

Quantifying Replication Value

A formula-based approach to study
selection in replication research.

Open Science Collaboration
(started in 2012)

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New challenges in replication research

The amount of non-replicated original research in psychology is vast.

We can't replicate everything (at once).
Everything is not worth replicating.

What makes a finding worth the resources required to replicate it?

What to replicate?

Literature review: <https://bit.ly/2JGTbCw>

- Theoretical impact
- Academic impact
- Societal impact
- Methodological concerns

Manual inspection can be time-consuming.

How do we search the record efficiently?

Replication value formula: Goals

- Provide rough initial estimate of “true” replication value based on quantitative, easily accessible information.
- Allow researchers to evaluate larger sets of findings.
- Increase the chance that we manually inspect findings that would be particularly fruitful to replicate.

Study selection procedure

1. Determine sample set of findings based on interest and expertise.
2. Use a formula to gain a first quantitative estimate the replication value of the findings.
3. Take a subset of findings with the highest formula replication value – manually evaluate subset.
4. Select the finding in subset most suitable for replication. If no finding in the subset is suitable, repeat step 3 and 4 for a new subset.

Replication value formula: Conceptual definition

$$RV = \frac{\text{Impact}}{\text{Corroboration}}$$

Replication value formula: Operationalization

Example operationalization:

$$RV = \frac{\text{Yearly citation rate}}{\text{Sample size}}$$

Many other possible operationalizations

- E.g. default Bayes factor: Field et. al. (2019)

Replication value formula: (some) limitations

- The formula is no substitute for detailed subjective evaluation.
- Some findings have high formula replication value but are not worth replicating.
- Some findings have low formula replication value but are worth replicating.
- Sometimes, replication is not the solution.

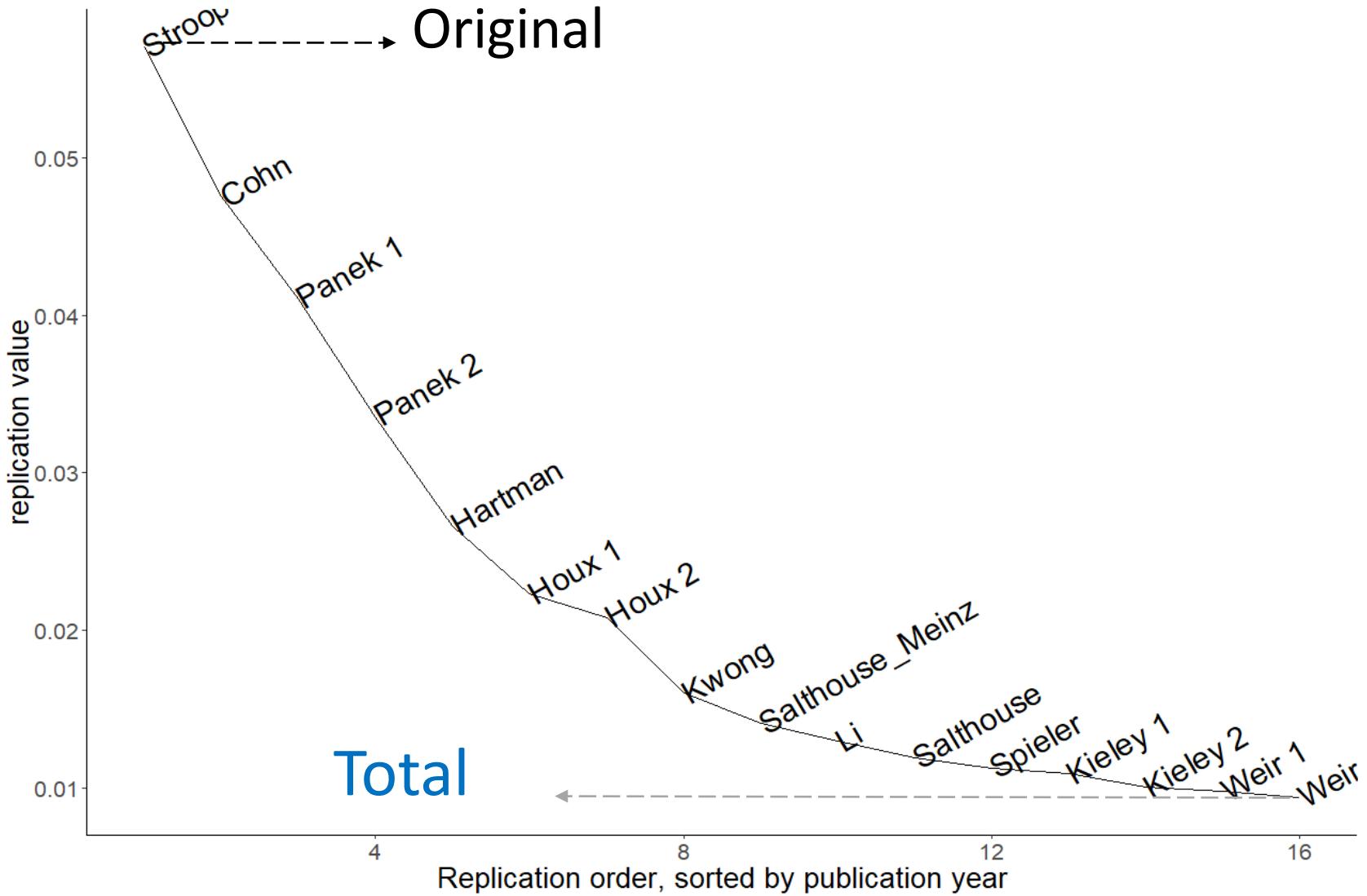
How to validate?



Avenues for validation

- Predictive validity for cases where “true” replication value is known.
- Face validity in actual replication efforts.
- Predictive validity for researchers’ subjective judgements.

Example: Stroop (1935)



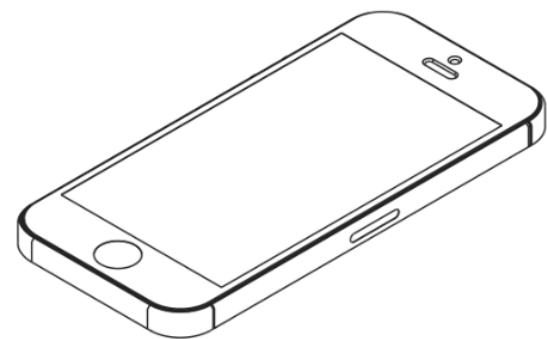
Planned validation studies

Replication project: Targeting studies for replication in social neuroscience.

- “Put your money where your mouth is” approach.
- 1000 candidates to be evaluated by formula.
- Final dataset will be made openly available to other researchers in the field.

Empirical project: Can formula replication value predict researchers’ evaluations?

What makes a study worth replicating?



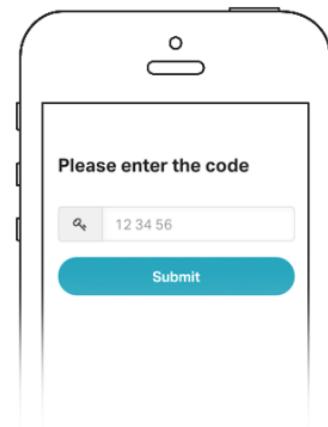
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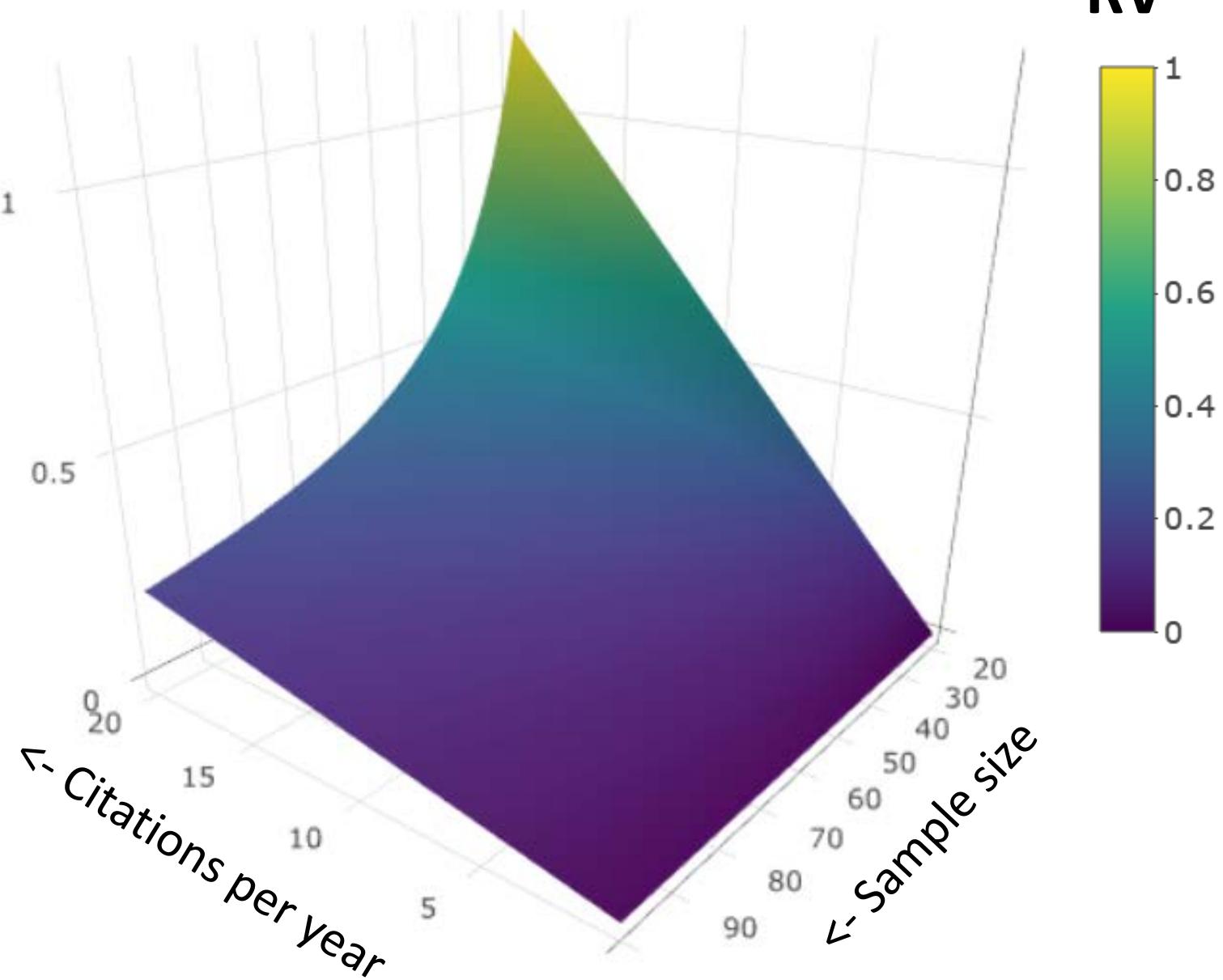
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Formula rank order

Rank	Study	Crossref citations	Sample size
1 st	Gaillot, Baumeister et al. (2007): ego depletion effect	532	61
2 nd	Bargh et al. (1996): elderly priming	1508	30
3 rd	Tversky & Kahneman (1981): gain versus loss framing	6067	307
4 th	Carney, Cuddy & Yap (2010): power posing effect	313	42
5 th	Bem (2011) : pre-cognition	215	50
6 th	Bressan & Stranieri (2008): Ovulation boosts attraction to single men	17	208

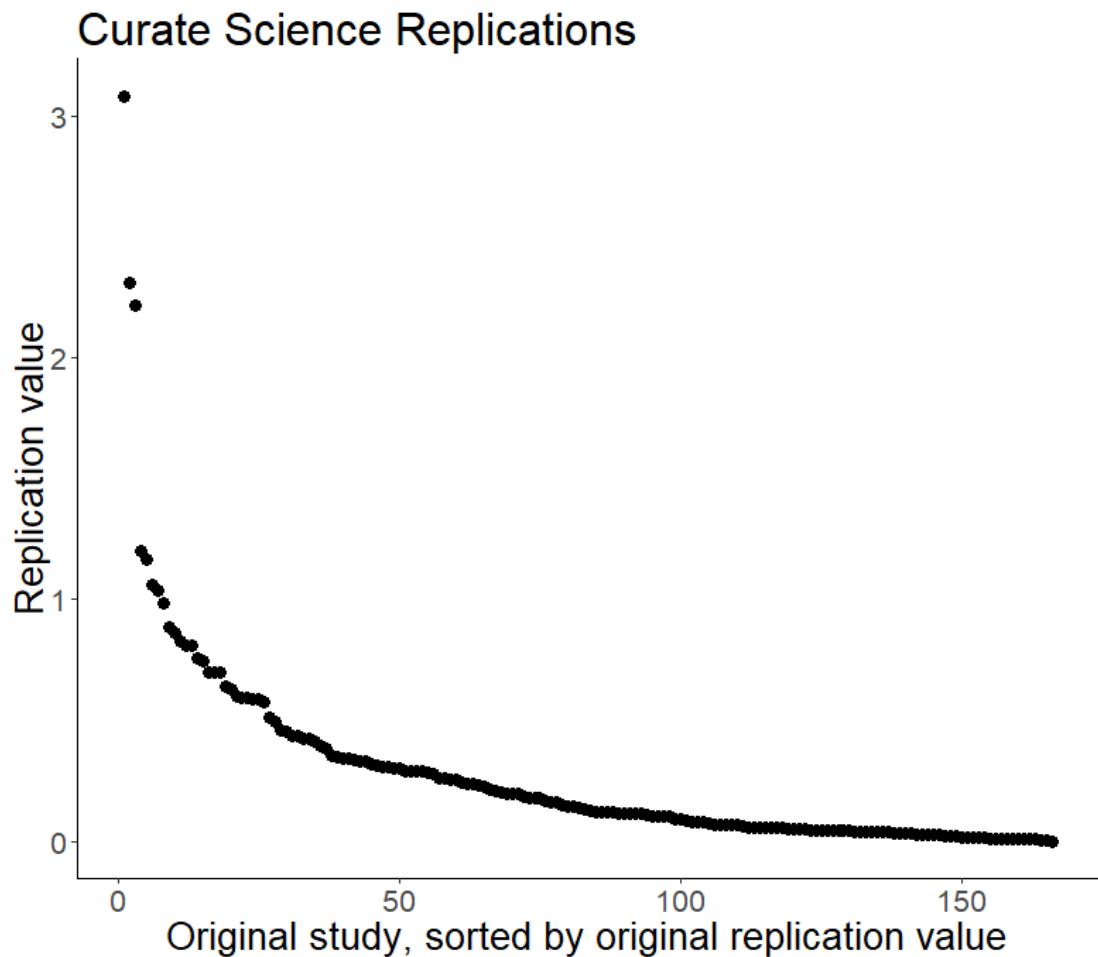
Formula behavior



Curate Science RV



- 166 original findings that have been replicated.
- More “famous” efforts get higher RV.



STEP 1:
Determine sample set
of findings based on
interest and expertise.

STEP 2:
Use a formula to gain a
first quantitative
estimate the replication
value of the findings.

STEP 4:
Select the finding in
subset most suitable
for replication. If no
finding in the subset is
suitable, repeat step 3
and 4 for a new subset.

STEP 3:
Take a subset of
findings with the
highest formula
replication value –
manually evaluate
subset.