The Meta-Plot: A descriptive tool for meta-analysis

Meta-research center Tilburg

ICPS, Paris   7-9 March, 2019
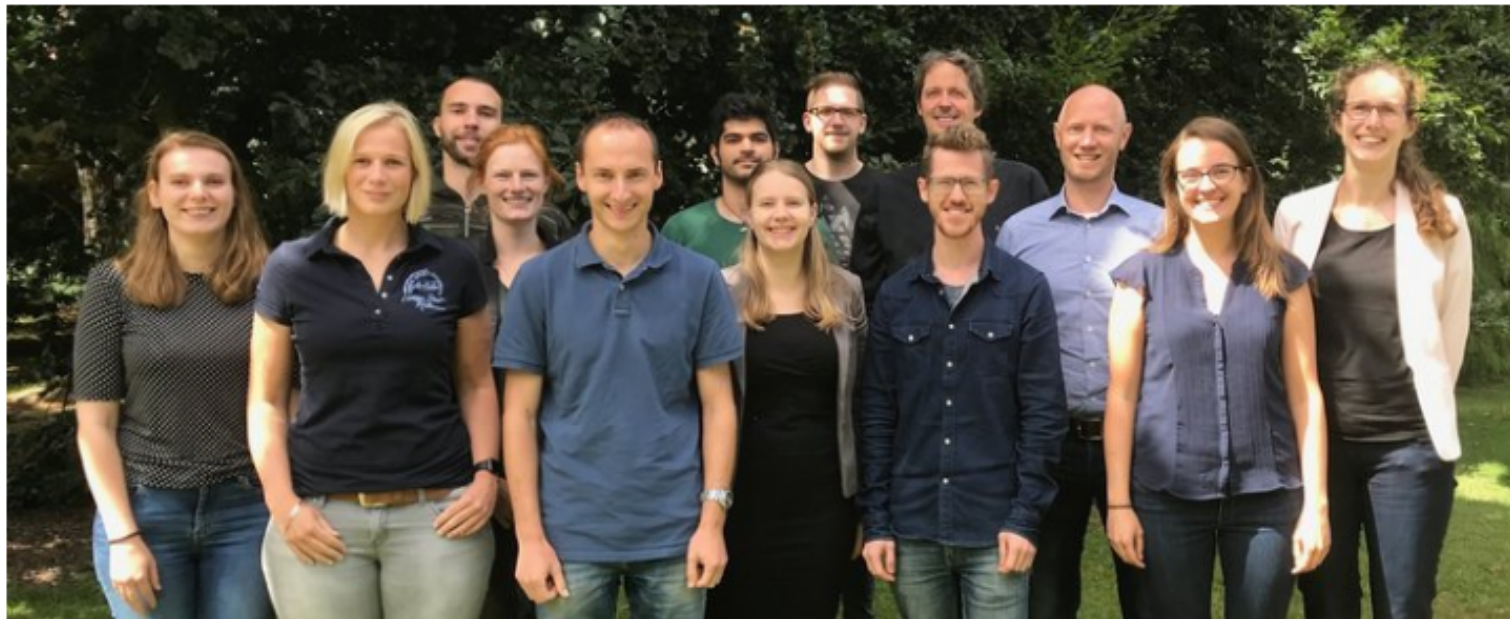
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https://metaresearch.nl/

Meta-Plot

A <u>descriptive tool</u> for meta-analysis, improving on existing tools (e.g. funnel plot), providing info on:

1) Sample size / power of primary studies

2) Estimate and CI of random-effects meta-analysis

3) Estimate as a function of studies' precision (cumulative meta-analysis → small-study effects)

4) Evidence of publication bias

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Background

Many studies conducted on X → Y

Studies differ in N&power, methods, designs, context, people; Field may be affected by publication bias

Meta-analysis: estimates of average and variance effect size, and moderator effects

Estimates may be influenced by publication bias (overestimation), and this influence is larger for lower N&power

Hence, there is a need for a tool that summarizes …

- Not only meta-analytic ES estimate + CI, but also

- Power & N of primary studies

- Sensitivity of ES estimate to precision of studies

- Evidence of publication bias

  → Meta-Plot

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Overview

(Cherry-picked) Example of a meta-analysis

Meta-plot for (cherry-picked) example

Meta-plot app

[Some other examples of meta-plot]

Cherry example

Meta-analysis of Rabelo et al. (2015) on the relation between the sensation of weight and moral judgement of importance

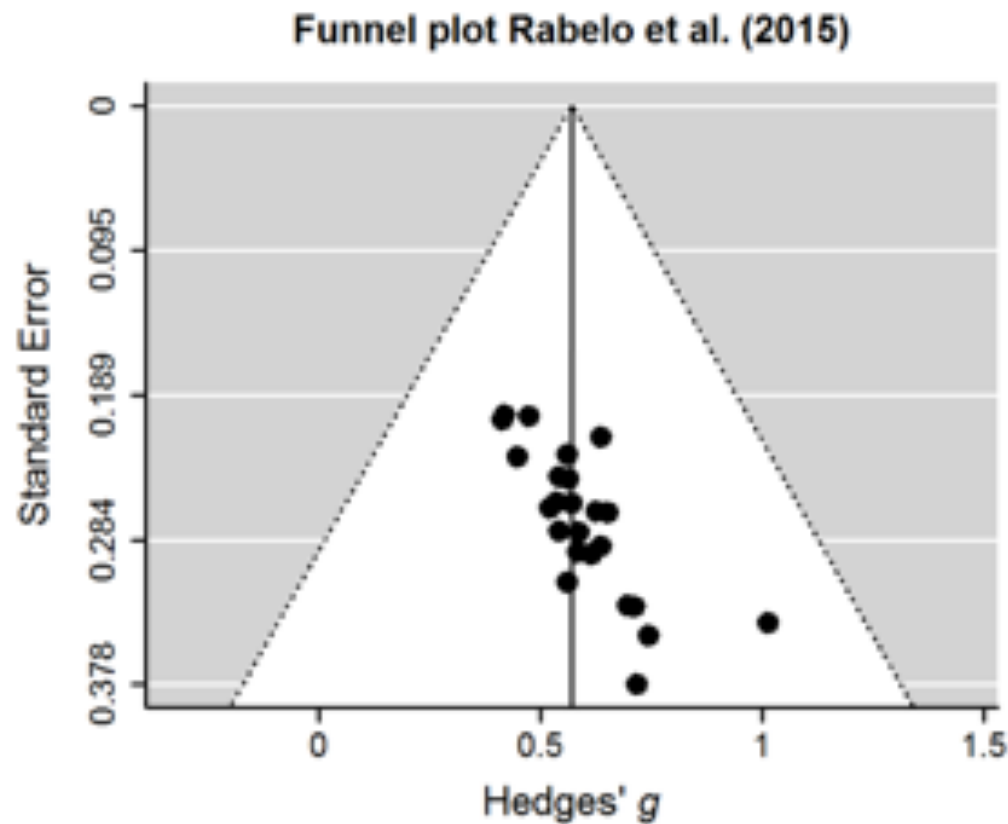25 effect size, 23 significant; N from 30 to 100

$g = 0.57$ (p < .0001), $I^2 = 0$

Methods adjusting for publication bias

Selection model: g = .25 (CI .22-.29)

P-uniform: g = -.15 (CI -.63 to .19(

Cherry example
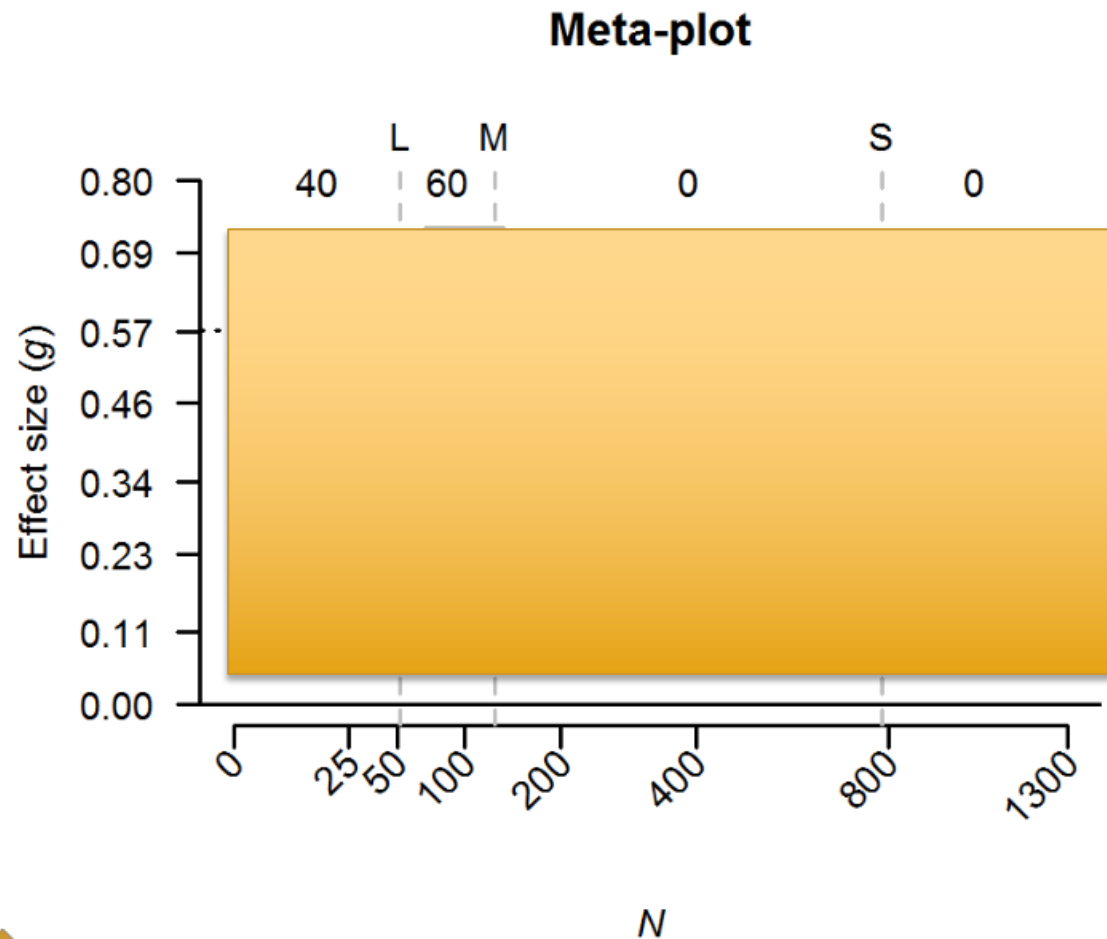
Egger's test of publication bias not significant (p = .10);
p-uniform signals publication bias (p < .001)
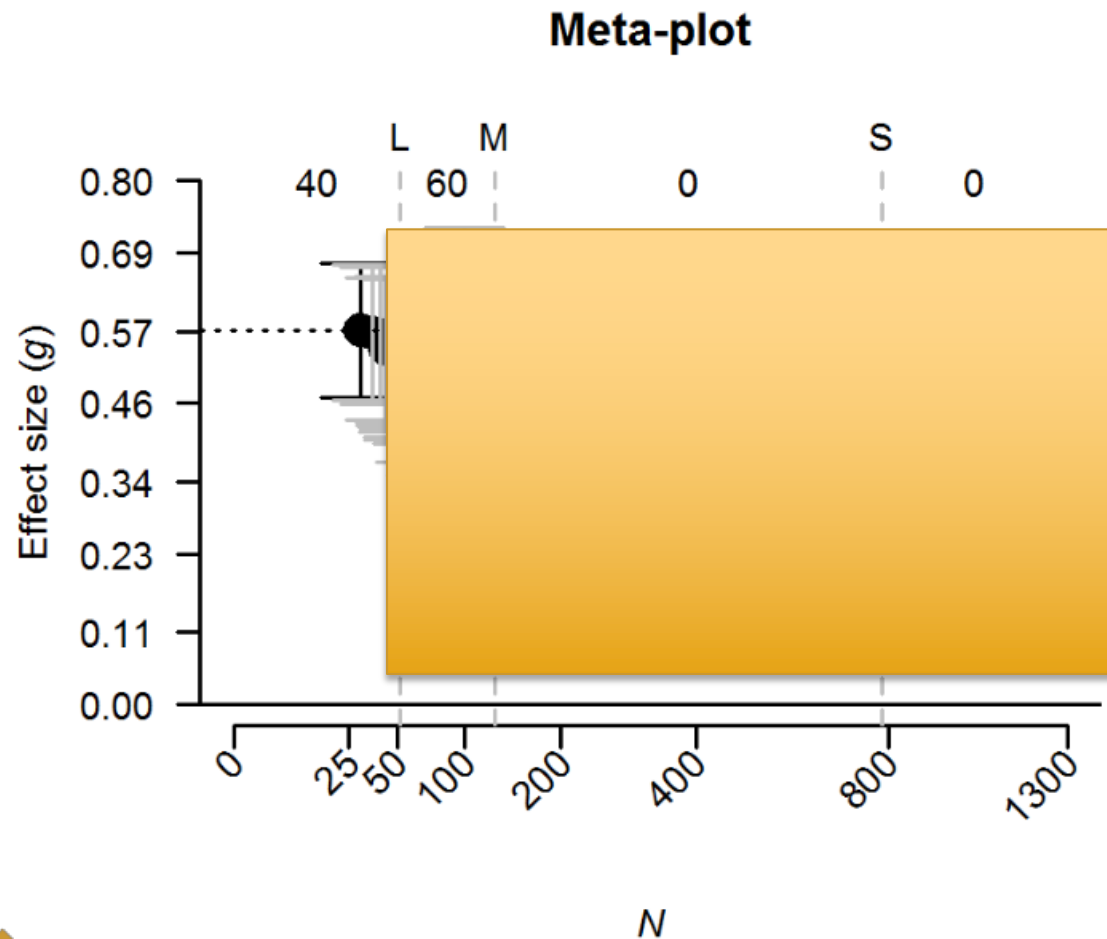

Funnel plot Rabelo et al. (2015)

Meta-Plot cherry example
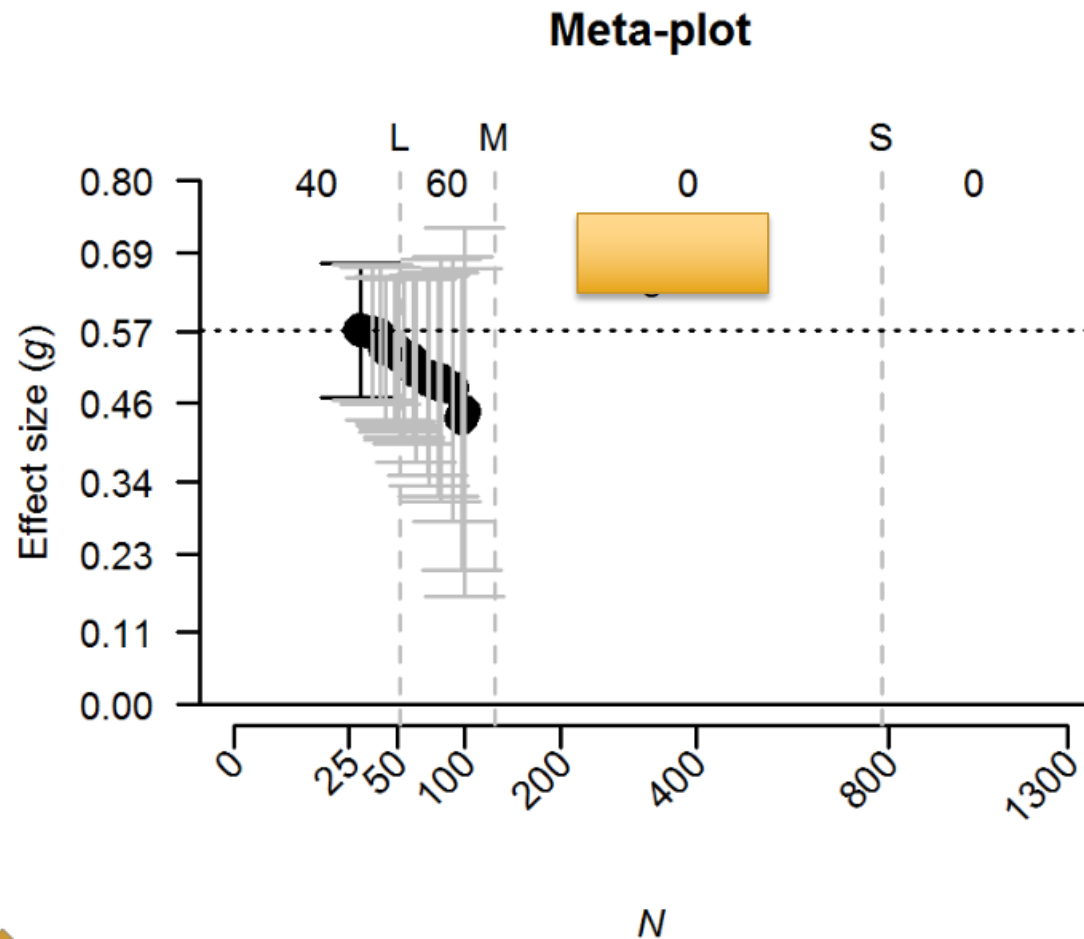
(1) Sample size / power of primary studies

Meta-Plot cherry example
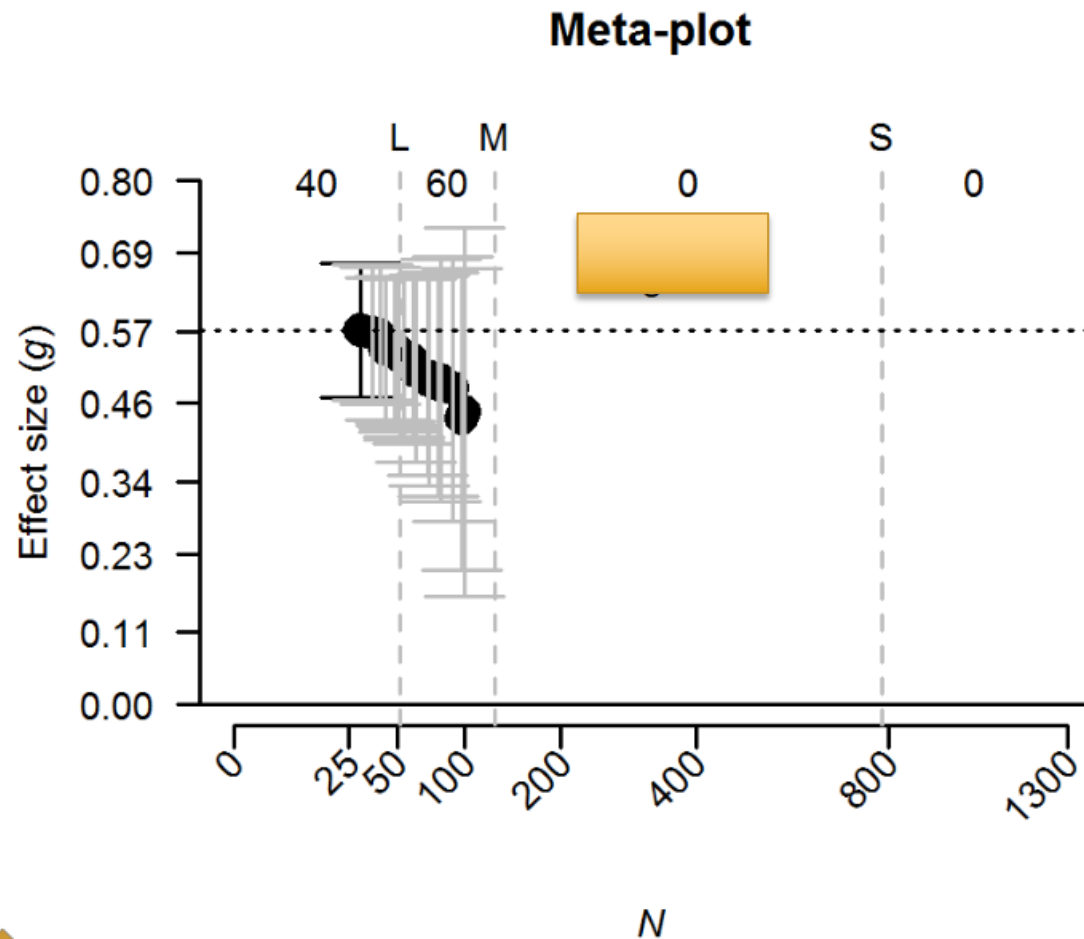
(2) Estimate and CI of random-effects meta-analysis

Meta-Plot cherry example
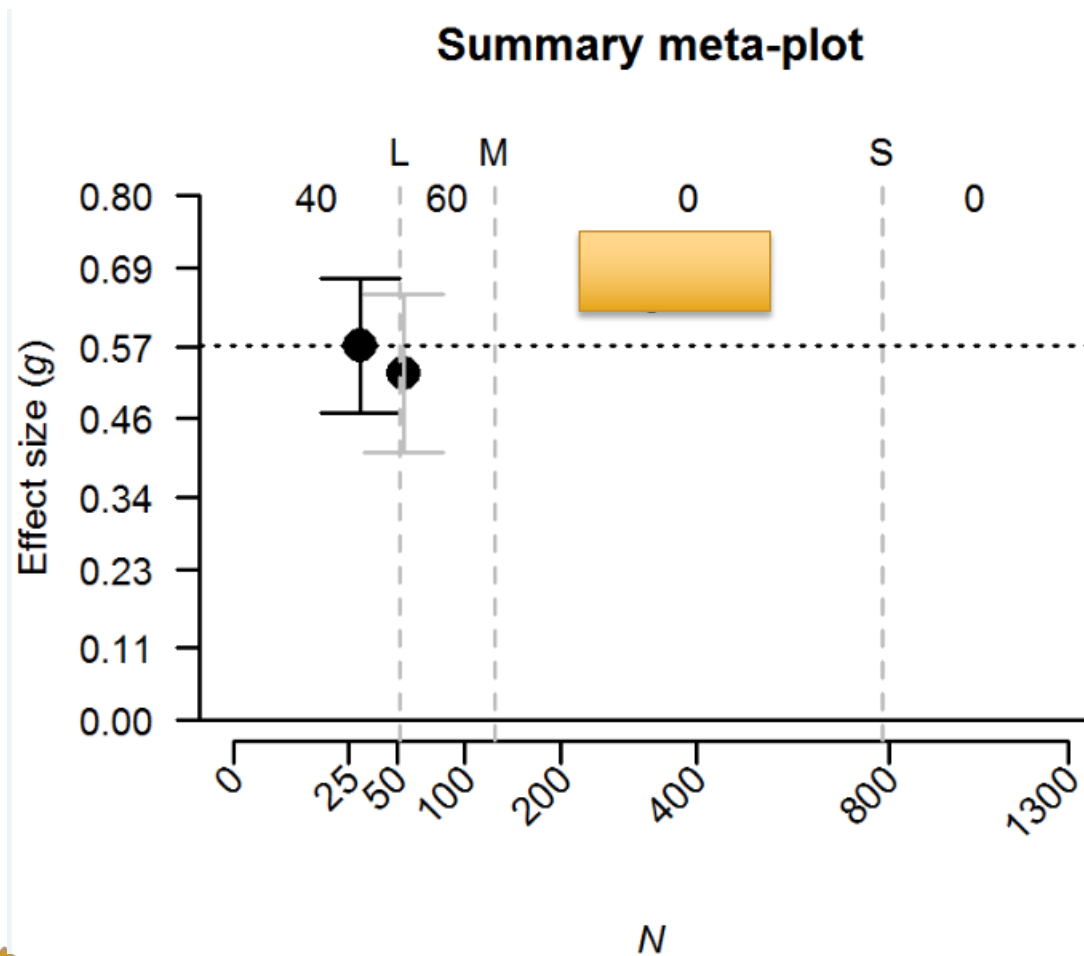
(3) ES estimate as function of studies' precision

(3) … evidence of small study-effects?

Meta-Plot cherry example

(3) … ES estimate for studies with certain power?
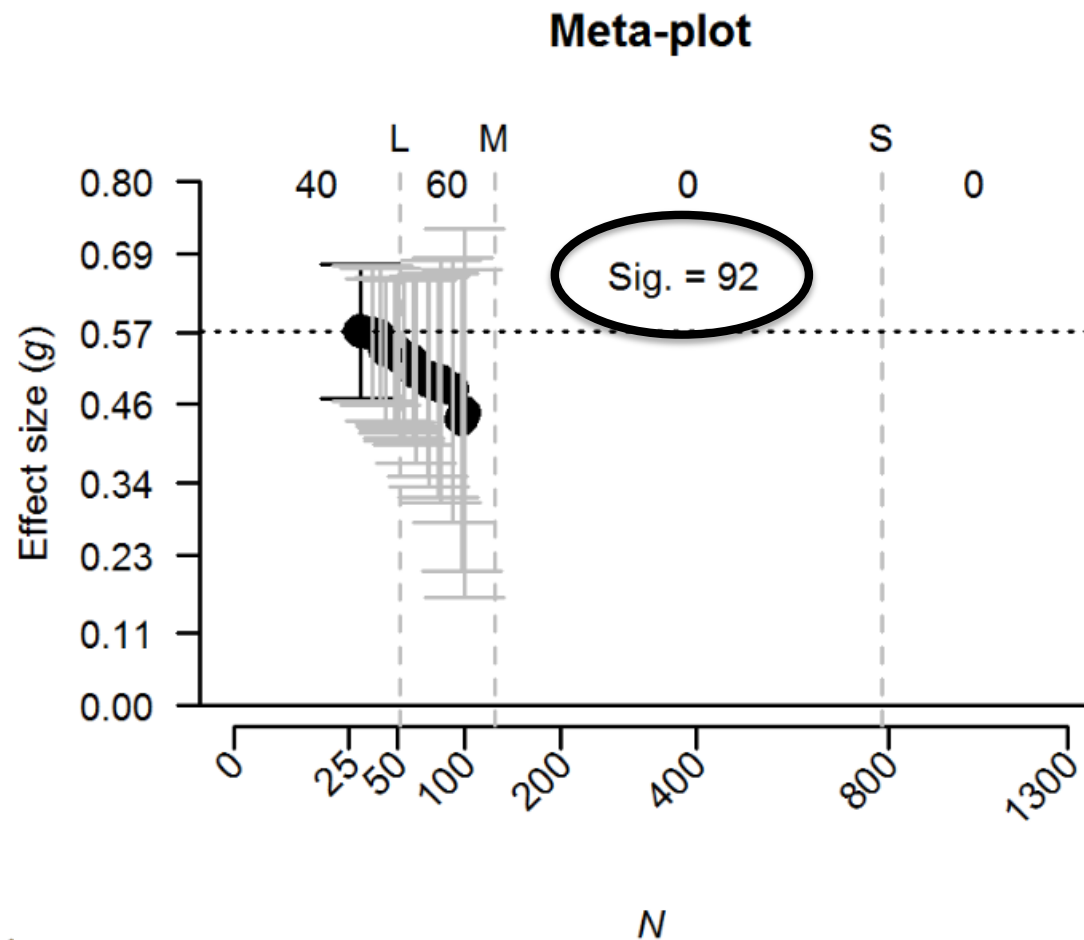
(4) Evidence of publication bias

- Showing expected value meta-analytic ES assuming:

   (i)   zero true effect size

   (ii) extreme publication bias (only statistical significant effects in meta-analysis)

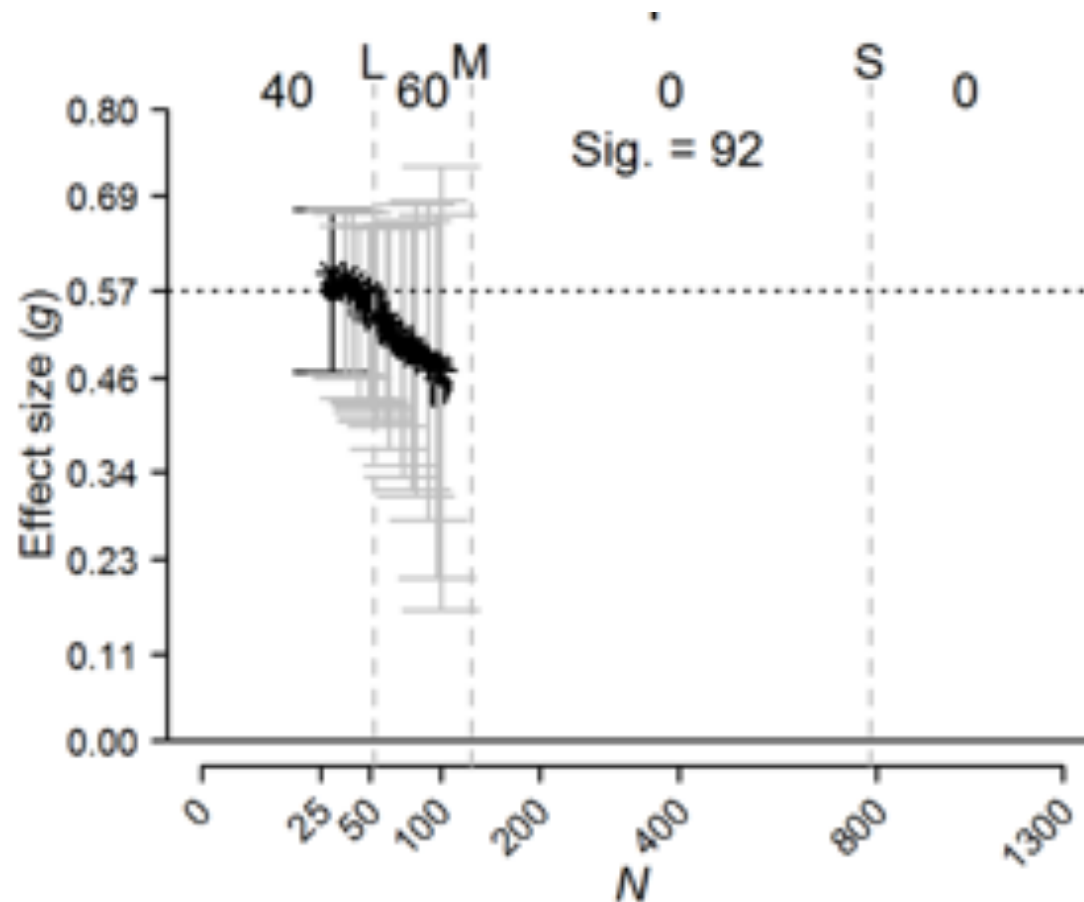- <u>Only show</u> these expected values if <u>>80%</u> of results are statistically significant

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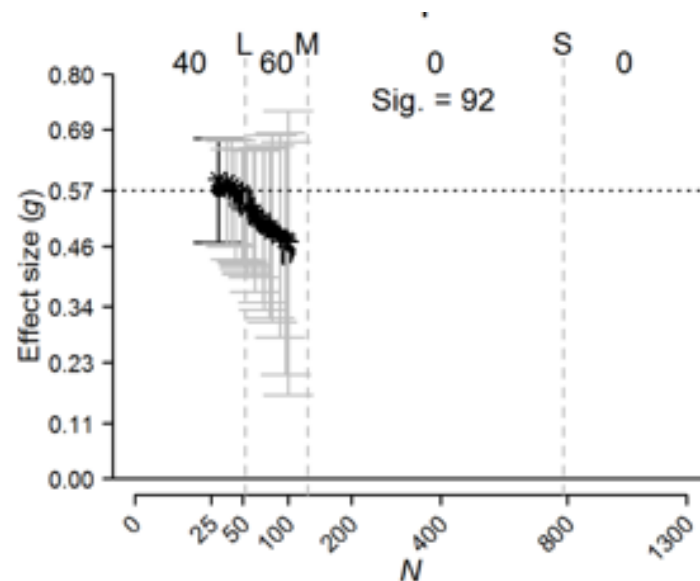## (4) Evidence of publication bias

Meta-plot

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(4) Evidence of publication bias

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(4) Evidence of publication bias

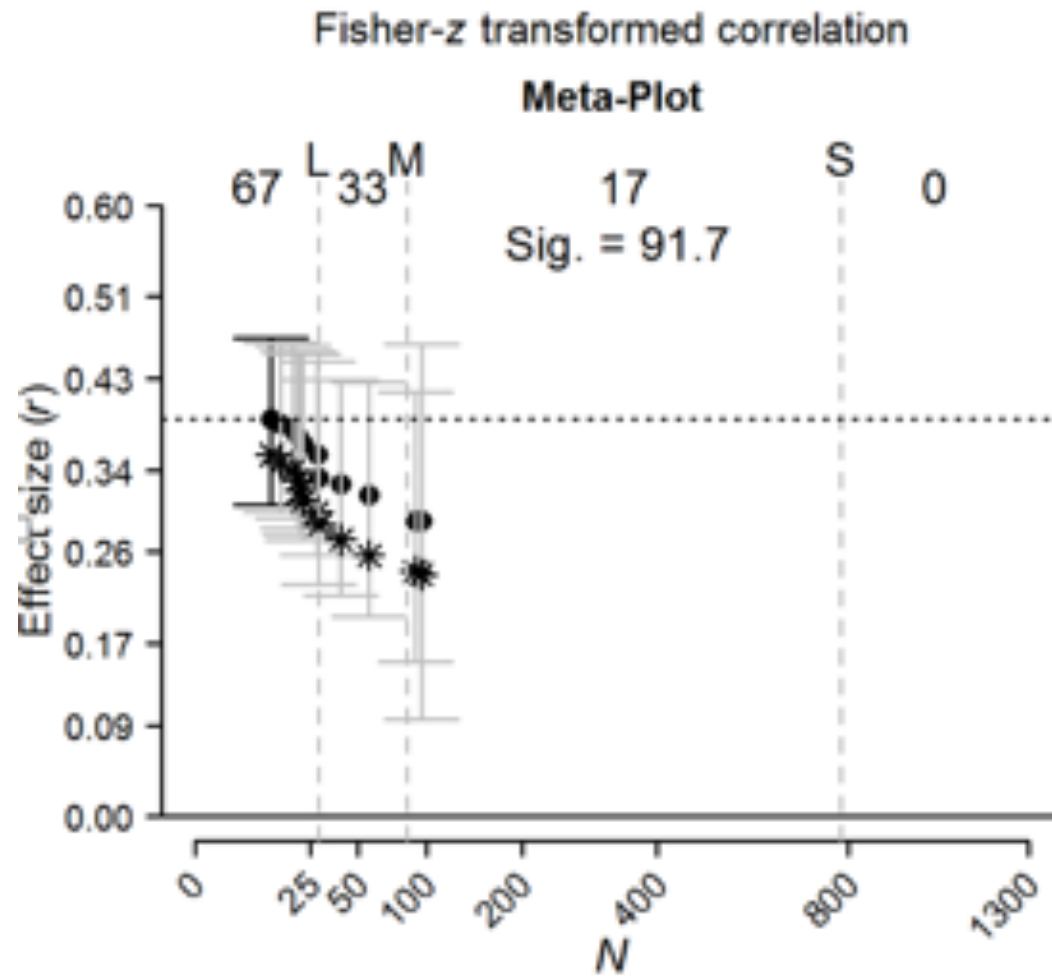→ Results meta-analysis in line with zero true effect size in combination with extreme publication bias

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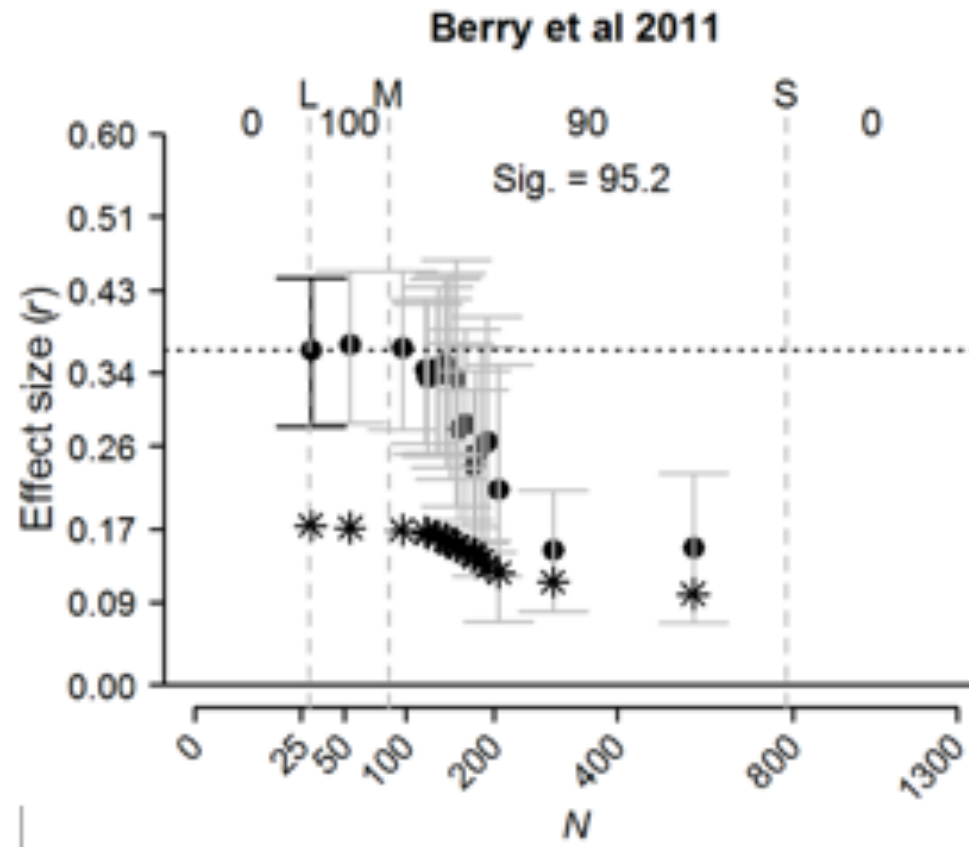
Meta-Plot app

App at https://rvanaert.shinyapps.io/meta-plot/

Paper under construction (m.a.l.m.vanassen@uvt.nl)

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Other examples of Meta-Plots

Green and Rosenfeld 2011

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Other examples of Meta-Plots

Card et al 2011

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