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Poster

Behavioural effects of approach-avoidance motivational conflicts in Zebrafish: testing an Attentional Control Model on videotracked swimming activity

YLIEFF Marc¹, FROIDBISE Sophie¹, JACQUET Laurie¹, LOSSON Isabelle¹, PONCIN Pascal¹, ANSELME Patrick²

¹ *Laboratory of Fish and Amphibian Ethology, Behavioural Biology Unit, University of Liège, Liège, Belgium;* ² *Behavioural Neuroscience and Experimental Psychopharmacology Unit, University of Liège, Liège, Belgium*

Motivational conflicts have been thoroughly studied in birds and mammals over the last decades, but their investigation has remained anecdotic with respect to fish. However, recent researches reveal that, emotion and cognition also play a pivotal role in the expression of fish behaviour. Fish exhibit fear, long-term memory, attentional and learning capacities that are comparable with those of other vertebrates, including nonhuman primates. Thus, fish can be expected to manage motivational conflicts using cognitive similar resources. As many other teleost fishes, zebrafish (*Danio rerio*) is a good candidate to investigate the behavioural effects of approach-avoidance conflicts because of its genetic and neurophysiological proximity with "higher" vertebrates. The present study aims to determine how Zebrafish reacted to threats of different magnitude (low vs. high) following the delivery of food.

A total of 66 female wild type AB zebrafish were tested in these experiments. Eight small aquaria (illuminated 12h/day by 14w neons tube and placed in 8 white wall boxes to improve visual contrast) were used, successively to train and test single fish. Each arena was composed of two parts (24x20x8 cm & 8x20x8 cm, lengthxdepthxwidth) separated by an anti-reflection pane of glass; the width of aquaria was narrow to minimise data loss during the 2-D video-tracking; the left part was the place where fish could freely move; the right part contained a threatening stimulus (low threat: a mere loop of yellow thread; high threat: a basic homemade dummy of *Xenentodon cancila*). In order to elicit approach behaviour, ZM-400 powder food was delivered through a funnel placed 40 mm away from the "dummy's area". Data were recorded on digital Sony® camera and they were analysed using the EthoVision Color-Pro® 3.1 video tracking system.



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Six groups of 11 fish each were defined. The different groups specify the stimuli presented on test day: G1-FT+: fish were exposed to food and, 15 s later, to the high threat for 30 s; G2-ØT+: no food, high threat; G3-FT-: food, low threat; etc.

The results indicate that the swimming total distance moved and turn angle mean are altered by the presence of food, its association with threat, and the magnitude of threat. Although these results can be partly interpreted in terms of fear or anxiety, we suggest that the zebrafish behaviour measured in conflict situations may require an explanation in terms of differences in attentional control on a task demands. Attention here is defined in the sense of selectively allocating cognitive resources to one aspect of the environment while ignoring other aspects. One of us has developed a model (the Anselme 's Anticipatory Dynamics Model) based on empirical evidence that attention is a limited cognitive resource, so that behavioural performance related to one stimulus depends on the amount of attentional resources allocated to another stimulus. The data are discussed in the light of this theoretical model.

Keywords : Motivational conflicts, Video-tracking, Zebrafish