

Variation in behavioral responses - why does it exist?

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It is blatantly apparent that a wide range of variation in behavioral responses exists, specifically in respect to how individuals react to anxious or stressful settings. But what leads to this variation? Do individuals have true autonomy over their reactionary responses or are people predisposed to their disposition?

This variation in behavioral responses is not exclusive or limited to humans, but rather also found amongst other species. An extensive amount of research has been conducted into this conundrum in model organisms, which tries to discern what the underlying mechanisms at play are. Of particular interest, is the work that has been done into this construct in regards to zebrafish (*Danio rerio*). Zebrafish are an established model organism that is known to exhibit distinct reactionary responses, colloquially referred to as behavioral profiles, to anxious or stressful scenarios. That is, they will either display a proactive (bold) or reactive (shy) coping strategy. But why this apparent variation occurs is still unclear.

We therefore wanted to delve further into this phenomenon. The specific interest of our study was to try to discern whether personality is inheritable through selection, whether there is a difference in behavioral profiles between different strains of a species and what effect chronic stress has in juveniles in regards to the development of these profiles.

To investigate this paradigm, a behavioral experimental set up was used and six different strains of zebrafish were tested. Specifically, three different behavioral models were ran that each explicitly were designed to induce an anxious state, which therefore enabled reactionary assessment. The strains used in this study were composed of a mutagenic strain, mutagenic chronically stressed line, a lab-bred reference strain, a wild line, and selectively bred bold and shy lines.

A series of comparative analyses were performed based off the data ascertained from the experiment, and our results posit that there is a genetic and thus heritable aspect to personality and that obvious and striking differences do exist between different strains of zebrafish. However, it is unclear what effect, if any, early life chronic stress has on the development of said coping styles. But our study does provide evidence that both genetic and environmental aspects play a role in determining ones' behavioral responses to anxious scenarios.

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