

FACULTY INTEREST SHEET: W. P. JORDAN**A. How animals learn: The relationship between habituation and latent inhibition**

Habituation is a “simple” form of learning to ignore stimuli that do not predict important environmental events. For instance, if you live in a noisy city next to a bus stop, at first you will notice the sounds of the bus stopping outside your house. After a while, you will habituate to the sounds and not notice them. We know it is a form of learning because if the sounds change, you will again notice them. I am interested in what has happened in your brain to produce this learning.

Conditioning is when one stimulus predicts something important like food. Conditioning with a habituated stimulus is difficult. You can learn that the formerly irrelevant stimulus is now important, but it takes longer to learn this new meaning of the stimulus. This is called latent inhibition because the inhibited learning is seen only later, after the conditions have changed.

It seems like habituation should cause latent inhibition, but many experiments show that it is not that simple. Habituation is one thing that is learned, but the latent conditioning is a second thing. We know that different brain areas and neurotransmitter systems must be involved, but we don't know the specifics. There are a number of drug or brain manipulations that can be done to sort this all out.

B. The Role of Sleep in Memory Consolidation

Sleep after learning leads to better performance (recall) than if the person stays awake. Why? Some theories say that sleep passively protects the new learning from interference. Other theories say that sleep actively helps consolidate memories.

Anti-anxiety drugs such as diazepam (Valium) disrupt memory, but they also encourage sleep. These two effects seem contradictory given the positive value of sleep on memory. There are many interesting experiments that can be done with rats to try to figure this out.

C. Cocaine sensitization

Large doses of cocaine, amphetamine, or other stimulants, cause humans and other animals to be more active, sleep less, and display various “psychological” symptoms. If you give a rat a small dose of cocaine, there is no behavior change. However, if you give this same, small dose once a week, the animal will become more sensitive to the drug and display increased locomotion and other “stimulated” behaviors. Because the cocaine stays in the brain only for a short time (less than an hour), the repeated, small doses must be changing the brain in some relatively permanent way. One theory of cocaine addiction is that the brains of users become “sensitized” by repeated use, creating the symptoms of addiction such as craving and desire to continue drug use. Understanding how the brain is changing during cocaine sensitization may help us understand addiction in humans.

D. Drug use patterns and attitudes about drugs among college students

Our society has many beliefs about drugs and drug use. There is a lot of emphasis on drug use among high school-aged and college-aged people (“young adults”). There are many interesting research questions that can be asked about how people begin using drugs, why they continue or stop using, and how social and cultural factors influence attitudes about drugs and drug use behaviors. (This is survey research, not laboratory experiments.)