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Dual Stimuli Response Frequency and Stimulus Choice of the African Clawed Frog, Xenopus laevis, when presented with two stimuli

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Abstract

This preliminary study examines responses of African Clawed Frogs to simultaneous presentation of two stimuli. Frogs were tested in a round arena with water 4 cm deep. Four stimulus rods driven via computer-controlled stepper motors were concealed in a screen suspended above the water. These rods could present a lateral line stimulus, a visual stimulus, or a combination of both. Overall, reactions and no reactions were evenly distributed--51.1% and 48.9%, respectively. Frogs responded more frequently to rostral than caudal stimuli (chi-squared 20.8, df=11, $p<0.04$). Frogs reacted more to stimuli between -90° and 90°. Turn angle depended linearly on stimulus angle (e.g., Turn angle = 0.44 + 0.64 x Stimulus angle; $p_{slope} < 0.0001$; $R^2_{adj} = 69.5\%$). (The distributions of stimulus angles appear slightly skewed as often the same stimulus rod was retested after the frog responded and partially oriented towards it, prompting a second test with smaller angles.) Two stimuli did not elicit more responses than one stimuli (P=0.25). The frogs' choice of stimulus depended primarily on stimulus proximity and angle, not stimulus type. When presented with two stimuli, the frog chose the nearer stimulus and the more rostral stimulus ($p < 0.0001$). The largest factor in predicting the frog's choice of stimuli seems to be the linear distance from the stimuli to the frog.