METASCIENCE
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Does a zero inter-rater reliability mean grant peer review is arbitrary?

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Motivation

- Grant peer review allocates billions of dollars of research funding
- Most selection mechanisms rely on peer review for assessing the quality and potential impact of proposed research

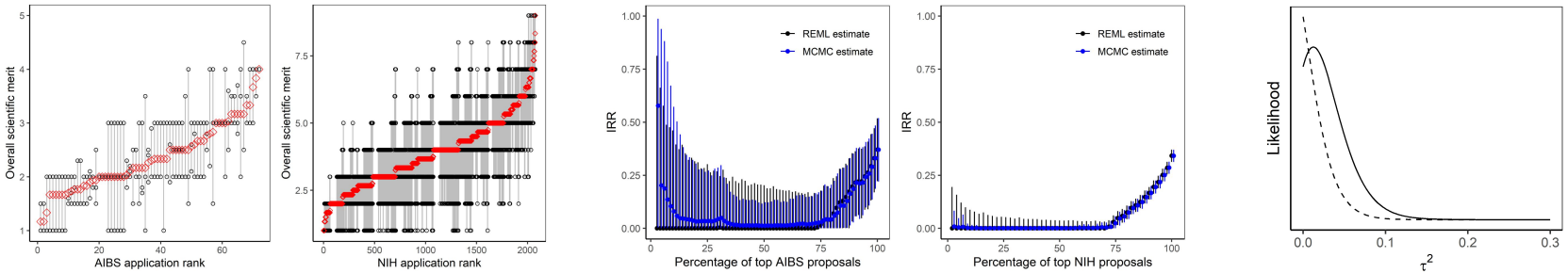
Inter-rater reliability (IRR):

- Measure of consistency among raters (>0,6 good, 0.35-0.6 fair, <0.3 low)
- Pier et al. (2018) found **zero** IRR in mock peer review of funded NIH proposals
- Does a zero IRR mean **grant peer review is arbitrary?**

Erosheva, E., Martinková, P., & Lee, C. J. (2021). When zero may not be zero: A cautionary note on the use of inter-rater reliability in evaluating grant peer review. *Journal of the Royal Statistical Society — Series A, 184*(3), 904-919, doi:10.1111/rssa.12681

Does a zero IRR mean grant peer review is arbitrary?

- Real data from a complete range of submissions to National Institutes of Health (NIH) and American Institute of Biological Sciences (AIBS)
  - Multi-rater IRR of about 0.3 for complete range of samples (0.6 for average rating of 3 raters)
  - Estimating local IRR from subsets of restricted-quality proposals will likely result in zero estimates under many scenarios
  - Zero estimates of IRR are possible even when the true value is not zero



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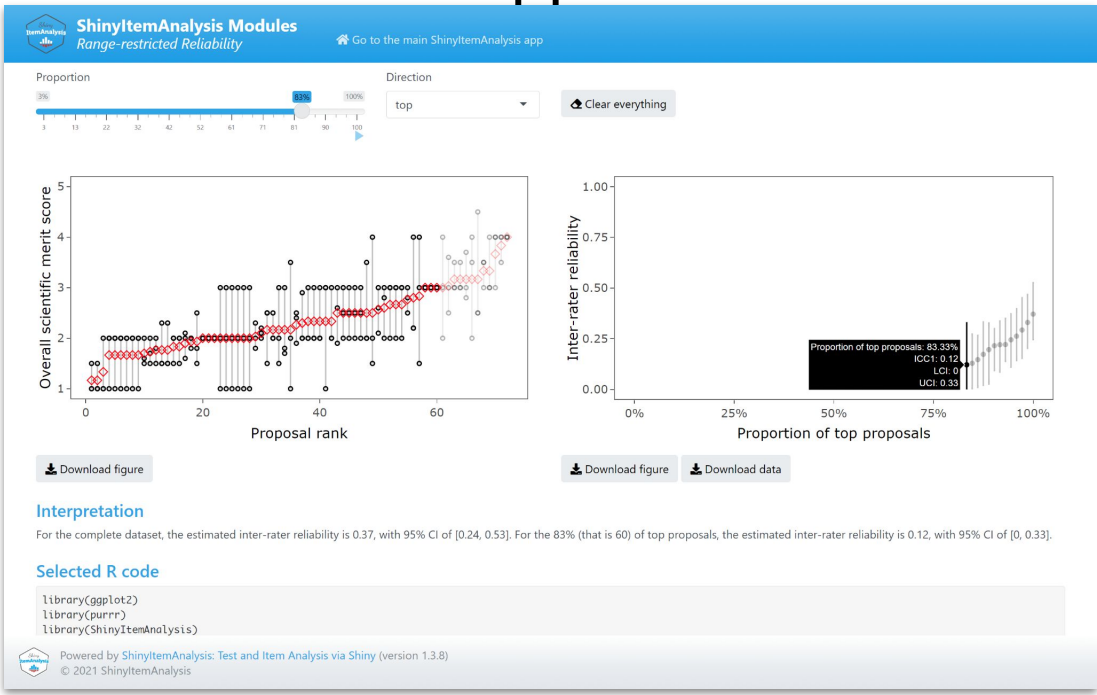
Software implementation and interactive app

- ShinyItemAnalysis R package
- **`ICCrestricted()`** function

Module on Range-restricted IRR:

- AIBS data
- Top & bottom restriction
- Restricted ratings (left figure)
- IRR estimates (right figure)
- Interpretation of results
- Sample R code



Martinková, P., & Drabinová, A. (2018) ShinyItemAnalysis for teaching psychometrics and to enforce routine analysis of educational tests. *The R Journal, 10*(2), 503—515, doi:10.32614/RJ-2018-074. See www.ShinyItemAnalysis.org

Discussion and Conclusion

- Zero IRR estimates are quite plausible in restricted-range scenarios
- **Question:** Is it valid to interpret range-restricted IRR estimates as indicators of peer review quality when reviewers are asked to score grant proposals across the whole range of submissions? **Answer:** Not from the measurement standpoint.

- Interactive SIA modules to support dissemination, replicability, open science

Thank you for your attention!

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References

- Erosheva, E., Martinková, P., & Lee, C. J. (2021). When zero may not be zero: A cautionary note on the use of inter-rater reliability in evaluating grant peer review. *Journal of the Royal Statistical Society — Series A, 184*(3), 904-919, doi:10.1111/rssa.12681
- Martinková, P., & Drabinová, A. (2018) ShinyItemAnalysis for teaching psychometrics and to enforce routine analysis of educational tests. *The R Journal, 10*(2), 503—515, doi:10.32614/RJ-2018-074. See www.ShinyItemAnalysis.org
- Pier, E. L., et al. (2018). Low agreement among reviewers evaluating the same NIH grant applications. *Proceedings of the National Academy of Sciences, 115*(12), 2952-2957.
- ShinyItemAnalysis module on Restricted-range IRR, https://shiny.cs.cas.cz/ShinyItemAnalysis-module-IRRrestricted/

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