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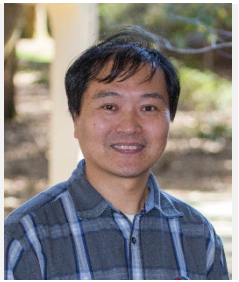
Discounting Effect Size when Borrowing Prior Data



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Utilization of Real-World Data/Evidence

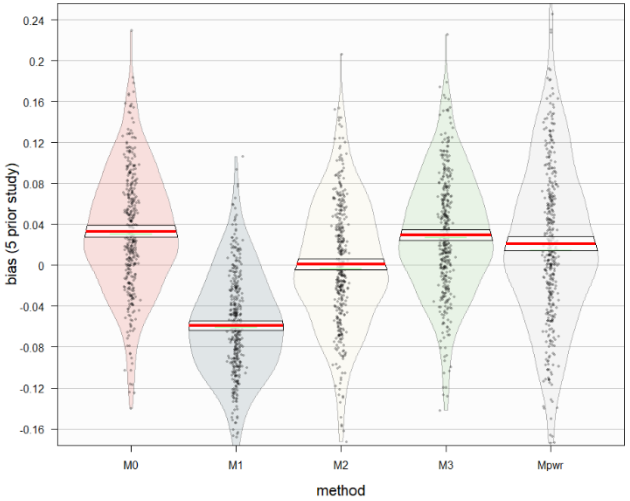
- In clinical trials, there is a growing interest in borrowing external data or historical information to reduce sample sizes and to increase study power.
- When borrowing prior data to augment the current trial, many Bayesian methods (i.e. the power prior methods) discount the sample size of the prior data but retain the same effect size of the previous study.
- Discounting the sample size may not be appropriate if the underlying assumption of unbiased mean treatment effect does not hold.
- When the treatment effect in the historical study is higher than expected in the current trial, the effectiveness could be over-estimated and the type I error might be inflated.

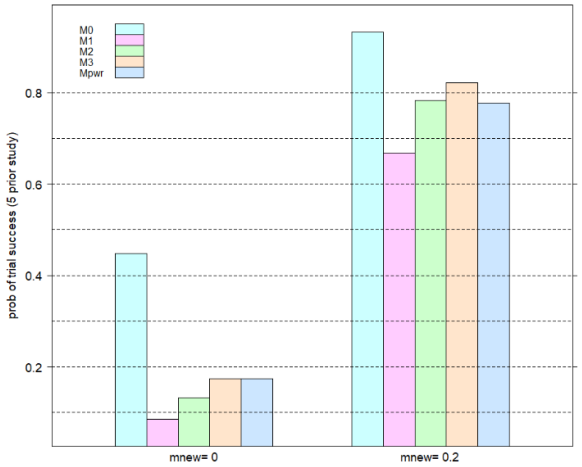
Methodology for Effect Size Discounting

- Several methods are proposed to shrink the effect size when borrowing prior or external data for the overall population or for a specific subpopulation, including
  - weighted mean method,
  - method with Bayesian hierarchical model,
  - multiplicity adjustment method, and
  - dynamic/conditional adjustment methods.
- We evaluate the performance of the proposed methods for normal and binomial endpoints through Monte Carlo simulation studies and compare them with some available methods of discounting sample size under different scenarios.

Simulation Results and Conclusion

- The proposed multiplicity adjustment method (M2) performs the best in terms of bias, type I error and power control.
- The power prior (M_{pwr}) and Bayesian hierarchical methods have comparable performance.





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Thank you!

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