Response to comment on ‘On the inference of spatial structure from population genetics data’

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1 THEORETICAL GROUND OF TESS

The Deviance Information Criterion (DIC) has been originally introduced in the context of generalized linear models, and Delorio and Robert (2002) and Celeux et al. (2006) pointed out some potential inconsistencies in the definition of the DIC for other families of models. However, Francois et al. (2008) do not give any information about this definition of the DIC to estimate the number of clusters. By doing so, they do not comply with the ‘long tradition in statistics’ consisting in giving a minimum of details to allow reproducible research. Chen et al. (2007) suggest to estimate the number of clusters by maximizing the likelihood. The maximum taken by the likelihood being an increasing function of the maximum number of clusters allowed in the model, this practice obviously does not have a ‘well-defined background in statistics’. Chen et al. (2007), Francois et al. (2008) and Durand et al. (2009) recommend to manipulate the neighbourhood graph (including by removing edges or by adding ‘dummy individuals’) at the user’s convenience. This practice does not have any ‘background’ or ‘tradition’ in any field of Science whatsoever. The reference to the book of Gelman et al. (2004) is irrelevant in all these contexts.

2 REANALYSIS OF A FIVE-ISLAND DATASET BY DURAND et al.

The recommendations about the choice of K_max have never been clear in the various references about TESS. In their present reanalysis, the authors recommend to test several values of K_max and to look for a plateau by a visual check of the outputs for the various runs. This criterion is subjective and opens a new door to manipulations. It would be interesting to know how such visual checks should be performed in intensive analyses [e.g. Rosenberg et al. (2005) involving 367 200 MCMC runs]. I also note that TESS was advertised in Chen et al. (2007) to be fast but the question is now raised as to what remains of this claim if the users have to perform runs for dozens of combinations of parameters and cumbersome visual comparisons.

Moreover, this reanalysis does not address at all the issue of spurious populations inferred by TESS for datasets consisting of a single cluster (Table C of Supplementary Material) and the choice of the interaction parameter \( \psi \).

3 ISOLATION-BY-DISTANCE DATA

The reference to Patterson et al. (2006) seems irrelevant in this context as IBD data have no reason to consist of several recently diverged populations in general. Besides, the number of clusters detected by TESS was found to be highly sensitive to the choice of \( \psi \) and K_max and did not seem to relate to a number of eigenvalues (which is fixed by nature). Novembre and Stephens (2008) do not discuss clustering models but they warned clearly against misinterpretation of spatial patterns in terms of demographic history. This point was missed by Francois et al. (2008) and Durand et al. (2009) do not clarify what the users are supposed to learn about their data under a pattern of IBD by using TESS.

4 CONCLUSION

The various theoretical references given by Durand et al. in their reply are a smoke screen and do not address the concerns one might have against TESS.

They chose not to mention (i) results for five-island data with \( F_{ST} < 0.03 \) and (ii) results for data consisting of a single cluster (where TESS proved to perform particularly poorly). This choice speaks for itself. Point (i) is particularly striking if one reminds that TESS was advertised as a program suitable to deal with extremely low differentiation (Chen et al., 2007).

Durand et al. do not say a word about the choice of the interaction parameter \( \psi \) which is now the elephant in the TESS room. Users that are willing to use TESS can either (i) use the default value 0.6 and be exposed to a high inaccuracy that can be seen in Table C of the Supplementary Material, (ii) experiment different values and get inconsistent results as discussed by Johansson et al. (2008), Cullingham et al. (2009) and Quéméré et al. (2009), (iii) try to tune \( \psi \) in such a way that the output of TESS matches the output of another clustering software or (iv) contact the TESS authors for ad hoc suggestions (Fedy et al., 2009).

The claims by Durand et al. that ‘TESS is based on highly validated methods’ and that ‘criticisms are not based on strong evidence’ are not supported by scientific argumentation.

Conflict of Interest: none declared.

REFERENCES


