
Rejuvenating functional responses in ecology with renewal theory

Sylvain Billiard*¹

¹Université Lille Nord (France) – CNRS, Université de Lille : UMR8198 – France

Résumé

Functional responses in ecology are functions linking population density (e.g. prey density) to interactions rate (e.g. prey consumption by a predator). Functional responses can have many forms and can dramatically affect population dynamics and stability. Yet, forms of functional responses are poorly justified, mainly from a phenomenological point of view, which makes inference from data difficult. We propose a general stochastic framework, based on renewal theory, where the interactions between individuals are explicitly modeled. We show how functional responses emerge from microscopic processes thanks to an approximation of the stochastic process. We also show that an approximation of the variance of the interaction rates can be obtained. We finally apply this framework to make inference from data. We especially show that much information can be extracted from the observed variance of the consumption rates.

*Intervenant