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BEHAVIORAL ETHANOL TOLERANCE: FACILITATION BY PREDICTIVE CONTEXTUAL STIMULI

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Siegel (1975) suggested that tolerance effects to addictive drugs (such as morphine) may be controlled in part by learned compensatory responses. He demonstrated that contextual stimuli present at the time of drug administration serve as Pavlovian conditioned stimuli (CSs) and eventually elicit a conditioned compensatory response (CR) opposite to the unconditioned response (UR) normally elicited by the drug. These compensatory CRs eventually cancel out the effect of the drug so that higher and higher drug doses are needed to maintain equivalent drug effects. This is the classic tolerance effect.

Following Rescorla's (1967) Information Theory, contextual stimuli should function as effective CSs only when they reliably predict drug administration, a prediction which has been confirmed with morphine tolerance in rats. The present experiment sought to extend Siegel's analysis to alcohol tolerance. Rats were trained to bar press for water reinforcers on variable interval (VI) schedules. When responding had stabilized, all rats received a series of intraperitoneal (ip) injections immediately prior to each VI session. In the PAIRED group, alcohol was injected consistently in the presence of one set of contextual stimuli, and sham saline injections were given in the presence of a different set of contextual stimuli. An UNPAIRED group received the same series of injections, but the contextual stimuli provided no information about the type of injection. Behavioral effects of alcohol were assessed by the amount of suppression of bar pressing following alcohol injections compared to bar pressing following sham injections. Tolerance was defined as a decrease in alcohol-induced response suppression over sessions. According to Siegel's hypothesis, tolerance should rapidly develop in the Paired group, but should occur slowly in the Unpaired group. Because behavioral studies of alcohol are often conducted in a constant environment over a long period of time, evidence of conditioned tolerance effects has important implications for the behavioral pharmacology of alcohol.