

Researchers describe neural mechanisms for gregariousness and monogamy in zebra finches

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A pair of Zebra finches at Bird Kingdom, Niagara Falls, Ontario, Canada.
Credit: Wikipedia

How do gregarious songbirds such as zebra finches, where both males and females live in close proximity and where females may be attracted by the songs of many potential suitors, sustain monogamy? A new study appearing in *eLife* sheds light on how males have evolved a high

tolerance to birdsong while females have evolved a high selectivity to these songs.

The article, titled "Sexual dimorphism in striatal dopaminergic responses promotes monogamy in social songbirds" is a collaboration of researchers from three City University of New York (CUNY) institutions—Hunter College, the Graduate Center, and City College—as well as Weill Cornell Medicine and Houston Methodist Research Institute. Much of the data collection took place at Hunter's Laboratory of Vocal Learning whose principle investigator, Ofer Tchernichovski, is a senior author on the study. Kirill Tokarev, a post-doctoral associate in the laboratory, is first author, and PhD students Julia Hyland Bruno and Iva Ljubičić are second and third authors, respectively.

Birdsong is typically thought to attract females and repel rival males in territorial species. Zebra finches, however, are among the songbird species in which numerous males and females live in close proximity but maintain monogamous relationships. To help solve the paradox of aggregation and pair bonding, the researchers examined the striatum, a brain area that regulates both social and sexual behaviors and that encodes reward signals via a molecule called dopamine. Dopamine in the striatum modulates singing behavior, but its role in the reinforcement function of the [song](#) had been largely unknown.

The researchers found that hearing songs induced dopamine in the striatum of zebra finch males. Surprisingly, the striatum of unmated females was insensitive to songs. In addition, unmated males but not females persistently exchanged mild punishments—in the form of puffs of air—in return for hearing songs. Unlike their single counterparts, mated females also showed song reinforcement, but exclusively to the song of their mate. These findings suggest that song may serve as a generic social stimulus for male [zebra finches](#), while [females](#) respond very selectively to their mate. Such sex-specific responses to the same

socially relevant stimuli can explain how gregarious animals are able to maintain monogamous pair bonds.

This study is an early step in understanding how neural reward systems are tuned to regulate social interactions. Knowledge of these mechanisms in songbird species with different social and mating systems may in turn elucidate social and sexual pathologies in humans.

More information: Kirill Tokarev et al. Sexual dimorphism in striatal dopaminergic responses promotes monogamy in social songbirds, *eLife* (2017). [DOI: 10.7554/eLife.25819](https://doi.org/10.7554/eLife.25819)

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