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The relationship between means and variances in avian reproductive success between local populations of white stork (*Ciconia ciconia*): reply to Moreno and Polo

Received: 24 November 2005 / Accepted: 2 December 2005 / Published online: 18 January 2006
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We are pleased that Moreno and Polo (2006) have commented on our paper published in a recent issue of *Population Ecology* (Tryjanowski et al. 2005). However, before our response we should emphasise that it was not our intention to overly criticise Moreno et al. (2003). In fact, we were inspired by Moreno et al.'s (2003) work, and we gave prominence to their work on relationships between means and variances between individuals in populations and how this could help explain some ecological processes (p. 119). Moreover, we tried to develop Moreno et al.'s (2003) proposition from a life-history trait to a real population (functional) level. However, we sincerely apologise for labelling their data as binary. It is in fact binomial, although it would be binary for those species laying single eggs, such as the albatrosses.

We still firmly believe that actual production of chicks is more important than proportional success. Moreno et al. (2003) stated that “success expressed as a proportion of successfully raised offspring” can be used as a population value. However, under this suggestion a pair laying one egg and raising one chick has greater influence on the modelled system than a pair laying four eggs and raising three chicks. Quite obviously the second pair has greater influence on population dynamics. This is a reason why we used local relationships between population means and variance of reproductive success to help understand long-term changes. Additionally, we used not only parameters established for binary values, but also for the actual

number of chicks. We decided to use variance in real chick productivity between pairs in local populations because variance in breeding success between individuals creates stochasticity, which can help to explain population dynamics better (see Lande et al. 2003). We present in detail in another paper (Sæther et al. 2006) an explanation for how this works for many local populations of white stork, including populations mentioned in Tryjanowski et al. (2005).

Moreno and Polo (2006) suggest that we should reanalyse our data set. This is not possible since white stork monitoring does not typically record clutch size. Practical difficulties discourage such data collection because the majority of Polish white storks nest on electrical pylons.

To conclude, we thank Moreno and Polo for correcting our statement on their binary data, and for enabling some healthy scientific debate. We believe our results are useful to understanding population functioning over space and time, which is the main subject of the discipline of “population ecology” as well as of the journal in which we published our paper.

References

- Lande R, Engen S, Sæther B-E (2003) Stochastic population dynamics in ecology and conservation. Oxford University Press, Oxford
- Moreno J, Polo V (2006) Comment on “The relationship between population means and variances of reproductive success differs between local populations of white stork (*Ciconia ciconia*)” by Tryjanowski et al. *Popul Ecol* 48:173
- Moreno J, Polo V, Sanz JJ, de León A, Mínguez, Veiga JP (2003) The relationship between population means and variances in reproductive success: implications of life history and ecology. *Evol Ecol Res* 5:1223–1237
- Sæther B-E, Grøtan V, Tryjanowski P, Barbraud C, Engen S, Fulin M (2006) Climate and spatio-temporal variation in the population dynamics of a long distance migrant, the white stork. *J Animal Ecol* (in press)
- Tryjanowski P, Sparks TH, Jakubiec Z, Jerzak L, Kosicki JZ, Kuźniak S, Profus P, Ptaszyk J, Wuczynski A (2005) The relationship between population means and variance in reproductive success differs between local populations of white stork (*Ciconia ciconia*). *Popul Ecol* 47:119–125

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