work from which specific hypotheses can be generated regarding the mechanism of drug action. Receptor theory provides one theoretical framework which has proven to be valuable at more molecular levels of drug analysis; however, it is only relatively recently that the principles of receptor theory have been evaluated for their applicability in analyzing and predicting the effects of drugs on behavior. In general, two pharmacological constants describe the effects of drugs that act at receptors: affinity and efficacy. All drugs that interact at receptors have affinity (i.e., the attraction between a drug and a receptor), whereas only agonists have efficacy (i.e., the ability to initiate biological responses by occupation of receptors). Behavioral studies have been used to quantify affinity and efficacy, to estimate fractional occupancy of agonists, to characterize the nature of drug interactions at receptors (e.g., reversible or irreversible), and to ascertain the receptor type(s) through which drugs produce specific behavioral effects. The biochemical and behavioral complexity inherent to drug studies *in vivo* can restrict the conditions under which the assumptions of receptor theory can be satisfied and, therefore, the range of conditions under which this approach can be applied. Nevertheless, it is becoming increasingly clear that the theoretical framework provided by receptor theory can be especially helpful for: interpreting behavioral data; generating specific hypotheses for empirical evaluation of mechanism of action *in vivo;* and directing the development of drugs as well as procedures towards specific pharmacological and behavioral endpoints. This approach to behavioral analyses of drug effects might be particularly useful in the development of pharmacotherapies for drug abuse.

INVITED ADDRESS
Chair: *Jonathan L. Katz*, Addiction Research Center, Baltimore, MD.

BENZODIAZEPINES AND BEYOND: REINFORCEMENT, DISCRIMINATION AND DEPENDENCE. Nancy A. Ator, Johns Hopkins University School of Medicine, Baltimore, MD.

Drugs that enhance the major inhibitory neurotransmitter GABA generally have anxiolytic, anticonvulsant, muscle relaxant, and sedative/hypnotic effects to varying degrees. Initially barbiturates (e.g., Seconal) and then benzodiazepines (e.g., Valium) provided most of the clinically useful drugs of this type. However, chronic barbiturate use rapidly produces physical dependence with a severe and often life-threatening withdrawal syndrome. Furthermore, among those who abuse drugs, a subset have favored barbiturates. Under prolonged dosing conditions, benzodiazepines, too, can produce physical dependence, albeit with a less severe withdrawal syndrome; and they also have been subject to misuse and abuse.

Greater understanding of the structure and functions of the GABA receptor complex has facilitated the development of novel compounds that may show more selective pharmacological profiles (e.g., nonsedating anxiolytics). To the extent that such compounds might have less abuse liability or produce little or no withdrawal syndrome, they could be of great therapeutic advantage.

Laboratory study of abuse liability typically involves study of a drug's ability to serve as a reinforcer under intravenous and oral drug self-administration procedures. Some information on other effects, such as the way a test drug is "classified" under a drug discrimination procedure, also has been interpreted in abuse liability assessment. The extent to which chronic drug administration can produce physical dependence has been assessed separate from reinforcing efficacy. Comparison of barbiturates, benzodiazepine agonists and partial agonists, and of novel nonbenzodiazepine anxiolytics/hypnotics across a range of procedures in the same species is useful not only for assessing abuse liability and dependence potential of novel compounds but also for investigating predictions about variables that contribute to a drug's efficacy as a reinforcer and about the relationship between reinforcing efficacy and dependence. Profiles of recently introduced compounds will be compared with those for established standards from research with nonhuman primates.

INVITED ADDRESS
Chair: *Charles R. Schuster*, Addiction Research Center, Baltimore, MD.

NEW PHARMACOTHERAPIES FOR HEROIN ADDICTION. James H. Woods, University of Michigan, Ann Arbor, MI.

Methadone has been established as a standard of reference for the treatment of heroin addiction since its introduction to medicine in the late 1960s. Naltrexone, a competitive μ receptor antagonist, is also available, but its usefulness appears restricted only to a certain set of addicts. Recently, a long acting μ-agonist, 1-α-acetyl-methadol, was approved for this indication. Buprenorphine, a long-acting, μ-partial agonist, is undergoing extensive trial for treatment of heroin addiction as well. The speaker will describe still another class of compounds, chemically and pharmacologically different in their mechanisms from those above, that may also have potential for the treatment of heroin addiction. These compounds are codeinones that appear to interact irreversibly with the μ receptor; they are converted metabolically to irreversible antagonists. The theory and the behavioral pharmacology of the use of these pharmacotherapies will be discussed.

NEW FELLOWS ADDRESS
Chair: *Warren K. Bickel*, University of Vermont, Burlington, VT.

PRIMING EFFECTS WITH DRUGS AND OTHER REINFORCERS. Harriet de Wit, University of Chicago, Chicago, IL.

Many positive incentive stimuli, including drugs of abuse, produce transient increases in the likelihood or vigor of responding to obtain those stimuli shortly after they are presented. For example, noncontingent presentations of rewarding stimuli such as food, water, rewarding electrical brain stimulation or drugs temporarily increase operant rates of responding to obtain these stimuli. This "priming" effect has been studied in laboratory animals, and, more recently, also in human volunteers. In the context of drug abuse, the priming effect has relevance for our understanding of the determinants of reinitiation and maintenance of drug use, and relapse to drug abuse. Sampling of a small amount of a preferred drug may increase an individual's desire for more of the drug and, relatedly, increase the likelihood that the individual will