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AUTONOMIC CUED REACTIVITY IN ALCOHOLICS: THE EFFECT OF OLFACTORY STIMULI

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Abstract — The present study was designed to investigate autonomic cued reactivity to olfactory alcohol stimuli in alcoholics. Twenty outpatient alcoholics and 20 social drinkers were exposed to high- and low-potency alcohol and neutral odors. The alcoholics showed greater skin conductance responses and increased heart rate acceleration responses to the high-potency alcohol odor than social drinkers, while there was no difference between the groups' responses to the low-potency alcohol odor. Alcoholics also reported greater difficulties in resisting a potential offer for a drink after relative to before the experiment, while there was no change in the desire to drink. The results indicate that alcohol cues are perceived as emotionally aversive and elicit a defensive response to avoid further processing of these stimuli. The increased autonomic reactivity may thus reflect a shift of focus from the environmental alcohol cues to internal thoughts and feelings. A rigid internal focus may constrain the ability to resist alcohol consumption and thus be a critical determinant in promoting craving and relapse in alcoholics.

One of the most enduring challenges in the treatment of alcoholism is the prevention of relapse after detoxification and therapy (Marlatt, 1985). Conditioning models of relapse propose that any distinctive stimulus that is repeatedly associated with ingestion of alcohol will become conditioned to the alcohol's effects (Rohsenow, Childress, Monti, Niaura, & Abrams, 1990). Previously neutral stimuli associated with drug intake (e.g., the sight or smell of an alcoholic beverage) will thus elicit drug-related conditioned responses (CRs; Niaura, Rosenhow, Binkoff, Monti, Pedraza, & Abrams, 1988). The emotional and physical states elicited by these CRs may serve as discriminant stimuli for drinking (Drummond, Cooper, & Glautier, 1990), which explains why alcoholics often experience craving and relapse upon the return to sites of drug intake after treatment (Grabowski & O'Brien, 1981).

The main difference between the conditioning models is the nature of the CRs that are supposed to promote relapse in the alcoholics. Wikler (1973) proposed that cues associated with ingestion of alcohol elicit CRs that resemble withdrawal symptoms. Siegel (1979) suggested that the CRs are elicited to compensate for the anticipated pharmacological effects of the drug and will thus be opposite in the direction of the unconditioned responses (URs) to the drug. According to both Wikler and Siegel, drinking is negatively reinforced; relapse is motivated by a desire to avoid or escape the aversive nature of the responses elicited by the alcohol cues. Stewart, deWit, and Eikelboom (1984) proposed, on the other hand, that alcohol cues elicit an appetitive motivational state and that drinking in the alcoholics is positively reinforced.

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Several studies have shown that cues related to substance use elicit an increased urge to drink (Ludwig, Wikler, & Stark, 1974) and affect behavior like increasing drinking speed (Stockwell, Hodgson, Rankin, & Taylor, 1982). Furthermore, several studies have shown that alcohol cues like the smell and taste of alcoholic beverages increase salivation (Cooney, Baker, Pomerleau, & Josephy, 1984), electrodermal activity (Ludwig, Cain, Wikler, Taylor, & Benfeldt, 1977), and heart rate (Cooney, Gillespie, Baker, & Kaplan, 1987). Cued reactivity in alcoholics has also been related to the likelihood of future alcohol consumption. Kaplan, Meyer, and Stroebel (1983) found that an increase in skin conductance level (SCL) in alcoholics elicited by the smell and taste of beer and predicted who would choose the beverage as reward on a subsequent performance task.

The results from studies that have investigated alcoholics' responses to alcohol cues isolated from alcohol consumption are less consistent. Litt, Cooney, Kadden, and Gaupp (1990) found that negative mood states elicited an increased urge to drink. Kaplan, Cooney, Baker, Gillespie, Meyer, and Pomerleau (1985) found an increase in SCL when alcoholics were exposed to the sight and smell of their preferred alcohol beverages. McCaul, Turkkan, and Stitzer (1989), however, did not find any increased SCL or HR response to the smell of an alcoholic beverage relative to a neutral beverage, although the alcoholics' urge to drink increased. This is in accordance with Eriksen and Götestam (1984), who also found that exposing alcoholics to slides depicting alcohol beverages and drinking situations elicted an increased desire for alcohol, but had no influence on HR. Stormark, Laberg, Bjerland, and Hugdahl (1993) found increased skin conductance responses (SCRs) in alcoholics compared to nonalcoholic controls, but this was independent of whether they were exposed to alcohol or neutral slides.

Differences in stimulus material may account for the inconsistent findings in these studies (Laberg, 1990). Staiger and White (1991) found that the sight and smell of the alcoholics' two favorite alcohol beverages produced large HR responses and increased desire to drink, while responses to other alcoholic beverages did not differ from the responses elicited by nonalcoholic beverages. This suggests that cued reactivity in alcoholics may be contingent upon the specific relevance of the alcohol stimuli and does not reflect a generalized response to all alcohol stimuli. Recently, the potency of the alcohol cue has also been shown to be an important property of the stimulus in eliciting cued reactivity (Greeley, Swift, Prescott, & Heather, 1993).

Previous studies on cued reactivity have focused primarily on whether the psychophysiological changes are iso- or counter-directional to the drug URs (e.g., Siegel, 1979). It is, however, difficult to make predictions about the direction of the CRs relative to the URs, since a drug may have multiple sites of action (Eikelboom & Stewart, 1982), and drug effects are influenced by the amount of intake and the time since intake (Niaura et al., 1988).

Autonomic reactivity may, however, also indicate how stimuli are evaluated (e.g., Jennings, 1986) and what motivational states are elicited, independent of whether the psychophysiological responses are iso- or counter-directional to the drug URs. Phasic changes in cardiovascular activity reflect different motivational states that are initiated by emotionally salient stimuli (Graham & Clifton, 1966). Aversive information, like loud noises and phobic stimuli elicit an increased cardiac acceleration (Sartory, 1983), while orienting toward a stimulus source is accompanied by cardiac deceleration (cf. Graham, 1979). Phasic changes in HR in response to alcohol stimuli may thus reflect whether the stimuli related to alcohol consumption are perceived as