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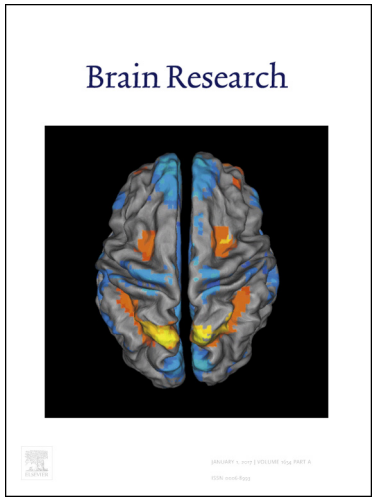

Research report

Dopaminergic neurons are preferentially responsive to advertisement calls and co-active with social behavior network nuclei in sneaker male midshipman fish

Zachary N. Ghahramani, Miky Timothy, Joshua Varughese, Joseph A. Sisneros, Paul M. Forlano

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ACCEPTED MANUSCRIPT

Dopaminergic neurons are preferentially responsive to advertisement calls and co-active with social behavior network nuclei in sneaker male midshipman fish

Zachary N. Ghahramani[a,c]*, Miky Timothy[a], Joshua Varughese[a], Joseph A. Sisneros[f-h], and Paul M. Forlano[a-e]

[a]Department of Biology and [b]Aquatic Research and Environmental Assessment Center (AREAC), Brooklyn College, Brooklyn, NY; Doctoral Subprograms in [c]Ecology, Evolutionary Biology and Behavior, [d]Neuroscience, and [e]Behavioral and Cognitive Neuroscience, The Graduate Center, City University of New York, New York, NY; Departments of [f]Biology and [g]Psychology, University of Washington, Seattle, WA; [h]Virginia Bloedel Hearing Research Center, Seattle, WA

*Corresponding author: 2900 Bedford Ave, 200 Ingersoll Hall Extension, Brooklyn, NY 11210, U.S.A.; e-mail: zackgmani@gmail.com

Abstract: Vocal species use acoustic signals to facilitate diverse behaviors such as mate attraction and territorial defense. However, little is known regarding the neural substrates that interpret such divergent conspecific signals. Using the plainfin midshipman fish model, we tested whether specific catecholaminergic (i.e., dopaminergic and noradrenergic) nuclei and nodes of the social behavior network (SBN) are differentially responsive following exposure to playbacks of divergent social signals in sneaker males. We chose sneaker (type II) males since they attempt to steal fertilizations from territorial type I males who use an advertisement call (hum) to attract females yet are also subjected to vocal agonistic behavior (grunts) by type I males. We demonstrate that induction of cFos (an immediate early gene product and proxy for neural activation) in two forebrain dopaminergic nuclei is greater in sneaker males exposed to hums but not grunts compared to ambient noise, suggesting hums preferentially activate these nuclei, further asserting dopamine as an important regulator of social-acoustic behaviors. Moreover, acoustic exposure to social signals with divergent salience engendered contrasting shifts in functional connectivity between dopaminergic nuclei and nodes of the SBN, supporting the idea that interactions between these two circuits may underlie adaptive decision-making related to intraspecific male competition.

Keywords: acoustic communication, alternative reproductive tactics, catecholamines, dopamine, social decision-making network, teleost

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