

When should an MLB manager challenge?



A Strategic Model

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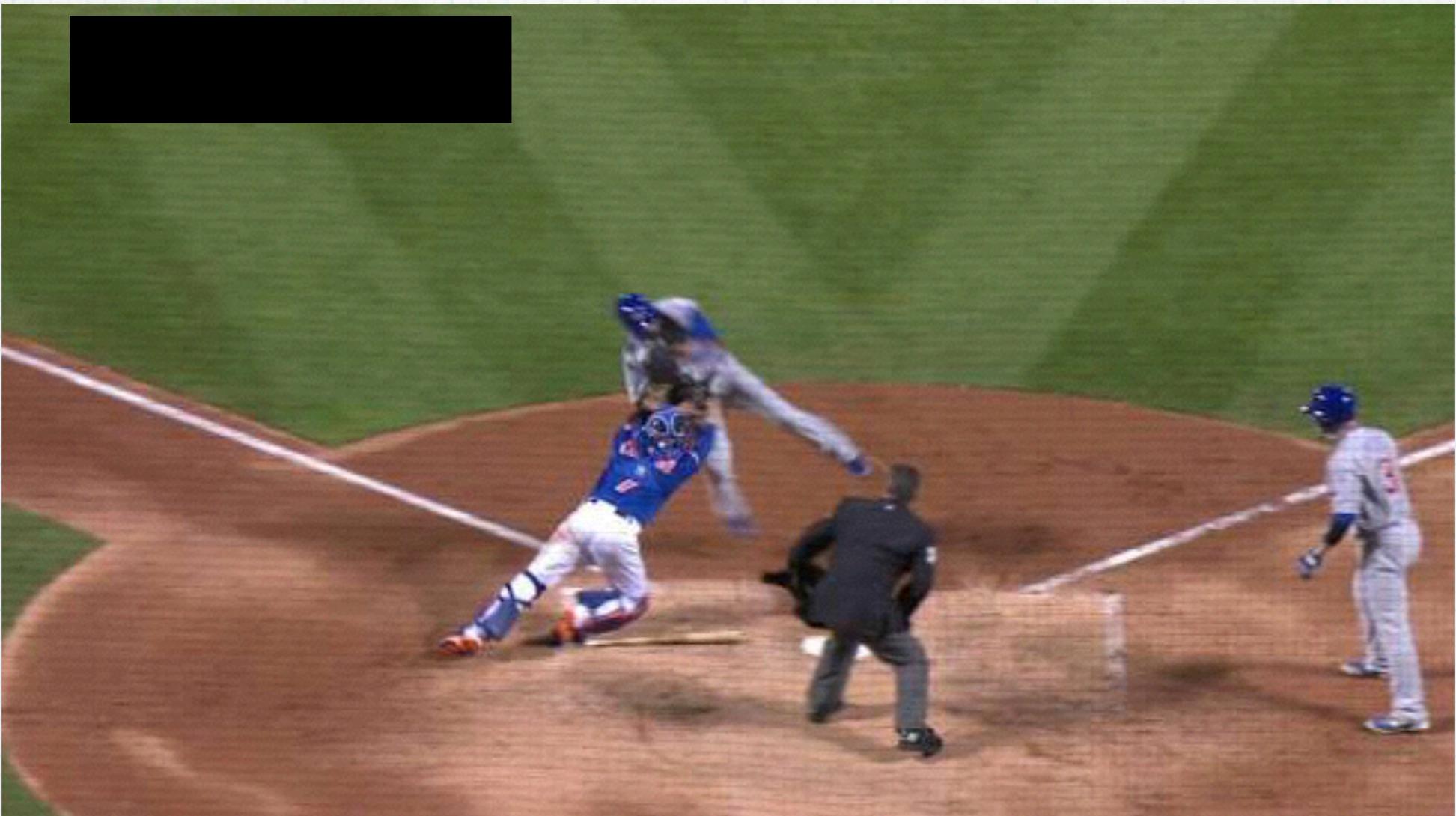




Cespedes throws . . .



Right on the money!



but...



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Manager Terry Collins challenges the call



Background

- Starting in 2014, a team can “challenge” an umpire’s call
- If video reviewers find the call incorrect, it’s overturned
- Otherwise, the team loses the chance to challenge for the rest of the game

Scenario II





Now, Should Terry Collins Challenge?



Can we make a data-driven decision?

Factors to Consider

1) How much of an advantage will a successful challenge give them?

Without overturning: 50.0% chance of winning



If overturned: 52.2% chance of winning

Factors to Consider

2) How much would it “cost” the team if the challenge is lost for the rest of the game?

Opportunity Cost $\approx .03\% / \text{out}$
remaining

In our case: 1.37%

Upside: 2.2% gain in Win Expectancy



Downside: 1.37% loss in Win Expectancy

Factors to Consider

3) Probability of Call Being Overturned

- Combined data from baseballsavant.mlb.com and retrosheets.org covering around 3,000 replays from April 2014-July 2016
- Approximated set of non-challenged plays
- Used SVM and linear regression models to generate probabilistic estimates
 - Features: challenging team, umpire, type of play, day of week, inning
 - Best models: .613 and .621 log-loss

Probability



74.4%



Putting it all Together

Upside = $(p)(\text{Win Expectancy Added})$

Downside = $(1-p)(\text{Opportunity Cost})$

Putting it all Together

Upside = 1.6%

Downside = .35%

Challenge it!



Conclusions

- Challenge calls aggressively!
 - This hinges on a proper estimate of “opportunity cost”
 - The consensus is that the cost is very low
 - “There's not much cost to consider.”
- Tom Tango (email correspondence)

Thank you!



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