Combining Confidence Distributions for Rare Event Meta-Analysis

April 12th, 2018
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Overview

What Is a Meta-Analysis?
What Is a Confidence Distribution?
Confidence Distributions in Meta-Analysis
Improvements
What Is a Meta-Analysis?

Study 1
- $n = 82$
- $\hat{OR}_1 = 2.27$
- $p_{val} = 0.51$

Study 2
- $n = 88$
- $\hat{OR}_2 = 1.00$
- $p_{val} = 1.00$

Study 3
- $n = 217$
- $\hat{OR}_3 = 1.57$
- $p_{val} = 0.49$

Study 6
- $n = 300$
- $\hat{OR}_6 = 2.73$
- $p_{val} = 0.09$

Combined Info
- $\hat{OR}_C = 1.76$
- $p_{val} = 0.05$

Average Treatment Event Rate: 6.6%
Average Control Event Rate: 3.8%
What Is a Meta-Analysis?

Rare Events  
(baseline probability: 0.7%)  

Can we lower the Type I Error rate by using methods better suited for meta-analyses with rare events?

What Is a Confidence Distribution?

Population Parameter  
\( \mu \)  

Point estimate  

Interval estimate  

Distribution estimate
Confidence Distributions in Meta-Analysis

\[ p_c(\theta) = F(c)[w_1h(p_1(\theta)) + \cdots + w_6h(p_6(\theta))] \]

Singh et al. (2005), Tian et al. (2009), and Liu et al. (2014)
Improvements

Rare Events
(baseline probability: 0.7%) 

\[ p_c(\theta) = F(c)[w_1 h(p_1(\theta)) + \cdots + w_6 h(p_6(\theta))] \]

Can we lower the Type I Error rate by using methods better suited for meta-analyses with rare events?

YES!

Thank you!

