

# Looping towards certainty: The role of flight loops in homing pigeon navigation

**Rithwik John Cherian**

University of Rochester, Rochester, New York, United States

**T. Florian Jaeger**

University of Rochester, Rochester, New York, United States

**Dora Biro**

University of Rochester, Rochester, New York, United States

## Abstract

Homing pigeons develop more efficient routes over repeated flights from a given location, but many open questions remain regarding the mechanisms behind this ability. This study examines the role of flight loops in navigation—instances where pigeons circle at specific locations during their homeward journeys. While loops are a source of navigational inefficiency, their navigational utility, if any, has not been studied. We adopt a data-driven approach to test hypotheses about looping on a GPS dataset of pigeons homing from a novel release site. We found that looping decreases with experience, with birds performing fewer and shorter loops with repeated releases. Less efficient navigators exhibited significantly more looping behavior. Our analysis revealed that directional uncertainty tends to decrease after loops compared to before, suggesting that loops may be an information-gathering mechanism. Additionally, locations where pigeons performed loops were more likely to be revisited in subsequent flights, indicating these sites might correspond to important and/or salient landmarks. Together, these findings illuminate the extent to which looping is not a purely stochastic navigational event, but a deliberate strategy.