Time Between Pitches: Cause of Long Games?

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The length of the average game continues to be a major topic for MLB and the baseball press as it has been above three hours for several years. Many factors have been suggested to account for the longer games and I addressed several of these last year by looking at patterns over the past 110 seasons (https://www.retrosheet.org/Research/SmithD/WhyDoGamesTakeSoLong.pdf). The two strongest connections I found were increases in the number of strikeouts and the overall number of pitches. One possibility that has received a great deal of attention is the time between pitches and in fact MLB has considered instituting a 20-second clock with the bases empty although that has not been implemented. At last year's SABR convention, Eliza Richardson Malone presented the results of her study of 31 starting pitchers in 2017. Although her data set was limited, her conclusion was clear, namely that she found very few pitch intervals exceeding 20 seconds. Therefore the proposal to force pitchers to throw within 20 seconds would not have a significant impact on game length.

With the help of Major League Baseball Advanced Media (MLBAM), I have the precise time down to the second that each pitch was thrown in every game in 2018 with the exceptions of the two games played in Puerto Rico and the three in Mexico. Therefore I had 717,410 pitches to study. By the way, that works out to just under 148 pitches per team per game.

First I need to clarify exactly which pitches I studied. The basic topic is the amount of time after a pitch before the next pitch is thrown. This means consecutive pitches to the same batter. Therefore, the last pitch thrown to each batter does not apply because there is no "next pitch" to him. When these "last pitches" are excluded, the total number of relevant pitches drops to 511,728, which is still an impressive sample size. The overall average interval for all pitches across all situations in 2018 was 23.8 seconds. Of course, there are many interesting ways to subdivide this number.

In addition to the interval between pitches, I studied the time taken for the following:

Between pitches
Mound visits
Between batters
Between innings
Substitutions
Replay challenges
Injuries
Ejections

I also looked at the length of each inning since many have reported slower play in later innings.

Table 1 has the basic data for time elapsed after each different pitch result for bases empty situations and those with a runner on first alone.

Table 1.

Pitch result	Seconds to next pitch	
	Bases Empty	Man on First
All pitches	20.3	28.4
Ball	18.7	26.0
Called strike	17.1	25.2
Swinging strike	20.2	27.5
Foul	26.3	34.1

The bases are empty for 58% of all pitches, so the first column confirms Malone's data that when the ball is not hit, the proposed 20 second clock would be a solution to a perceived problem that doesn't actually exist. These are averages of course so some values are less and some more, but overall the bases empty situation provides little opportunity for a rule intervention to speed up the game; pitchers are already meeting this standard. The time increases after a foul ball compared to pitches when no contact is made. This is not a surprising difference since in the modern age essentially every foul ball results in a new ball being put in play, which takes more time. There is greater chance for variation here since a ball fouled at the plate will not slow things nearly as much as a long foul into the stands.

There is a man on first alone 18% of the time and the second column presents the average intervals in this situation. All other situations combined add up to 24% of pitches. It is conventional wisdom that the game slows down when someone gets on base and these numbers certainly support that position. The average increase is 8.1 seconds across all pitch results.

Pickoffs
However, we have to consider another major feature of having a man on first, namely pickoff throws. I documented 11,194 throws to first in 2018, 10,755 by pitchers and 439 by catchers. The pickoffs added an average of 25 seconds to each pitch interval although there was a wide variation. When the overall average time for pickoff attempts is subtracted from the 28.4 second interval for a runner on first, then the time between pitches drops to 22.9 seconds. In other words, pickoff attempts at first account for about two thirds of the increase found with having a runner on first. To complete this thread, the other runner situations differ very little, with a combined effect of adding about 1 additional second to the time for a runner on first only.
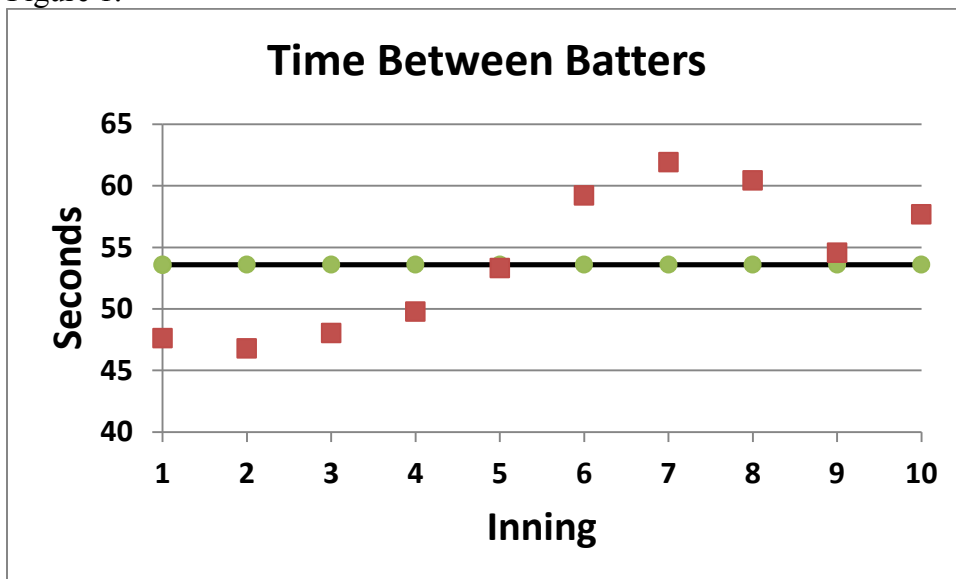
Mound Visits
Mound visits were restricted in 2018 for the first time with a limit of six per game for each team. This limit has been reduced to five for 2019. I began noting mound visits in July of 2018. The average time consumed by a mound visit is 81.5 seconds, even though the rules are clear that the visit itself is limited to 30 seconds. The 81 second interval is the actual time between pitches whereas the 30 second clock starts when the manager or coach has left the dugout and does not

include the return trip to the dugout, accounting for the wide difference between the rule and the reality. Player visits to the mound are also counted, but the rules do not specify how to time those. If a mound visit ends up in a pitching change, then it does not count against the limited number for the game and I did not count them in my average time.

Time Between Batters

The average time between batters within an inning is 54 seconds. Again this is the time from the last pitch to the previous batter and the first pitch to the next one. I noticed interesting differences in this time for different innings as shown in Figure 1. The green line is the average for all innings.

Figure 1.

The value is low in the early innings and then it rises with a peak in the 7th to over 62 seconds, which is almost 15 seconds more than the quickest time in the second inning. The increased time in later innings makes sense as the game pressure mounts and it is reasonable for both batter and pitcher to take a little extra time to get ready. All extra innings are combined as 10. The one point that stands out is in the 9th which has a remarkable drop from the 8th and 7th innings. Two years ago in New York I showed that 47% of games had a margin of three or more runs when the 9th inning started and the team in the lead won 97% of those games. I suggest that the drop I found here reflects the reality there is less deliberate preparation by either the batter or the pitcher since so many games are clearly decided by this point. If a game goes beyond 9 innings, then it is reasonable that the time increases since the games are obviously closer.
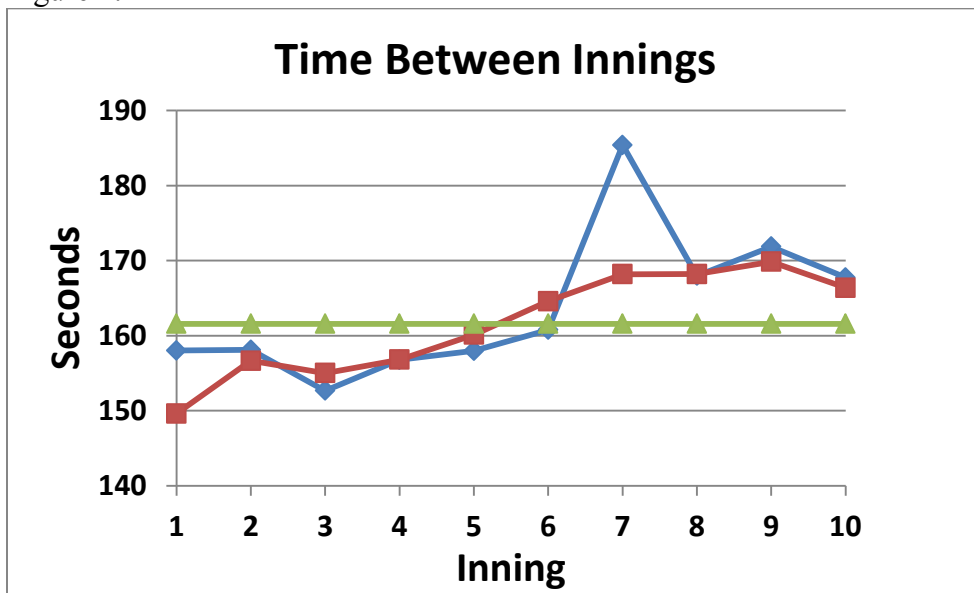
Time Between Innings

I found the average time between innings to be 2 minutes and 42 seconds. This is interesting in light of the MLB pace of play rules put into effect for 2018 which set different limits based on the nature of the television broadcast of the game, as shown in Table 2:

Table 2.		
	MLB Rule	Actual
Local TV	2:05	2:41
National TV	2:25	2:55
Postseason games	2:55	Not studied

I did not look at postseason games. According to MLBAM, there were 62 games designated as national television games in 2018 as opposed to 2368 local television games. The average time between innings for the locally televised games was 2 minutes and 41 seconds and for the nationally televised games it was 2 minutes and 55 seconds, a difference of 14 seconds. In any case, the observed times are well beyond the stated limits, especially for the locally televised games. However, we have to consider when the official clock is started at the end of each half-inning. MLB issued very precise descriptions of how the timing is to be done including different starting details when a relief pitcher is entering the game. The average time between innings also changed significantly by inning, as shown in Figure 2.

Figure 2.

The green line presents the average for all inning changes, the blue line the changes after the top of an inning and the red line the changes after the bottom of an inning. There are two striking features to me in this figure. First, the times get progressively longer as the game proceeds just as the breaks between batters do, and second, the break after the top of the 7th inning is much longer than all the others. In fact, it is 17 seconds longer than after the bottom of the 7th. Everyone will immediately realize this reflects the 7th inning stretch, but there is another wrinkle. You may recall that most teams now play "God Bless America" during the 7th inning stretch at Sunday games. There are three notable exceptions. First, the Yankees play this song in the 7th inning of **every** game, but the Blue Jays and A's don't play it at all! There were 391 games played on Sundays in 2018, to which I added the Yankee non-Sunday games and subtracted the

Toronto and Oakland games. That gave a total of 430 games with God Bless America and 2002 games without it, presumably all of which had "Take Me Out to the Ballgame" except for the Orioles who play "Thank God I'm a Country Boy". The breakdown for these games in shown in Table 3.

Table 3.	
7th Inning Stretch times	
All Games	3:06
Take Me Out to the Ballgame	2:53
God Bless America	4:04

The extra one minute and 11 seconds consumed by "God Bless America" is pretty dramatic since it is played in 17.7% of all games. Once again we need to remember that the times I found are from the last pitch to the last batter of the inning to the first pitch of the first batter in the next inning. However, it is clear that the actual times do not correspond to the carefully prescribed timing procedures promulgated by MLB.

Substitutions

Substitutions are another kind of event that takes extra time, of course. The most common type is a pitcher change. Table 4 has what I considered.

Table 4.		
	Seconds	
Type	Start Inning	Mid-Inning
All	13	83
Pitchers	14	138
Pinch-hitters	6	14

As expected, the mid-inning substitution of a pitcher has the greatest amount of additional time, taking over two minutes more than a new pitcher at the start of an inning. One of my surprising results from last year is that the number of mid-inning pitching changes has changed almost not at all in the last 25 years, although the total number of relievers per game has increased steadily since 1975.

Replay Challenges

We now live in the age of replay challenges and they constitute another significant interruption. MLB reports the time taken for each review but by their definition the timing of the challenge starts when the umpires commit to the review. My numbers again are the actual elapsed seconds before the next batter or pitch. Once again there is a difference between challenges at the end of an inning, the end of a batter appearance of the middle of a batter appearance. These details are in Table 5.
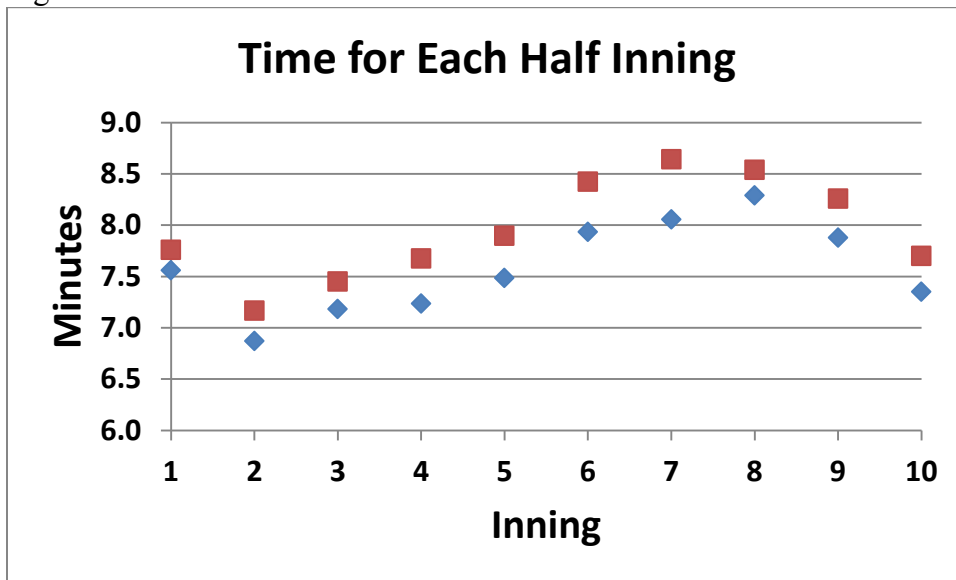
Table 5.

Challenge Situation	Occurrences	Average Time Consumed
End of Batter	665	2:42
End of Inning	185	4:26
Mid-batter	260	3:00
Overall	1100	3:05

The "End of Batter" and "End of Inning" data have to be looked at carefully, since there is already time consumed by these events. The numbers I reported above have had these challenge times removed. The properly weighted average for these events is 3:05. MLB reports an average of 1:28. Again, their timing starts with the request and ends with the decision from New York, but my measured average time for the interruption is more than double their reported time.

Time to Play Each Inning
The time taken to play a given inning also changes during the course of a game, partly reflecting pitcher subs, but not entirely. Figure 3 shows the values for each inning from the first pitch of the inning to the last.
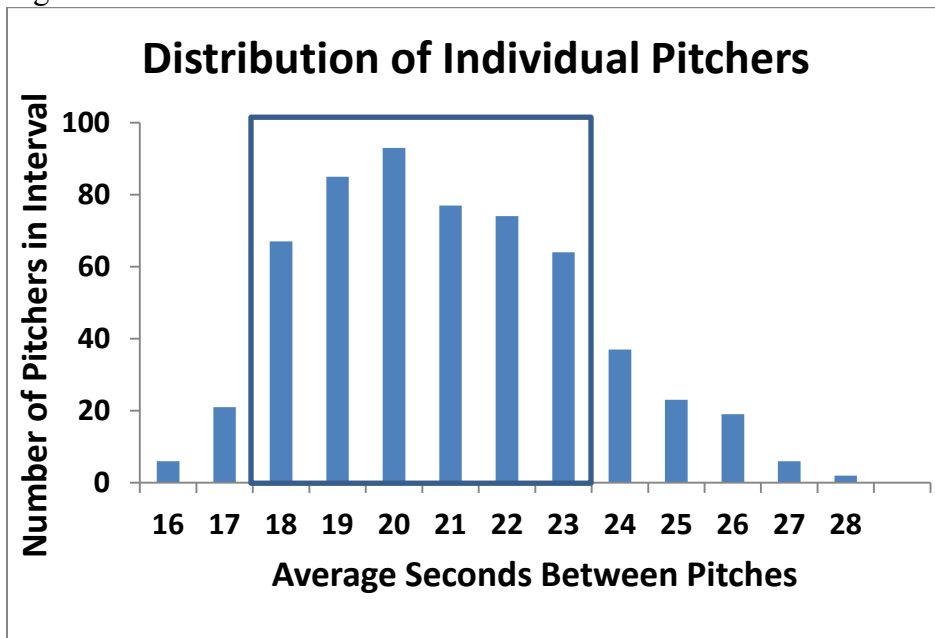
Figure 3.

The data for the visiting team are in blue and for the home team in red. It is interesting that the home innings take longer on average in all cases than the visitors with a difference of 12 seconds in the 1st to 35 seconds in the 7th, an average of 22 seconds. There is a drop of 36 seconds in the average from the 1st inning to the 2nd and then a fairly steady rise through the 7th. Note that this pattern mimics the differences between batters that we saw before. When these individual half-inning values are summed, we find that the average 8.5 inning game has 2 hours and 12 minutes of actual playing time and the average 9 inning game has 2 hours and 20 minutes of play.

Individual Pitchers

I also looked at the time taken by individual pitchers since one would reasonably expect variation here. In order to reduce noise in the data, I only considered pitchers who threw at least 100 pitches of the "interval" type I examined here with the bases empty. There were 575 pitchers who met this criterion with the average ranging from 15.3 to 28.4 seconds.

I also looked at the ERA and WHIP (walks plus hits per inning) of these 575 pitchers to see if there were any relation between pitching success and time between pitches. There was no relation. The longest time is 8 seconds slower than overall average, which is not trivial over the course of an entire game, but it is more important to ask how often these slow times occur. Figure 4 shows a distribution that is probably expected, with the large majority of pitchers showing little variation from the mean. In fact the pitch intervals of 18 to 23 seconds cover 80% of all pitchers.

Figure 4.

Individual Batters

It is a logical extension to check individual batters, once again limiting the analysis to those who saw at least 100 "interval" pitches with the base empty and excluding all pitchers. There were 513 batters in this group. Their range was 17.4 to 25.9 seconds, which is narrower than I found for pitchers. I examined batter success in terms of OPS in relation to the pitch interval and once again there was no relation.

Individual Umpires

The other party in each pitch is the plate umpire, of course. The range here is amazingly narrow, from 19.3 to 20.5 seconds, barely a one second difference. We can safely conclude that the identity of the umpire is of virtually no significance in the time taken between pitches

Ejections

There were 87 ejection episodes in 2018 which saw the banishment of 189 players, coaches and managers since there were many cases in which two or more were ejected at the same time. These ejections consumed an average of one minute and 52 seconds.

Injuries

Injuries to players and umpires were very different in their time consequences. I catalogued 528 stoppages of play for an injury to a player and these took an average of two minutes and 19 seconds. Umpire injuries are rarer and there were only seven in 2018. However, these took an average of nine minutes and 3 seconds. Almost all of these involved the home plate umpire hit by a foul ball, necessitating his replacement so it is to be expected that this would take longer.

Summary and Highlights

- Bases empty   20.3 seconds
- Man on first   28.4 seconds
- Throws to first   25 seconds
- Mound visits   **<u>81 seconds</u>**
- Between batters   54 seconds
- Between innings   162 seconds
- Seventh inning stretch   15 additional seconds
- "God Bless America"   **<u>71 additional seconds</u>**
- Pitcher change start inning   14 additional seconds
- Pitcher change mid-inning   **<u>138 additional seconds</u>**
- Challenges between plays   162 seconds
- Challenges between innings   266 seconds
- Fastest to slowest pitchers   12 seconds
- Fastest to slowest batters   7 seconds
- Injuries to players   2:19
- Injuries to umpires   9:03

Conclusion

As demonstrated here, there are many different factors that add to the time of games. However, the length of time between pitches makes only a minor contribution.

Table 6 breaks down the average "regulation length" game, that is, those which are either 8.5 or 9 innings.

Table 6.

	8.5 innings	9 innings
Total games	1065	1145
Average Game Time	2:56	3:05
Calculated Play	2:12	2:20
Calculated Breaks	42 min	44 min
Calculated Game Time	2:55	3:04

The "calculated" times were obtained by summing the observed average times for each half inning as well as the individual average times between innings. The nearly perfect match between the actual and calculated game times gives me great confidence that I considered the proper factors. As a final point, I looked on a per game basis at the various interruptions I identified. These are contained within the calculated play time and are listed in Table 7.

Table 7.

	Events Per Game	Total Time (minutes)
Pickoff Throws	4.6	1.9
Mound Visits	5.4	7.3
Substitutions	4.4	6.1
Challenges	0.5	1.3
Ejections	0.1	0.1
Injuries	0.2	0.5
Total	15.1	17.1

These regulation-length games average 3 hours and 1 minute, so the 17.1 minutes of interruptions comprise an average of 9.5% of the total play. There is a question in my title to which the clear answer is NO – time between pitches is not the culprit.

We are left with the question of where MLB could intervene to shorten games and I see no obvious target. There is a pending new rule requiring relievers to face three batters instead of one and the intent is to save time, but that would appear to have little impact. It seems that the inherent structure of the game has changed to the current rate at which events flow and we should expect that to continue.