Is that song sexy or just so-so?

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Why is your mate's rendition of Marvin Gaye's "Let's Get it On" cute and sexy sometimes and so annoying at other times? A songbird study conducted by Emory University sheds new light on this question, showing that a change in hormone levels may alter the way we perceive social cues by altering a system of brain nuclei, common to all vertebrates, called the "social behavior network."

"Social behaviors such as courtship, parenting and aggression depend primarily on two factors: a social signal to trigger the behavior, and a hormonal milieu that facilitates or permits it," says Emory neuroscientist Donna Maney, who led the study. "Our results demonstrate a possible neural mechanism by which hormones may alter the processing of these signals and affect social decision-making."

Maney's research examines how genes, hormones and the environment interact to affect the brain, using songbirds as a model. Her work helps provide an understanding of the basic principles underlying brain structure and function common to many species, including humans.

Maney led a previous study on white-throated sparrows that suggested hormones may modulate the way the auditory system processes courtship signals. The new study (currently online), to be published in the Nov. 10 edition of the *Journal of Comparative Neurology,* expands on that research, tracking and quantifying the effects of hormones across nine different nodes of the brain's social behavior network.

The research group treated female white-throated sparrows with

estrogen, to mimic the levels seen during the breeding season, and compared them with females that had low, non-breeding levels of estrogen. The birds listened to recordings of either male white-throated sparrow song (a courtship signal that should command the attention of breeding females) or synthetic beeps (which should be pretty boring for all the females). The researchers then used a marker of new protein synthesis to map and quantify the activity in the social behavior network that was induced specifically by song.

Across most of the network, song-specific neural responses were higher in the "breeding" females than the "non-breeding" ones. But the effects of estrogen were not identical in every region. "If every node in the network just responded more in the presence of estrogen, then we'd conclude that estrogen acts as an on-off switch," Maney says. "But what we're seeing is more complicated than that. Some activity goes up with estrogen, and some goes down. We are seeing how estrogen changes the big picture as the brain processes social information."

The findings suggest that the perceived meaning of a stimulus may be related to the activity in the entire social behavior network, rather than a single region of the brain. "The same neural mechanism may be operating in humans," Maney says. "In women, preferences for male faces, voices, body odors and behavior change over the course of the menstrual cycle as estrogen levels rise and fall. Our work with these songbirds shows a possible neural basis for those changes."

Source: Emory University