Biological systems, from ecosystems to the human body, involve many interacting agents (e.g., species, cells). Standard models of interactions among agents are based on linear chemical kinetics, assuming agents move randomly and independently. Yet many organisms and cells actively search for one another using sensory data, suggesting that movements in real systems are correlated, not independent.

We explore whether this correlation affects encounter rate kinetics. Sensory response breaks the independence between movements of searchers and target positions, even when sensory signals are noisy and directionless. This causes:

1. Searchers to concentrate search effort near targets
2. Emergent non-linear encounter rate kinetics

In contrast to chemical kinetic models, this predicts encounter rates that are non-linear in target density.

To relax assumption of perfect sensing, we reduce the information searchers acquire about targets. We compare encounter rate kinetics of a searcher moving using random movements plus noisy non-directional sensory signals, to a searcher moving randomly and independently of target positions.
