Cognitive Modulation of Sexual Behavior
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Were it not for sexual behavior, you and I would not be here, nor would many animal species. Given its critical role, it is not surprising that sexual behavior is multiply determined. Hormonal and neuroendocrine processes mediate sexual motivation or readiness to respond to environmental sexual stimuli. Responses to environmental sexual stimuli are in turn mediated by both preprogrammed instinctive mechanisms as well as by learning and memory.

The role of learning and memory in the control of sexual behavior has been recognized for a long time. For example, Craig (1918) noted that "the sexual tendency is . . . directed, *with much guidance by experience*, toward securing the stimulation required for discharging the sexual reflex" (p. 100, emphasis added). However, only recently have the precise learning mechanisms involved in sexual behavior been empirically documented. These more analytic empirical studies have also helped to identify a number of cognitive factors involved in sexual conditioning. The evidence suggests that sexual behavior is delicately tuned by learning and memory mechanisms that shape both the stimulus control and effectiveness of sexual responses.

Conditioning of Sexual Anticipatory Behavior

In many situations, learning is manifest in the development of anticipatory behavior. The proverbial Pavlovian dog salivates in anticipation of the presentation of food. Rats freeze in anticipation of painful stimulation, and pigeons peck a lighted key that signals brief access to grain. Conditioned anticipatory behavior is also readily evident in sexual situations.

Conditioned anticipatory behavior has been examined most extensively in male domesticated quail (*Coturnix japonica*). Male quail learn to approach a localized stimulus (a light, for example) that is presented shortly before each time they receive access to a sexually receptive female. In such situations, the light is referred to as the conditioned stimulus or CS and access to the female serves as the unconditioned stimulus or US. The development of sexually conditioned approach behavior requires the pairing of the conditioned stimulus with copulatory opportunity (Domjan et al. 1986). Beyond that requirement, however, the learning occurs under a remarkably wide range of circumstances. Conditioned approach behavior develops, for example, even if the conditioned stimulus is presented more than 2 meters away from the location of the female that provides copulatory opportunity (Burns and Domjan 2000) and even if contingencies are introduced such that the CS is followed by the US only on those trials when the subject fails to make the conditioned response (Crawford and Domjan 1993).

Under special circumstances, sexual conditioning can also result in conditioned copulatory responses directed towards the conditioned stimulus. Copulation in quail consists of the male grabbing the back of the female’s head and/or neck feathers (the grab response), mounting the female’s back with both feet (the mount response), and making cloacal thrusts that brings the male’s cloaca in contact with the female’s (cloacal contact responses). Conditioned grab, mount, and cloacal contact responses occur if the CS is a three-dimensional object that can support copulatory behavior. Figure 1 shows an example of such behavior. The conditioned stimulus in this study was a terrycloth object that included a taxidermically prepared head and some neck feathers of a female quail. The pairing of such a CS object with copulatory opportunity results in conditioned grab, mount, and cloacal contact responses if the conditioning trials involve a relatively short interval between the CS and the US (e.g., Akins 2000; Cusato and Domjan 1998).

Sexually conditioned behavior shows many features common to conditioned responding, including acquisition, extinction, retention, blocking, stimulus discrimination, trace conditioning, second-order conditioning, and conditioned inhibition (Akins and Domjan 1996; Crawford and Domjan 1995, 1996; Domjan et al. 1986; Köksal et al. 1994). To the extent that these features