Intro

The hot hand fallacy in sports is the idea that a player who has seen recent success is more likely to see equal or greater success in the future. There is debate among fans and professionals if the hot hand fallacy is real or not, arguing whether coaches should prioritize players who have had recent success, or long-term success. For example, if you were an MLB manager, would you rather start Player A who has a .859 OPS[1] through 278 plate appearances[2] over the course of the season but has only a 0.141 OPS over his last five games, or Player B who has a 0.630 OPS over 268 plate appearances and boasts a 1.071 OPS over his last five games?

I too have debated this fallacy myself. As someone with a strong math background, I know a larger sample size is always better. However, as someone who played sports growing up, I know there is a psychological aspect to playing, and playing well in recent games can do wonders for a players confidence which could lead to better performance. I have decided to conduct an analysis on if this ideology appears in the MLB among hitters.

I am using data from the 2023 MLB season which was obtained from [fangraphs.com](). This data contains hitting statistics for every player from every game of the season. I have filtered the data by player name alphabetically then by date chronologically. I prepared the data so each row contains the stats for that game as long as the cumulative hitting statistics over the course of the season for that player.

Analysis

In order to answer this question, let's evaluate how players perform in games after they've played well throughout their previous five games. But what defines a good game? Let's use the league average OPS as a benchmark. In 2023, the average OPS was 0.734, so any game above this mark would be considered a good game. This includes going one-for-four with a double, one-for-three with a walk, and two-for-five with two singles, just to name a few. In 2023, there were 20,970 instances of a player averaging an OPS above 0.734 over a span of 5 games. Just under 42% of their next games resulted in an OPS above the league average. The league hovered around this mark no matter how much better they hit than the league average over their last 5 games.

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[1] Short for On-Base plus Slugging. A statistic used throughout this analysis as it acts as a representation of a player's overall offensive contribution. 0.734 is league average. 0.600 is considered poor. 0.850 is considered great. 1.000 is considered elite.
[2] A plate appearance represents each time a batter got on base, struck out, or hit into an out.

OPS In Last 5 Games	> 0.734 OPS	> 0.800 OPS	> 0.850 OPS	> 0.900 OPS
% Of next games above 0.734 OPS	41.88%	42.03%	42.43%	42.43%

However, players who had a sub .700 OPS in their last five games had a good next game between 36 and 39% of the time, no matter how bad it got.

OPS In Last 5 Games	< 0.700 OPS	< 0.650 OPS	< 0.600 OPS	< 0.500 OPS
% Of next games above 0.734 OPS	38.66%	38.56%	38.39%	37.50%

On the flip side, there were 10,834 times a player had at least 250 plate appearances and above-average OPS for their season. Nearly 47% of the next games resulted in an above-league-average OPS. The difference in the percentage of good games only increases as the season-long OPS increases.

Season OPS	> 0.734 OPS	> 0.800 OPS	> 0.850 OPS	> 0.900 OPS
% Of next games above 0.734 OPS	46.75%	50.51%	53.18%	57.20%

But aren't we comparing apples to oranges here? We're comparing every MLB player of the 2023 season to players who've had at least 250 plate appearances. Take Giants outfield prospect Wade Meckler for example. MLB.com didn't list him as a top-30 prospect for the Giants in 2023. He wasn't an MLB-ready hitter that year, but had a small stint in the big leagues. From August 23 to August 28 he held a 1.564 OPS over a five-game stretch. His next game? 0 for 4 with 3 strikeouts. Is this surprising because he

was on such a hot streak, or more representative of his actual play, as he would have a .578 OPS during a 20-game stint in the bigs. On the other hand, if I told you multiple time all-star Ronald Acuna Jr. blasted two homers in a game, would you really need to know that he was 8 for his last 23 and had nearly a 1.1 OPS over his last 5 games, to think that would happen? Or would you just know that Ronald Acuna Jr. is one of the best players of his generation, and he's capable of having a great game any time he steps onto the field. Wade Meckler would not get 250 plate appearances in a season, simply because he's not MLB-ready. Ronald Acuna Jr. would get 250 plate appearances, because he's Ronald Acuna Jr. So why is it fair that these two players are being compared?

        To solve this issue, let's look at five-game stretches among players who had at least 250 plate appearances in the season. As expected, these players with at least 250 plate appearances, and a good five game stretch are more likely to have a good game than all batters with a good five game stretch, but again the 5 game streak is negligible.

Last 5 Game OPS	> 0.734 OPS	> 0.800 OPS	> 0.850 OPS	> 0.900 OPS
% Of next games above 0.734 OPS	44.70%	44.82%	45.07%	45.06%

No matter how good their previous five games were, a player's chances of having a good next game go up by a few percent.

        Looking at these numbers on a graph can make it much clearer. Here is the chance a player has a good next game vs. their OPS in their last five games.
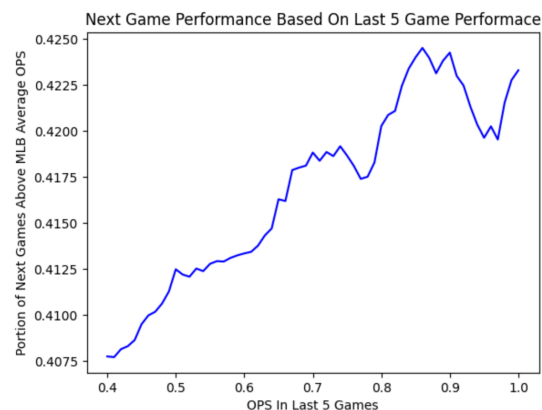
It hovers between 41 and 42% no matter how good the last 5 games were. Now here's the graph for a player's OPS in their last five games for players with at least 250 plate appearances on the season.
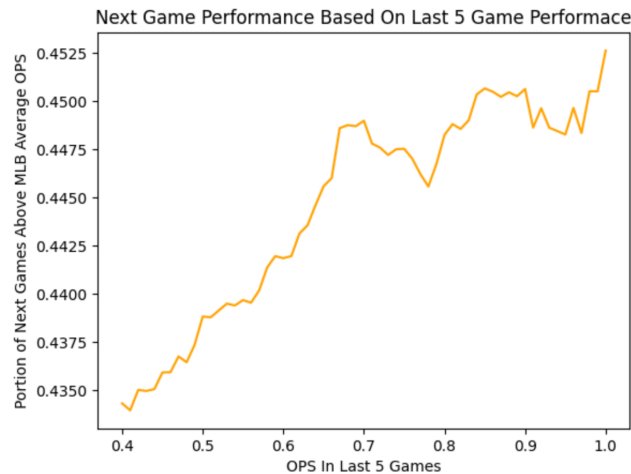
It's better, but doesn't really increase as OPS increases. Now here's the graph for the player's OPS over the course of their entire season, along with the previous two graphs.
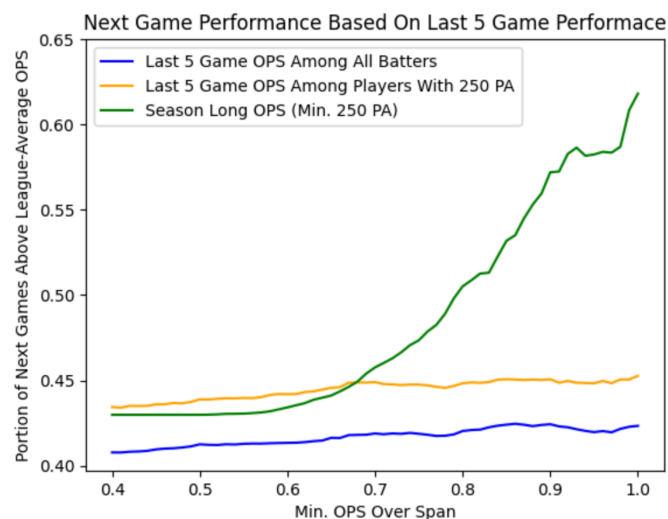

Clearly, a player who has a high OPS over the course of a larger span, is more likely to have a good game than someone who had a high OPS over their last five games.

Now let's explore a case similar to my example from the beginning of the video. How well do good players perform when they're on a cold streak and vice versa? When broken down into its simplest form, it's quite clear which sample is more valuable.

Season OPS	Above Average	Below Average
Last 5 Game OPS	Below Average	Above Average
% of next games above league average OPS	45.59%	37.12%

Players with a below average OPS on the season, who have an above average OPS in their last 5 games, had an OPS above average in their next game only 37% of the time. Whereas players who had an above average OPS on the season and a below average OPS in their last 5 games, had an above average OPS in their next game 46% of the time. Players of all skill levels are actually more likely to have a good game, if they've been on a cold streak.
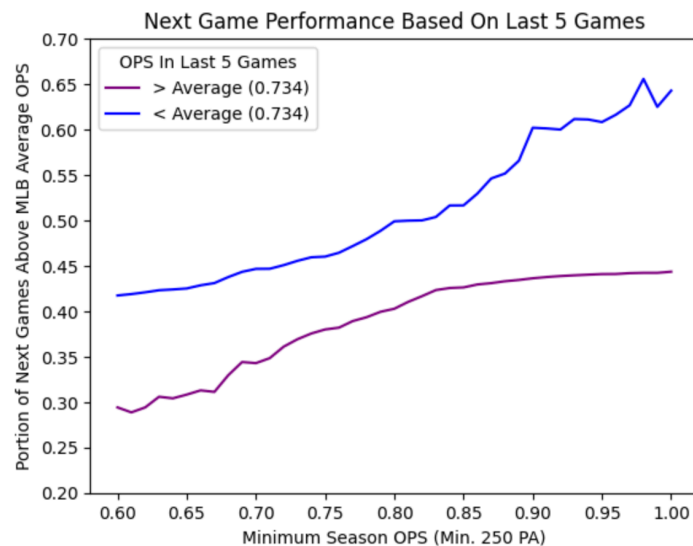
Players with a below average OPS in their last 5 games are actually 10 to 20% more likely to have a good game than players who hit similarly on the season and have had an above average OPS in their last 5 games.

If you're still not sold, let's revisit my proposition from the beginning of the video. Player A would go 2-4 in their next game with a double and a walk, where Player B went 0-3 with a walk in their next game. Still unsure? Player A is 7 time all-star, 5 time silver slugger, and 2022 NL MVP Paul Goldschmidt and Player B is rookie second baseman Michael Massey.