Oikos

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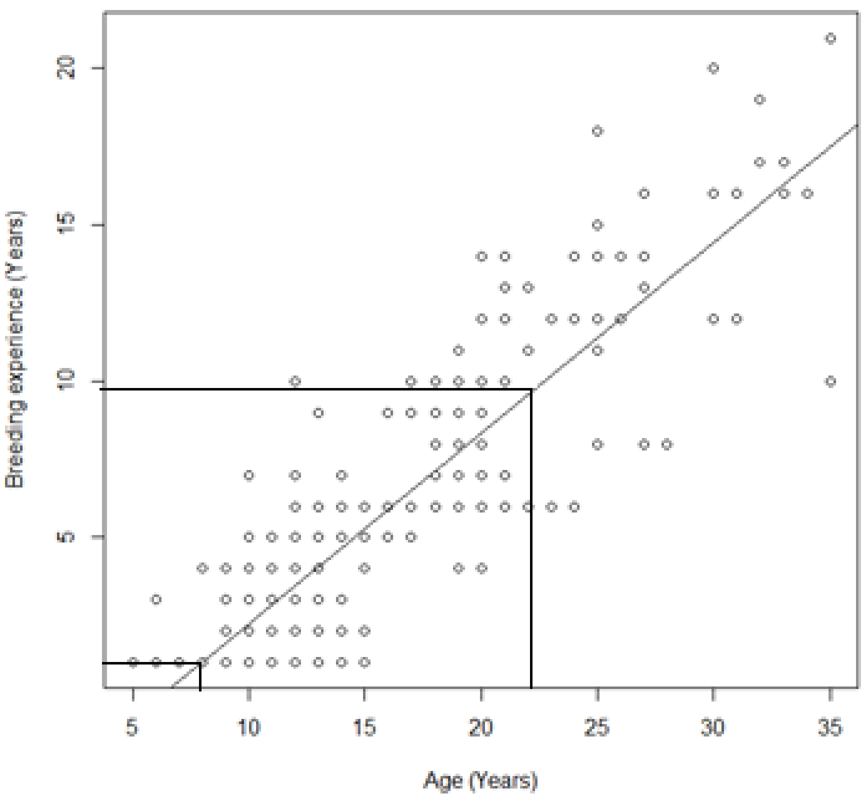
Appendix 1

Choosing the thresholds for grouped breeding experience

As shown in Figure 1 in the paper Pardo et al (2013) demonstrate the survival changes at thresholds of 8 years and 22 years. In the analysis where we use thresholds of breeding experience we obtain these from the plot below. This plot shows the average breeding experience at different ages. The threshold of 8 years is < 2 years breeding experience and 22 years is > 9 year breeding experience.

Figure A1. The relationship between breeding experience and age in our population. The thresholds of 22 years and 8 years of age from Pardo et al 2013 are used to extract breeding experience equivalents.



Appendix 2

Analysis of models without covariates affecting bout duration

While we feel the best models account for the fact that we know individuals have different bout duration during the first breeding attempt, when they swap partners and if there is a mismatch in breeding experience, it could be argued that as there is a tendency (although we argue not a strong enough correlation) for these to covary with breeding experience itself. The models could in fact be underestimating the effect of breeding experience by including these and so here we present all major models without these effects.

Table A1. Intrinsic effects on individual bout duration (hours). Results for a model of individual bout duration with age, sex, and breeding experience. Unlike in the main paper, here we exclude first breeding attempt as it may mask variation with breeding experience. All variables are scaled with a mean = 0 and standard deviation = 1. Non-significant interactions were dropped from models. The effects retained in the final model are shown by a ✓ and those omitted by ✗. Significant effects are shown in bold. Results are consistent with those shown in the paper.

	Final model	Scaled parameter estimate	SE	Chi Squared	df	P value
Effects on individual bout duration						
Intercept	✓	*-0.29*	*0.17*			
Sex - Male	✓	***0.35***	***0.09***	***14.83***	***1***	***<0.001***
Individual breeding experience	✓	0.00	0.05	0.00	1	0.95
Individual breeding experience × Sex	✗			0.17	1	0.68
Individual breeding experience^2	✗			0.10	1	0.75
Individual breeding experience^2 × Sex	✗			0.56	1	0.76
Random effects						
ID random intercept	✓	0.16				
Year random intercept	✓	0.17				
Residual variation	✓	0.75				

Table A2. Coordination between partners in bout duration, and the importance of breeding experience. Results for a model of individual bout duration with partner bout duration, age, sex and breeding experience. Unlike in the main paper here we exclude first breeding attempt, change of partner and the difference between the breeding experience of the pair as these may mask the effects of breeding experience. All variables are scaled with a mean = 0 and standard deviation = 1. Non-significant interactions were dropped from models. The effects retained in the final model are shown by a ✓ and those omitted by ✗. Significant effects are shown in bold. Results are consistent with those in the paper except the weak quadratic effect of partner breeding experience does not appear in these models.

	Final model	Scaled parameter estimate	SE	Chi Squared	df	P value
Effects on individual bout duration						
Intercept	✓	-0.31	0.15			
Sex - Male	✓	**0.42**	**0.07**	**46.28**	**1**	**<0.001**
Partner breeding experience	✓	0.00	0.04			
Bout duration partner	✓	0.21	0.04			
Partner breeding experience^2	✗			2.23	1	0.13
Interactions estimating effects on coordination						
Partner breeding experience × Bout duration partner	✓	-0.12	0.04	**8.76**	**1**	**0.003**
Partner breeding experience^2 × Bout duration partner	✗			2.41	1	0.12
Random effects						
ID random intercept	✓	0.08				
ID - Bout duration partner random slope	✓	0.02				
Year random intercept	✓	0.12				
Residual variation	✓	0.71				

Appendix 3

Could senescence in coordination itself arise?

While in this study we assess whether senescence in individual bout duration occurs, it could be possible that senescence in coordination could occurr, and without any detected change in trip duration itself. In this paper we look at changes in the mean bout duration. However, it is plausible that if individuals decrease in quality with age, they may become more variable in bout duration. This change could act to decouple bout length and decrease coordination. This is beyond the scope of this paper but we have done some preliminary analyses here to explore the idea that individual and partner bout duration may affect coordination differently.

We tried to explore these ideas by fitting the model shown in table S2 using individual breeding experience as opposed to partner experience. It could suggested that if individual senescence could change coordination and partner survival could drive sexual conflict. We attempted to look at this in our population. The interaction between individual breeding experience and partner bout duration showed very similar results as those seen in Appendix 2 Table A2 (Individual breeding experience × Bout duration partner ($\chi^2 = 8.18$; df = 1; $p = 0.004$; Estimate = -0.10 ± 0.04). The correlation in this population between individual and partner breeding experience is 0.67 ($p < 0.001$).

The similarity in ages and breeding experience in this population brings two constraints to an analysis like this. First, if the survival probabilities are similar for both members of the pair, it is difficult to partition the driver of changes in coordination. Second, the correlation between the ages and breeding experience make it statistically difficult to partition effects. The hypothesis could however be tested in a species which does not pair by age.

Appendix 4

Analyses using birds that have not repaired – i.e. they are breeding with their first partner

To examine whether our results are driven by repairing itself, or the perceived risk of repairing with age, we repeated analyses using only birds which are still breeding with their original partner. The results support those in the manuscript and suggest that repairing itself does not drive pour results.

Table A3. Coordination between partners in bout duration, and the importance of breeding experience. Results for a model of individual bout duration with partner bout duration, sex, breeding experience, first breeding attempt, and the difference between the breeding experience of the pair. This analysis uses birds which are still breeding with their original partner. All variables are scaled with a mean = 0 and standard deviation = 1. Non-significant interactions were dropped from models. The effects retained in the final model are shown by a ✓ and those omitted by ✗. Significant effects are shown in bold.

	Final model	Scaled parameter estimate	SE	Chi Squared	df	P value
Effects on individual bout duration						
Intercept	✓	-0.23	0.11			
First time breeder	✓	-0.15	0.16	0.68	1	0.41
Sex - Male	✓	**0.50**	**0.09**	**26.62**	**1**	**<0.001**
Partner breeding experience	✓	-0.10	0.26			
Bout duration partner	✓	0.19	0.05			
Difference in breeding experience between partners	✓	**0.10**	0.05	3.39	1	0.07
Partner breeding experience^2	✓	0.00	0.24			
Interactions estimating effects on coordination						
First time breeder × Bout duration partner	✗			1.53	1	0.21
Partner breeding experience × Bout duration partner	✓	**-0.54**	**0.15**	**4.22**	**1**	**0.04**
Difference in breeding experience between partners × Bout duration partner	✗			0.77	1	0.38
Partner breeding experience^2 × Bout duration partner	✓	**0.41**	**0.16**	**7.74**	**1**	**0.005**
Random effects						
ID random intercept	✓	0.05				
ID - Bout duration partner random slope	✓	0.03				
Year random intercept	✓	0.02				
Residual variation	✓	0.80				

Appendix 5

Change in repairing rate with age

The repairing rate with age in their population mimics the survival probability and reproductive success. Young birds have poor reproductive success and survival (Pardo et al 2013 – see Figure 1 in main paper). Old birds show the same pattern and we find that both groups have higher repairing probability (Figure A3).

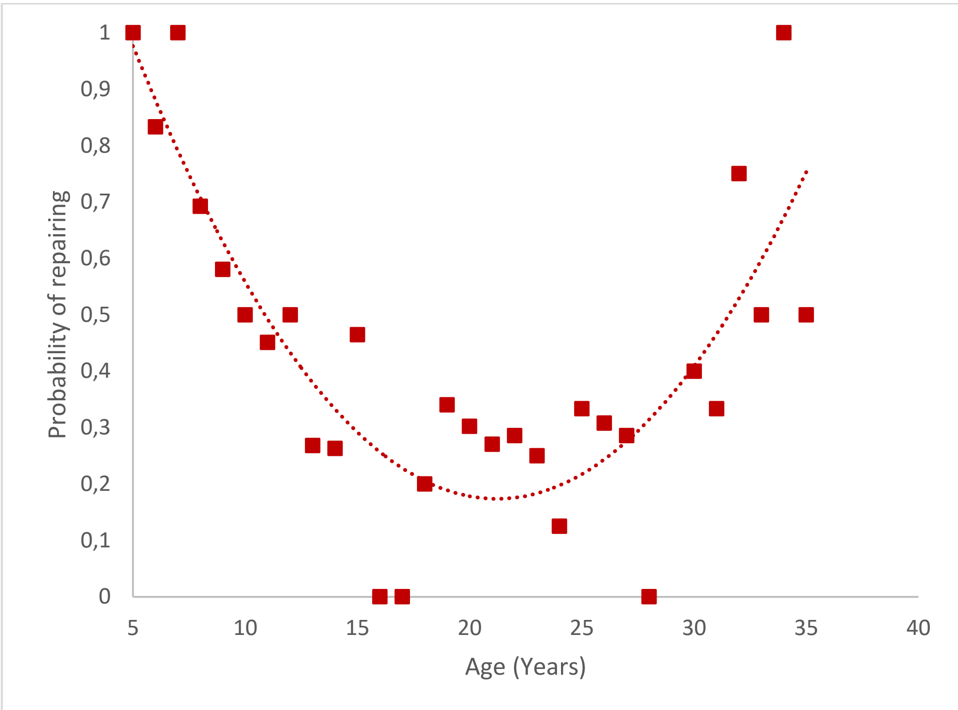


Figure A3. The repairing probability of birds included in our study. The repairing probability is calculated as the proportion of birds within that age group which repair. All birds of age 5 are breeding for the first time, as this is the minimum age at first reproduction so this value is constrained to be 1.