

# **A novel framework for analyzing interaction between individuals: a case study using brown hyenas in Northern Botswana**

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**Keywords:** modelling animal movement; movement ecology; spatial ecology

**Abstract:** New developments in GPS and related satellite tracking technologies have facilitated the collection of highly accurate data on moving objects, far surpassing the ability to analyze them. Interactions, for which the basic unit of observation is a pair of locations for two individuals, can be considered a second order property of movement but their social and psychological explanations and implications are far less generalizable. Within movement pattern analysis, human interactions have been studied far more extensively than any other type, and they are often based on detailed information such as 'travel diaries' from which activity spaces can be calculated and intersections of multiple activity spaces can be used to derive social interaction metrics.

The nature of interactions between individuals of an animal population is a fundamental aspect of a species' behavioral ecology and information on the frequency and duration of these interactions is vital to understanding mating and territorial behavior, resource use, and infectious disease epidemiology. However, the number of times an individual animal comes into contact with another is an extremely difficult parameter to estimate and preliminary research has shown that current interaction metrics produce quite variable results and do not facilitate meaningful interpretations of interaction rates in general (Miller 2012). The goal of this research is to develop a novel framework that can be used to analyze and interpret dynamic interactions between individuals and focuses on GPS collar data from sixteen brown hyena individuals in Northern Botswana as a case study.

## **References**

Miller JA (2012) Using Spatially Explicit Simulated Data to Analyze Animal Interactions: A Case Study with Brown Hyenas in Northern Botswana. *Transactions in GIS*, 16(3), 271–291.