



Random-Effects Meta-Analysis with Shrinkage

Pool disagreeing studies honestly, then borrow strength across a class of products.

DerSimonian and Laird within a product, empirical-Bayes shrinkage across products, and a flag on every maker-funded study rather than a quiet exclusion.

SPORT

Any

FAMILY

Evidence and gear

LICENCE

£299

one-off, perpetual

RUNNING IN THE PLATFORM

<https://edgewortharena.com/arena/api/gear/evidence?kind=shoes>

Inputs

NAME	TYPE	UNITS	WHERE IT COMES FROM
studies	list of (product, effect, standard error, n, funded)	mixed	the literature
prior (optional)	string	-	method of moments, or your own

Outputs

NAME	TYPE	UNITS	NOTES
pooled effect and interval	floats	the effect's units	
tau, I2	floats	-	how much the studies disagree beyond their errors
shrunk estimate	float	-	and how much of its own number the product kept

Method

- 1 Estimate the between-study variance τ^2 from Cochran's Q, floored at zero.

THIS IS THE SAMPLE

The method runs to 3 steps; one is shown. The assumptions, the limits, the module layout and the reference implementation come with the licence. Everything on the page below this -- what the model was measured at -- is the same in both versions, because that is the part you should not have to take on trust.



What it was measured at

Computed now, over the shoe literature in the catalogue.

MEASURE	RESULT	READING
Products pooled	9	from 14 studies, 1 of them maker-funded
The most-studied shoe	$+3.5 \pm 0.7\%$	over 4 studies, I^2 61%
After shrinkage	+3.5%	it keeps 93% of its own number
Class mean	2.9%	what a one-study product is pulled towards

Assumptions

What has to be true for the numbers to mean what they say.

- Effects are exchangeable within a class, which is what licences the borrowing. A shoe with a plate and one without are arguably not.

Limits

Where it is known to be wrong. Published because a model without stated limits is one nobody has pushed on.

- Publication bias is not modelled. Funded and independent studies are both carried and labelled, which lets a reader see the split rather than trusting a correction.

LICENCE

Issued to Evaluation copy. One perpetual licence to use and modify this model inside your own organisation. Redistribution of the specification or the reference implementation is not included. No warranty is given: the validation above is the whole of the claim being made.