

Effects of functional constraints and opportunism on the functional structure of a vertebrate predator assemblage

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Summary

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Within mainstream ecological literature, functional structure has been viewed as resulting from the interplay of species interactions, resource levels and environmental variability. Classical models state that interspecific competition generates species segregation and guild formation in stable saturated environments, whereas opportunism causes species aggregation on abundant resources in variable unsaturated situations.

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Nevertheless, intrinsic functional constraints may result in species-specific differences in resource-use capabilities. This could force some degree of functional structure without assuming other putative causes. However, the influence of such constraints has rarely been tested, and their relative contribution to observed patterns has not been quantified.

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We used a multiple null-model approach to quantify the magnitude and direction (non-random aggregation or divergence) of the functional structure of a vertebrate predator assemblage exposed to variable prey abundance over an 18-year period. Observed trends were contrasted with predictions from null-models designed in an orthogonal fashion to account independently for the effects of functional constraints and opportunism. Subsequently, the unexplained variation was regressed against environmental variables to search for evidence of interspecific competition.

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Overall, null-models accounting for functional constraints showed the best fit to the observed data, and suggested an effect of this factor in modulating predator opportunistic responses. However, regression models on residual variation indicated that such an effect was dependent on both total and relative abundance of principal (small mammals) and alternative (arthropods, birds, reptiles) prey categories.

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In addition, no clear evidence for interspecific competition was found, but differential delays in predator functional responses could explain some of the unaccounted variation. Thus, we call

for caution when interpreting empirical data in the context of classical models assuming synchronous responses of consumers to resource levels.