



The motivational basis of cognitive determinants of addictive behaviors



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HIGHLIGHTS

- Current concerns theory explains the cognitive basis for addictive behaviors.
- Having a substance-related goal sensitizes a person to substance-related stimuli.
- Substance-related selective attention is correlated with urges and actual use.
- Training reduces both substance-related attentional bias and substance use.

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ABSTRACT

If a person expects that (a) drinking alcohol or using another addictive substance will enhance positive affect or reduce negative affect, and (b) there is a strong likelihood that these desirable consequences will occur if the substance is used, that person is likely to form a goal of using the substance. The theoretical framework presented here predicts that when that happens, the person will have a current concern for using the substance, with the person thereby sensitized to environmental stimuli related to procuring and using the substance. One indication of the sensitization is selective attention to substance-related stimuli, which is correlated with urges to use and actual use of the substance. Accordingly, interventions have been developed for helping substance users to overcome substance-related attentional bias. The results are promising for reducing both the attentional bias and the substance use. Finally, we discuss other cognitive-modification and motivational techniques that have been evaluated with promising results.

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This article aims to demonstrate associations between particular properties of cognition—especially of attention, but also recall and mental content—and maintenance of addiction to alcohol. The goal theory of current concerns (e.g., Klinger & Cox, 2011a) links motivational, emotional, and cognitive processes to account for cognitive determinants of addictive behaviors. We describe the main features of the theory and cite evidence for its validity, especially as applied to addiction, including interventions.

1. The goal theory of current concerns

Initially, the goal theory of current concerns was developed to account for the contents in the stream of a person's goal-related cognitive processes (see Klinger, 1971, 1978). Subsequently, it was expanded to a broad motivational theory (e.g., Klinger, 1977; Klinger & Cox, 2011a) to encompass emotional phenomena (Klinger, 1989, 1996; Nikula, Klinger,

& Larson-Gutman, 1993), value, mood, depression, aggression, alienation from work and in marriage, suicide, meaning in life, and substance use (Cox & Klinger, 1988, 2011a; Klinger, 1975, 1977, 1993, 2012), as well as motivational structure (Cox & Klinger, 2002; Klinger & Cox, 2011a, 2011b), thought content (Klinger, 1971, 2009, 2013), and treatment methods (Cox & Klinger, 2011c; Cox et al., 2003). Cognitive processes, however, remained a central focus of the theory (e.g., Klinger, 1996, 2009, 2013). This article is not the place for a full presentation of the theory, but here we apply those parts of it that relate to the focus of this special issue.

1.1. Some definitions

First, we define motivation as “the internal states of the organism that lead to the instigation, persistence, energy, and direction of behavior” (Klinger & Cox, 2011a, p. 4). These internal states comprise hypothetical brain mechanisms—and accompanying cognitive processes—that are necessary to keep a person focused on attaining a goal. These are *implicit* processes of which the person is normally unaware but that greatly influence conscious mental content and goal-seeking

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behavior, including the goal to use an addictive substance. We use the term *current concern* to designate the latent, continuing brain processes launched by commitment to a particular goal that persist until the person attains the goal or, in the face of insuperable obstacles or unacceptable costs, relinquishes it.

A goal is defined here as an endpoint—an object or an event—that the person is trying to achieve because he or she expects that achieving it will bring an emotional payoff by enhancing positive affect (appetitive goals of attaining, keeping, or restoring something, such as a job, an achievement, or a relationship) and/or reducing negative affect (aversive goals aimed at avoiding, escaping, or ridding oneself of something valued negatively, such as an illness, a noisy roommate, or a bill-collector). The payoff may be intrinsic to the outcome, such as a feeling of being loved, or extrinsic in the sense of an outcome being instrumental in leading to other outcomes that will provide the intrinsic satisfaction (for example, arranging a date that enables a love relationship).

However, portions or even all of the processes entailed in goal pursuit may be nonconscious, and when conscious they probably become so after nonconscious activation (e.g., Libet, 1985). In most subhuman animal species, these processes presumably occur in the absence of conscious thought.

1.2. The process of choosing goals

Of the many things—called *incentives*—that could change a person's affect in a desirable way, only a subset becomes goals. It has been understood since ancient times that people are disinclined to pursue as goals outcomes that have zero value or that cannot realistically be attained. Of the remaining incentives, people need to choose which ones they will pursue. By 1738, Bernoulli (probably inspired by Pascal) offered what is probably the first formal model for making economic choices, an *expected-utility* model (e.g., Mongin, 1997), which was eventually imported into psychology as a variety of Value X Expectancy formulations (e.g., Bundorf, Mata, Schoenbaum, & Bhattacharya, 2013; Feather, 1982; Morone & Morone, 2014; Van Eerde & Thierry, 1996). (Expectancy is defined in this context and this article in the strict traditional sense as subjective probability of success.) Under this model, the transformation of an incentive into a goal is determined primarily by two important variables: The value that the person attributes to the incentive (i.e., how desirable the affective change from obtaining the incentive is expected to be) and his or her expected likelihood of being able to achieve it within an acceptable time frame and at acceptable cost. Because the relationship between *value* and *expectancy* is theoretically multiplicative, if the value of either of them is zero, there will be no motivation to pursue the incentive, and a goal will not be formed. If, on the other hand, the product of value and expectancy is high enough relative to alternative possible goals, commitment to pursuing the goal of obtaining the incentive will be formed, and it will continue until either the goal is reached or the pursuit is relinquished. Most models of human choice contain the main elements of this model. For example, it has been successfully applied in recent decades to, among others, choices of jobs (e.g., Youngblood, Mobley, & Meglino, 1983), crimes (e.g., Becker & Mehlkop, 2006), contraceptives (e.g., Weisman et al., 1991), family size (Beach, Campbell, & Townes, 1979), migration (Chemers, Ayman, & Werner, 1978), political choices (Quattrone & Tversky, 1988), and medical decisions (Bundorf et al., 2013; Smetana & Adler, 1979). It has also been applied successfully to predicting binge drinking (Quinlan, Jaccard, & Blanton, 2006) and to finding associations of tobacco beliefs with smoking (van der Pligt & de Vries, 1998).

As this model relates to addiction, it is important to distinguish between value and expectancy on the one hand and craving on the other. Craving would not occur with zero value and expectancy, but otherwise intensity of craving fluctuates in accordance with a variety of other variables, such as temporary obstacles to goal attainment (Field & Cox, 2008).

1.3. When an incentive becomes a goal

Successful pursuit of goals can occur reliably only if an organism commits to pursuing each goal, retains a record of its commitment to pursuing it, and thereby launches a disposition to respond in ways that facilitate attainment of the goal. All characteristics of animal organisms must have been selected in the course of evolution for their direct or indirect utility for goal attainment.

The goal theory of current concerns integrates the emotional, motivational, and cognitive processes that are entailed in goal pursuit (Klinger, 1975, 1977; Klinger & Cox, 2011a). A central feature of a current concern is that it sensitizes the individual to respond to cues associated with the goal, giving them *processing priority* over other cues. This sensitization takes the form of *protoemotional* responses (preconscious, valenced but still nonconscious; Klinger, 1996, 2013) to the cues, which in turn evoke cognitive evaluations of how relevant and important the cues are to the goal pursuit. Depending on the outcome of this evaluation, it may engage further processing in the form of attention to and retention of the cues in memory, and goal-related directed and spontaneous thought (Klinger, 1978, 2009, 2013), and dream content (Hoelscher, Klinger, & Barta, 1981; Nikles, Brecht, Klinger, & Bursell, 1998 [using experimentally manipulated cues that were related either to a participant's goals or to someone else's goals]) sometimes accompanied by overt emotional responses (e.g., Nikula et al., 1993) and possibly overt action directed at goal-attainment. In short, current concerns bias cognitive processing as well as emotions and overt action toward the individual's goals.

In additional evidence, experimentally instated goals enhanced delayed memory for their cues more than cues irrelevant to participants' task goals (Montagrin, Brosch, & Sander, 2013). Correlational studies have demonstrated relationships of self-reported goals with self-reported recent thoughts (Klinger, Barta, & Maxeiner, 1980) and with self-reported daily activities (Church, Klinger, & Langenberg, 1984 [described in Klinger, 1987]; Roberson, 1989). When asked to generate their anticipated future events in relation to a goal, participants indicated more such events if the goal was important to them than when it was unimportant (Reilly & Mansell, 2010).

Others have also found similar evidence with regard to the effects of depressed and anxious states on thought content, retrieval, and attention. For example, retrieval is biased in the direction of mood-congruent content (Bower, 1992) specific to the type of negative affect, depressed versus anxious (Ingram, Kendall, Smith, Donnell, & Ronan, 1987). The tendency with respect to depressed states is likelier a state than a trait effect (Lewinsohn & Rosenbaum, 1987), because it dissipates after the depression has remitted, suggesting that these memories are specific to respective current concerns. With regard to attention, anxious individuals responded more quickly than others to threat-related probes (Broadbent & Broadbent, 1988), and panic-disorder patients responded more slowly than others in naming the color specifically of threat-related words (Ehlers, Margraf, Davies, & Roth, 1988). (See also, below, evidence obtained with variants of the Stroop technique.) The generalization that concerns sensitize people to goal-related stimuli thus seems to apply to aversive goal pursuits as well as to appetitive ones.

As the goal theory of current concerns relates to alcohol use, there is now also extensive evidence for a positive relationship between the amount of alcohol habitually consumed (ranging from social drinking to heavy, maladaptive drinking) and the degree to which alcohol cues distract from the Stroop task of naming the colors displayed in slides and from performance on other similar tasks (for reviews see Cox, Fadardi, Intriligator, & Klinger, 2014; Cox, Fadardi, & Pothos, 2006). The delay in color-naming indicates that the alcohol-related content of the stimuli receives processing priority over other stimulus features, which are less important for these participants. Such attentional bias for alcohol cues is associated with urges to drink and actual alcohol consumption, as addressed in subsequent sections.

The goal theory of current concerns also describes consequences of disengaging from goals (Klinger, 1975, 1977, 1993, 1987; Klinger

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