructs and the stages of the drinking behaviors; dashed lines indicate the temporal sequence of the drinking behaviors. For practical purposes cognitive constructs are hypothesized to intervene between awareness of the need state and performance of the behavioral response.)

goals focus on the use of alcohol to escape negative mood states, forget stresses and pressures and avoid unpleasant thoughts. Through factor analytic techniques, alcohol expectancy researchers have identified six to seven domains in which alcohol may be seen as capable of achieving either positive or negative reinforcement for the drinker and these include: assertiveness, affective state, general social interaction, cognitive and motor functioning, tension reduction and sexual functioning (Brown et al., 1987; Young et al., 1991).

The key factor determining which behavioral options "come to mind" would seem to be accessibility in memory. As an example, an individual may experience a cue state involving arrival home from a day's work, a negative mood and awareness of physical tension. Depending on prior learning, options immediately available in memory may include lying down to rest, taking a shower, sitting down to talk with a spouse or pouring a beer. Before any weighing up process occurs, expectations of positive consequences (reinforcement) may help determine which options will be most readily accessible in memory; that is "come to mind" first (Goldman et al., 1991). In the same way, expectations about consequences that are likely rather than unlikely, proximal rather than distal and personal rather than general probably help to determine the accessibility in memory of drinking as an option.

Drinking refusal self-efficacy

In relation to the point in the drinking decision at which the response option is finally selected, one other cognitive construct should be discussed. This is the notion of drinking refusal self-efficacy (DRSE). When Bandura (1977) proposed expectancies as a cognitive variable, he discriminated between expectancies about the consequences of an action (in this discussion, alcohol expectancies) and expectancies about the individual's ability to perform the behavior. These latter expectancies, or self-efficacy beliefs, can be applied to drinking behavior in terms of the individual's hypotheses about whether or not he or she is able to resist or refuse alcohol at will (Young and Oei, 1991; Young et al., 1991). Studies have shown that refusal self-efficacy beliefs in smoking cessation programs predict successful quitting and maintenance of the behavior change (Lawrance and Rubinson, 1986). A recent study by Oei and Sweeney (submitted for publication) found a relationship between alcohol consumption and specific DRSE beliefs, which could not be accounted for by level of general self-efficacy. Solomon and Annis (1990) found that DRSE beliefs were useful in predicting maintenance of change in drinking behavior and, in fact, that alcohol expectancies themselves did not contribute to the prediction once DRSE had been accounted for. Another recent study (Baldwin et al., in press) found that DRSE played a more important role than did alcohol expectancies in predicting both quantity and frequency of alcohol consumption in a college population. This finding was replicated with a community sample (Lee and Oei, in press).

Rather than entering into the weighing-up process, DRSE beliefs are hypothesized to intervene between the weighing up and the behavioral response. It is argued that no matter how little reinforcement a drinker may expect from alcohol, if that person considers him or her self unable to resist, drinking is likely to occur. On the other hand, if the drinker expects reinforcement from drinking, then the argument that he or she is unable to resist will serve as a means of abdicating responsibility for the drinking decision and ignoring possible negative consequences of drinking behavior. Cooney et al. (1987) found that alcohol-dependent subjects experienced an increase in positive expectancies and a decrease in DRSE on exposure to drinking cues. This finding accords with Marlatt and Gordon's (1985) hypothesis that, in situations of high risk for relapse, positive alcohol expectancies increase and DRSE declines sharply.

Refusal self-efficacy is considered potentially situation-specific and, for this reason, existing instruments include

items measuring refusal self-efficacy in social, emotional pressure and general situations (Lawrance and Rubinson, 1986; Young et al., 1991). Refusal self-efficacy beliefs are assumed to be acquired through the processes of instrumental learning, with the individual gathering information in various situations as to whether or not he or she is able to resist or refuse alcohol.

Instrumental learning

So far, this article has addressed the content of the alcohol expectancy construct. It is now appropriate to examine the process by which expectancies are set up and consolidated in memory. It is postulated that both positive and negative alcohol expectancies are acquired through the processes of instrumental learning. Walker (1969) explained the instrumental response as elicited by four mechanisms: it is first *pushed* by the drive conditions, *pulled* by the individual's expectations of reinforcement, determined by the *structure* of the learning task and finally *glued* to the stimulus by virtue of reinforcement. Although Bolles (1972) considered actual reinforcement nonessential to explanations of motivation since the *expectation* of reinforcement was the active motivating agent, any theory of motivation for ongoing behavior must take into account previous instrumental knowledge and reinforcement history.

Social learning processes can be considered a subset of the instrumental learning paradigm; direct experience is not necessary for people to learn to expect positive or negative consequences of a behavioral response to stimuli. Miller and colleagues (1990) have shown that children as young as six can articulate alcohol expectancies similar to those of adults, and several studies have found evidence that young adolescents form expectancies prior to drinking experience that can predict their later drinking behavior (Christianson and Goldman, 1983; Christiansen et al., 1982, 1989).

Instrumental learning is a controlled process (Shiffrin and Schneider, 1977). The individual is more or less consciously aware of cues and behavioral options available and makes a conscious decision to make a particular response. He or she then observes the consequences of this behavior being performed in response to these cues and stores the information for further use in the form of expectancies. If the new information seems incompatible with information gathered through earlier experience, further cognitive effort will be required to assess the differences between earlier cues and responses and the current ones in order to modify earlier expectancies or create new ones. In this way, during the acquisition phase of drinking behavior, each new drinking episode is another learning experience. Positive alcohol expectancies, and, to some extent, low drinking refusal self-efficacy in a given situation, cue drinking behavior. The positive and negative consequences of drinking, and the ease or difficulty of resistance, feed back into the cognitive constructs; if consequences are experienced as positive and resistance is experienced as difficult, the link between the cognitions and drinking behavior becomes progressively stronger.

Controlled processing

Once behavioral options have been retrieved from memory, a choice among them must be made and it is here that researchers disagree over the process of choosing. According to what Goldman et al. (1991) refer to as algebraic models, one would expect that, for each option, the individual weighs positive against negative expected consequences to gain an overall expectation of reinforcement. The option with the highest level of expected reinforcement would then be the chosen option. However, Goldman et al. point out that human decision making is generally much more rapid than such models would allow. Time rarely permits such an exhaustive evaluation of all possible options (except, as Goldman et al. dryly remark, to a researcher carefully considering the mechanism). It seems more likely that accessibility in memory is the primary determinant of the choice of behavioral option, and, as has already been stated, expectations of reinforcement play a vital role in this accessibility.

Shiffrin and Schneider (1977) have described controlled processing as having the following characteristics: it requires attention; has limitations based on the capacity of short-term memory; can be adopted quickly and easily without extensive training; can be used to cause permanent learning; and, unless automatic processes take over, will quickly produce a plateau in performance. Automatic processes are not limited by the capacity of short-term memory and therefore do not require attention; they may be initiated through subject control but run to completion automatically once initiated; they require considerable training to develop and are difficult to modify once learned; they do not directly cause new learning in long-term memory; they lead to improved performance over trials as automatic sequences are learned; and they occur so quickly that conscious perception of the elements in a sequence is at best fleeting. Tiffany (1990) states that, to the extent that a response is always associated with a configuration of stimuli, these stimuli will, with practice, produce an obligatory retrieval of the response from memory.

This transition from controlled to automatic processing can be viewed as paralleling the transition from instrumental to classical conditioning, which is considered the primary process behind the maintenance phase of drinking behavior. The concepts of controlled processing and instrumental learning emphasize conscious cognitive processing over repeated rehearsals, with both the elements and the sequence remaining fixed over trials. The concepts

of automatic processing and classical conditioning emphasize that a qualitatively different form of processing emerges after much practice, such that a sequence once triggered runs to completion without conscious control and is subsequently difficult to interrupt or alter. In this two-phase model of drinking behavior, the more conscious processes are considered characteristic of the acquisition phase of drinking, while the more automatic processes are considered dominant in the maintenance phase.

Maintenance Phase

Classical conditioning

In Bolles' (1972) notation, a response-consequence expectancy is represented as R-S*. A second kind of expectancy put forward by Bolles is the stimulus-consequence expectancy, S-S*. In this formulation, certain events or cues in the internal or external environment (stimulus conditions, S) are expected to be associated with other events or consequences (S*). This is the noncontingent associative, or classical conditioning, formulation. It describes, for example, the cue-consequence link in Pavlovian experiments in which the animal's response (e.g., salivation) to a set of events (e.g., food presentation) has no effect on the consequences or second set of events (e.g., ringing of a bell), but after training is nevertheless involuntarily produced as a response to either set. The same formula describes learned helplessness, in which the animal learns that the consequences associated with a stimulus cannot be avoided through any behavioral response.

Rescorla (1988) has criticized the unsophisticated view of classical conditioning which considers the whole mechanism merely a process in which an unconditioned stimulus (UCS) is paired with a conditioned stimulus (CS), such that after many repeated pairings the CS will elicit the unconditioned response (UCR). Rescorla views classical conditioning as the formation of associations between elements in memory; he points out that what is important about the UCS-CS pairing is the amount of information that the CS provides about the UCS. For example, if an electric shock and a tone are presented to an animal subject contiguously, but uncorrelated in time, the animal's response to the UCS (shock) will be poorly conditioned to the tone. This is because the tone provides no information about the shock even though the two events are "paired" or contiguous. If, on the other hand, the shock occurs only during the tone, the response will become conditioned to the tone, because in this case the tone is informative about the shock (Rescorla, 1988). In the acquisition phase of drinking behavior, explicit hypotheses about the contingency of reinforcement on drinking are formed and tested according to the principles of instrumental learning. In the maintenance phase, however, associations have been formed between stimuli, expectations of reinforcement and drinking behavior that cannot be disputed and replaced as can explicit hypotheses (Kirsch, 1985; Rescorla, 1988). Drinking behavior has undergone a subtle but powerful change in the cognitive framework of the drinker, from being a behavioral response to stimuli that may be expected to lead to reinforcement to being a consequence or event that occurs in association with the original cues.

Theories of classical conditioning in the substance abuse field are not new, but have been somewhat fragmented to date. Heather and Greely (1990) cite three examples in reference to the clinical technique of cue exposure: Wikler's (1965) conditioned withdrawal model, in which withdrawal symptoms become classically conditioned to internal and external events leading to drinking to overcome these symptoms; Siegal's (1979) somewhat similar compensatory response model in which repeated pairing of cues with drinking eventually leads to the cues producing effects opposite to the effects of alcohol, producing tolerance; and Stewart et al.'s (1984) conditioned appetitive model in which previously neutral stimuli become associated with alcohol and acquire the capacity to elicit the positive motivational state produced by alcohol, leading to alcohol-related thoughts and drinking behavior. The model presented here is most closely related to that of Stewart et al. (1984): the internal drive state and external cues, such as place and presence of significant others, become associated with drinking, producing an overpowering expectation of reinforcement which nevertheless does not constitute reinforcement in itself, since in that case there would be no need for actual drinking behavior. What is classically conditioned to the internal and external stimuli is the network of expectancies, providing a powerful motivation to drink. Cognitively, the issue is not that reinforcement is contingent on drinking behavior, but rather that drinking behavior must inevitably occur in the context of the internal and external cues that are signalling reinforcement. The drinking behavior itself can be seen as the element that will complete the pattern; the drive to drink can be considered in a sense a compulsion toward closure (Figure 2).

The phenomenon of craving can be explained in terms of such a model. In everyday life, an individual daily encounters a multitude of internal and external cues. Any one of these that has been previously associated with drinking is theoretically capable of triggering a whole chain of memory nodes, bringing the entire original stimulus situation and expectations of reinforcement flooding back into the individual's experience of the present. The power of these memories is that they are not limited to "objective" aspects of past drinking episodes, but rather comprise the *affect* associated with such episodes (Goldman et al., 1991; Lazarus, 1982; Wolpe, 1978; Zajonc, 1980). If drinking has, during the initiation phase, been a reinforcing experience, with the drinker experiencing feel-

ings of security, competence, attractiveness and so on, the emotions triggered by memories of these episodes create a powerful motivational state for present drinking. Whether or not the drinker attributes these positive feelings to the alcohol consumed on previous drinking occasions is now not the relevant issue, since expectations of reinforcement do not now take the form of conscious hypotheses that may be examined and disputed. Expectancies have made their contribution in encouraging the individual towards further drinking episodes in the acquisition phase. What the individual now experiences is an automatic process, or an activated framework, in which the cues, drinking behavior and positive feelings are inextricably bound together. The drinker may not even be conscious of an "urge" to drink (Tiffany, 1990); he or she automatically seeks the drinking situation, the memory of which has been triggered by the initial cue.

Automatic processing

Tiffany (1990) has put forward a model in which addictive behavior is viewed as a "drug-use action plan" consisting of automatic processes, with controlled processes playing a role only when the action plan is disrupted in some way. He lists the characteristics of automatic processing as speed, autonomy, lack of control, effortlessness and lack of conscious awareness. Procedures for carrying out the skills involved in drug use are stored in memory as automatized action schemata and encoded within these memory systems are stimulus configurations (or cue states, with both internal and external elements), procedures for the enactment of specific actions, coordination of actions into sequences, alternative action sequences in the event of minor obstacles, support physiology for action components and generation of physiological adjustments in anticipation of drug intake. Tiffany does not consider that self-referent statements (e.g., "I need a drink") are integral components of drug-use action plans in highly practized drinkers. This assertion is in agreement with the present proposal that, whereas the acquisition phase of drinking behavior involves conscious decisions about the cue state, behavioral options and expected consequences in the maintenance phase of drinking behavior are more or less automatic, fast and nonconscious.

Tiffany's notion of action plans is closely allied to spreading activation models of memory. Shiffrin and Schneider (1977), early in the history of these models, conceptualized long-term memory store as a structure of nodes, each of which might consist of a complex set of interrelated events. A single node was conceptualized as unitized; although one node might activate others, it need not necessarily always do so, whereas the activation of an element within a single node automatically activates the other elements. Short-term memory store was defined as those nodes currently activated at a given time. In an automatic process, nodes of associative information are activated (brought into short-term store) in response to external and internal stimuli that match the encoded stimulus pattern sufficiently closely.

Classical conditioning is presented here as the process by which an action plan is consolidated in memory. Associations between cue states, expectations of reinforcement and drinking are strengthened and become emotionally salient through repeated drinking episodes. Eventually drinking is "triggered" by cue states through an automatic process and the original expectations of reinforcement are no longer available to conscious awareness. Disconfirming evidence, such as experience of negative consequences, will not be used to refute and modify expectations, since these are no longer conscious cognitions but have become fully encoded in unitized action plans in the long-term memory. Leigh (1989) has expressed concern over current measures of alcohol expectancies, in which problem drinkers tend to endorse positive expectancies across domains with little discrimination. In fact, as Smith (1988) points out, a characteristic of the alcohol dependence syndrome is that drinkers seem to lose situational sensitivity, engaging in less weighing up of cues and expected consequences in varying situations. This observation fits well with the generalized endorsement of alcohol expectancy items and also with the model that states that associations between cues, expectancies and responses formed through classical conditioning cease to be open to conscious cognitive assessment.

Most learning research makes use of criteria for determining whether or not a behavior has been learned; for example, an animal must correctly complete a maze on a certain percentage of trials before its success is attributed to learning rather than chance. Determining whether learning has occurred in human cognitions about behavior is less straightforward, but several of the DSM-III-R (American Psychiatric Association [APA], 1987) criteria for alcohol dependence can be interpreted as suggesting that an automatic process has been learned. For example, the narrowing of behavioral repertoire suggests that the option of drinking is most accessible in memory; the experience of craving resembles a drive toward closure of a pattern established in memory; and the whole phenomenon of relapse can, as has been discussed, be considered indicative of an automatic association between certain cues and drinking behavior. It may be possible to develop more sophisticated measures of just how often a cognitive process runs automatically from cues to drinking behavior. In the meantime, it is enough to note that the known characteristics of problem drinking behavior are compatible with the current model of cognitive learning.

Issues

The two-process model as outlined here raises many questions. Chief amongst these is the issue of why, when

so many social drinkers receive and presumably continue to receive reinforcement from drinking, only a small percentage of drinkers become dependent on alcohol. It is likely that a number of factors play a role here. Logically, those most at risk for alcohol dependence are likely to be those who, in the acquisition phase, perceive themselves as receiving most reinforcement from drinking. Long-established programs of social skills and communication training are based on the rationale that a person who does not feel deficient in these skills is less likely to use drinking as a means of "acquiring" them to cope with interpersonal situations (Cooper et al., 1988). Even those more socially competent, however, may feel inadequate in some situations and certainly may have trouble in other areas, for example in coping with emotions (Marlatt and Gordon, 1985). Cue states, therefore, are obviously not the only contributing factor: another is the repertoire of behavioral response options available and accessible. It is an often-cited symptom of alcohol dependence, that the drinker's behavioral repertoire narrows such that options other than drinking are no longer selected (APA, 1987). Logically, people who begin with a wider behavioral repertoire with which to respond to situational demands are in a better position to select appropriate responses to various cues. A behavioral response repertoire is determined largely by learning and prior experience; people who receive reinforcement from a wide variety of activities from an early age are less likely to narrow their behavioral repertoire to drinking.

Expectancy theory, however, emphasizes cognitive processes as the most important factor in the acquisition of addictive behavior. It is the individual's tendency to attribute reinforcement to drinking and to ignore or discount negative consequences, in the acquisition phase, that leads to repeated drinking episodes and ultimately to automatic drinking behavior. The weight of evidence in the alcohol literature to date suggests that expectancies can discriminate amongst drinking styles. Young and Oei (1993) found that problem drinkers expected greater gains in relaxation and assertiveness, but less social reinforcement and positive affect, from alcohol than did nonproblem drinkers. The problem drinkers also reported greater cognitive impairment, carelessness and loss of behavioral control from drinking alcohol. Many other studies have indicated that lighter drinkers are more likely to expect global positive change and social lubrication from alcohol, while heavier drinkers expect more specific enhancement of skills and abilities and increases in assertiveness, aggressiveness and arousal (Brown et al., 1985; Connors and Maisto, 1988). It may well be that feelings of inadequacy in coping socially and emotionally, combined with a narrow behavioral repertoire and early socially learned positive expectations of alcohol, lead to repeated episodes of drinking and the acquisition of classically conditioned drinking action plans in later life. Lower levels of drinking refusal self-efficacy, as mentioned earlier, are also likely to prove a risk factor for problem drinking, in both the acquisition and maintenance phases.

Another issue for the model concerns even long-term problem drinkers' ability to stop drinking voluntarily for a period of time, before either voluntarily or involuntarily returning to drinking. Some drinkers are capable of abstaining for a short period because of some other external constraint; for example, a family event. It is suggested that the impetus of the new stimulus may sometimes be sufficient to bring the drinking process back into the realm of conscious controlled processing. The drinker finds him or her self in an unusual situation because of the added internal and external cues, which have implications for the consequences of drinking. The automatic process is therefore disrupted at the very beginning, in the cue state, allowing controlled processing to take over. The weighing-up process now has the chance to take into account expectations of the negative consequences, both intrapersonal and interpersonal, of drinking in this particular situation, which may be strongly salient and highly emotionally charged. For a time, then, drinking can be avoided through conscious choice. However, when the normal cue state reasserts itself, the learned automatic process is still in position to be triggered and result in drinking behavior.

This model also explains why, when Tiffany (1990) indicates that a large proportion of drinkers attempting to maintain abstinence experience no conscious or verbal urge or craving to drink, many of them nevertheless relapse. Any circumstance that distracts an individual from controlled, effortful processing opens the way for an acquired automatic process to reassert itself in response to cues that occur. This explains why relapse often occurs when an individual is experiencing stress, negative affect, anxiety or a sense of being unable to cope (Marlatt and Gordon, 1985). Not only may these be classically conditioned cues for drinking and therefore encoded in an automatic process, but also their occurrence distracts the individual from the attempt to maintain abstinence through conscious weighing-up and decision-making processes. Neither is a negative affective state necessary to elicit drinking; many drinkers have been classically conditioned to drink in moods of celebration or sociability, and these cues also may distract attention away from controlled processing while in themselves triggering the automatic sequence.

Regular heavy drinking is not the only drinking style explained by this model. Binge drinking can be conceptualized as an automatic process which, by reason of prior learning, is triggered only by specific stimulus situations. For example, binge drinking is commonly associated with pay day, when it may be the accessibility of ready cash and the company of others in a similar situation that provide the trigger for the drinking episode. The "bender" or "spree" phenomenon is likewise explainable in terms of specific cues that have relevance for the individual; per-

haps a time of year (for example, an anniversary of some event, or even a change of season), a mood state or contact with some person or place that occurs infrequently are encoded into the individual's action plan as triggers for a prolonged drinking episode that may perpetuate itself until external stimulus demands alter again. The case of binge drinking clearly illustrates a general principle: the stimulus conditions that trigger drinking are highly individual and an important objective in treatment will be to identify which combinations of cues in the individual client's internal and external environment appear to trigger drinking behavior most consistently.

Prevention and Treatment Implications

According to Tiffany (1990), once an action plan has developed through practice and repetition, controlled processes play a role in drug-taking behavior only when the action plan is somehow disrupted. When the drinker is seeking to complete the action plan (that is, *abstinence avoidance*), disruptions such as finding no alcohol in the house or being prevented from drinking by the presence of a disapproving significant other are seen as obstacles to be overcome. However, for a drinker seeking to stop drinking, the automatic process must be deliberately disrupted using controlled processes; the goal is *abstinence maintenance*.

In terms of treatment, this model suggests that the most appropriate cognitive-behavioral strategy is to break the automatic process through consciousness raising; that is, bringing the elements of the action plan back into the realm of conscious thought and decision making. Preliminary stages of treatment involve detoxification and the motivational interview. It is not to be expected that an educational treatment strategy can succeed unless the client is sober and not in a state of acute withdrawal; in addition, the physiological effects of alcohol consumption are part of the encoded pattern that treatment is attempting to break. Like all treatment strategies, moreover, those arising from this model depend heavily on the client's motivation to stop drinking, since the process of weakening highly learned associations in the automatic sequence is likely to prove extremely difficult and take some time.

First, individuals need to become familiar with their own cue states. Internally, they must recognize mood states and perceptions of lack of or excess in response to external demands that have in the past been associated with drinking. Externally, they must recognize those cues that have been associated with drinking situations, such as the smell of alcohol or the presence of certain significant others. They must understand how and why the presence of these cues indicates risk for drinking, learn to identify and predict occasions on which these cue states are most likely to occur and develop strategies for avoiding the occurrence of these cue states in the first place. Current endeavors to train alcohol-dependent people in social skills, assertiveness, communication skills, mood management, and so on, represent attempts to prevent the occurrence of cue states based on deficits in these skills.

Second, individuals must increase their repertoire of constructive realistic behavioral response options to cue states and make these options accessible in memory; for example, by making and rehearsing short lists of options that apply in specific situations. Role-play techniques should be considered vital to this kind of learning, since verbal or written suggestions may interfere only with encoded cognitions, whereas behavioral activity is needed to interfere with encoded action.

Third, individuals need to understand explicitly their own positive and negative expectations for each behavioral option and, particularly, for drinking. Such a process would involve the gathering of disconfirming evidence for positive expectancies of alcohol, the strengthening through evidence collection of negative expectancies of alcohol, explicit discussion of short-term rewards versus long-term costs of drinking and collecting evidence for positive expectancies of the more constructive behavioral options available (Brown et al., 1988). Although it has been pointed out that expectancies acquired over a lifetime may be extremely difficult to change (Leigh, 1989), Massey and Goldman (1988) had some success in lowering the alcohol consumption of college students whose drinking was initially moderate to high, by challenging their alcohol expectancies over a 2-week intensive training period. Moreover, it has already been noted that many problem drinkers are aware of at least some negative effects of alcohol (Young and Oei, 1993), but find their positive expectations too firmly encoded and too powerful to be outweighed by negative expectancies. It may be that treatment can build on existing negative expectancies as a basis for motivation not to drink.

Fourth, simple practical measures should be taken to guard against what Tiffany (1990) terms "absent-minded relapse." That is, creating physical obstacles that disrupt the automatic process, like ensuring alcohol is not readily available in the house, will allow controlled processes the chance to take over from an action plan that may have been automatically triggered.

Fifth, again through role-playing techniques, raising drinking refusal self-efficacy is a vital factor in any relapse-prevention strategy. The individual must learn to recognize the situations in which he or she is most at risk for drinking and gather evidence that he or she is capable of resisting drinking in such a situation should it be unavoidable. This may, in fact, constitute a very difficult phase of treatment, since so many factors may contribute to a high-risk situation that reproduction of all cues involved is close to impossible and the drinker may have considerable difficulty generalizing higher DRSE acquired

under protected artificial conditions to situations occurring in the real world.

Connors and Maisto (1988) have suggested several intervention techniques for problem drinkers that can be interpreted in terms of the current model. These include self-monitoring by clients to understand their own cue states for drinking, education/didactic interventions to provide a framework in which clients can understand alcohol expectancies and their role in drinking behavior, cognitive restructuring to modify expectancies, and social- and coping-skills training to reduce the motivational power of certain cue states and provide a wider range of behavioral options. It must be remembered, however, that addictive behaviors are notoriously difficult to disrupt even through intensive intervention techniques and even when the client is highly motivated to change his or her behavior. The resilience of automatic processes may in part explain this. Prevention is, therefore, likely to be easier and more successful than treatment. It is suggested that alcohol and drug education programs based on cognitive-behavioral principles and focusing specifically on alcohol expectancies may play a useful role in preventing problem drinking. In view of recent findings that alcohol expectancies are formed in childhood and go through significant strengthening at a time of many other cognitive-maturational changes around age nine (Miller et al., 1990), educators may be well advised to introduce such programs for a much younger age group than has generally been considered (Oei and Baldwin, 1992).

The two-process model of drinking behavior provides a starting point for explaining many phenomena associated with drinking behavior. Further research remains to be done on relationships between cognitions and physiological effects of alcohol, particularly regarding the phenomenon of tolerance. The division between phases one and two also requires further investigation; since the delineation between acquisition and maintenance of drinking behavior is not viewed as sharp or sudden, assessment tools need to be developed to examine the degree to which an individual's controlled processing of alcohol-related stimuli has given way to automatic processing. It is hoped that the model presented here will provide a useful framework for addressing these issues and for conceptualizing prevention and treatment strategies.

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