distribution with parameter $P = Pr(T \geq \tau \mid \theta)$ so that

$$p(N \mid \theta) = [1 - F(\tau \mid \theta)][F(\tau \mid \theta)]^{N-1} \quad \text{for} \quad N = 1, 2, \ldots. \tag{7}$$

If the MLEs of N and θ are now derived from a likelihood function of the form $g(t \mid \theta)p(N \mid \theta)$ then the MLE of θ will not be the same as the one derived from $g(t \mid \theta)$. Thus, just contemplating the possibility of learning about this uninformative, unobserved N will change our estimate of θ.

In the second case, when we knew that just one experiment was performed, we have $p(N = 1 \mid \theta) = 1$ and

$$p(k = 1 \mid N = 1, \theta) = Pr(T \geq \tau \mid N = 1, \theta) = 1 - F(\tau \mid \theta).$$

Then

$$p(\theta \mid t, k) \propto f(t \mid \theta)p(\theta) \tag{8}$$

so that we analyze the data (t, k) using the original underlying density $f(t \mid \theta)$.

Intermediate situations between these two can occur, and knowledge about N more vague than that considered above can be incorporated in a natural way into the analysis. The example presented here is just a particular case in which two selection mechanisms (geometric and Bernoulli) have been considered to generate $k = 1$ published studies out of N performed ones. In Bayarri and DeGroot (1987) more general selection mechanisms are considered, as well as conditions under which the selection mechanism can be ignored in the analysis of the data, either because it does not provide additional information about θ or because, even if it does, the particular form of the prior distribution makes it ignorable when making inferences about θ.

To conclude this comment, I would like to stress my personal opinion that meta-analysis is one of the areas in statistics that really calls for a Bayesian analysis. As we have seen, conclusions from a meta-analysis rely very heavily on the prior information; even the assessment of the weight function can be highly subjective. All these subjectivities must be incorporated in an explicit form into the analysis. In this way, different readers can judge whether or not the different components of the analysis agree with their own particular beliefs on the subject and, if not, reach their own particular conclusions.

ADDITIONAL REFERENCES

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Comment

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Meta-analysis is an important area of research and any contribution to its methodology is welcome. I am glad to see that Iyengar and Greenhouse extended the scope of meta-analysis by modeling selection bias using simple classes of weight functions that cover a variety of situations. However, some caution is necessary in pooling information from different sources. Often the parameter under estimation like θ in the example of Table 4 may not be the same in all studies. So modeling must take into account variations in θ also. In that case one must specify what exactly is being estimated by meta-analysis. If θ is considered as a variable, it would be of interest to estimate its mean value and variance. The anomalies noted by the authors in the estimation of θ can be explained by the possibility that θ is not the same in all the studies.

Perhaps a preliminary test for homogeneity of different studies with respect to the parameters of underlying distributions is one way of approaching the problem. Of course, in constructing such a test, one must take into account selection bias. If the test reveals inhomogeneity, then other problems arise, such as comparison of estimates between studies and possible explanation of the differences. A more satisfactory method may be to introduce a prior distribution on θ; the problem in such a case is the estimation of the prior distribution of θ, which provides all the information.

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