

Up 3 in the Final Seconds, Should you Foul?

Analyzing the last 3 Regular Seasons, Possessions Starting with 5+ seconds on the Game Clock, Shot Clock off

Main Takeaways

- “Intentional Fouling” is the better strategy. Boosting Win% by **5%** compared to “Playing out the Possession”
- Despite this, teams chose to “Play out the Possession” nearly 6x more

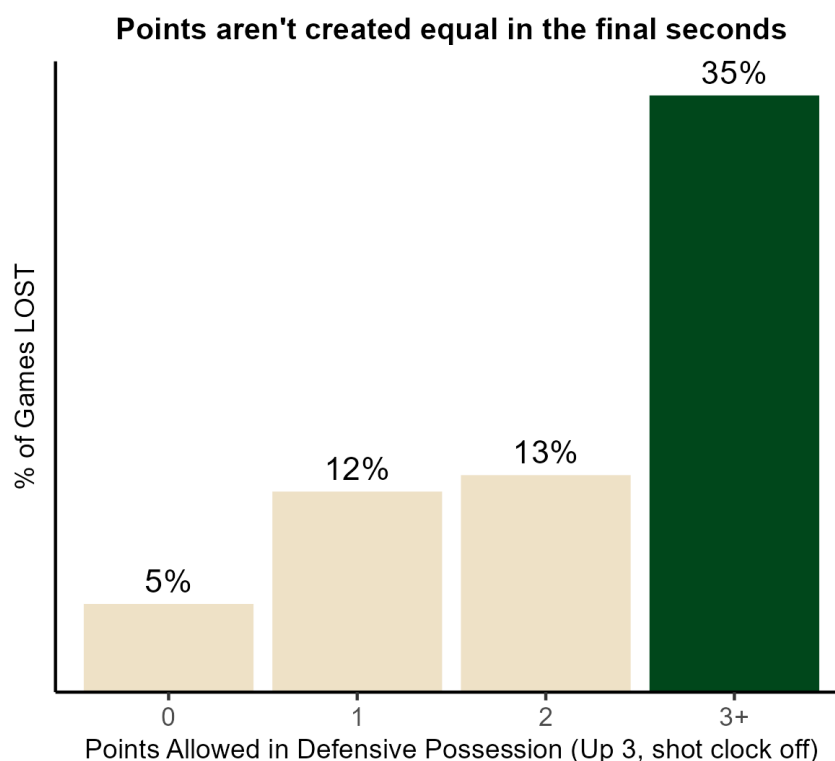
Fouling Up 3 is beneficial but uncommon

Up by 3, Shot Clock off, at least 5 seconds remaining

Points Allowed by Strategy								
	Frequency	0 points	1 point	2 points	3+ points	Average	W/L	Win%
Foul	15%	12%	35%	51%	2%	1.47	40-3	93%
Defend	85%	70%	1%	14%	16%	0.76	214-29	88%

“Fouling” allows more points on average. How can it be the best strategy?

- “Playing out the Possession” is 8x more likely to **lose the lead** (allow 3+ points)
- Allowing 3+ points is nearly 3x worse than giving up 2 points (Lose 35% of the time vs. 13%)



What is included in this analysis?

We take all possessions in the last 3 Regular Seasons starting with at least 5 seconds remaining where the defense is up 3 with the shot clock off in the 4th Quarter or Overtime. Each possession can only count toward one **opportunity** to avoid double-counting. Each opportunity is deemed either "Fouling" or "Defending."

Why are possessions starting with less than 5 seconds excluded?

These possessions are excluded because the defense may not have enough time to implement their intentional foul strategy. Risk of a shooting foul is at its peak in these moments, the worst possible outcome, so it is unwise to foul in these scenarios. Additionally, 5 seconds is the threshold where shooting fouls become as common as "bonus" fouls.

What is deemed as an intentional foul?

Intentional fouls are any possession that results in Bonus free throws and shooting fouls that were deemed to be "intentional fouling gone wrong" by video review. For example, a defender may take a hack at the offensive player's arm, but the savvy shooter is loading up and earns the continuation foul.

Intentional Fouling has led to losses only 3 times. What happened?

- Luka successfully retrieves his own missed free throw against the Knicks
- Lillard clutches 4 Free Throws while the Pelicans turn the ball over
- Wizards foul too late, give up 4 point play to Kennard

Which teams prefer each strategy?

The Mavericks and Suns were the only teams to intentionally foul at least half of the time. 15 teams never chose to intentionally foul in the last 3 seasons including us (the Bucks) who "defended" all 9 opportunities.

How can this project be improved?

Several data points could improve this project. The most important is probably an "overtime" variable. I would argue that a strategy that wins in regulation is better than one that wins in overtime. For example, maybe teams who "Defend" have won in overtime 70% of the time. This would mean they are probably getting lucky in their results and we would expect the strategy to be worse than it appears to be. The given data led me to take an "outcome based" approach instead of going the "expected" route. Having players' free throw percentages and pregame win probabilities would also help in taking an "expected" approach that would do a better job at estimating the true merit of each strategy, albeit losing interpretability. You could even simulate the ends of each game.