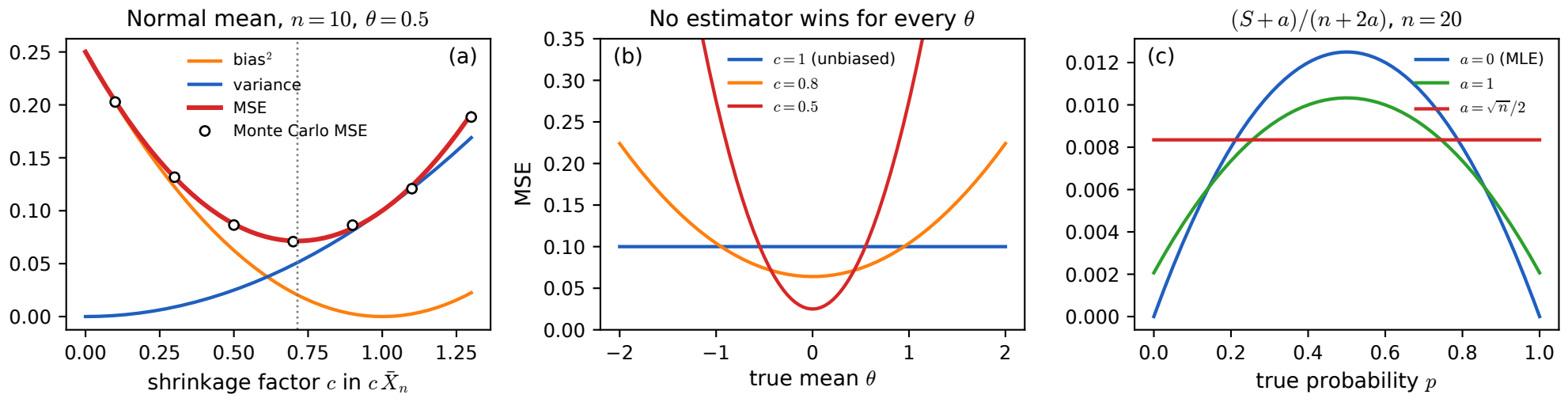

Normal mean, $n = 10$, $\theta = 0.5$
(a)
bias^2
variance
MSE
Monte Carlo MSE
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.25
0.50
0.75
1.00
1.25
shrinkage factor c in $c\bar{X}_n$
No estimator wins for every θ
(b)
$c = 1$ (unbiased)
$c = 0.8$
$c = 0.5$
MSE
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
−2
−1
0
1
2
true mean θ
$(S + a)/(n + 2a)$, $n = 20$
(c)
$a = 0$ (MLE)
$a = 1$
$a = \sqrt{n}/2$
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0.0
0.2
0.4
0.6
0.8
1.0
true probability p