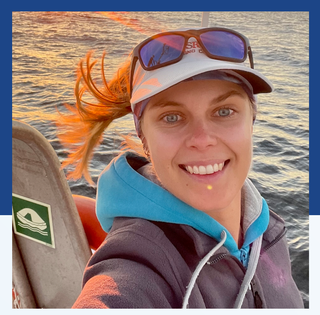
Investigating laterality and spatial associations in common dolphin mother-calf pairs using an unmanned aerial vehicle



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Introduction

In different mammals, mother-offspring interactions are lateralised due to a **right-hemispheric advantage in social processing**[1,2]. For cetacean mother-calf dyads, spatial relationships that confer **predator protection** (**infant position**, underneath the mother) and **hydrodynamic benefits** (**echelon position**, beside her) are of additional importance[3,4] (Fig. 1). We investigated these spatial associations in common dolphins (*Delphinus delphis*) in the south of Portugal using an unmanned aerial vehicle (UAV).

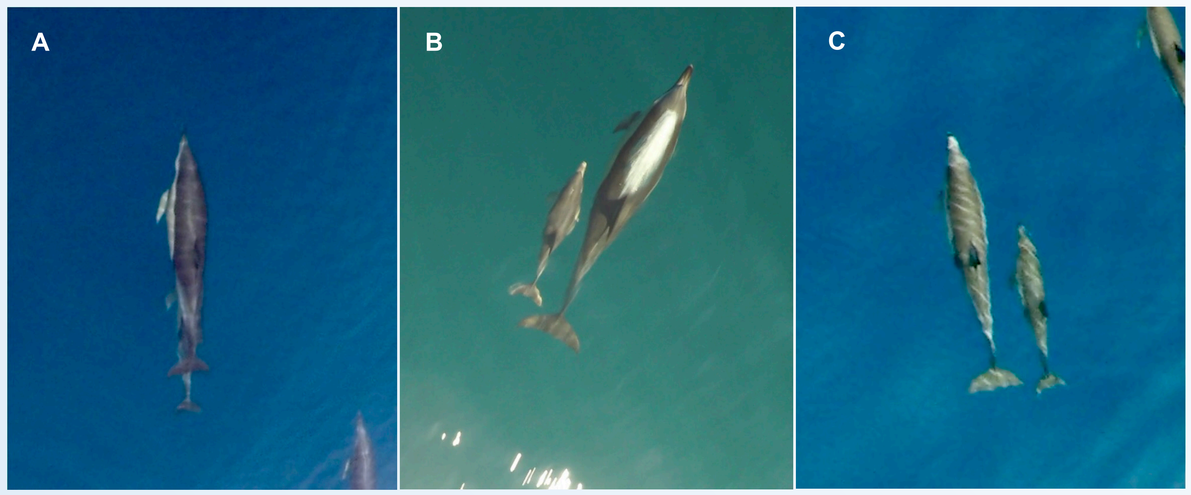

Fig. 1 - *Common dolphin calves' spatial positions relative to the mother.* **A:** *Infant position.* **B:** *Echelon position - left.* **C:** *Echelon position - right.*

Methodology

Aerial footage was captured in 2016 (Fig. 2) and analysed, documenting calf position and laterality. To examine how these were affected by **group size**, **calf proportion** and **number of social events**, we used **Baseline-Category Logit Models,** setting **calf identity** as random effect. Additionally, we assessed differences between **month**, **group cohesion** and **position within the group**.

Fig. 2 - *Drone launching from the boat.*

Results

Descriptive analysis (1768 calf positions assessed): **58.5% of calves were in echelon** (29.1% left; 29.4% right) and **41.5% in infant position**. Laterality (i.e. echelon) changed with month, and both, echelon and infant position were affected by group cohesion and position within the group (Fig. 3).

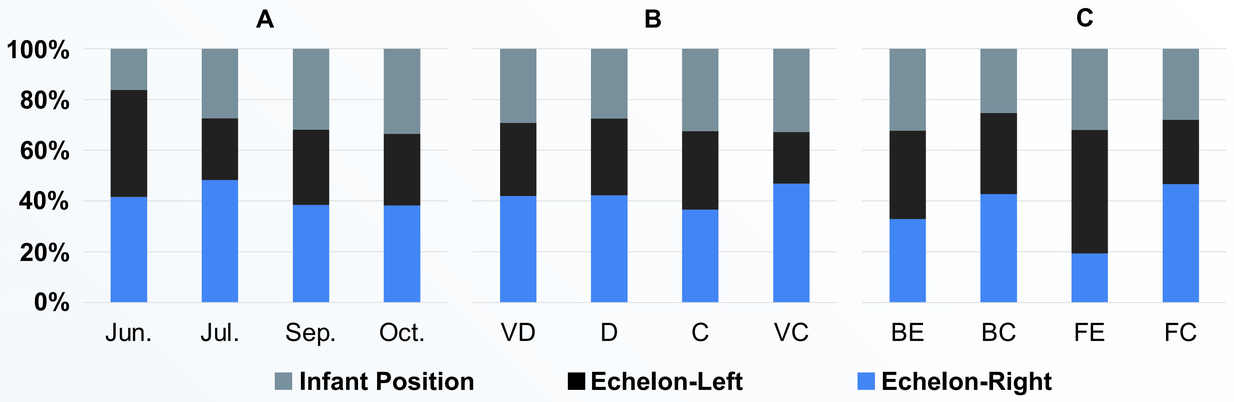

Fig. 3 - *Relative frequency of calf positions for:* **A:** *month.* **B:** *group cohesion (VD: very dispersed, D: dispersed, C: compact, VC: very compact).* **C:** *position within group (BE: back-edge, BC: back-centre, FE: front-edge, FC: front-centre).*

Modelling (670 calf positions assessed): The best model included the **number of social events**. When these increased, **calves were significantly more in echelon-left**, compared to infant position (p = 0.01, Fig. 4).

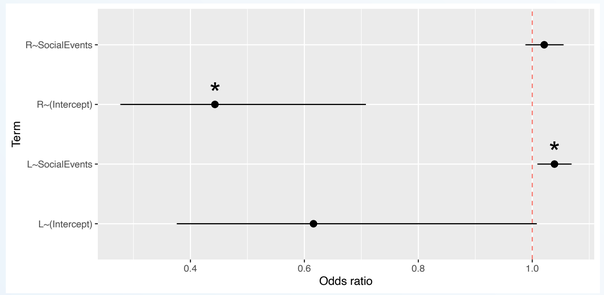

Fig. 4 - *Odds ratios of the best model, testing calf position (baseline: infant position) and laterality (R: echelon-right; L: echelon-left) against number of social events. Significant results are highlighted with an asterisk.*

Discussion and Conclusion

Our results suggest that echelon and infant position are of similar importance for common dolphins and indicate a potential **lateralisation of mother-calf interactions**. Echelon-left is preferred over infant position with more **social displays** in the group, pointing towards **maternal monitoring**[2]**. Calf age** (proxied by month) and **group structure** may further impact calf positioning[4,5]. Using **UAVs to study spatial relationships in cetaceans** offers profound insights from a novel perspective.

References

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Acknowledgements

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