Long-Term Batter-Pitcher Familiarity

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In baseball, the times through the order (TTO) effect is fairly well understood. Through a combination of batter familiarity and pitcher fatigue (with the former much more important than the latter), batters tend to perform better the more times they face a pitcher in a game. This research extends that concept past the game level to the season and lifetime levels. Do batters 'remember' their findings from previous at bats, or does the TTO penalty reset for each new game or season? After analyzing MLB pitch data from the 2021-2024 seasons, I conclude that the long-term effect of batter familiarity is about five times less significant than the game-level effect, meaning that the effects would be comparable after roughly five games or fifteen at bats. That is to say, a batter facing a pitcher for the fifteenth time in his career but the first time in a game would be expected to experience a similar performance boost compared to a batter facing a pitcher for the first time in his career but the third time in the game.

INTRODUCTION

Since the TTO penalty is so significant – not just in a statistical sense, but also in its ability to change the way baseball games are managed - it is important that we understand as much as we can about its causes and effects.

In a single-game setting, those causes and effects are fairly well-understood. If you'd like to take a deep dive on why it is generally believed that familiarity is more important than fatigue, this article[1] is a good place to start.

There is also a growing awareness of the effects of batter-pitcher familiarity in other settings, namely playoff series. Kevin Cash famously removed Blake Snell in the sixth inning of Game Six of the 2020 World Series solely to avoid the TTO penalty. However, he replaced Snell with Nick Anderson, who had already pitched twice in that series. Is a third time in the series any better than a third time in the game?

My analysis aims to answer that question, as well as to generally provide a better understanding of the long-term effects of batter-pitcher familiarity.

METHODS

All of the analysis in this article was conducted using Baseball Savant pitch-by-pitch data from the 2021-2024 MLB seasons.

To prep the data, I grouped pitches by plate appearance and marked the number of times each batter-pitcher matchup occurred. I did this on the game level, the season level, and the total lifetime level.

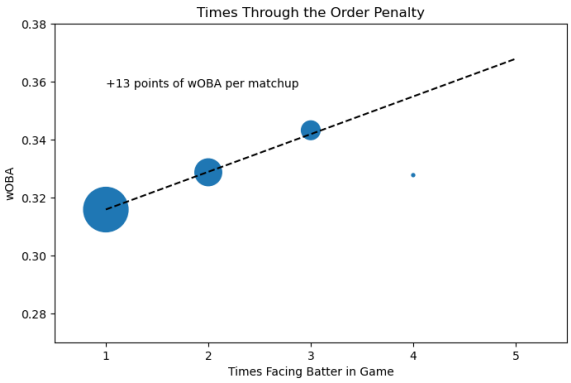

FIG. 1: *Points are weighted by data population. Pitchers very rarely go more than three TTO.*

ANALYSIS

I first calculated the classic TTO penalty, measured in wOBA[2] (see FIG. 1). As expected, hitters perform significantly better the more times they face a pitcher in the same game. For context, that 13 point (.013) slope implies that Brett Gardner turns into Kenny Lofton at the plate when he faces a pitcher for the third time.

There are a few different ways to approach long-term familiarity. My first question was whether the penalty itself changes after many matchups. If a

[1] https://medium.com/something-tangible/pq4-solving-the-times-through-the-order-penalty-fa8cb035ddb1

[2] https://library.fangraphs.com/offense/woba/

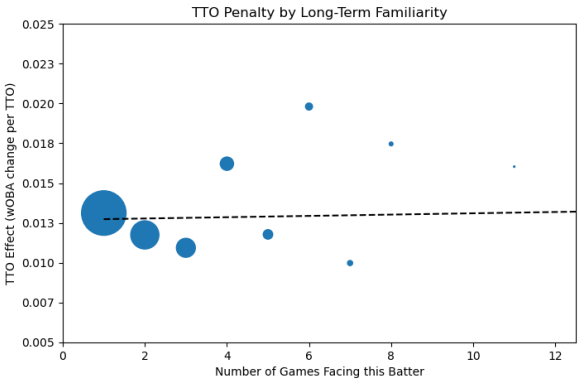

FIG. 2: *Trendline is weighted linear regression. The TTO penalty does not change appreciably with long-term familiarity.*

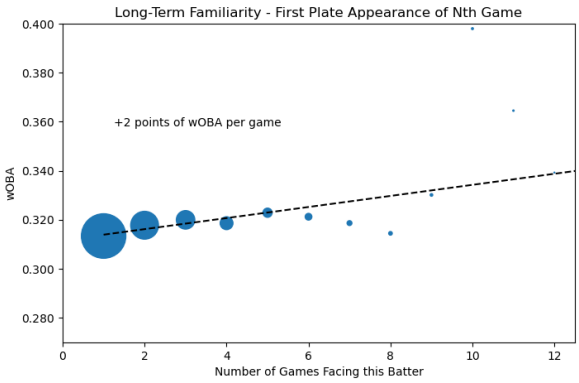

FIG. 3: *Trendline is weighted linear regression. Batters improve by roughly .002 wOBA per game vs. the same pitcher, at least up to five games.*

pitcher is facing a team for the fifth time in the season, will he be more or less susceptible to the TTO penalty? As we can see in FIG. 2, the answer is neither; the penalty is essentially constant, fluctuating within ±30% or so.

If batters retain any benefit from long-term familiarity, it does not manifest itself in the TTO penalty. However, what if we just consider the first plate appearance of each game? Does the batter's baseline performance improve after seeing the pitcher in multiple games?

That answer appears to be a yes, albeit a limited one. FIG 3 shows that over the first few games, a penalty of about .002 wOBA per game is exacted. But after that, with sparse data, it is difficult to say whether that penalty continues to increase. It is possible that a soft ceiling of long term familiarity exists at about 5 games worth of matchups, after which no further advantage is gained. It is also possible that the data is too sparse and too raw to detect performance changes over such a time period, when both the hitter and pitcher may be very different players compared to their first meeting.

Next, let's examine both of these effects in tandem. I first grouped the batter-pitcher matchups by number of games against one another. Then, within those groups, I found wOBA for each time through the order (combining the occasional four and five with the threes). FIG. 4 supports the previous conclusions and brilliantly illustrates the cyclic pattern of familiarity. Within each game, batters gain large advantages with every at bat, only to lose around 80% of that advantage by the time they next face that pitcher.

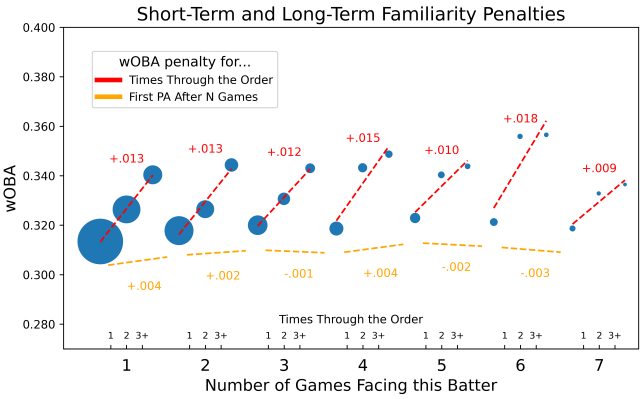

FIG. 4

DISCUSSION

These findings are enlightening, but certainly do not tell the full story. I have failed to account for numerous confounding variables (e.g. time of year, player selection bias) and have thus far ignored the effects of time between games.

In the future I would like to address those issues, most predominantly the last one. Presumably, seeing a reliever three straight days will lend itself to more familiarity than seeing him three times in a season. I'd like to make a similar chart to FIG. 3 but with time on the x-axis rather than games. I will be sure to update this document when I have the time to make those changes and additions.