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Fish adjust aggressive behavior to audience size with limited information on bystanders' fighting ability

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Highlights

- The effect of virtual bystanders was assessed using mirror images.
- Fish seem to interpret mirror images as an audience.
- Fish adjust aggressive behavior to bystanders under size-based audience.
- Fish reduces aggressive behavior with high energetic costs in front of a larger audience.

ABSTRACT

In a social environment, individual behavior is modulated by surrounding observers (a phenomenon known as the audience effect). Here, we used mirrors to test the effect of two audience sizes (one virtual bystander vs. three virtual bystanders) on the aggressive behavior of a focal fish when bystander's fighting ability was not clear (i.e., information about the ability of virtual conspecifics limited by their mirror images). We found that the Nile tilapia, a cichlid fish, responds to its image as an audience by reducing overt aggression in the presence of larger audience.

Keywords: bystander; mirror-elicited image; social network.

1. Introduction

Social animals interact with conspecifics in unpredictable social environments, and a given individual's behavior is often shaped by the behavior of others conspecifics' (Taborsky and Oliveira, 2012). Information is acquired either directly (when a signaler and receiver are involved) or indirectly, through observation of bystanders' behavior (McGregor and Peake, 2000). However, while bystanders acquire information within a communication network, signalers and receivers can also detect the presence of a bystander and change the way they interact, a phenomenon known as audience effect theory (Taborsky and Oliveira, 2012). According to this, behavioral

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