

Encounternet: A new technology to track small scale spatial movements

Davide Baldan



Koos Dansen

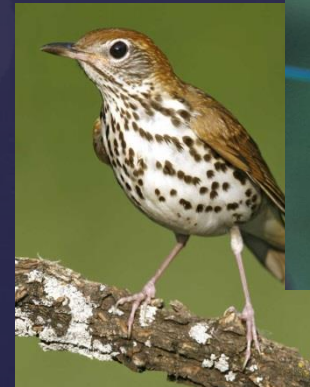
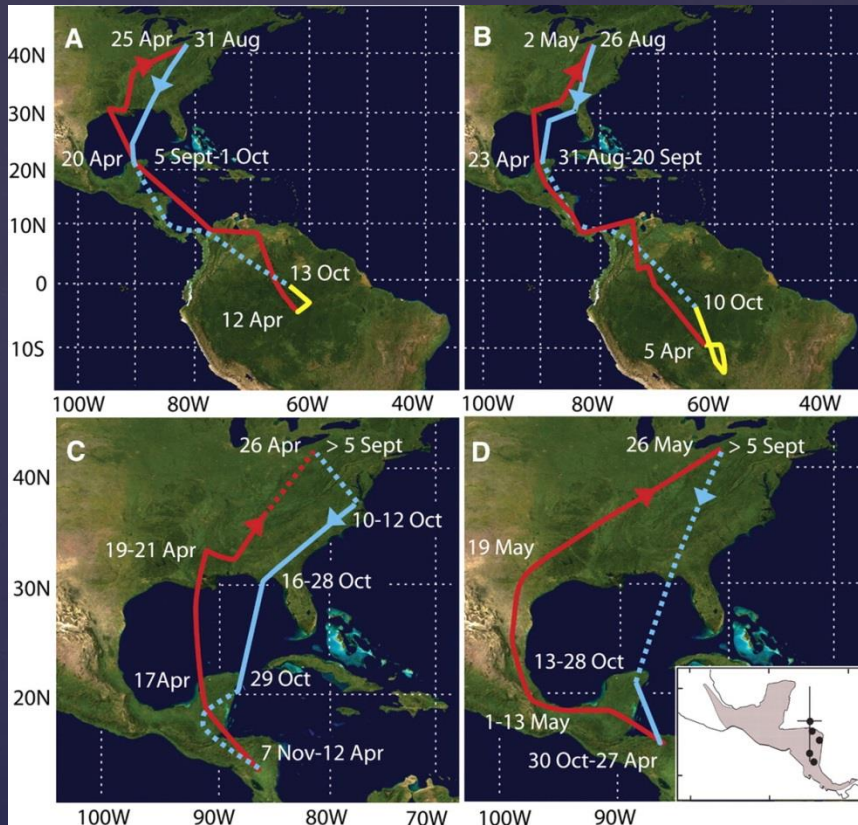


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Tracking long distance movements...

Tracking Long-Distance Songbird Migration by Using Geolocators

Bridget J. M. Stutchbury,^{1*} Scott A. Tarof,¹ Tyler Done,¹ Elizabeth Gow,¹ Patrick M. Kramer,¹ John Tautin,² James W. Fox,³ Vsevolod Afanasyev³



Tracking small scale movements...

Encounternet



- **Social behaviour (Social networks)**
- **Reproductive behaviour (Lekking behaviour and parental feeding)**

Encounternet (encounternet.net)

Encounternet tag

- 0,9 gr. (great tits and manakins)
- 9 gr. (crows)



- Broadcasts ID pulses every 5 sec.
- RSSI (Received Signal Strength Indication)

Encounternet (encounternet.net)

Encounternet tag

- 0,9 gr. (great tits and manakins)
- 9 gr. (crows)



Base stations

- Portable and wireless receivers
- Placed in specific locations or in arrays



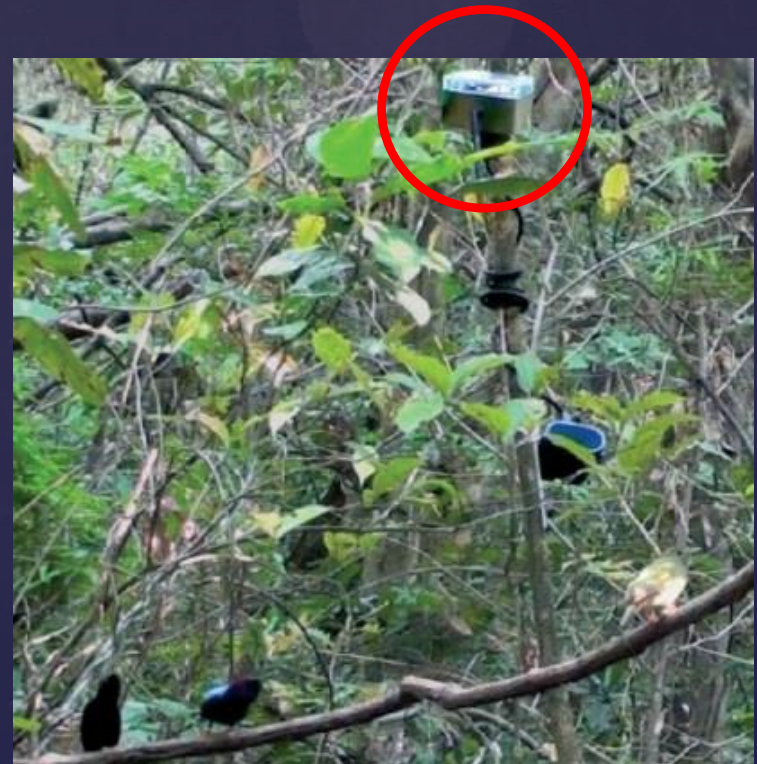
Encounternet to locate birds in specific locations

Lekking behaviour in long-tailed manakins (*Chiroxiphia linearis*)
(Mannil *et al.* 2012; ongoing project)



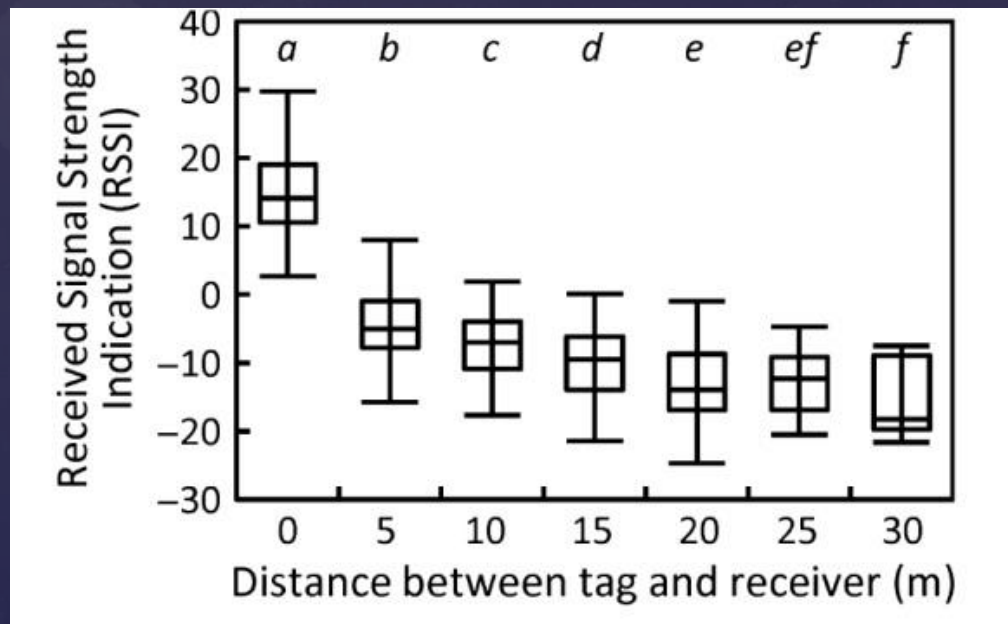
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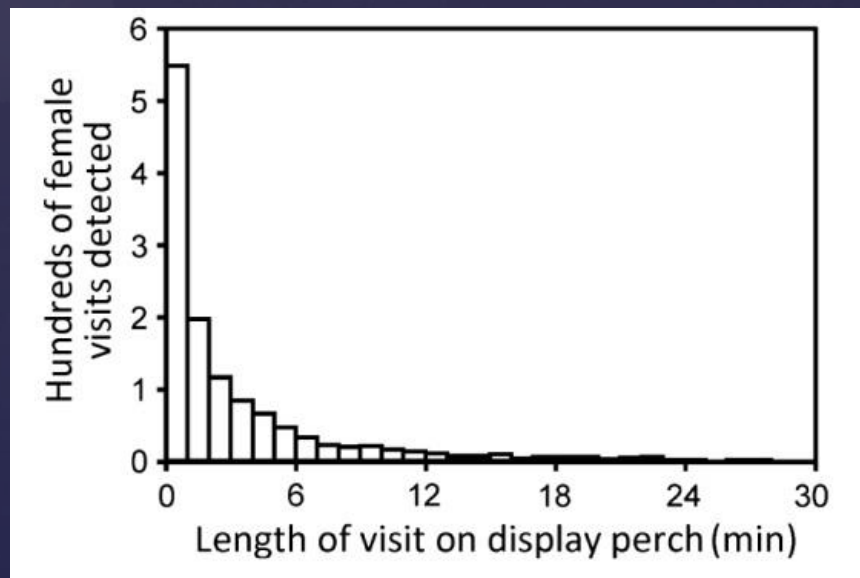
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Encounternet to locate birds in specific locations

Lekking behaviour in long-tailed manakins (*Chiroxiphia linearis*)
(Mannil *et al.* 2012; ongoing project)

Mean 'perch visit length' of $2,62 \pm 0,30$ min

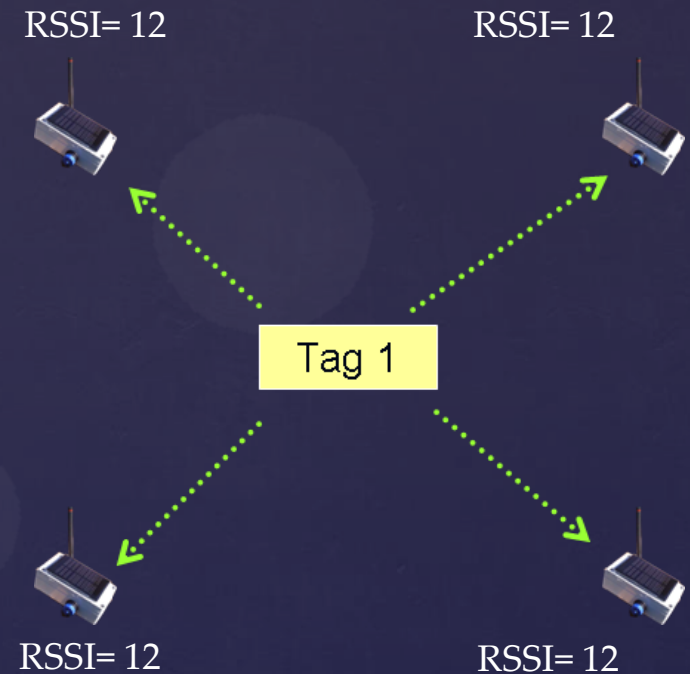


Encounternet to track animal movements and social interactions

Triangulate locations by arrays of base stations in relations to the detected RSSIs

Multiple tags can be located inside the same array

From triangulated locations to social interactions



Encounternet to track animal movements and social interactions

Social networking in territorial great tits: slow explorers have the least central social network positions

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^a Behavioural Ecology Group, Wageningen University, Wageningen, The Netherlands

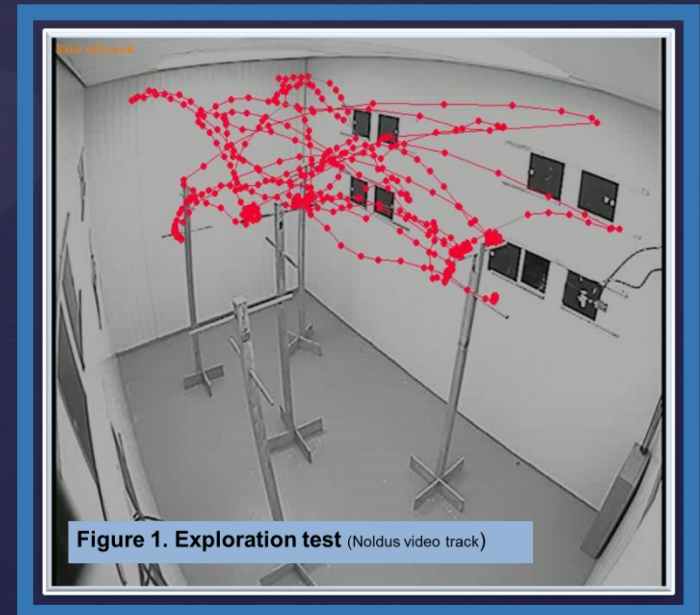
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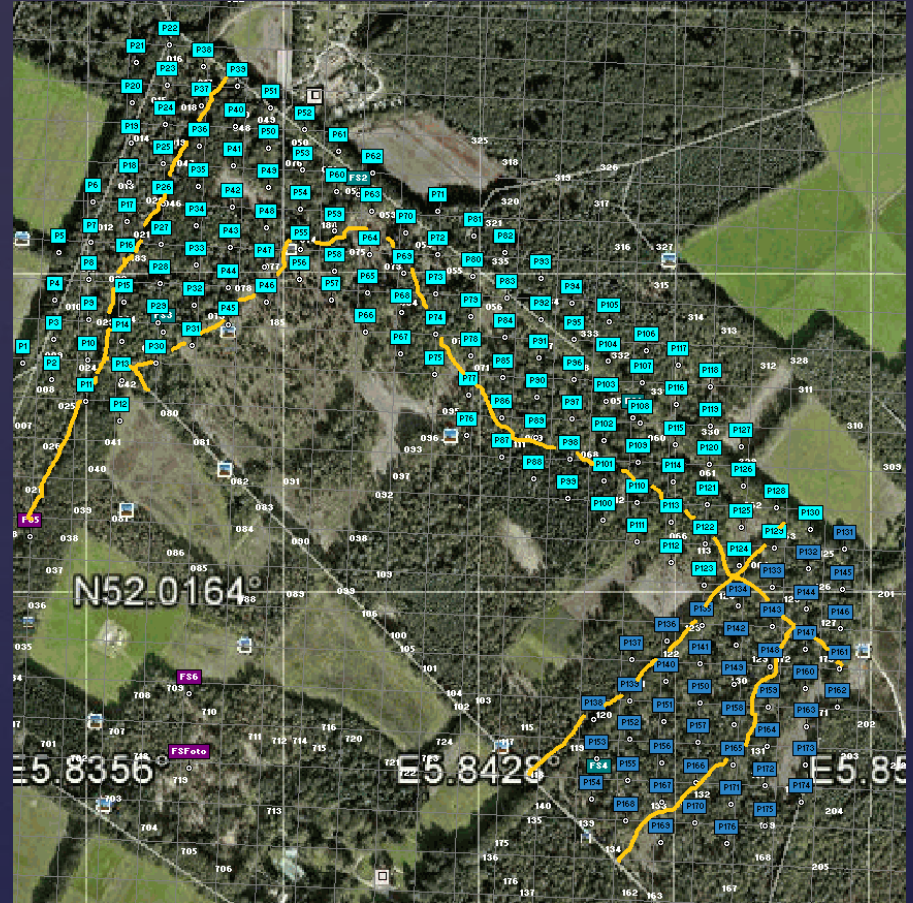
Social network in relation to personality in animal populations

Exploratory behaviour in 34 great tits



Encounternet to track animal movements and social interactions

- 176 Base Stations in a 50m triangular array in Westerheide (The Netherlands)
- 34 tagged individuals tracked for 5 days



Encounternet to track animal movements and social interactions

For 13 individuals:

- 9380 locations (RSSIs averaged every 30 sec)
- 70 Encounters (occasions two birds were found within 10m)

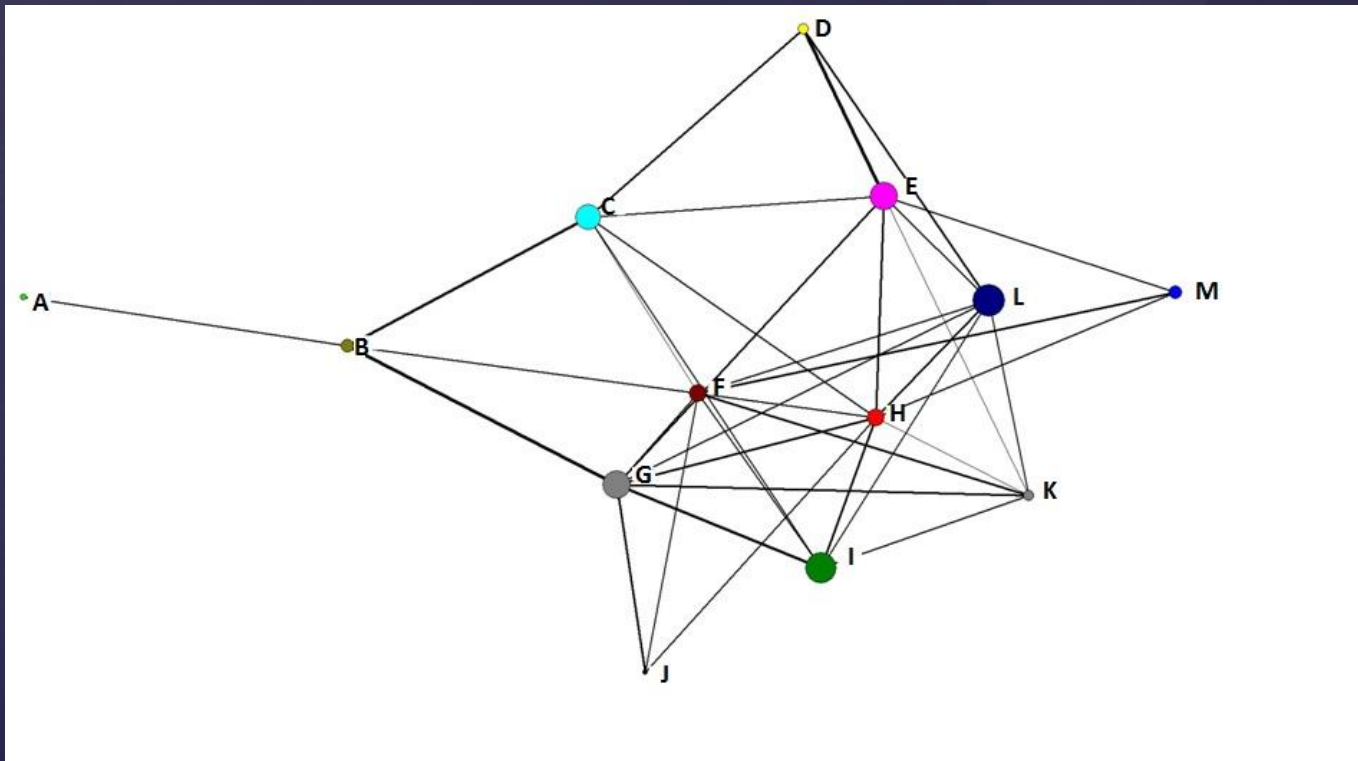
Tag Log

(tagID)	day	time	duration(s)	UTM x	UTM y	(num) bases used
(3)	3-9-2012	12:03:18	25	695418.2139	5766728.346	(1) 324
(3)	3-9-2012	12:03:49	20	695399.8424	5766851.682	(1) 322
(3)	3-9-2012	12:04:24	25	695400.8894	5766840.828	(2) "313,322"
(3)	3-9-2012	12:04:55	23.3	695415.3522	5766744.267	(2) "313,324"
(3)	3-9-2012	12:05:25	25	695356.6143	5766813.898	(3) "313,318,324"
(3)	3-9-2012	12:05:55	26.6	695362.2052	5766705.9	(4) "308,313,318,324"



Encounternet to track animal movements and social interactions

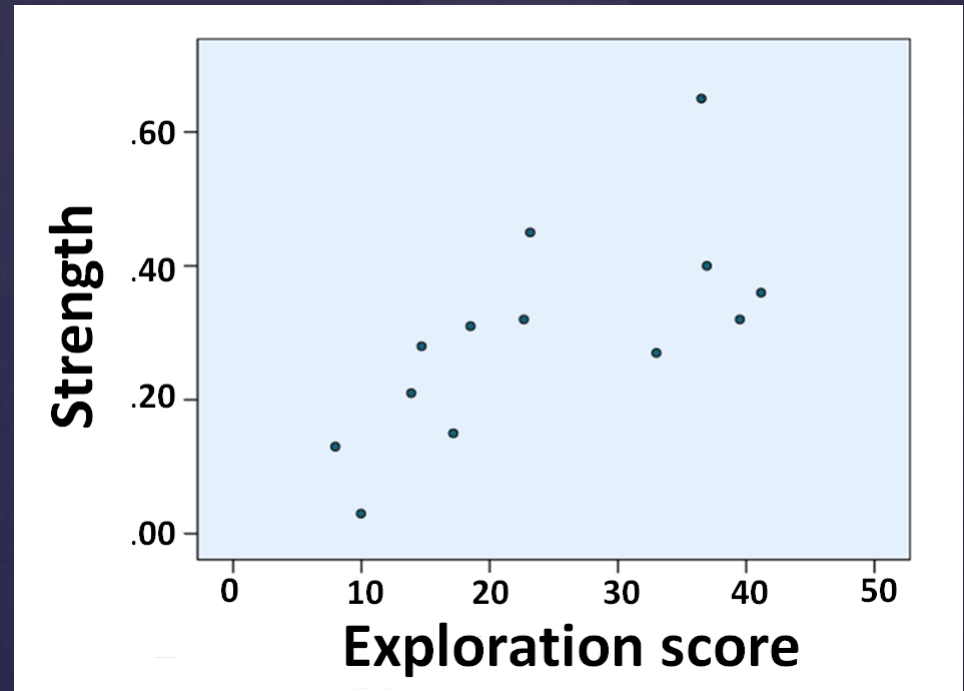
Social Network Analysis



Encounternet to track animal movements and social interactions

Social Network Analysis

Association strength
correlates with
exploratory behaviour



($P < 0.02$, Linear permutation model* controlling for average nestbox distance; Adjusted R-squared: 0.4016 F-statistic: 5.027 on 2 and 10 DF)



Encounternet to track animal movements

Spatial coordination during foraging activity in parental great tits



D. Baldan PhD project



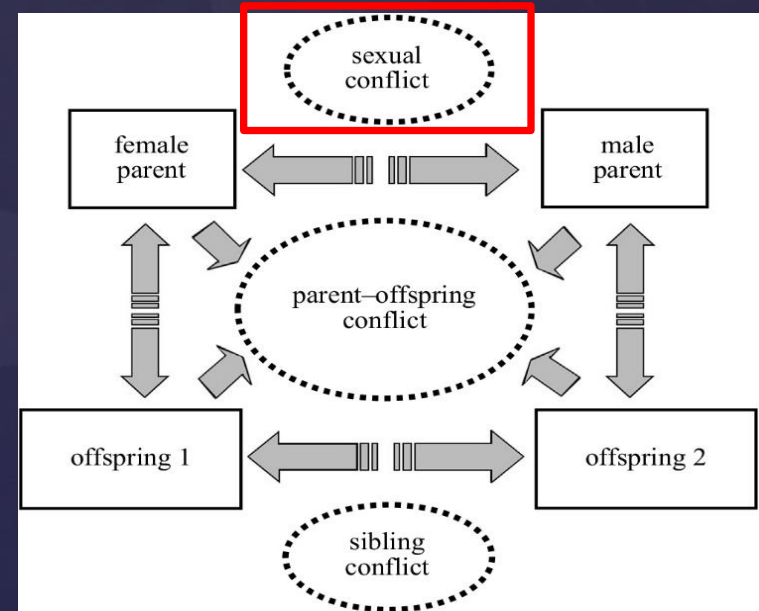
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Encounternet to track animal movements

Negotiation over parental care

Sexual conflict over parental care:

'A conflict between the evolutionary interests of individuals of the two sexes' (Parker 1979)



(Parker *et al.* 2002)

Encounternet to track animal movements

Negotiation over parental care

Behavioral Ecology (2014), 25(1), 216–222. doi:10.1093/beheco/art109

Original Article

Reciprocity and conditional cooperation between great tit parents

Rufus A. Johnstone,^a Andrea Manica,^a Annette L. Fayet,^a Mary Caswell Stoddard,^a Miguel A. Rodriguez-Gironés,^b and Camilla A. Hinde^a

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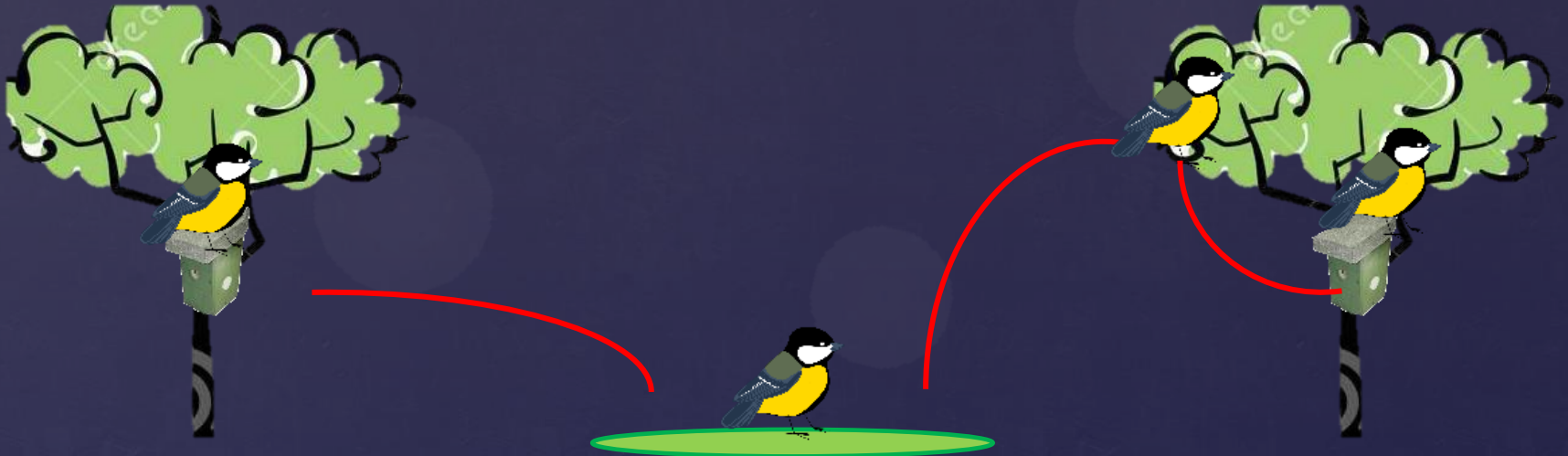
Alternation as mechanism promoting higher level of parental care



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Encounternet to track animal movements

Spatial proximity by parents in the foraging round trip



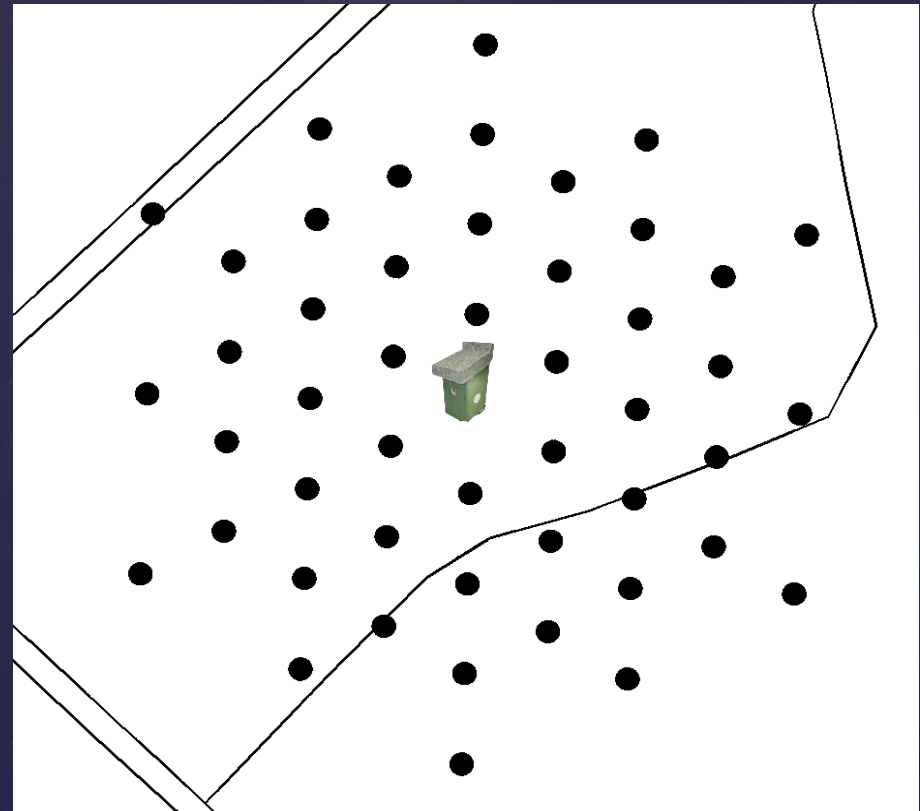
Nest departure – Arrival to the foraging patch - Departure from the foraging patch - Arrivat to the nest – Enter the nest

Encounternet to track animal movements

Spatial coordination during foraging activity in parental great tits

Methodology

- Encounternet array with 25m triangular cells
- Cover the foraging area within the range of 75m



Encounternet

- Allows to monitor large number of individuals over long periods
- Powerful system to collect spatial data and social interactions
- Few studies published (Mannil *et al.* 2012, Snijders *et al.* 2014)
- Accuracy in tracking spatial movements
- Effective tools for monitoring animal ecology
- Versatile system for studying a wide range of animal behaviours



Acknowledgements



Kate Lessells
Kees Van Oers



Lysanne Snijders
Marc Naguib
Camilla Hinde



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