Title of abstract: The functional response in pelagic copepods

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The functional response in feeding rate to prey concentration is the main determinant of trophic interactions, yet the shape of the functional response and the mechanisms that govern it remain controversial for pelagic copepods. We developed and tested a simple functional response optimization model that considers predation risk and metabolic expenses. The model predicts that feeding activity in feeding-current and cruise feeding copepods should be highest at intermediate prey concentrations, and decrease at both higher and lower prey availabilities; this generates a sigmoid Holling type III functional response. Passively ambush feeding copepods should, in contrast, have a type II functional response. We tested model prediction by examining the prey-concentration-dependent feeding behaviour in 3 species of copepods, *Acartia tonsa*, *Temora longicornis*, and *Centropages hamatus.* We used video recording to quantify feeding behaviour (time spent feeding; appendage beat frequency; swimming velocity, etc) and found significant differences between species: *A. tonsa* behaves as predicted, while the behaviour of *T. longicornis* and *C. hamatus* were independent of prey availability. A review of literature reports on observed shapes of the functional response showed that ambush feeders almost consistently have a type II response, while feeding-current and cruise feeding copepods have either a type II or type III response, consistent with model predictions and – partly – behavioural observations.

Keywords: predation risk, feeding activity.

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