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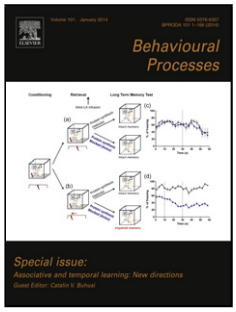

Title: Shy herbivores forage more efficiently than bold ones regardless of information-processing overload

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Title: Shy herbivores forage more efficiently than bold ones regardless of information-processing overload

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Highlights:

- Katydids from the Tettigonioidea clade of Orthoptera exhibit different personality types
- There was no support for neural constraint hypothesis
- Bold katydids are actually less efficient foragers than shy ones

Abstract

The neural constraint hypothesis is central to understanding decision-making by foraging herbivorous insects which make decisions less efficiently when they face multiple choices for numerous resource types and/or at high densities instead of a fewer choices. Previous studies have also shown the relationship between personality type and decision-making style. How personality types correlate with foraging efficiency among herbivores is however largely untested. To answer this question, we used a widespread, polyphagous, floriphilic katydid, *Phaneroptera brevis* (Orthoptera: Tettigoniidae) and two naturalised, Asteraceae, food plants, *Biden pilosa* and *Sphagneticola trilobata*, as model systems. After we determined each katydid's exploration and boldness levels, we examined its foraging efficiency across different combinations of floral resource choice and density. We showed: (1) For the first time within the Tettigonioidea lineage that this katydid exhibits different personality types in exploration and boldness. (2) Contrary to our prediction, we did not find any support for the neural constraint hypothesis because more floral resource choice at a high density did not reduce foraging efficiency. (3) Surprisingly, bold katydids tend to be less efficient foragers than shy ones. Our findings have enhanced understanding of herbivore behavioural ecology and knowledge to better deal with potential pest herbivores.

Key words: florivory; neural constraint hypothesis; animal personality; behavioural ecology; katydids; Orthoptera