

## Is the Optimal Foraging Model an Optimal Model?

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My presentation will argue for what I see as being most fruitful role of optimality models in animal foraging theory. I will argue that, counter-intuitively, optimality models are most useful when they *fail* adequately to model an organisms' foraging behavior. I begin with the historical observation that behavioral ecologists have added new parameters to complicate their optimal foraging model only when an older and simpler model broke down. For example, the initial set of optimal foraging models assumed an even distribution of prey and also assumed that foragers settle on specific strategies based solely on the energy intake it yields over time. It is the failure of such simple models that forced behavioral ecologists to take seriously cases in which prey distribution is patchy. It also forced them to think about which aspects of foraging decisions are state-dependent and why (risk-sensitivity being a prominent example here). I will then move on to argue that we are now at a point where the failure of old models has pressured foraging theory to begin moving in a new and fruitful direction that re-integrate proximate and ultimate explanations of animal behavior. New research by Alex Kacelnik among others has used the failure of the optimality assumption in all these models as a means to gain insight into the proximate cognitive mechanisms that underlie animal behavior. This new research is important because it does not simply use the failure of an existing model to build a new, more complex one. Rather, it uses the failure of the optimality *assumption* underlying *all possible* models of this kind. The lesson to draw from this, I suggest, is not that optimality models are bad and prone to failure. Rather, while I do urge caution when using them, I argue that these models illustrate the generative role that fictional and indeed totally unrealistic assumptions can play in science. Finally, I will end with a more general discussion of the methodological and epistemological message we should take away from all of this.