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Appendix 1

Supplementary material Appendix 1

Table A1. Occurrence of undirected autumn movements, i.e. movements deviating from the mean 90° sector of the final winter distribution, dependent on age and sex. Generalized Linear Mixed Models (GLMMs) were fit to a sub-sample of Gadwalls of known age (n=75) or sex (n=64) which originated from Germany and England. Origin was included as random effect. The two separate models were used to calculate parameter estimates for juveniles relative to adults and for females relative to males. Possible age- and sex-specific effects were tested in a Bayesian framework, using the function `sim` (R-package `lme4`) to simulate the posterior distribution (10,000 simulations) and to obtain 95% Credible Intervals for the model parameters.

GLMMs: Autumn direction $\sim \mathbf{X} + (1 | \text{origin})$, family = binomial

X	Term	Estimate	95% Credible Intervals		Effect
			$q_{2.5\%}$	$q_{97.5\%}$	
Age	(Intercept)	-0.09	-0.68	0.50	
	Age yearling	0.42	-0.52	1.33	No
Sex	(Intercept)	0.10	-0.51	0.72	
	Sex female	-0.61	-1.64	0.41	No

$q_{2.5\%}$ and $q_{97.5\%}$ = 2.5% and 97.5% quantiles of the posterior distribution.

There is a significant effect if zero is not included in the 95% Credible Interval.

Bibliographic reference for main paper:

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Supplementary material Appendix 2

Table A2. Variation in distances (log-transformed) covered during autumn movements. Linear Mixed Models (LMMs) were fit to a sub-sample of Gadwalls of known age (juvenile vs. adult, n=75) or sex (n=64) which originated from Germany and England. Origin was included as random effect. LMMs were re-fit using Maximum Likelihood and Likelihood Ratio Tests were performed to test single fixed effects.

LMMs: $\text{Log}(\text{autumn distance}) \sim \text{direction}^\dagger + \mathbf{X} + \mathbf{X}:\text{direction}^\dagger + (1|\text{origin})$

X	Term	df	AIC	Likelihood Ratio Test statistics		
				logLik	χ^2	P
Age	Full model	6	203.0	-95.5		
	Direction [†]	4	220.5	-106.2	21.5	<0.001
	Age	4	200.8	-96.4	1.8	0.40
	Age:direction [†]	5	202.7	-96.4	1.7	0.19
Sex	Full model	6	170.8	-79.4		
	Direction [†]	4	192.2	-92.1	25.4	<0.001
	Sex	4	168.2	-80.1	1.4	0.49
	Sex:direction [†]	5	169.0	-79.5	0.3	0.61

df = degrees of freedom; AIC = Akaike's information criterion; logLik = Log-Likelihood

[†]Binary response: autumn direction consistent vs. inconsistent with the mean 90° sector of the final winter distribution.

Significant P values are shown in bold.

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