Author's response to reviews

Title: Optimizing cost-efficiency in mean exposure assessment - cost functions reconsidered

Authors:

Svend Erik Mathiassen (smn@hig.se)
Kristian Bolin (Kristian.Bolin@nek.lu.se)

Version: 3 Date: 19 April 2011

Author's response to reviews: see over
Gävle, April 18th, 2011

Re: manuscript Optimizing cost-efficiency in mean exposure assessment – cost functions reconsidered

Dear editor.

We were greatly encouraged by the very positive comments from the reviewers, rating this paper “an article of outstanding merit and interest in its field”, “extremely interesting and valuable” and “An article whose findings are important to those with closely related research interests”.

The comments from the reviewers were inspiring, and we have done our best to improve the paper further by attending to these comments, as explained in detail overleaf.

In the re-submitted manuscript, text edits are marked in red colour.

On behalf of both authors, Yours sincerely,

Svend Erik Mathiassen
Reviewer Seixas

Reviewer:
A simpler presentation of the findings to make the results more easily accessible to the exposure assessment scientific and practitioner communities would be very welcomed.

Answer:
We definitely agree that a more “popular” edition of this paper would be attractive, preferably also commenting on previous results regarding optimal exposure assessment, which is a fast developing research field. We will definitely include this idea in our future discussions.

Reviewer Vernez

Reviewer:
"on one occasion from each..." sentence unclear.

Answer:
We have tried to make this clearer: “the optimal strategy consisted in measuring on only one occasion from each of as many subjects as allowed by the budget”.

Reviewer:
The authors make reference to the strategies developed to ensure compliance with exposure limit. This is an interesting point and it should also be considered in the discussion section.

Answer:
We have included a specific comment to strategies for surveying compliance in the discussion (page 22).

Reviewer:
(on measurements entailing large analysis costs): The authors should discuss to which extent (and limits) their model may be used in such a case.

Answer:
We have included a specific comment to strategies entailing large costs (and maybe, inaccuracies) in the analysis stage in the discussion (page 21).

Reviewer:
I would suggest shortening the "one-variable substitution approach" section. Introducing objective functions using capital letters (I1, E1…) may be also confusing for the reader because the cases in the results section are also designated by capital letters.

Answer:
We have discussed whether to cut on the one-variable substitution section, but we believe that, in order to keep non-experts lined up with the (quite complicated) steps in the analytical procedure, this section represents a reasonable trade-off between making the paper longer and helping more readers. As concerns the capital letters (used in figure 2), they do represent cases (of how objective functions may theoretically look), and so having capital letters is compatible with the notation used elsewhere.
Reviewer:
Is table 1 really useful?
Answer:
No, actually not. We have deleted it, as suggested by the reviewer.

Reviewer:
I would therefore suggest shortening the description of case A, which is perhaps less interesting for the reader.
Answer:
We agree that case A has been discussed in some (not many!) papers in the literature. However, we want to report and discuss case A using the same procedures and notation as for the other three (entirely novel) cases in our paper. We believe that this will help the reader better than if she has to look up and “translate” references for comparison, which use, e.g. a somewhat different notation.

Reviewer Tekle

Reviewer:
In the methods section, I suggest to define the estimate of the mean exposure...
Answer:
We have included an explicit mathematical definition of the mean (page 6)

Reviewer:
It is assumed that a researcher uses estimates from previous studies or guess values... (comment on exposure assessment strategies often planned to also address variance components).
Answer:
This suggestion opens an entirely new class of optimization problems, i.e. cases where two objectives are to be addressed at the same time (in casu, a precise mean exposure, and access to variance components). While we believe that the present paper should be restricted to the more simple (while still complicated...) issue of optimizing cost-efficiency from only one objective (a precise mean exposure estimate), we have included a section in the discussion (page 22 bottom – page 23) dealing with this very interesting and challenging new issue.

Reviewer:
For case B, the condition for convexity of the objective function... (the reviewer points out that the derivation in Appendix A was insufficient).
Answer:
Thank you, this is perfectly true. We have added the additional condition as suggested by the reviewer, both in the appendix and in the main text (page 14)

Reviewer:
Case I2 is shown in Figure 2 on how the objective variance function may look as a function of resources. However, nothing is mentioned in the text about this case. What are the conditions that such case could occur and then what is the optimal sampling strategy for such case?.
Answer:
We believe that this case is, indeed, mentioned in the text, since this is the whole story about when the objective function is convex or concave. However, we have also added a note on case I2 to the review of figure 2 (bottom of page 10), and in the beginning of the results section (page 11).
Reviewer:
In case A…

Answer:
We have added the more elaborate equation as suggested by the reviewer (page 12)