Meta-Analysis of Response Ratios

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In meta-analyses of continuous data sometimes the “response ratio”, i.e. the ratio of the mean outcome in the experimental group to that in the control group, might be a sensible summary statistic [Hedges et al., 1999]. Since it is a dimensionless quantity, it is especially attractive when the individual studies measure the outcome of interest on different scales.

Subject matter knowledge may suggest a constant response ratio across the studies. This assumption is equivalent to a model where the response in the treatment groups is proportional to that in the control groups. A L'Abbé-Plot can be used to check this assumption graphically. Fieller’s theorem may be used to construct confidence intervals for response ratios for the individual studies, especially for use in forest plots.

The variance of an average response ratio may be estimated in different ways [Hartung et al., 2008, chap. 8.3]. The approach carries forward to meta-regression of logtransformed mean outcomes.

The meta-analysis of response ratios is illustrated using experimental data on the efficacy of granulocyte-colony stimulating factor [Minnerup et al., 2008] and erythropoietin [in preparation] in animal models for stroke. The outcome of interest is the volume of affected area of the brain and was obtained in rats as well as in mice.

References