

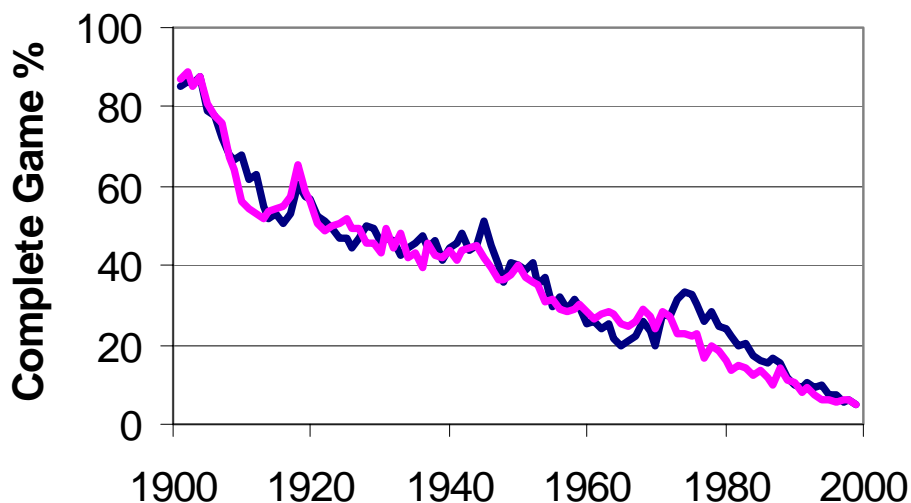
## From exile to specialist: The evolution of the relief pitcher

By: David W. Smith  
June 23, 2000

Many parts of baseball have changed substantially in the last 100 years, but none more dramatically than the use of relief pitchers. This topic is even more interesting since the entry of a substitute pitcher is a direct, conscious action on the part of the manager; it is not an indirect consequence of changes in performance. As a result, the study of relief pitcher usage is rather different from most areas examined Sabermetrically and changes in the pattern of usage should be interpreted differently.

Let's begin with the large scale raw numbers. Although my topic is relief pitching, the other side to the equation is starting pitching. Figure 1 presents the percentage of complete games per season from 1901 through 1999. These percentages were calculated with data from Total Baseball, generously provided by Pete Palmer. The darker line is for AL pitchers and the lighter one for NL. There is some oscillation in the lines, but the overall downward trend is unmistakable. The peak was in 1902 for the NL (88.7%) and in 1904 for the AL (87.6%). The low points were reached in both leagues in 1999 with values of 4.81% (AL) and 4.94% (NL).

Figure 1: Percentage of complete games for each league. NL in purple, AL in blue.



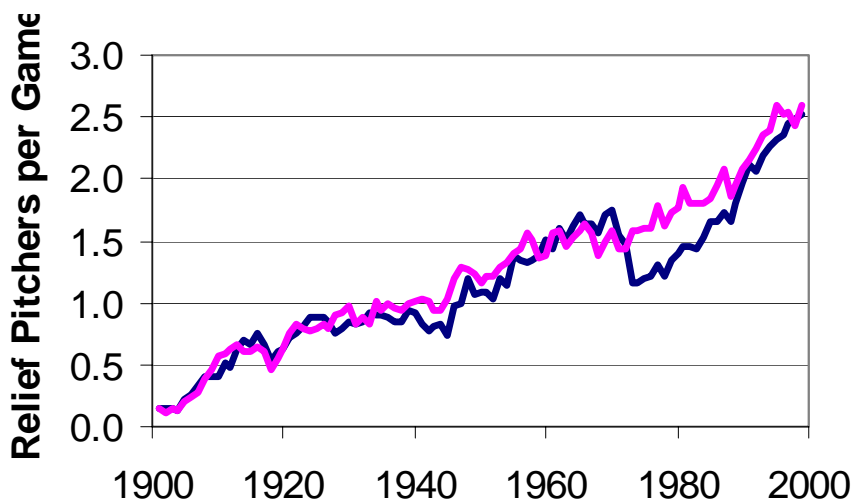
There are three areas of special note in this figure, one of which we will consider in much detail. First, after a steady

decline of about 15 years, there is an upsurge in both leagues in 1917 and 1918. It is hard to believe that U.S. involvement in World War I could have had this large an effect, but the only other factor I could think of is that perhaps it was a delayed consequence of the demise of the Federal League after the 1915 season. However, that doesn't seem very likely either. Suggestions for other explanations are welcomed. The second year of note is 1945, when the AL experienced a one-year jump of over 5%. Although there were certainly manpower changes in this final year of World War II as many veterans returned, it is curious that the effect would only appear in one league, since the other year-to-year changes tend to be parallel in the two leagues.

The final region of note is the most important, and that is the striking divergence between the two leagues beginning in 1973 with the advent of the designated hitter. However, it is very interesting that the big jump only lasted for two seasons and since then the two leagues have remained quite parallel. In fact, since 1990 they are virtually identical. This pattern tells us something of the thinking process of AL managers and it appears that at least this effect of the DH was pretty short-lived. We will return to this interval later.

Figure 2 presents relief pitcher data for 1901-1999 in terms of relievers used per game per team. The rise is the expected mirror image of the decline in complete games and the same three regions stand out here, with 1945 and the DH eras even more prominent. However, once again we see that the gap between the two leagues has essentially disappeared in the last decade as managers appear to be controlling their pitcher usage on bases other than the presence or absence of the DH.

Figure 2. Relief pitchers per game. NL in purple, AL in blue.



Figures 3 and 4 are expansions of the 1965-1985 portion of Figures 1 and 2, just to emphasize how different the two leagues were for a few years after the DH arrived, but that those differences did not persist.

Figure 3. Percentage complete games in each league, 1965-1985

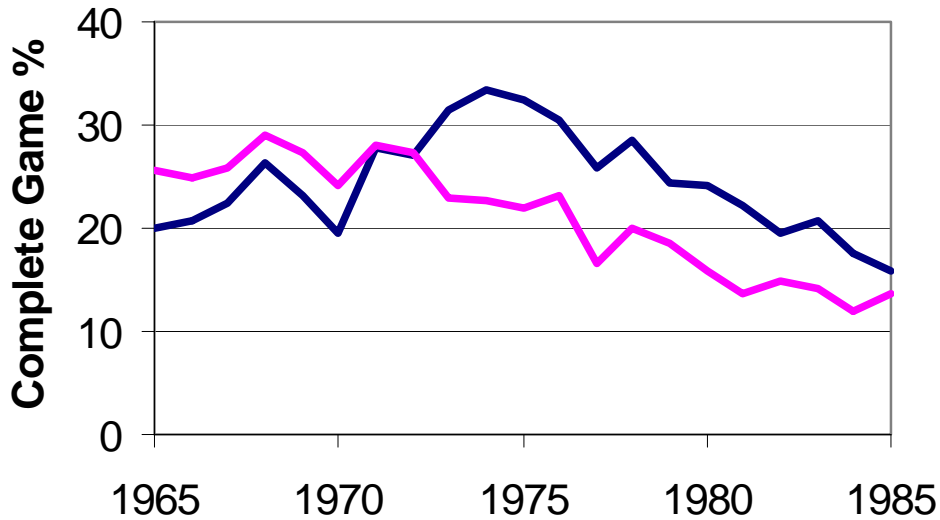
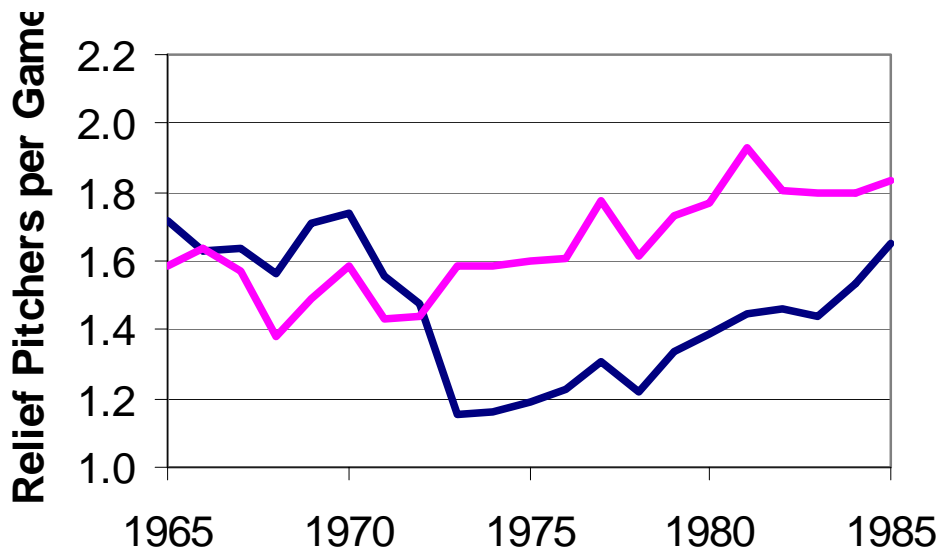


Figure 4. Relief pitchers games in each league, 1965-1985



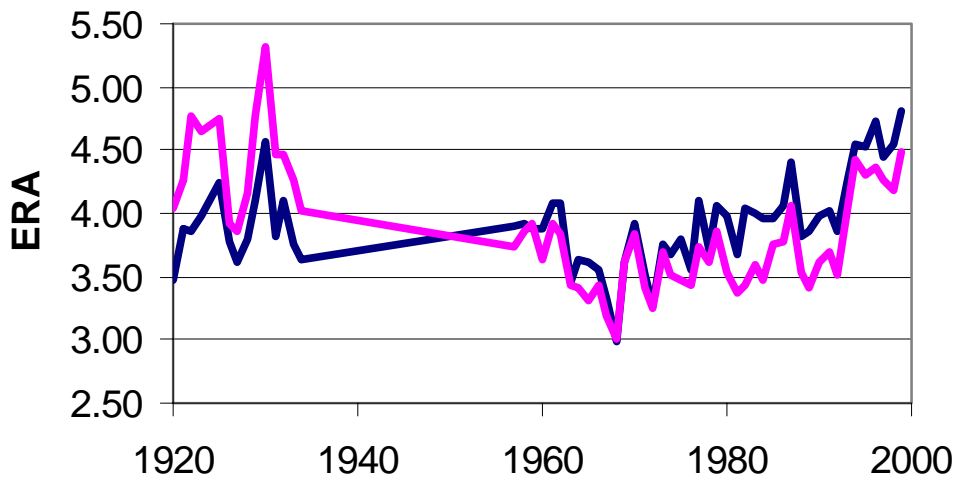
I am always most interested in baseball questions which can be addressed by the use of play by play data and I therefore looked for some ways to explore relief pitching with that detailed information. My sources were Retrosheet files for 1920-1934 and 1957-1983, Total Sports files for 1984-1998 and data I received from Gary Gillette and Pete Palmer for 1999. Due to a number of factors, including game account availability, I decided that the holdings for the seasons from 1935-1956 were too sparse to be useful. Table 1 contains a summary of the games used for play by play analysis.

<u>Seasons</u>	<u>Games Played</u>	<u>Games Available</u>	<u>Percentage Available</u>
1920-1934	18475	5410	29.3
1957-1973	27351	26173	95.7
<u>1974-1999</u>	<u>54052</u>	<u>54052</u>	<u>100.0</u>
Totals	99878	85635	85.3

Obviously one must be careful when making conclusions from seasons with partial data, especially the early ones used here. The sample proportion of nearly 30% is hopefully representative of the actual totals.

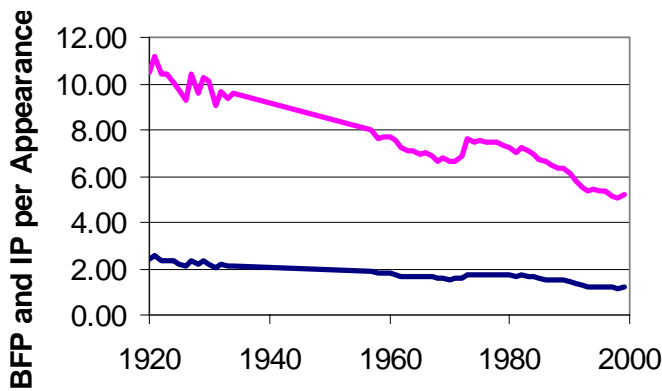
What meaningful questions can we ask about relief pitchers with these data? The first item I considered was ERA. Figure 5 presents the ERA for starters (blue line) and for relievers (purple line) in these games. It is striking that for the early seasons the relievers' ERA is higher than that of the starters in each season, usually by about half a run or more. On the other hand in the more recent years the pattern is almost completely reversed; only 1968 shows a lower value for the starter, and that was a tiny difference (2.98 vs 3.01). Since the mid-1970s the gap between starters and relievers has widened. The difference was .34 runs in 1999 (4.82 vs 4.48). What happened? How can we account for the improved performance of relievers relative to starters? It is often said (the dreaded "conventional wisdom") that relievers used to be failed or at least ineffective starters and that in modern times relievers are carefully selected and groomed for their roles. The ERA results in this figure certainly seem to support those positions. Not only has the pattern of superior performance been reversed, but the magnitude of the differences has shrunk, perhaps indicating that the early relievers really were more marginal performers. The last point to note on this figure is that the offensive boom of the late 1990s is within the range of production that occurred in the early 1930s.

Figure 5. Starter and Reliever ERA, for both leagues. Starters in blue, relievers in purple.



The next aspect I considered was the length of the average appearance of a reliever. Figure 6 presents this information in terms of batters faced (purple line) and innings pitched (blue line). The extremes are 2.54 innings pitched with 11.13 batters faced in 1921 and 1.17 innings pitched with 5.08 batters faced in 1998. This figure shows a general downward trend, but there is a sizable jump from 1972 to 1973, the first year of the designated hitter. This change is perhaps expected as managers can be expected to leave pitchers in a bit longer in a game with a DH since they don't have to remove them for pinch-hitters. However, the effect lasted for only a few years and the downward trend resumed, with the values of the last few years fitting the trend from the earlier part of the 20th century. It was surprising to me that the DH effect appeared to be temporary, as managers adjusted to the realities of the new rule. There will be more on this point in a minute.

Figure 6. Batters faced pitcher (purple line) and Innings pitched (blue line) for relief pitchers.



The last feature I addressed was a complex one relating to when relievers enter the game. There are many ways to subdivide this information, but I chose to ask how often relievers do the following three things:

1. enter to start an inning
2. enter to start the 9th
3. pitch to only one batter

Figure 7 shows these results with the heavy line for entry at the start of any inning, the medium line for entering to start the 9th and the light line for pitching to only one batter. Once again we see a dramatic event in 1973, when the percentage of the time that a reliever entered to start an inning fell from 53.4% to 41.2% in one year. This difference is attributable entirely to the American League, as Figures 8 and 9 quickly show. Can we make sense out of this dramatic drop? I think we can. In a league without a DH, pitchers are often removed for pinch-hitters and their successors of course enter the game to start an inning. In the absence of pitcher batting, it is reasonable to expect that the timing of many pitching changes will be altered. Just to be sure, I checked pinch-hitting appearances for both leagues for 1972 and 1973. The results are in Table 2 and the conclusion is pretty clear.

Figure 7. Percentage of games in which reliever enters to start an inning (blue line), start the 9<sup>th</sup> inning (purple line) and pitching to only one batter (yellow line).

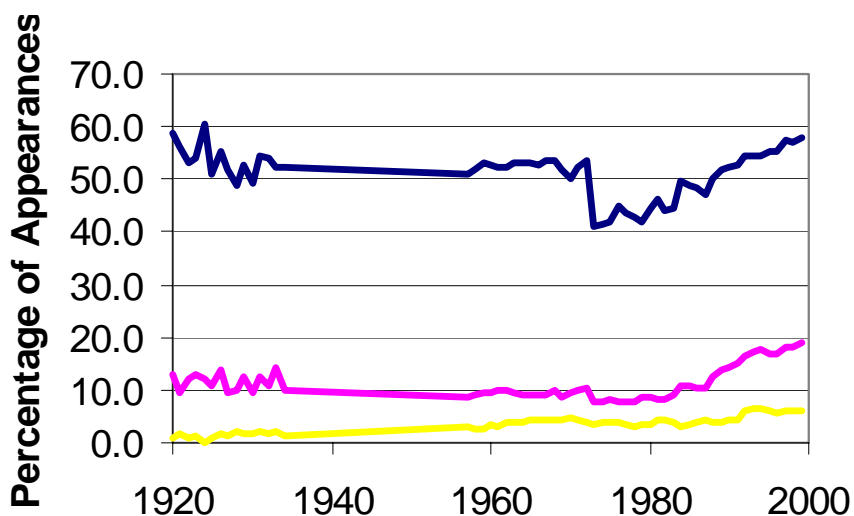


Figure 8. As for Figure 7, but AL only.

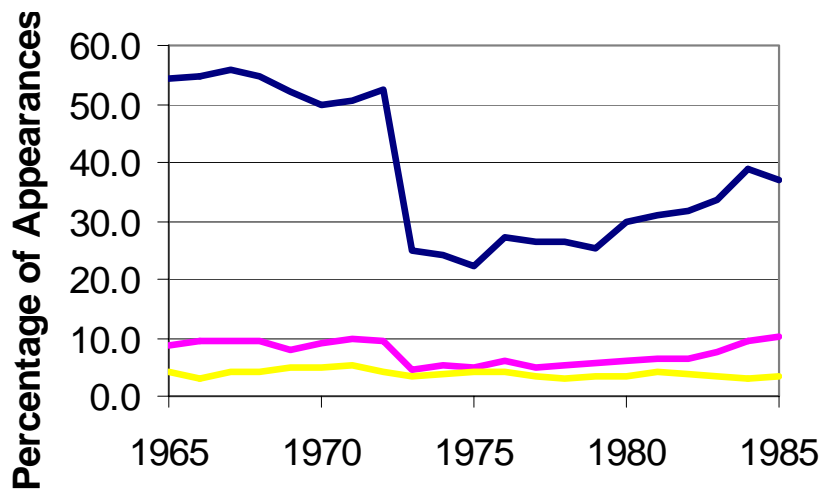


Figure 9. As for Figures 7 and 9, but NL only.

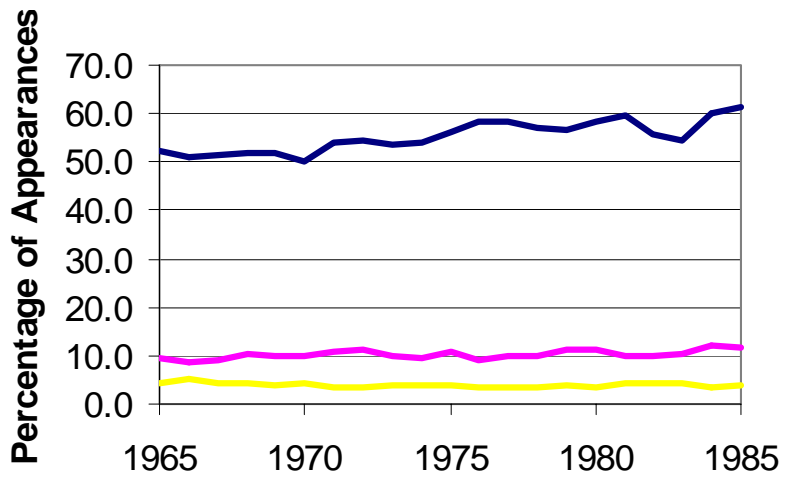


Table 2. Number of times pitcher removed for pinch-hitter, 1972-1973

<u>League</u>	<u>1972</u>	<u>1973</u>
AL	1537	4
NL	1604	1800

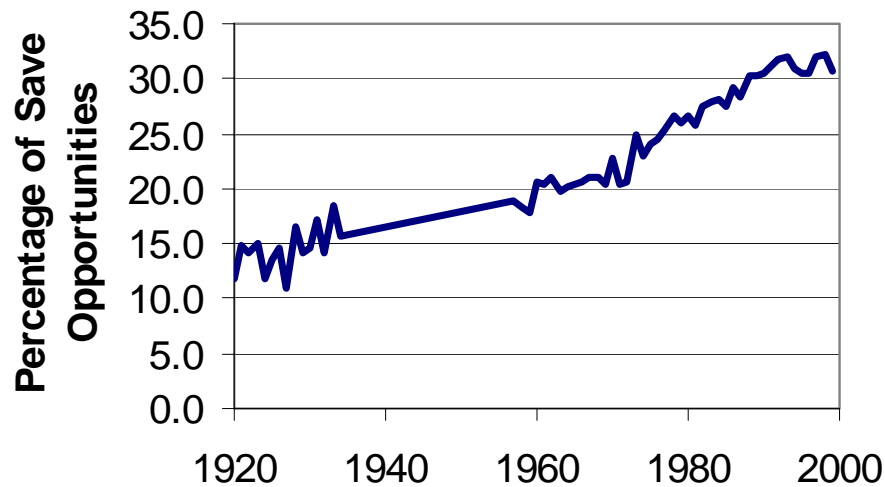
There are three more things to say about Figure 7. First, note that the decline in 1973 began to turn around almost immediately, to such an extent that the modern value is now one of the highest found. Once again it appears that the advent of the DH caused AL managers to do things differently, but only for a few years. The other two comments have to do with the other two measurements. It is axiomatic that every team wants a "closer" to finish off a win. The middle line shows that the percentage of appearances which happen to start the 9th inning has been steadily rising for about 20 years, after a long period of stability. This was observed in both leagues and contributes to the increase in the top line just mentioned. In 1999 18.8% of all relief appearances came at the start of the 9th inning. Finally, the use of specialists to face a single batter has also increased, as the bottom line on figure 7 shows. The numbers are small, but the rise has been steady, with the 1999 value being 6.1% after a peak of 6.7% in 1994 when there were 1313 of these briefest possible stints. I did not try to identify the individual pitchers, although we all have our candidates, I'm sure. It is likely that these are left-handers, brought in to get the one tough left-handed batter.

The last topic to address briefly is the use of relievers in save situations. Figure 10 shows that the percentage of pitchers who enter in save situations has had a steady increase for a long time. Although this may reflect a strategy difference by managers, it is most likely a consequence of the increased number of relievers. For example, it is not uncommon for three or even more pitchers to enter in a save situation in the same game for the same team.

Figure 10. Percentage of reliever entries in save situations,



both leagues combined.



Conclusions:

1. Decline in complete game percentage leads to expected increase in relief appearances.
2. Introduction of the DH had dramatic effects on relief pitcher usage, but these have mostly dissipated.
3. Based on ERA, modern relievers perform better than starters, which is a reversal from earlier times.
4. The average relief appearance has become shorter as they become more numerous.
5. Relievers now enter much more often to start the 9th inning and are more likely to pitch to only one batter.