

Results

Using changepoint analyses on a total of 976 migration periods (autumn: 552; spring: 424) from 414 individual birds, we detected *Zugunruhe* in 80.9% migration periods (autumn: 396; spring: 394, excluding 17 periods that were ambiguous).

Occurrence of *Zugunruhe* in different populations

Our final model predicting the frequency with which birds engaged in *Zugunruhe* comprised population, age, season, and the population  $\times$  season interaction.

Effect of population and season

We found significant differences in *Zugunruhe* frequency among populations, and these varied between seasons. In autumn, Kenyan, Austrian and Irish populations showed a significantly lower proportion of periods with *Zugunruhe* than Austrian  $\times$  Siberian and Siberian birds. In spring, the proportion of migration periods showing *Zugunruhe* was significantly elevated compared to autumn for Austrian

( $z = 2.66$ ,  $p = 0.0078$ ) and Irish ( $z = 3.31$ ,  $p = 0.0009$ ) stonechats. Figure 3 details these patterns.

Effects of age and sex

The proportion of periods during which birds engaged in *Zugunruhe* was significantly lower for older birds during both spring and autumn ( $z = -7.43$ ,  $p < 0.0001$ ). This observation was consistent across all populations. There was no significant effect of sex on frequency of *Zugunruhe* (Fig. 3C, D).

Consistency of *Zugunruhe* within individuals

We examined whether birds monitored for two or more migration periods (counting spring or autumn;  $n = 296$  birds) always, sometimes, or never engaged in *Zugunruhe* (Fig. 4). Pooling all population groups, 63.9% of individuals always engaged in *Zugunruhe* and only 3.0% of birds never exhibited *Zugunruhe*. The remaining 33.1% were mixed records, when birds changed between showing and not showing *Zugunruhe*. Among birds with mixed records and data from their first autumn, 62.0% (49/79) showed

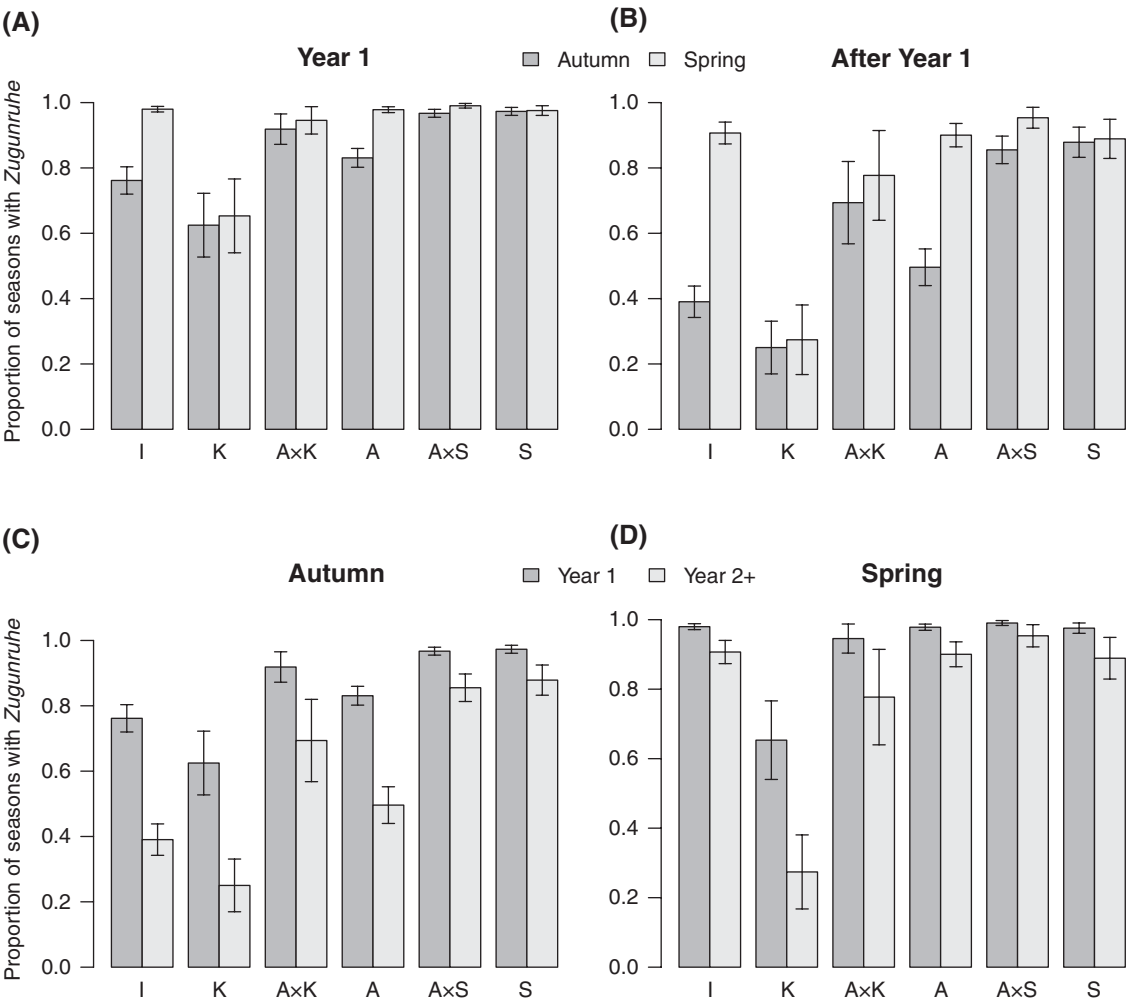


Figure 3. The proportion of seasons during which stonechats showed *Zugunruhe*, by population and age. Proportions were analysed with binomial errors; error bars show one standard error. Bar charts in the top row (A, B) directly contrast autumn and spring seasons side-by-side, while the bottom row (C, D) directly contrasts birds in their first year from older birds. Kenyan stonechats frequently abstained from *Zugunruhe* (spring and autumn), as did Irish and Austrian populations (autumn only).