

# The Game of the Century?

by Dave Studeman

September 21, 2006



**Dodgers 11, Padres 10 (10 innings)**

It was the game of the century, at least this young century. The Dodgers, who were last in the league in home runs at the time, hit four consecutive bombs in the bottom of the ninth inning (in five pitches) to tie the game against the Padres, the Padres took back the lead in the tenth, and then **Nomar Garciaparra** hit a two-run homer in the bottom of the tenth to win it for L.A. This was mid-September, in the midst of a two-way race for the NL West lead. For pure regular-season drama, there have been very few games like it.

The action was also intense in the gameday chats. The Padres blog Ducksnots, which previously had a high of 300 comments, **posted over 800 during this game**. Dodger Thoughts also **had about 800 gameday comments**. So I've

combined **WPA tracking** with “the best of” comments from both blogs to give you a feel for the action. In the following notes, “DS” stands for comments from Ducksnorts, and “DT” stands for comments from Dodger Thoughts.

As you can see, the intensity was high from the very first pitch:

### **First Inning**

DS: Not that I mind, but why do the Dodgers keep sticking Marlon Anderson out in left field instead of Andre Ethier?

### **Mike Piazza doubles, Adrian Gonzalez scores. Padres lead 1-0, WPA = .585**

DT: Crap. And can someone explain to me how that 2-2 pitch to Piazza was not a strike? I hate to be one of those ball-strike call complainers but that sure looked like a strike to me. Sigh. Come on Brad!

DS: That ball was smoked...holy crap.. vin scully says that Lofton made a good effort...that ball was played horribly by Lofton.

DT: Bob's current mood: choleric.

DS: Attaboy, Mikey. Got the crowd booing. Is Penny going crazy yet?

DT: Stop booing, you idiots, it's not his fault he isn't a Dodger anymore.

### **Mike Cameron triples, scoring two more runs. Padres WPA=.762**

DS: JD Drew just played that ball from Cameron as poorly as Lofton

DS: Cameron: 15 RBIs vs. Dodgers this season.

DT: Bob's current mood: sullen

### **Geoff Blum singles, scoring Cameron. Padres lead 4-0, WPA= .820**

DS: Brad Penny is our friend. Serious hanger to Blum on 0-2. Man, if I were a Dodgers fan I'd be mighty pissed about that pitch.

DT: AARRGGH.

DT: Why do the Dodgers make the Padres look like Murderer's Row? I mean really –

this is ridiculous.

DS: Has Vin Scully said, “The rout is on.” yet?

---

### More from The Hardball Times



#### A Hardball Times Update

by RJ McDaniel

Goodbye for now.

---

DT: I’m not actually giving up on this game. But I am about to give up on Bad Penny.

#### **Bottom of first, first two Dodgers single.**

DS: Hey Jake, no need to make this interesting.

#### **Garciaparra hits into double play, Rafael Furcal to third. Jeff Kent drives in Furcal. Padres lead 4-1, WPA=.754**

DT: Dear Nomar, take notice of what a veteran should do in a pennant chase...drive in runs...see Jeff Kent.

#### **First Inning over**

DS: Wow, Jake is some kind of fired up tonight. Mariano Duncan (1B coach) said something to Jake on his way off the field. Jake turned around and started jawing at him, the ump grabbed Jake by the collar and pulled him away.

DT: I’m not above Penny putting one in his ribs.

DT: I see a fight breaking out at some point tonight – two pitchers with bad tempers, tight pennant race, Mariano Duncan, we’ve got it all!

#### **Top of the second, Brad Penny strikes out side around a single. Padres WPA=.753**

DT: Brad Penny should strike out the side more often. He should work on that.

DS: Bummer about the lack of runs, but 57 pitches through 2 innings is nice.

#### **Bottom of the second, Marlon Anderson homers, cutting the Padres lead**

**to 4-2 and WPA to .689**

DT: “Dumb Luck” Anderson has managed to hit 3HRs in like 25ABs for the Dodgers. Whether any of them will help, who knows. But its something.

DS: Marlon Anderson? Jake, come on. Are you telling them what pitches you’re going to throw?

**Top of the third, Cameron singles but is caught stealing to end the inning. Padres WPA=.678**

DS: Yep...76 now after the pitchout... I thought Cameron was safe..but the replay showed the tag just beat his foot to the bag.

**Bottom of the third, Furcal homers. 4-3 Padres, WPA=.567**

DT: Get out ball!

DS: Peavy doesn’t have the great stuff tonight. He’s giving it all back.

**Still bottom of the third, Kent doubles on a ball off the center field fence (almost caught by Cameron) and scores on a ground-rule double by Drew. Score tied 4-4 and WPA=.500**

DS: For some reason I am thinking of “The Tortoise and the Hare” right now.

DT: I find the fact that the Dodgers have tied this game to be one of the single most amazing events of the year.

DT: Woo hoo. Those of you who gave up on this game may now return humbly and quietly to your seats here, we’ll take you back with open arms.

DT: Bob’s current mood: Bewilderment

DS: I am guessing Jake’s a little too fired up. His pitches look like they did earlier in the year, very little life on them. I think he’s trying too hard.

**Top of fourth, Padres get a man on, but he’s out stealing. Dodger WPA=.560**

DS: This game is definitely a lot of work to watch.

**Dodgers fail to score in the bottom of the fourth.**

DS: Finally a scoreless inning by Jake.

**Padres load bases with two out in the top of the fifth, including a single by Gonzalez, but Cameron lines out. Dodger WPA=.566.**

DT: Bob's mood at this time: resuscitated.

DS: Irritating. This shouldn't even be a game. Talk about letting a guy off the hook.

DT: The Padres are letting Penny off the hook. He's at 90 pitches and they're 1st pitch swinging. Penny may actually get 2 more innings after batting.

DS: If you had Piazza and Gonzalez run in opposite directions from the same starting point, would the fabric of time be ripped assunder?

**Dodgers threaten in the bottom of the fifth, including a double by Garciparra, but don't score. WPA=.500.**

DS: Man, the Dodgers are really good at placing their fly balls into the gaps, while the Padres hitters are foolish enough to hit their fly balls right at tfielders.

**Top of the sixth, Brett Tomko relieves Penny. Leadoff double by Blum.**

DT: It's Bombko time. Strap yourselves in (or down).

DS: Thank God. It's Brent EarnedRunKo.

DS: I just once would like to see a Barfield AB that didn't start like this:

1st pitch: swing and miss or foul

2nd pitch: foul

He seriously is swinging at every first pitch. And here he attempts a bunt after going down 0-1? His crappy AB has ruined this opportunity.

DT: I'll never understand why any team would bunt when Tomko is on the hill.

**Padres fail to score. Dodgers WPA=.575**

DT: Like I've said all day long. Tomko is our Best pitcher. smile

**Bottom of sixth, Alan Embree replaces Peavy. Dodgers load bases on Anderson single, walk and infield "hit" with none out. WPA=.789**

DT: This Marlon Anderson thing is unreal.

DS: And Embree has caught the Peavy disease, unable to finish hitters off.

DT: that may be the first memory I have of Wilson Betemit walking in a Dodger uniform.

DS: Well, I guess that's what you expect when you bring in your 8th most effective reliever.

DS: Ok I have this theory. If a team has a bases loaded, nobody out situation, and fails to score a single run, they automatically lose the game. No matter what happens from there on, they have no hope. It's like a curse. My theory has worked twice, most recently a few weeks ago against Colorado. So hypothetically the Padres can win the game right here.

**Cla Meredith relieves Embree. Dodgers don't score, as they get an out at home on a grounder and Kenny Lofton hits into a double play. Meredith jumps into the individual WPA lead with 22. Overall team WPA=.500.**

DS: that's it! we won!

DS: Wow, Cla is a superfreak.

DT: pain...so much pain...

DT: There are more momentum switches here than a Foucault's Pendulum caught in a hurricane!

DS: I think the momentum just swung back.

DT: I'm not sure we can recover from that momentum shift

DT: TJ's current mood: Flummoxed

**Top of the seventh: Wilson Betemit makes an error and allows Brian Giles on. Gonzalez sacrifices him to second, but Josh Bard hits into a double play. Still 4-4, Dodgers WPA=.588**

DS: Bochy doing a lot to not win the game in that inning. Sac bunt by Gonzalez, PR for Piazza when the man on 1st is the least important part of staying out of a DP, pulling Branyan...damn.

DT: Bard just GIDP'ed on a pitch loads the bases up if he takes it. Some bad managing tonite.

Bad bunting.

Lots of bad.

**Dodgers get one runner on, but don't score in bottom of seventh.**

**WPA=.500**

DT: this game is the best game I've watched all year. But it is impossible to enjoy.

The baseball equivalent of Schindler's List.

**Jonathan Broxton enters game for Dodgers. Padres take 6-4 lead in to of eighth on double by Josh Barfield and single by Todd Walker. Barfield's hit is worth .305 WPA and the Padres' WPA climbs to .840.**

DT: Yes! let's hear it for our rookies!!!!

DT: Aw heck I tells ya.

DT: Saito has pitched 5 innings this month! I hate to say it, but Grits is creeping into Jimbo territory.

DS: You guys notice how it doesn't seem to matter who the Dodgers have working the eighth, we have their number?

**Anderson triples and Betemit singles him home to cut lead to 6-5, but the inning ends as Garciparra strikes out with runners on second and third. 6-5 Padres after 8, WPA=.838.**

DS: I don't get where Anderson thinks he's Ethier all of a sudden. What a time to have a career night.

DT: Attention people who keep quitting on this game: learn your lesson!

DS: puddle underneath my chair on that out

DS: Scully's voice went so flat on that K

DS: Mercifully, the inning ends.

DS: Barring any other Dodger offense, Hoffman will earn his save in the 9th — 3, 4, 5 batters.

DS: Damn this is big-time fun!

**Takashi Saito enters the game for the Dodgers, but the Padres seemingly clinch the game with three more runs in the top of the ninth, making the score 9-5 and their WPA=.982. Key hits are a double by Bard and a Saito wild pitch.**

DT: Man, even Saito's getting hit. Lofton just saved a home run.

DT: Sheesh, now this game is turning into "The English Patient." I hated that movie.

DT: Okay, I'm gonna go watch Studio 60 now (after barfing for a few minutes). Night everyone. Hope the rest of the season is less painful to watch than this series was.

DT: There's still the wild card, there's still the wild card, there's still the wild card...

DS: Not going to be Trevor time -- yet. Given this game, though, I'm not counting it out.

DT: this is as discouraged as I have been about anything in a long time.

**Bottom of the ninth. Jon Adkins pitching for the Padres. Jeff Kent hits a home run. The Dodgers' WPA still only .04**

DS: There's your save opportunity.

DT: Is Kent teasing us?

**J.D. Drew homers. Dodgers WPA=.09**

DT: J.D. Drew and Jeff Kent stop getting my hopes up! They're destined to come agonizingly close and then be unable to come through.

DS: We could be witnessing the implosion of our season.

**Trevor Hoffman enters game. Russ Martin homers. Dodgers WPA=.20**

DS: I can't believe this. NO NO NO NO NO

DT: Martin hits it out!!! Oh for the love of your preferred celestial power!

DS: I have never seen anything like this. Was that on four pitches!?!?!?!?

**Anderson hits a home run. Tie game. Dodger WPA=.638.**

DS: Five pitches.

DT: OMG. Tell me this isn't a dream.

DS: he said it....Unbelievable. I've never seen that in baseball...not at any level. this is why baseball rules over other sports. the game is never over until the absolute end.

DT: Gameday seems to be broke. It keeps on saying every Dodger hitter is hitting a home run. Major software bug or something.

DS: This is one of the most amazing things I have ever seen.

DT: this has to go down in history as the "Marlon Anderson" game.

DT: OH MY GOD!!! I can't believe I was watching the Daily Show and missed the first three homeruns.

DS: both teams don't deserve to win. at the same time, both teams do.

DT: TEST THEIR COFFEE!

**Hoffman gets three outs and the game goes into extra innings.**

DT: And Furcal...Just...Missed it.

DS: I would not have believed it if I hadn't seen it with my own eyes. The Back to Back to Back to Back Game will be unforgettable, no matter who wins.

DT: When I said Marlon Anderson was redundant, I was obviously on crack.

There was no one else like him alive.

In his day, he was the mightiest man on earth,  
highborn and powerful.

Beowulf appropriation.

DS: Over? Did you say "over"? Nothing is over until we decide it is! Was it over when the Germans bombed Pearl Harbor? Hell no! And it ain't over now. Cause when the goin' gets tough... the tough get goin'! Who's with me? Let's go!

**Padres score a run in the top of the tenth off Aaron Sele on a double by Giles and a single by Bard (WPA on play of .358). Lead 10-9 with WPA of**

**.800.**

DS: THE BARD!!!!!!! Yeeeeesssss!!!! I'd like to plant a kiss right on the top of that beautiful bald head.

DT: oh well, better luck next ....

DS: How many runs do we need to be safe? 8?

DT: I don't believe anyone has been retired in order tonight on either side.

DS: Who works the bottom half?

**Rudy Seanez enters game for San Diego.**

DS: Seanez? Really? Well, okay.

DT: At least the only have to get one back this time. And against Seanez...

DS: I would pitched Hoffman. He made just 11 pitches last inning.

**Lofton walks. Padres WPA is .667.**

DS: Nice walk, Rude. Looks like I picked a bad time to run out of Jim Beam.

**Garciparra hits a home run, worth .667 WPA. Dodgers win.**

DT: OMG.

OMG

OMG!!!!!!

DS: No goddamn way!

DT: Guys, I don't know you very well, but I think I want to hug all of you right now very very much. I'm both extremely happy, and not a little scared that the end of the world may be nigh.

DS: Wow. Geez, it all came down to Red Sox players.

DT: So I went upstairs for a blue gatorade and came back down to "Nomar Garciparra homers (18) on a fly ball to left field. Kenny Lofton scores." Even though it is but salt, sugar, and filtered water I think that it will have to be savored.

DS: So this is what being a Met fan for the last 14 years felt like.

DT: I saw my first game on July 3, 1955, at Ebbets Field. I was 7. I am in my 52nd season of being a Dodgers fan. I just told my daughter, who is 19, that tonight's game may have been the greatest game in major league history.

DS: This seemed like a pretty crazy, fluky win, and certainly the Padres' bats were just as hot as the Dodgers'. To hit homers like that is insane – you can't do that in batting practice even. And, hey, in the future maybe the Padres' starting pitcher can get through 6 and Cla can finish the game from there.

DT: This is the second-greatest moment in Dodgers history. And that may have been the greatest single baseball game of all time. It was certainly the greatest comeback of all time. Oh man.

DT: Well, good night all from the east coast! Or, maybe I have been sleeping for the past hour or so—just told my wife I had the strangest dream...

---

Although the biggest blow was Garciparra's, Marlon Anderson truly was the star of this game, with .773 WPA points. Here's my final tally for each player:

Padres	Bat	Pitch	Field	WPA	LI
Meredith	0.000	0.305	0.000	0.305	2.13
Barfield	0.252	0.000	0.026	0.278	1.36
Bard	0.254	0.000	0.000	0.254	2.66
Piazza	0.147	0.000	0.031	0.178	1.67
Blum	0.136	0.000	0.032	0.168	1.41
Giles	0.124	0.000	0.001	0.125	0.96
Walker	0.068	0.000	0.000	0.068	1.48
None	0.057	0.000	0.000	0.057	1.33
Gonzalez	0.036	0.000	0.000	0.036	1.25
Brayan	0.032	0.000	0.003	0.035	1.32
Cameron	0.031	0.000	-0.007	0.025	1.52
Cust	-0.002	0.000	0.000	-0.002	0.06
Alexander	-0.008	0.000	0.000	-0.008	0.85
Linebrink	0.000	-0.018	0.000	-0.018	3.26
Sledge	-0.045	0.000	0.000	-0.045	1.94
Adkins	0.000	-0.072	0.000	-0.072	0.63

McAnulty	-0.102	0.000	0.000	-0.102	3.76
Peavy	-0.049	-0.127	0.000	-0.176	1.12
Roberts	-0.197	0.000	0.017	-0.180	1.48
Embree	0.000	-0.214	0.000	-0.214	2.42
Hoffman	0.000	-0.414	0.000	-0.414	2.00
Seanez	0.000	-0.800	0.000	-0.800	3.89
	0.736	-1.339	0.103	-0.500	1.62

Dodgers	Bat	Pitch	Field	WPA	LI
Anderson	0.773	0.000	0.000	0.773	1.49
GarciaParra	0.404	0.000	0.000	0.404	2.59
Beimel	0.000	0.132	0.000	0.132	2.10
Drew	0.106	0.000	0.014	0.120	1.53
Kent	0.112	0.000	0.007	0.118	1.05
Robles	0.089	0.000	0.000	0.089	4.28
Betemit	0.123	0.000	-0.042	0.081	1.64
Tomko	0.000	0.071	0.000	0.071	1.94
Lofton	0.021	0.000	0.013	0.034	1.91
Martin	-0.048	0.000	0.027	-0.021	1.21
Ethier	-0.046	0.000	0.000	-0.046	1.72
Lugo	-0.058	0.000	0.000	-0.058	2.14
Saenz	-0.089	0.000	0.000	-0.089	3.31
Furcal	-0.099	0.000	-0.037	-0.136	1.34
Saito	0.000	-0.144	0.000	-0.144	0.96
Penny	-0.052	-0.126	0.000	-0.178	0.91
Sele	0.000	-0.312	0.000	-0.312	2.67
Broxton	0.000	-0.338	0.000	-0.338	1.31
	1.236	-0.718	-0.019	0.500	1.47

Imagine what this game would have felt like without the safety net of the Wild Card?

### References & Resources

The WPA graph at the beginning of this article is from **Fangraphs**. Fangraphs also keeps track of player WPA in each game. You might notice that my WPA calculations differ a bit from Fangraphs'. That's because we use slightly different run tables. Also, I like to watch a game and give credit (or discredit) to fielders on certain plays. Still, our figures are very close.

Many thanks to Jon Weisman of **Dodger Thoughts** and Geoff Young of

**Ducksnots** for running terrific blogs. I hope they don't mind that I borrowed their comments.

---

Dave Studeman was called a "national treasure" by Rob Neyer. Seriously. Follow his sporadic tweets [@dastudes](https://twitter.com/dastudes).

---

Comments are closed.

# WPA in the USA

by Dave Studenmund

On July 14, the Braves and Padres played a roller coaster of a game. The Braves took a 4-0 lead in the first on home runs by Chipper and Andruw Jones, but the Padres came back to tie it in the third, 5-5, on a double by Mike Piazza and a home run by Adrian Gonzalez. Atlanta scratched back to take the lead again, 8-5 in the fifth, but the Padres scored three in the sixth and one more in the seventh to take their own lead, 9-8.

The Braves were not going to relinquish the game easily, however, and they scored three runs off Trevor Hoffman in the top of the ninth for an 11-9 lead. Not so fast, said the Padres, who scored two of their own in the bottom of the ninth on consecutive hits by the Joshes (Barfield and Bard) that sent the game into extra innings.

In the 10th, Adam LaRoche homered to put Atlanta up by one, but the Padres once again refused to yield, scoring one more in the bottom of the inning. Finally, the Braves scored three runs in the top of the 11th to put the game away, 15-12, and everyone went home exhausted.

There were so many lead changes and comebacks that day in San Diego that this game deserves to be called the ultimate roller coaster of 2006, based on a little statistic called Win Probability Added (WPA).

WPA is a relatively simple idea, though the math is kind of complex. I'll try to explain WPA with an example. We can calculate, based on the number of times an average team scores per inning, that an average team with a one-run lead in the top of the ninth has an 83% chance of winning. And, if we look up that situation in actual baseball games (no one out, no one on, top of the ninth, one-run lead), we find that the leading team really has about 85% of the time. The numbers don't match exactly, because teams use their best relievers with one-run leads (increasing their probability a bit), but the results are pretty close.

Apply that math to every situation in a game, and you have an average team's win probability for every play in every inning. For instance, when the Braves took a four-run lead over the Padres in the very first inning, their win probability was about 80%. When the Padres took a 9-8 lead in the bottom of the seventh, their win probability was 74%. Two-run lead for Atlanta in the ninth? 90%. Padres come back to tie in the bottom of the ninth? 50%.

And on and on. Each change in win probability is the Win Probability Added of that play. So once you add up all of the WPA swings in that July 14 game, you get a total of 793% or .69 WPA points of change per

**The Roller Coasters of 2006: Games with Most Changes in WPA**

Date	Winner	Score	Loser	Score	Innings	Tot WPA	Avg/Inning
7/14/2006	ATL	15	SD	12	11	7.63	0.69
9/18/2006	LAN	11	SD	10	10	6.84	0.68
9/27/2006	PHI	8	WAS	7	14	9.15	0.65
9/6/2006	WAS	7	STL	6	9	5.83	0.64
5/19/2006	ARI	10	ATL	9	9	5.80	0.64
5/14/2006	BAL	8	KC	7	9	5.72	0.63
8/30/2006	PIT	10	CHN	9	11	6.99	0.63
8/4/2006	HOU	8	ARI	7	9	5.68	0.63
4/16/2006	STL	8	CIN	7	9	5.62	0.62
6/26/2006	BOS	8	PHI	7	12	7.43	0.62

inning, more than twice the major league average of .30. That's a lot of action for one little ballgame.

Actually, Padres fans chewed quite a few fingernails last season, because their team was also involved in the second-wildest game of the year. Remember when the Dodgers hit four straight home runs in the bottom of the ninth (September 18 in Los Angeles) to tie the game and eventually won in the 10th on a Nomar Garciaparra home run? There were .68 WPA points exchanged per inning in that game, just .01 less than the Atlanta game. Given its record-setting home run heroics and pennant implications, I have no problem calling the September 18 game 2006's "game of the year."

On the previous page, you see a list of the 10 wildest games of the year, measured by total changes in WPA (per inning) during the game.

That September 27 game in Washington was a wild one. Philadelphia, hoping to make the postseason, walked Washington's Ryan Zimmerman with the bases loaded in the bottom of the ninth to tie it. Both teams scored in the 10th, but Philadelphia took a two-run lead in the 14th. It was good that Philly scored two, because Washington managed to load the bases with no one out in the bottom of the inning. After a sacrifice fly and a double play, however, the game belonged to the Phillies.

The most boring game of the year was Detroit's 15-4 victory over Kansas City on September 23. Detroit took a 10-0 lead in the first inning and led 15-0 after four; for all intents and purposes, the game was decided before the Royals even came to bat. There were only .07 WPA change points per inning that day in K.C.

Less than two weeks earlier, the Phillies' Tom Gordon had made the biggest WPA pitching play of the year. The Phillies were leading Houston 4-3 in the bottom of the ninth (79% win probability), but Gordon allowed a couple of hits, his fielders botched a couple of plays and the Astros had the bases loaded with one out. The Phillies' win probability had dropped to 46%. But Gordon got Humberto Quintero to ground into a double play, winning the game for the Phils and adding .54 win probability points in one play. (Once a team wins a game, its win probability is 100%, natch.)

There were two other similar plays last year. Baltimore's Chris Ray got Garrett Anderson to ground into a double play on May 28, and the Reds' David Weathers

"got" Johnny Estrada to line into a double play on May 7. Both plays occurred with the bases loaded and one out in the bottom of the ninth and the visiting team winning by a run.

Given the pennant implications of Gordon's September save, we'll give him credit for the biggest "pitching" outcome of the year. Indeed, most of the biggest WPA defensive plays of the year involved double plays, which makes sense. Two outs have a bigger impact than one.

But a pitcher shouldn't get 100% of the credit for a double play, right? After all, his fielders helped. So let's ask a more specific question for pitchers: what was the biggest strikeout of the year?

It occurred on September 29, when the Twins were still trying to catch the Tigers for first place in the American League Central. They entered the bottom of the ninth losing to the White Sox 4-1, but scored two runs and had the bases loaded with two out and Phil Nevin at the plate and Bobby Jenks on the mound for the Sox. Jenks had pitched the entire ninth and let the Twins get back into the game. But with the bases loaded, Jenks struck out Phil Nevin on three pitches for a WPA gain of .28. The Twins had to wait a few more days to take over first place.

Okay, now let's turn the tables and uncover the biggest offensive play of the season. Which single swing of the bat did the most to win a game?

It turns out that there were two. On July 30, the A's were down by two runs when Milton Bradley came to bat with runners on first and second and two outs in the bottom of the ninth. Toronto had scored three runs in the top of the inning, and the A's winning probability at that point was just 10%, even though Mark Kotsay had just fouled seven straight pitches off of relief ace B.J. Ryan to earn a walk and get Bradley to the plate.

Bradley responded by smoking a home run to center field and giving the A's a 6-5 victory. That single hit changed Oakland's win probability from 10% to 100%; Bradley added .90 WPA points with one swing of the bat.

One other batter matched Bradley's WPA output. That was Boston's David Ortiz, who hit a home run in a very similar situation on June 11 against Akinori Otsuka and the Texas Rangers. Bradley's and Ortiz's home runs had bigger game impacts than any other hits all season.

Hopefully, these examples give you a feel for win probability and how it works. To recap, the specific probability of a situation is its Win Probability, and the phrase Win Probability Added describes the change in win probability from play to play. If you assign Win Probability Added to the players involved in each play, you have a fascinating way to judge which players did the most to help their teams win.

You probably noticed that Win Probability is a “real time” statistic. A home run in the ninth inning of a tie game has a much bigger WPA impact than a home run in the first inning of a tie game, because a team is much more likely to win the game when it goes ahead in the ninth.

That may strike you as unfair, but that’s what WPA is. It reflects the tension and dynamic of game situations as they occur. That’s why I like to use it to find the most thrilling and significant games and plays. And when used properly, it can also tell you a lot about individual players.

### The Bullpen

For instance, WPA is a truly unique way to measure the impact of major league bullpens. WPA measures the impact of bullpens (and bullpen deployment) better than any other single statistic because it captures both performance and situation. The top five WPA bullpens in the majors last year were...

**Top WPA Bullpens**

Team	WPA	LI
Twins	11.2	0.85
Mets	11.1	1.06
A’s	8.9	1.16
Angels	8.5	1.02
Padres	7.9	1.16

There’s no doubt that the Twins’ and Mets’ bullpens were the best last year. They had the two lowest ERAs (2.91 and 3.25, respectively) among all major league bullpens, and they both accounted for about 11 WPA points. Since one win equals .50 WPA points (each team starts a game with a 50% chance of winning, so the winning team gains .50 WPA points during the game), this means that these two bullpens each contributed 22 wins above .500 to their team’s record.

The Mets and Twins both finished about 40 wins above .500, so their bullpens were responsible for roughly half of their above-average performance.

I didn’t list it here, but the Texas bullpen was sixth in the majors in bullpen ERA (3.74), yet 19th in bullpen WPA (0.90). To understand why, let’s kick around another WPA angle, perhaps the best angle of all.

The right-hand column in the previous table includes a statistic called Leverage Index (LI), an invention of baseball analyst Tom M. Tango, who is the leading champion of WPA today. Tom developed LI as a way of measuring the relative criticality of a play. The greater the potential impact of a plate appearance on win probability, the higher the Leverage Index.

For instance, when Bobby Jenks struck out Phil Nevin with the bases loaded, the Leverage Index was 11—the situation was 11 times more critical than the average situation. That’s just about as high as LI gets. An average LI is one; most relief aces have an average LI around 2.0.

So why did Texas rank so low in bullpen WPA? Because they pitched best when it mattered least. I’ve put all Texas bullpen situations into the following Leverage Index groups, so you can see how their performance worsened as situations became more important:

**TEX Bullpen**

LI	WPA
0.0 - 0.5	0.90
0.5 - 1.0	0.03
1.0 - 1.5	0.90
1.5 - 2.0	-1.26
2.0 - 2.5	-0.43
2.5 - 3.0	1.72
>3	-1.69

When the Leverage Index was under 1.50, the Texas bullpen was fine. But in three of the four groupings above 1.50, the bullpen’s WPA was negative. Overall, their stats looked good, but WPA captured how well (or poorly) they pitched to the situation. In this case, WPA tells the real story.

## WPA in the USA

Let's look at the individual members of one of last year's best bullpens, the San Diego Padres', led by the all-time leader in career saves, Trevor Hoffman.

### The San Diego Bullpen

Name	WPA	LI	Save Ops
Hoffman T.	4.05	2.08	51
Linebrink S.	2.52	1.90	11
Meredith C.	3.11	1.40	2
Embree A.	0.77	1.15	0
Adkins J.	0.37	0.96	0
Cassidy S.	-0.95	0.92	2
Brocaill D.	0.01	0.74	0
Sweeney B.	0.13	0.45	3

Hoffman led the Padres in bullpen WPA, and he also compiled the highest Leverage Index. But he wasn't the only outstanding reliever in the pack.

If you were to look only at each pitcher's save opportunities, you'd think that Hoffman made many more critical appearances than any other San Diego reliever. But Scott Linebrink's LI was only slightly lower than Hoffman's. In fact, Linebrink's LI was higher than that of several closers on other teams. He also performed extremely well, with a WPA of 2.52

Linebrink and the remarkable Cla Meredith were among the top 16 relievers in all of baseball last year, along with Hoffman. The top ten relievers in 2006 WPA were:

### Top Ten Major League Relievers

Name	Team	WPA	LI
Rodriguez F.	LAA	5.39	2.12
Papelbon J.	BOS	5.24	2.02
Nathan J.	MIN	5.19	1.62
Ryan B.	TOR	4.75	1.89
Putz J.	SEA	4.34	1.71
Saito T.	LAN	4.09	1.50
Hoffman T.	SD	4.05	2.08
Wagner B.	NYN	3.85	1.88
Zumaya J.	DET	3.70	1.60
Rivera M.	NYA	3.39	1.83

Hopefully, you can see that a glance at the saves leaderboard won't necessarily tell you who the best relievers were last year. WPA will. Want to see a list of the worst relievers? Here you go:

### Ten Worst Major League Relievers

Name	Team	WPA	LI
Dempster R.	CHN	-3.13	1.77
Turnbow D.	MIL	-2.91	1.78
Burgos A.	KC	-2.13	1.68
Sisco A.	KC	-1.95	0.90
Carmona F.	CLE	-1.82	1.53
Messenger R.	FLA	-1.68	0.84
Seanez R.	BOS	-1.50	0.54
Herges M.	FLA	-1.48	0.95
Williams T.	BAL	-1.48	1.28
Wickman B.	CLE	-1.48	1.98

Dempster, Turnbow and Burgos had truly bad years, though they continued to pitch in high-leverage situations for much of the year. By the way, Bob Wickman's record includes only his time with Cleveland. He logged a WPA of 0.79 with Atlanta.

As you can see from these lists, relievers face different levels of intensity. The Angels' Francisco Rodriguez, for instance, had an LI almost 0.50 higher than Joe Nathan's. This is a result of both managerial usage and team opportunity.

Managers choose when to bring relievers into games. Hopefully, they use their best relievers in the most important situations, though that doesn't always happen as often as you'd like. LI is a good tool for judging when to bring in your best relievers.

The Twins played only 60 close games last year (games with a margin of only one or two runs), the fewest in the majors. So their bullpen LI was also the lowest in the majors, 0.85. This makes their bullpen WPA total even more impressive, because it's harder to rack up a lot of WPA in low-leverage situations.

If you'd like to adjust each pitcher's WPA to even out the opportunities he was handed, simply divide WPA by LI. That essentially gives you a "normalized" WPA. Here's the list of top relievers ranked by normalized bullpen WPA:

**Top Ten "Normalized" WPA Relievers**

Name	Team	WPA	LI	WPA/LI
Nathan J.	MIN	5.19	1.62	3.20
Saito T.	LAN	4.09	1.50	2.73
Carrasco H.	LAA	1.42	0.54	2.61
Papelbon J.	BOS	5.24	2.02	2.60
Rodriguez F.	LAA	5.39	2.12	2.55
Putz J.	SEA	4.34	1.71	2.54
Ryan B.	TOR	4.75	1.89	2.51
Zumaya J.	DET	3.70	1.60	2.31
Rincon J.	MIN	2.42	1.08	2.24
Meredith C.	SD	3.11	1.40	2.23

Joe Nathan rocked last year, and so did the Angels' Hector Carrasco. The guy had a great year, but fans missed him because he didn't pitch in many key situations.

**Starting Pitching**

Virtually all starting pitchers have a Leverage Index between 0.85 and 1.15, and their WPA generally reflects their overall performance. There are some exceptions, however. For instance, here's a list of the top 10 major league starters, ranked by WPA. I've also tossed in their Runs Saved Above Average (RSAA), a comparison of their total runs allowed compared to the major league average. Positive numbers are good:

**Top Ten WPA Starters**

Name	Team	WPA	LI	RSAA
Oswalt R.	HOU	4.43	1.00	42
Santana J.	MIN	4.18	0.97	49
Webb B.	ARI	3.69	0.96	34
Carpenter C.	STL	3.38	1.02	37
Smoltz J.	ATL	3.28	1.04	31
Sanchez A.	FLA	3.21	1.15	22
Halladay R.	TOR	3.20	0.97	38
Young C.	SD	3.14	0.98	24
Arroyo B.	CIN	3.01	0.91	31
Robertson N.	DET	3.00	1.04	16

The first name that jumps out at me is Florida's Anibal Sanchez, who had the sixth-highest WPA total among all major league starters, although his RSAA figure was tied for 24th. The reason for Sanchez's ranking lies in his Leverage Index which, at 1.15, was at the upper end of the starting pitcher spectrum. He faced relatively more critical situations than most starters, and he evidently pitched well in them.

A couple of other pitchers who rank surprisingly high, such as San Diego's Chris Young and Detroit's Nate Robertson, pitched very well in high-leverage situations. For instance, batters hit only .199 against Robertson with runners in scoring position. Or, using the language of WPA, his WPA total was 0.50 when LI was below one, but 2.50 when it was over one. He was the opposite of the Texas bullpen.

I should mention that the WPA statistics used here don't attribute any WPA to fielders, though future versions of WPA might.

One last point: you probably noticed that WPA totals tend to be lower for starters than relievers. This is primarily a matter of opportunity; relievers get to pitch in late innings when their performance has more impact. Once again, there is a simple way to adjust this: divide WPA by LI to derive a list of the pitchers who contributed the most to their teams' wins, regardless of opportunity:

**Top Ten "Normalized" WPA Pitchers**

Name	Team	WPA	LI	WPA/LI
Oswalt R.	HOU	4.43	1.00	4.44
Santana J.	MIN	4.18	0.97	4.30
Webb B.	ARI	3.69	0.96	3.84
Carpenter C.	STL	3.38	1.02	3.32
Arroyo B.	CIN	3.01	0.91	3.31
Halladay R.	TOR	3.20	0.97	3.30
Nathan J.	MIN	5.19	1.62	3.20
Young C.	SD	3.14	0.98	3.20
Smoltz J.	ATL	3.28	1.04	3.16
Liriano F.	MIN	2.91	0.93	3.12

On this list, there's only one reliever among the top 10 pitchers in the majors: Minnesota's Joe Nathan.

## Batters

Here are the top 10 batters, ranked by WPA:

**Top Ten Major League Batters**

Name	WPA	LI
Pujols A.	9.24	1.03
Howard R.	8.20	1.06
Ortiz D.	8.04	0.99
Jeter D.	5.98	1.00
Berkman L.	5.37	1.04
Dye J.	5.14	0.98
Beltran C.	4.93	0.96
Bonds B.	4.74	1.01
Abreu B.	4.71	1.01
Morneau J.	4.46	1.04

Like starting pitchers, the typical batter's LI will be between 0.85 and 1.15. Batters don't have a lot of control over when they come to bat (except for pinch hitters), and their LI will usually average around 1.0, unless their team plays a lot of close games.

I didn't separate batters into teams, because Bobby Abreu ranks among the top 10 batters in the majors when you combine his WPA totals with the Phillies and Yankees. Thought you'd like to see that.

Even so, Albert Pujols, Ryan Howard and David Ortiz were the three most valuable batters by a wide margin last year, according to WPA. Over the past five years (2002 through 2006), only Barry Bonds has had a higher WPA count than Pujols' 2006 figure. Bonds surpassed it twice, in 2002 (9.83) and 2004 (a phenomenal 12.64). Despite his relatively low profile in 2006, Bonds still managed to finish eighth in the majors.

## Clutchiness

If you put a bunch of baseball analysts in a room and ask them about clutch hitting, you're just asking for trouble. I guess if you were to push really hard, you might get a consensus that clutch hitting happens, but it can only be identified in retrospect. In other words, it's very hard to say which batters are "clutch hitters," but sometimes batters do have seasons in which they perform very well in the clutch.

But that would be the easy part. If you're really a troublemaker, you could sequester them in a room (like a jury) and ask them to define a clutch situation. They might never leave. If they were to somehow agree, you could send them back with another question: if a player usually hits .200 but bats .300 in the clutch, is he a better clutch hitter than a batter who bats .320 in all situations?

Be sure to order pizza.

The concept of clutch hitting is so elusive that blogger Dan Smith borrowed a page from the *Colbert Report* and dubbed it "clutchiness"—something that may exist but defies description for anyone but the describer, who absolutely knows it when he sees it. Clutchiness is baseball's equivalent of Colbert's truthiness.

I'll step into this quagmire and suggest that WPA and LI don't exactly define clutchiness but they come pretty close.

WPA is a real-time statistic, and isn't clutch hitting a real-time phenomenon? Wouldn't you say that a single with a man on third in the ninth inning and the score tied and the crowd standing and yelling is more "clutch" than that exact same hit in the top of the first? Well, maybe you wouldn't. But some people would, and that difference is exactly what WPA measures.

Leverage Index is a useful measure of the clutchiness of a situation. Milton Bradley's home run and Bobby Jenks' strikeout were both clutch performances because they occurred in clutch situations, as measured by LI.

If you're not totally on board with me, try one other mind game. Watch your favorite team play a close ballgame and track the game using the Baseball Graphs WPA spreadsheet. Pay particular attention to two things: your anxiety level during the game and the LI of each situation. My guess is that the two will match closely from play to play. If you believe that clutch hitting occurs when emotions are taut and the game hangs in the balance, then you've discovered a clutchiness monitor. You've defined the thing that can't be defined.

Maybe you're with me; maybe you're not. At least we're not sequestered in a motel room together. But here is something that is fairly straightforward: a list of batters who appeared in at least 10 plays with a Leverage Index of 3.0 or more. I would call these "clutch plays," because they had at least three times more impact on a game outcome than an average play.

By this measure, there were 6,250 clutch plays in 2006, and here is the list of the 10 batters who performed best in those plays. I've included their total WPA, average Leverage Index, the number of plays and the average WPA per 10 plays (which is how I ranked the results).

The names near the top probably won't surprise you, but the name at the very top just might:

**The Clutchiest Hitters of 2006**

Name	WPA	LI	Plays	Avg WPA
Kielty B.	1.68	3.8	10	1.68
Ortiz D.	3.47	4.0	24	1.44
Pujols A.	4.18	4.0	29	1.44
Griffey Jr. K.	2.58	4.6	19	1.36
Palmeiro O.	1.46	3.7	12	1.22
Durham R.	2.36	4.2	20	1.18
Monroe C.	2.33	4.3	20	1.16
Bradley M.	1.14	3.7	11	1.03
Catalanotto F.	1.02	4.4	10	1.02
GarciaParra N.	2.11	4.2	24	0.88

In 10 high-leverage plate appearances, Oakland's Bobby Kielty walked, singled three times, doubled twice and homered. He even sacrificed twice. Only once did Kielty make an out he wasn't trying to make. Yes, Bobby Kielty wins our Clutchiness Player of the Year award.

I'm sure you're dying to know about chokiness, too. The worst clutch hitters of 2006 were...

**Special Thanks to...**

You and I might never have heard of WPA were it not for the efforts of Tom M. Tango. Tom's insight, effort and generosity are unparalleled. Close behind Tom in the generosity department is David Appelman, who runs FanGraphs ([www.fangraphs.com](http://www.fangraphs.com)). Fangraphs has WPA and Leverage Index stats for the last five years, and David supplied all the WPA stats used in the THT Annual. We can't thank either of these two guys enough.

Win Probability Added was first published (under a different name) by Harlan and Eldon Mills in 1970. Researchers who have also moved WPA forward include George Lindsey, Jay Bennett, Doug Drinen and Keith Woolner. I think it was Newton who said something about standing on the shoulders of giants.

If you'd like to read more about WPA (and who wouldn't?), I'd suggest this THT article:

<http://www.hardballtimes.com/main/article/the-one-about-win-probability>

For more about Leverage Index, Tom Tango wrote an excellent overview in a series of articles at The Hardball Times:

<http://www.hardballtimes.com/main/article/crucial-situations/>

<http://www.hardballtimes.com/main/article/crucial-situations-part-2/>

<http://www.hardballtimes.com/main/article/crucial-situations-part-three>

Regarding the title of this piece, I know that major league baseball is played in Canada. I just couldn't resist the John Mellencamp reference.

**Least Clutchy Hitters of 2006**

Name	WPA	LI	Plays	Avg WPA
Cedeno R.	-1.35	4.3	15	-0.90
Clark T.	-0.99	4.4	11	-0.90
Martinez V.	-1.54	4.1	18	-0.86
Rivera J.	-1.06	4.1	13	-0.82
Matsui K.	-1.23	4.0	16	-0.77
Blum G.	-0.97	4.2	13	-0.75
Hart C.	-0.74	3.9	10	-0.74
Sullivan C.	-1.03	4.7	14	-0.74
Hall T.	-0.94	4.1	13	-0.72
Teixeira M.	-1.36	4.0	19	-0.72

Boy, Mark Teixeira really did have a disappointing year, didn't he? Although he had a fine second half, he had no power in the first half of the year (just nine home runs before the All-Star Break). And now it turns out he wasn't clutchy, either. In 18 plate appearances with an LI over 3.0, he hit just two singles, one double and drew one walk.

Small sample size? Of course. WPA is a snapshot of what happened in 2006, not an in-depth portrait for the ages. But what a snapshot.

# The Story Stat

by Dave Studenmund

I know what you're thinking: we don't really need another baseball statistic, do we? Aren't there enough esoteric baseball stats, with their funny little acronyms and names, that just repeat what we already know?

Well, yes, I know how you feel. But every once in a while, a statistical concept so different comes along that it deserves to be added to our daily jargon.

Imagine a statistic that captures the drama of a game, play by play. Imagine a stat that allows us to quantify the current status of a game, and the importance of a situation. Imagine a statistic that assesses the true impact of a play's outcome, based on what we know of the game at that moment.

In short, imagine a single statistic that tells the stories, as opposed to the facts, of each baseball game. If you can imagine that, well, you're pretty imaginative. And you're probably imagining something very similar to WPA: Win Probability Added.

WPA assigns a percentage (anything between 0% and 100%) to the probability that one team will beat the other at any point in a game. It accounts for the score, inning, number of outs and base situation, and assumes the teams are evenly matched.

Now, we know that many teams aren't evenly matched, but using an average "background" gives full credit to the teams and players who make the plays as they're made. And, besides, why not assume everyone is even at the beginning of a game? Seems to me that's the best way to let the story of a game unfold.

Thanks to the baseball site called *Fangraphs* ([www.fangraphs.com](http://www.fangraphs.com)), we now have the WPA for every play of the year, as well as live WPA game graphs, play logs and player totals. Believe me when I tell you that this is a stat you want to know.

Let's take a real live example from the most important game of the 2007 regular season: the tiebreaker between Colorado and San Diego on Oct. 1. It was just the 12th tiebreaker in major league history, and only Bobby Thomson's "Shot Heard 'Round the World" in 1951 can compare for sheer tie-breaking game drama.

Here is how the 13th inning of the Denver/San Diego game played out, from a WPA perspective:

- At the top of the 13th, the score was 6-6 and both teams had a 50% chance of winning.
- Brian Giles led off the inning with a walk, and the Padres' win probability (or WP) rose to 58%.
- Scott Hairston smashed a dramatic home run, putting San Diego ahead, 8-6, and giving the Padres a 92% WP. That homer was worth 0.34 in Win Probability Added, the difference in Win Probability as a result of the play.
- Chase Headley singled to center, increasing the Pads' WP to 93%.
- The next three batters made outs, and the Padres held a 90% probability of winning going into the bottom of the inning.

The Rockies had other thoughts, however, when they came to bat in the bottom of the 13th.

- Kaz Matsui led off with a double, and the Rockies' WP, which had been 10%, jumped to 20%.
- Troy Tulowitzki doubled to center, scoring Matsui and making the score 8-7. Down by only one run, with a runner on second and nobody out, the Rockies' WP was 45%. Tulowitzki's blast had a WPA of 0.25.
- Matt Holliday tripled to right, scoring Tulowitzki. Tie score, man on third, nobody out, and the Rockies' WP was 94%. Holliday's triple was worth a WPA of 0.49, the single biggest play of the game. At this point, a Rockies win was extremely likely.
- Todd Helton was intentionally walked, which raised Colorado's WP a minuscule amount.
- Jamey Carroll hit a sacrifice fly, Holliday scored, and the Rockies won 9-8. End of game—WP of 100%.

In one inning, we saw a rise of 40%, followed by a swing of 90% in the other direction. That is pure baseball drama. By the way, here's how the bottom of the ninth of the Giants' fabled comeback against the Dodgers in 1951 played out:

## The Story Stat

- The Giants were losing, 4-1, at the beginning of the bottom of the ninth. Their WP was 4%.
- Alvin Dark singled to first, WP rose to 9%.
- Don Mueller singled to right and Dark went to third. The Giants' WP was 19%, a 10% increase.
- Monte Irvin fouled out, and New York's WP dropped to 11%.
- Whitey Lockman doubled, scoring Dark and sending Mueller to third. With one out and runners on second and third, trailing by two runs, the Giants' WP was 29%.
- Bobby Thomson smashed a home run to left field, a play worth 0.71 WPA.

Perhaps this gives you a little perspective. As big as Matt Holliday's triple was for the Rockies, Thomson's home run was much bigger.

You may be wondering how Holliday's triple compares to the biggest hits of 2007. From a pennant-winning perspective, there was none bigger. But from a game perspective, each of the following blows were struck with two out in the bottom of the ninth, making them worth an amazing 0.90 WPA:

- On April 15, Marco Scutaro hit a three-run home run with two out in the ninth to lead Oakland over the Yankees, 5-4.
- Stephen Drew hit a two-run homer to put the Diamondbacks over the Padres, 3-2, in an early April 25 game.
- Aramis Ramirez homered on June 29 to lead the Cubs to victory over the Brewers, 6-5, when the Cubs were in the midst of winning 11 of 13.
- Also on June 29 (a big day for dramatic home runs), the Rockies lost to the Astros when Mark Loretta hit a two-run homer to cap a 9-8 victory for Houston.
- What goes around comes around: In a key Sept. 18 game, Todd Helton hit a two-run homer to lead the Rockies to a 9-8 win over the Dodgers.
- B.J. Upton hit a two-run homer for the Devil Rays on Sept. 8, capping a win over the Blue Jays, 5-4.

The biggest defensive play of the year occurred on June 23, in an interleague game between the Nationals and the Indians. Victor Martinez had hit a three-run homer off Chad Cordero in the top of the ninth to put the Indians up 4-3 (0.52 WPA on the play), but the

Nationals had fought back and loaded the bases with one out against Joe Borowski. At that stage, the Indians' win probability was down to 46%.

But Felipe Lopez bounced into a forceout at home, and catcher Kelly Shoppach managed to nab Nook Logan off third base on the same play—end of game. With a turnaround of 54% on one play, the Indians managed to pull out the win.

Those were some of the most dramatic moments of the 2007 baseball season. Let's see what other stories we can pull out of Fangraphs' WPA statistics.

### The Rockies' streak

There was no bigger story in baseball this year than the Rockies' phenomenal streak at the end of the year. They won 15 of their final 16 regular season games, including that tiebreaking cliffhanger against the Padres, to grab the wild card slot on the last play of the season.

Here is the WPA record of that remarkable streak. I've broken down the WPA contributed by Colorado's batters, starting pitchers and relievers:

Date	Opp	Score	Batting	Starters	Bullpen
9/16	FLA	13-0	0.33	0.16	0.00
9/18	LAN	3-1	0.00	0.32	0.18
9/18	LAN	9-8	0.99	-0.13	-0.36
9/19	LAN	6-5	0.50	-0.03	0.03
9/20	LAN	9-4	0.36	0.13	0.01
9/21	SD	2-1	-0.61	0.29	0.82
9/22	SD	6-2	0.21	-0.15	0.44
9/23	SD	7-3	0.30	0.19	0.01
9/25	LAN	9-7	0.64	-0.50	0.36
9/26	LAN	2-0	-0.14	0.41	0.23
9/27	LAN	10-4	0.39	-0.06	0.17
9/28	ARI	2-4	-0.44	-0.13	0.07
9/29	ARI	11-1	0.36	0.14	0.00
9/30	ARI	4-3	0.09	0.29	0.12
10/01	SD	9-8	0.54	-0.37	0.33
<b>Totals</b>			<b>3.52</b>	<b>0.57</b>	<b>2.41</b>

You may be able to spot the logic in these numbers. In most blowouts, such as that 13-0 pasting of the Marlins, the Rockies' largest WPA totals were contrib-

uted by their batters and starters. Relievers don't really get a chance to contribute when the game is already decided by the sixth or seventh inning. In low-scoring affairs, the team was led by its pitchers; in games that went down to the wire, credit (or blame) was taken by the bullpen.

The 9-8 win over the Dodgers in the second game of a doubleheader on Sept. 18 was a particular doozy. Starter Mark Redman gave up a 3-0 lead in the first inning, but the Rockies' batters fought back and led, 5-4, in the fifth. However, the Rockies' bullpen couldn't hold onto the lead, and the Dodgers were winning 8-5 in the eighth. Colorado's batters battled back, closing the gap to 8-7 in the bottom of the eighth and winning in the ninth on that two-out home run by Helton. The Rockies' batters refused to quit, and won the equivalent of two games in one!

The batters were the biggest contributors to the Rockies' streak, with 3.52 WPA points. Individual leaders were Holliday (1.9 WPA), Helton (1.2 WPA) and Brad Hawpe (1.0 WPA).

But the surprise contributor to the Rockies' streak was their bullpen, which contributed 2.41 WPA to the 16 games. Before Sept. 16, Rockies relievers were rocky indeed, actually contributing a negative WPA (-2.22) to the team. Their resurgence, led by Matt Herges (0.70), Brian Fuentes (0.61) and Manny Corpas (0.44), was the true story behind the story.

### The Mets' un-streak

While the Rockies were putting together their historic run, the National League East was the scene of another historic run of games: The Mets lost 12 of their final 17 games, losing their hold on first place in the NL East to the Phillies. Here is a WPA scorecard of those 17 games:

Date	Opp	Score	Batting	Starters	Bullpen
9/14	PHI	2-3	-0.64	0.24	-0.10
9/15	PHI	3-5	-0.17	0.24	-0.57
9/16	PHI	6-10	0.19	-0.30	-0.39
9/17	WAS	4-12	0.04	-0.37	-0.17
9/18	WAS	8-9	0.10	-0.62	0.02
9/19	WAS	8-4	0.42	-0.24	0.32
9/20	FLA	7-8	0.44	-0.25	-0.68
9/21	FLA	9-6	0.49	-0.09	0.09
9/22	FLA	7-2	0.23	0.26	0.01

Date	Opp	Score	Batting	Starters	Bullpen
9/23	FLA	7-6	0.52	-0.06	0.04
9/24	WAS	4-13	-0.16	-0.27	-0.07
9/25	WAS	9-10	-0.11	-0.34	-0.05
9/26	WAS	6-9	-0.14	-0.14	-0.22
9/27	STL	0-3	-0.48	-0.04	0.03
9/28	FLA	4-7	-0.12	-0.44	0.06
9/29	FLA	13-0	0.36	0.14	0.00
9/30	FLA	1-8	-0.10	-0.41	0.00
<b>Totals</b>			<b>0.87</b>	<b>-2.69</b>	<b>-1.68</b>

During the Mets' run of ignominy, their batters were slightly above average, but their pitching and defense, particularly their starting pitching, was horrendous. Like Colorado's resurgent bullpen, this trend was a surprise; up to Sept. 14, the Mets' starters had compiled a WPA of 4.38 and the bullpen's WPA was 3.12. Their pitching collapse in the final 17 games of the season was a shock to most baseball observers.

The biggest culprits were reliever Jorge Sosa (-1.04) and starters Tom Glavine (-0.76), John Maine (-0.54), Mike Pelfrey (-0.50) and Oliver Perez (-0.48).

WPA doesn't account for fielding (it could, but Fangraphs hasn't quite figured out how to make that work) and the Mets' fielders developed holes in their gloves in September.

Before Sept. 14, the Mets' Revised Zone Rating (RZR) was .847, meaning that they successfully handled nearly 85% of all balls that were hit into their fielders' zones. From that point on, however, their RZR was .771. That might not look like a big difference to you, but it's equivalent to the difference between a .253 and .329 batting average.

Let me put it this way: Mets fielders allowed two more hits per game during their September plunge than they had the previous part of the season. That's worth more than a run a game. The positions that took a particular turn for the worse in RZR were:

	Pre 9/14	9/14+	Diff
Second Base	.835	.640	-.195
Shortstop	.886	.756	-.130
Third Base	.699	.605	-.094
Left Field	.920	.750	-.170

Despite the fact that their bats stayed relatively healthy, the Mets' everyday players still deserve part of the blame for the Mets' collapse.

**Clutchiness**

Bill James has an article in these pages about clutch hitting. We like to call this "clutchiness," Steven Colbert style, because it's a subject that is difficult to pin down. We're pretty sure it exists, but we're just not sure what "it" is, or how to find it.

A statistical offshoot of WPA is something called Leverage Index. Leverage Index (LI) was invented by Tom M. Tango (who also has a couple of articles in this *Annual*) to estimate the relative importance of a plate appearance. LI uses the WPA framework to determine how critical a plate appearance is by evaluating all possible outcomes of the plate appearance. The greater the potential difference in outcomes, the more critical the situation.

An average plate appearance is 1.0, but critical plate appearances (such as a tie game, two outs in the bottom of the ninth) can be 7.0 or more. We call the most critical plays high-leverage situations, or "clutchy" situations.

There aren't a lot of high-leverage situations. Of the 195,190 plays tracked by Baseball Info Solutions and Fangraphs last year, 118,725 had an LI below 1.0. Only 18,901 (less than 10%) had an LI over 2.0. Only 6,111 (just three percent—slightly more than one a game) had an LI over 3.0.

To determine a player's clutchiness, I (arbitrarily) chose an LI cutoff of 3.0, and listed all batters who made at least 10 plate appearances with an LI of 3.0 or more. I then ranked them by WPA gained for every 10 high-leverage plays. Using this methodology, the 10 clutchiest batters of 2007 were:

Name	Tm	LI	WPA	Plays	WPA/P
Tulowitzki, T	COL	3.77	2.76	23	1.20
Loretta, M	HOU	3.70	2.23	21	1.06
Logan, N	WAS	4.43	0.99	10	0.99
Matsui, K	COL	3.80	1.88	20	0.94
Hatteberg, S	CIN	4.01	1.15	13	0.89
Escobar, Y	ATL	4.02	1.08	13	0.83
Suzuki, K	OAK	3.89	0.91	11	0.83
Flores, J	WAS	4.53	1.39	18	0.77
Drew, S	ARI	3.88	1.54	20	0.77
Michaels, J	CLE	4.16	0.70	10	0.70

Rockie rookie Troy Tulowitzki had a tremendously clutch year, particularly in the first half of the season. In April and May, he had eight plate appearances with an LI of 3.0 or more, and made a positive contribution in each one. He was walked twice, hit by a pitch, singled twice, doubled twice and tripled. Each contribution came in the ninth or extra inning of a close game.

Although Tulowitzki also made some positive contributions later in the year, such as the very last game of the year, his clutch performances in the first two months of the season really stand out.

If you're like me, the rest of the list consists of a bunch of "huhs?" Nook Logan? Kaz Matsui? Jesus Flores? What about some of the "well-known" clutch hitters of our day, perhaps those mentioned in the James article?

David Ortiz? Though he's been a clutch hitter in the past, WPA doesn't rank Ortiz highly in 2007. In 25 plate appearances with an LI of 3.0 or more, his WPA was -0.02. That's negative.

Chipper Jones was better, contributing 0.55 WPA in 25 clutch plate appearances. Albert Pujols contributed 0.17 in 22. Alex Rodriguez, who had some big late-inning home runs early in the year, finished with 1.13 WPA in 18 clutch plays. He ranks 17th among major leaguers with 0.63 WPA per 10 plays.

How about the least clutchy batters? Here they are, using the same methodology, only in reverse:

Name	Tm	LI	WPA	Plays	WPA/P
Gutierrez, F	CLE	4.95	-1.40	12	-1.17
Jacobs, M	FLA	4.07	-1.24	11	-1.13
Spilborghs, R	COL	3.76	-1.30	13	-1.00
Mientkiewicz, D	NYA	3.56	-0.99	10	-0.99
Granderson, C	DET	4.49	-1.38	14	-0.98
Ramirez, M	BOS	4.29	-1.25	13	-0.96
DeJesus, D	KC	4.16	-1.28	14	-0.91
Chavez, E	OAK	4.19	-1.91	21	-0.91
Crosby, B	OAK	4.26	-1.08	12	-0.90
Fick, R	WAS	4.04	-1.11	13	-0.85

The funny thing is that there are probably more "star" names on this list than on the list of clutchiest hitters. One trend is clear: Batters who have a severe platoon disadvantage, such as Curtis Granderson, can be beaten in critical situations. You can read more about

this in the introduction to our statistics, “Now You Has Stats.”

Some teams managed to deliver more often than other teams in the “clutchy.” Here are the top five teams, ranked by batting WPA in situations with LI over 3.0. You may not be surprised to see Colorado at the top of the list...

COL	3.85
NYN	2.78
SEA	1.51
ARI	1.00
FLA	0.70

...but the Mets also performed very well in critical situations. Their major clutchy contributors were Carlos Delgado (0.67 WPA/P), Jose Reyes (0.51), Shawn Green (0.32), Endy Chavez (0.25) and Luis Castillo (0.18).

For the other perspective, here’s the list of the five least “clutchy” WPA totals:

PIT	-6.26
KC	-4.77
OAK	-4.70
MIN	-3.99
BOS	-3.82

I won’t name specific players here, but it is interesting that the World Champion Red Sox are on the list. As dominant as they were, delivering clutch hits wasn’t a hallmark of the 2007 Red Sox team.

### Pitching clutchiness

The interesting thing about critical situations is that pitchers usually win them. Of last year’s 6,111 clutchy situations, pitchers managed a positive WPA 3,773 times, or 61% of the time, even though WPA is generally distributed evenly between batting and pitching. Altogether, pitchers compiled a 37.50 WPA total in those high-leverage situations.

Said differently (and just for fun), if pitching and batting were two separate teams, pitching would have a record of 118-44 in critical situations.

The reason is pretty obvious: Teams have an advantage in high-leverage situations because they can bring in a fresh reliever, often creating a platoon advantage (for

instance, bringing in a LOOGY—Lefthanded One-Out GuY—to face a lefthanded batter). In fact, new pitchers entered the game in 879 of those 6,111 clutchy situations (that is, new pitchers were brought in to face batters in 14% of high-leverage situations), and they compiled a 13.2 WPA in those single plate appearances.

Who were the best pitchers in critical situations last year? Like the list of clutchiest batters, it will surprise you:

Name	Tm	WPA	Plays	WPA/P
Saarloos, K	CIN	0.97	10	0.97
Dohmann, S	TB	0.88	11	0.80
Marte, D	PIT	1.03	13	0.79
Herges, M	COL	0.86	11	0.78
Romero, J	PHI	1.24	16	0.78
Sele, A	NYN	0.85	11	0.77
Perez, R	CLE	1.21	16	0.75
Putz, J	SEA	3.58	48	0.74
Qualls, C	HOU	2.65	36	0.74
Feliciano, P	NYN	1.00	14	0.71

Kirk Saarloos had a truly awful 2007, with a 1-5 record and a 7.17 ERA. But in 10 high-leverage plays, Saarloos gave up three double plays, two flyouts, two strikeouts, two fielder’s choices and a walk. Not a bad record at all. Too bad he stunk the rest of the time.

In limited playing time, Tampa Bay’s Scott Dohmann managed to compile a similar clutchy record. Damaso Marte was used as a classic LOOGY last year, to great effect. And we’ve already mentioned the impact Herges had on the NL West pennant race.

Really, the only “mainstream” relievers on this list are J.J. Putz, who had a fantastic year in Seattle, and Houston’s Chad Qualls. Still, I’m guessing you’d like to see the list of least clutchy pitchers:

Name	Tm	WPA	Plays	WPA/P
Aquino, G	MIL	-1.37	10	-1.37
Julio, J	FLA	-1.06	13	-0.82
Majewski, G	CIN	-0.87	11	-0.79
Correia, K	SF	-1.54	23	-0.67
Brown, A	OAK	-0.85	13	-0.65
Hoey, J	BAL	-0.61	10	-0.61

Name	Tm	WPA	Plays	WPA/P
Santos, V	CIN	-0.78	14	-0.56
Ray, C	BAL	-2.11	38	-0.56
Eyre, S	CHN	-0.55	10	-0.55
Ohman, W	CHN	-0.81	15	-0.54

On the surface, Milwaukee's Greg Aquino (who spent April and September with the big club) had a mediocre year: 4.50 ERA in just 14 innings. But in nine of 10 situations when the leverage index was above 3.0, he made a negative contribution to the Brewers' effort. In fact, he had a 0.27 WPA when the LI was below 2.0, and a -1.68 WPA (that's negative) when the Leverage Index rose above 2.0. That's the opposite of clutch pitching.

And I'm guessing that Orioles fans aren't surprised to see Chris Ray on this list, nor are Cubs fans surprised to see Scott Eyre and Will Ohman.

The Cubs and Orioles had some of the least clutch pitching of all, as evidenced by their WPA totals in critical situations:

BAL	-3.42
COL	-3.08
TOR	-2.21
CHN	-1.72
MIL	-1.46

Baltimore's Chris Ray may have garnered 16 saves in 20 opportunities, but that doesn't begin to describe the poor season he had; his WPA record does. Colorado's bullpen ranks as the second-least clutch staff in the majors, although the Rockies' September run more than atoned for their un-clutchiness.

Scads could be written about the Blue Jay, Cub and Brewer bullpens, too, but I'll leave those to your vivid imagination.

But let's end this discussion on a positive note: the clutchiest pitching staffs of the year:

ARI	6.11
SEA	5.22
LAA	4.99
BOS	3.84
MIN	3.53

Two of the biggest surprises of the year, Arizona and Seattle, can point to their bullpens as major reasons for their success.

### The Diamondbacks' fluky season

Speaking of Arizona, WPA can help us understand one of the major riddles of the year: How did the Diamondbacks manage to compile a 90-72 record and finish first in the NL West, despite being outscored by 20 runs? In all of baseball history, this feat has been matched only by the 1984 Mets, who also went 90-72 despite giving up 22 more runs than they scored.

On average, a team that is outscored by 20 runs can expect to finish a full season with 79 wins, because it takes about 10 runs to convert a loss to a win and 79 is two less than the 81 games an average team would win. Arizona beat this expectation by an astounding 11 games. Can we track down the difference using WPA? Sure we can.

Let's start with the D-back bats. Arizona scored 712 runs, 57 less than the National League blended average of 769. In general, you would expect 60 runs under average to result in -6.0 WPA. In real life, Diamondback bats compiled -1.2 WPA, nearly five games out of the 11-game difference.

How about pitching? Well the Diamondbacks allowed only 732 runs last year, 37 less than the blended average of 769. You'd typically expect a pitching staff with that record to compile a WPA of 4.0, but the Diamondback pitchers actually had a WPA of 10.2, six more than expected.

So, give the Diamondback offense credit for five out of the 11-game difference, and give the pitchers the remaining six-game credit. The credit for Arizona's amazing run was shared almost equally by the offense and the defense.

How did they do it? Primarily by performing better when it mattered most. Here is a table of how much WPA the D-back batters contributed by several degrees of Leverage Index (less than one, between one and two and more than two):

LI	Plays	WPA
0-1	3853	-0.94
1-2	1937	-3.28
>2	525	3.01
<b>Total</b>	<b>6315</b>	<b>-1.21</b>

To give this table some perspective, remember two things: First, the Arizona batters would be expected to compile a WPA of -6.0. Second, batters tend to perform worse as LI increases. You can see that D-back batters followed this pattern when their LI exceeded one, but they certainly turned things around when LI reached two or more.

As for their pitching, we've already seen how well Diamondback pitchers performed in clutch situations. But let's break it down a bit more.

Here is a table of how the Diamondback starting pitchers performed (as measured by WPA) according to the Leverage Index. As you can see, they matched their performance to the criticality of the situation extremely well:

LI	Plays	WPA
0-1	2450	-0.87
1-2	1565	-0.50
>2	271	4.10
<b>Total</b>	<b>4286</b>	<b>2.73</b>

Now, here's the same table, for the Diamondback bullpen:

LI	Plays	WPA
0-1	1318	-0.30
1-2	429	1.37
>2	400	6.41
<b>Total</b>	<b>2147</b>	<b>7.48</b>

Now, that's pitching to the situation. Virtually every Diamondback pitcher delivered in high-leverage situation, but particular props go to Jose Valverde (2.52 WPA in 65 critical situations) and Brandon Lyon (1.79 WPA in 53 critical situations). And credit also goes to manager Bob Melvin for calling on the right pitchers in the right situations.

To finish the story, let's post a comprehensive table which displays the average WPA per 1,000 plays for batters, starting pitchers and relievers. For each group, the table includes the major league average and the Diamondbacks' average. As you can see, every group of Diamondback players rose to the occasion:

LI	Batters		Starters		Bullpen	
	MLB	ARI	MLB	ARI	MLB	ARI
0-1	-0.11	-0.24	-0.03	-0.36	0.35	-0.23
1-2	0.15	-1.69	-0.38	-0.32	0.63	3.20
>2	-2.52	5.73	-0.73	15.13	4.39	16.02

There are thousands of stories in a baseball season; these have been just a few of them. WPA crosses the divide between what we see on the field and what we see in the statistics. That's why I call it the "story stat," and why you can expect to see it in more and more baseball venues.

# The Year in a Single Number

by Dave Studenmund

Let's start with a story, a little personal history mixed with a lot of baseball history. The story takes place in a bookstore about 25 years ago. I was browsing through the sports section and came across an edition of *The Hidden Game of Baseball*, an early sabermetric classic. I was grabbed by the introduction and never put it back.

You see, the introduction to this "revised and updated" paperback version had a radical claim: that Cal Ripken had just posted the fourth-best season in baseball history. The authors (Pete Palmer and John Thorn) weren't talking about 1983, Ripken's first MVP year. They were talking about 1984, when he finished 27th in MVP voting.

This was Palmer's way of introducing a new statistic—one that included the impact of both batting and fielding—that came to be known as "linear weights." Of course, he was also trying to shake our minds, get us to look at baseball in a new way. At that he was successful. The book, along with Bill James' *Abstracts* of the same time, shook up lots of folks.

The idea was to express a baseball player's value as the single most important number of all: the number of wins he contributes to his team. It was a radical idea at the time though it may seem old hat now. These days, we have several win statistics, such as James' Win Shares and Tom Tango's WAR (Wins Above Replacement) to choose from. (Actually we have two versions of WAR—thank you, FanGraphs and Baseball Reference—but let's not worry about that right now.)

At the time I didn't realize that there had been an earlier attempt at player win calculations. In 1970, the Mills brothers published a little-known classic called *Player Win Averages: A Computer Guide to Winning Baseball Players*, and started a statistical revolution that would slumber for about 30 years before reawakening this decade. In their little book, they laid the groundwork for something we now call Win Probability Added (WPA; also called Win Expectancy).

The Mills brothers (their given first names were Eldon and Harlan, which might explain why they were evidently computer nerds even back in 1970) designed an absolutely brilliant but simple way to tally up the events of a game and give appropriate credit to individual players.

Think of it this way. With two outs in the bottom of the ninth, runner on third, we can make a pretty darn good estimate of how many times an average team will score a specific

number of runs the rest of the inning, like zero (74 percent), one (19 percent), two (5 percent), three or more (whatever is left percent). We know this sort of thing through the use of advanced mathematics such as Markov Chains or perhaps just plain old historical data, but we are pretty confident about the numbers.

So if the score is tied, then there is a 74 percent average probability that the home team will score no runs and the game will go into extra innings and a 26 percent average probability that the home team will score at least one run and win the game in the ninth. If you assume that each team has a 50 percent chance of winning in extra innings, that means that its Win Probability at that moment is 0.74 times 0.5, plus 0.26—or 63 percent.

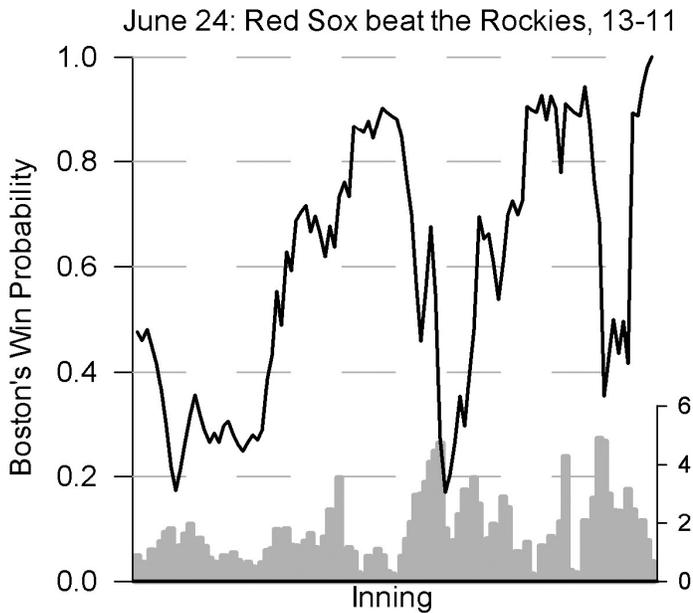
I know that was hard to get through, but that was the end of it. That was all the math you need to understand WPA. The beauty of the system is that you can "chain" all of these probabilities backward through the game—all the way back to the very first batter in the very first inning—and determine the win probability at any point of a game.

Let me give you an example. On June 24 of this year, the Red Sox and Rockies played a wild one in Colorado. The Rockies jumped out to a 2-0 lead in the early innings, thanks to some walks and singles (the key one delivered by Brad Hawpe) but the Red Sox took a 4-2 lead in the fourth inning (key double by Mike Cameron) and built their lead to 6-2 an inning later (thanks to an Adrian Beltre homer).

The Rockies singled seven times in the sixth, however, and took the lead back, 7-6 (Ian Stewart had the single with the greatest impact). The Red Sox came right back in the next inning (key hit: a Jason Varitek double) to take a 9-8 lead and Dustin Pedroia padded the lead in the eighth with a two-run home run. 11-8.

The Rox were not happy about this. They chipped away with one run in the eighth to make it 11-9 and then posted a dramatic comeback in the bottom of the ninth to tie the game. The key hit was, once again, a single by Hawpe.

Yet it was not meant to be for Colorado. Pedroia hit another two-run homer in the top of the 10th, Jonathan Papelbon retired the Rockies in order (after he had given up the lead in the ninth) and the Red Sox won this seesaw battle, 13-11. If you were to graph the play-by-play win probability of the game (and why wouldn't you?), this is what it would look like...



(Those gray lines represent the Leverage Index of each play; more about that later.)

By our calculation, this was the Most Exciting Game of the Year. To qualify for TH1's special award, a game has to have the greatest number of Win Probability swings from play to play, divided by the number of innings in the game. No other game was so swingy. If this game had been a tennis match, the Colorado crowd would have had whiplash.

The hero of the game was obviously Pedroia. When you add up all the increases and decreases of Win Probability that occurred in his plate appearances, it turns out he contributed 0.9 "wins" to the cause. Hawpe was the Rockies' top contributor, with 0.25 "wins." In such a high-scoring game, the player with the most "losses" was naturally a pitcher, Boston's Hideki Okajima.

Parenthetical aside: I put "wins" in quotation marks, because those numbers aren't really wins. Each team begins a game with a 50 percent probability of winning—the winning team gains 50 percent throughout the ups and downs of the game and the losing team loses 50 percent by the end of the game. So, if a player has 0.9 WPA points, he's actually contributed almost two whole wins in just one game. That may not make sense to you, but what if all the other players on his team gave up a whole lot of losses in the same game? Someone's got to make up for them.

In fact, Pedroia's WPA total in this game was the sixth-highest of the year. The leader in single-game WPA was the Braves' remarkable rookie Jason Heyward, who led the Braves to a 4-3 comeback win over the Rockies (them again?) on April 18. Heyward didn't light up fireworks a la Pedroia; he only walked twice and singled in three at-bats. But he singled

with two outs, bases loaded and the Braves trailing 3-2 in the bottom of the ninth. That one hit was good for 0.74 WPA all by itself. Coupled with a bases-loaded walk earlier in the game and a couple of other plays, Heyward posted an astro-nomic total of 1.03 WPA in just one game.

That single of Heyward's, by the way, was the eighth-biggest hit of the year. The biggest single hit was Pedro Alvarez's two-out 10th-inning home run against—wait for it—the Rockies on Aug. 7. The Pirates were down by two runs at the time with runners on first and second. Alvarez's blast off Huston Street was worth 0.91 WPA points all by itself.

You know that walk-off home run by Kendry Morales on May 29? The one in which he broke his leg in the celebration at home, forcing him to sit out the rest of the year? That was worth only 0.16 WPA points, because the Angels had already loaded the bases with just one out in a tie game. Seems like a waste of an injury, doesn't it?

The best pitching performance of the year was turned in by Roy Halladay, of course. On May 29, he didn't just pitch a perfect game. He pitched a perfect game in a 1-0 win. The Marlins technically had a decent probability of winning in the ninth inning even though they hadn't reached base against Halladay. That's awesome pitching, yes, awesome pitching in a tight game.

Edwin Jackson's eight-walk no-hitter also occurred in a 1-0 game, against the Rays, and that performance ranks as the second-best pitching performance of the year.

WPA stats and graphs are available all year long at both Fangraphs.com and Baseball-Reference.com. At Baseball Reference, you can also see how well each player has performed in "high leverage" situations. You may have an intuitive sense of what high leverage means (basically, the most critical situations) but, thanks to WPA, we can quantify exactly how critical a specific situation is.

The trick to Leverage Index is to quantify the range of potential win probability outcomes of a specific play; the bigger the range of outcomes, the higher the criticality (or leverage). An average Leverage Index is 1.0 and most plays in a season are less critical than that. But many plays are very high leverage. For instance, when Heyward grounded that single to left on April 18, down by a run with the bases loaded and two out, the Leverage Index was 10.72—about as high as the Index goes.

Leverage Index gives us a tool to establish "clutch" play. When LI is high, the game is on the line and you can say that players who deliver have delivered in the clutch. I don't know if Heyward is a "clutch" batter, but his single on the 18th was certainly a clutch play. So let's see who delivered the most in the clutch in 2010.

I'm going to arbitrarily use a Leverage Index of 2.0 as a cutoff point for clutch play. About 10 percent of all plays have

## The Year in a Single Number

an LI of 2.0 or more, which makes them rare enough, but not too rare, to matter. Here are the 10 batters who contributed the most in high-leverage plays.

Batter	Plays	WPA
Rodriguez, Alex	64	3.3
Cabrera, Miguel	85	3.2
Votto, Joey	69	3.0
Cruz, Nelson	57	2.8
Bourn, Michael	74	2.4
Conrad, Brooks	38	2.3
Choo, Shin-Soo	68	2.2
Youkilis, Kevin	47	2.0
Hart, Corey	67	1.9
Lee, Carlos	64	1.9

This list includes the usual array of top-notch sluggers mixed in with some surprises. Astros leadoff man Michael Bourn performed very well in high-leverage situations, as did their cleanup hitter, the otherwise execrable Carlos Lee.

A few years ago, you heard a lot about Alex Rodriguez not being a clutch batter. Some of the WPA stats even seemed to back this up. Well, A-Rod did a fine job in the clutch this year. In seven different plays with a Leverage Index over 4.0, A-Rod walked, singled, doubled, homered, hit a sacrifice fly, advanced on a wild pitch and hit into a fielder's choice. His total WPA in those seven situations was 1.2. No one is going to start calling him A-Clutch, but give the guy his due.

Let's ratchet this up a notch. About one percent of plays have a Leverage Index of more than 4.0. Who were the leaders in those situations?

Batter	Plays	WPA
Conrad, Brooks	8	1.62
Lee, Carlos	6	1.50
Heyward, Jason	12	1.34
Cabrera, Miguel	14	1.32
Torres, Andres	12	1.25
Rodriguez, Alex	7	1.21
Kotchman, Casey	10	1.09
Berkman, Lance	8	1.04
Gonzalez, Adrian	9	0.96
Ortiz, David	10	0.94

The Braves' Brooks Conrad came to bat only 177 times last year, but he sure made his plate appearances count. In eight really-high-leverage appearances, he homered three times,

singled, walked, sacrificed, flied out and struck out. That is a terrific record. Did I mention three home runs in eight plate appearances?

Oh, and Carlos Lee.

I hope you see that WPA gives you an entirely different way of judging batters. To show you what I mean, here are two lists. One is a list of the top 10 batters in the majors according to Base Runs, the best standard "run estimator" (a stat that tabulates the general impact of all individual batting events into a total number of runs created). The other list contains the leaders in batting WPA.

Batter	Base Runs	Batter	WPA
Pujols, Albert	130	Votto, Joey	7.0
Bautista, Jose	127	Cabrera, Miguel	6.9
Cabrera, Miguel	121	Hamilton, Josh	5.7
Gonzalez, Adrian	119	Pujols, Albert	5.4
Votto, Joey	119	Heyward, Jason	4.9
Crawford, Carl	118	Gonzalez, Adrian	4.9
Holliday, Matt	116	Holliday, Matt	4.1
Werth, Jayson	115	Choo, Shin Choo	4.0
Cano, Robinson	114	Bautista, Jose	3.7
Hamilton, Josh	114	Cano, Robinson	3.5

The two lists are mostly similar, but not entirely. Heyward was 28th in Base Runs, for example, but fifth in batting WPA. Cleveland's Shin-Soo Choo stepped it up a notch. There are several reasons the rankings differ, but situational hitting is probably the biggest one. WPA rewards hitting in high-leverage situations; Base Runs doesn't. Which list is more legitimate? You decide.

What about pitchers, you ask? Well, as you can imagine, the list of "clutch" pitchers is dominated by closers, since they are given the most opportunities in high-leverage situations. Still, you may find some surprises among the top 10 (Leverage Index higher than 2.0):

Pitcher	Plays	WPA
Soria, Joakim	137	6.11
Bell, Heath	133	4.50
Soriano, Rafael	101	3.86
Wilson, Brian	144	3.67
Marmol, Carlos	151	3.51
Lyon, Brandon	130	3.43
Feliz, Neftali	103	2.80
Pelfrey, Mike	85	2.61
Perez, Chris	119	2.51
Kuo, Hong-Chih	63	2.38

This list verifies the great (and somewhat overlooked) season that Joakim Soria had in Kansas City. One starter did make our list, the Mets' Mike Pelfrey. Color me surprised.

---

There's a natural extension to Win Probability, something that both Sky Andrecheck and I explored last year. Sky called it Championship Leverage Index. Once again, the concept is pretty simple. If you assume that all teams are fundamentally .500 teams, it's pretty easy to calculate each team's probability of making the postseason or winning the World Series at any point during the year (although the wild card makes the math kind of hairy).

A lot of websites do this sort of thing, and they even improve upon the concept by factoring in each team's strengths, weaknesses and schedule.

The real fun comes when you combine each team's championship probability with the number of games left in the season to determine its most crucial games; "Championship Leverage Index," naturally enough. You find, for instance, that...

- Some teams, such as Baltimore and Kansas City, had their "most critical" games on the first day of the season. Their tires went flat immediately.
- The most critical point for any teams in the American League belonged to Chicago and Minnesota in Aug. 10-12. Both teams' Championship Leverage Index stood around 3.0 (three times the criticality of a normal regular season game), but the Twins took two of three from the ChiSox in Chicago, and that was that.
- Meanwhile, in the National League, the Central competitors were in a very similar situation. The Reds and Cardinals were locked in a tight race after St. Louis swept the Reds in early August. On Aug. 11, both teams had Championship Leverage Indices around 3.0, but the Reds went on to win their next seven straight and the Cards lost five in a row. Drama over.
- The real drama came at the end of the season, when the Giants, Braves and Padres were fighting for two postseason slots. On the very last day of the season, the Padres' and Braves' Championship Index was over 12.0, meaning that the final game of the season was 12 times more critical for them than an average regular season game!
- The Giants' Championship Leverage Index that day was much lower—3.5—because they had more options to make the postseason. In fact, their Index had been higher (4.7) just a week before, but they took six of seven

before meeting the Pads, which gave them a bit of breathing room even after losing the first two games of the San Diego series.

In our Statistics section, where we graph the progress of each team during the season, you'll find their Championship Leverage Index plotted along their wins, losses, runs and runs allowed. We think it paints a full graphical picture of each team's season.

The "ultimate number" comes about when you combine the Championship Leverage Index with WPA. For example, Miguel Tejada's second-best WPA day of the year was on Sept. 24, when his Padres were in a dogfight in the NL West and playing the Reds. Tejada hit two RBI singles in crucial situations, the Padres won, 4-3, and Tejada's WPA for the day was 0.52.

Since the game was crucial for the Padres, their Championship Index that day was 4.26. If you multiply Tejada's WPA by the Padres' Championship Index, you get 2.23, which we'll call Championship WPA. Tejada's performance that day was the biggest single-game Championship WPA performance of the entire year. No batter contributed more to his team's chances of success in a single game.

In contrast, Tejada's best WPA game of the year was 0.71 on April 30 for the Orioles, who never really had a critical game all year. As a result, his Championship WPA that day was only 0.14—just one-seventeenth of the contribution he made to the Padres on September 24.

See how it works? Consider the case of the Giants' Pat Burrell, who played in 51 games with a Championship LI of more than 2.0, and compiled a total of 2.1 WPA. That is the highest WPA total in critical games of any player in the majors last year. Burrell's big pennant-producing performances included a key two-run homer in the bottom of the eighth against the Dodgers on July 31 and two more critical home runs against the Cubs on Aug. 11 and 12. Not bad for a guy dumped by the Rays earlier in the season.

The Twins' Jim Thome played in just four games with a Championship LI of 2.0 or more, but he did the job when it counted. Those four games included one against the White Sox on Aug. 18, when he belted a game-winning home run in the bottom of the tenth.

And let's not forget about the aforementioned Brooks Conrad, who not only hit in the clutch, but hit in the clutch in the critical games. His solid performance in the last week of the Braves' season helped them get into the playoffs.

These are just some of the plays and players that stand out when you look at the season this way, through the lens of the "ultimate number." To close this part of our discussion, let's

## The Year in a Single Number

take the natural step and simply multiply the two figures—WPA and Championship Leverage Index—for all batters and all games. Here’s the top 10 in Championship WPA:

Batter	Champ WPA
Votto, Joey	8.13
Heyward, Jason	7.08
Cabrera, Miguel	6.74
Hamilton, Josh	6.27
Pujols, Albert	6.09
Conrad, Brooks	6.08
Gonzalez, Adrian	5.74
Holliday, Matt	4.95
Huff, Aubrey	4.65
Burrell, Pat	4.17

Look at that. The usual suspects, to be sure, but also some real surprises. I’ve touched on most of the surprise batters already, but let’s take a moment to give a guy his due. Joey Votto had a great year (37 home runs and 113 RBIs), batted well in the clutch (a .355 batting average and 1.098 OPS with the game leverage at 1.5 or more) and continued to do it while the Reds played some tough games and ultimately made the postseason. National League MVP? You could do worse.

I’ve called Championship WPA the “ultimate number,” but of course it isn’t. For one thing, the current implementation of WPA doesn’t include the impact of fielding, which (as you’ll find elsewhere in these pages) is a tremendously important part of a ballplayer’s value equation. I simply wanted to use WPA to give you some of the highlights of the year. That’s really the value of WPA, why I like to call it the “story stat.”

As I said upfront, we have a plethora of win-based statistics these days. So the question still nagged at me. How good was Cal Ripken in 1984? I decided to try to figure it out.

Let’s step through the systems one-by-one. According to Win Shares, he was really, really good. I’ve created a modification that I consider an improvement over Bill James’ original Win Shares system, called Win Shares Above Bench (WSAB). I won’t go into the details, but WSAB thinks that Ripken was

indeed the MVP of the league in 1984, even better than he was in 1983. In fact, WSAB ranks Ripken’s 1984 as the best year of his career. But it’s still only 238th on the list of all seasons by position players since 1900.

According to Win Shares (and WSAB), the greatest individual season since 1900 among position players was turned in by another shortstop, the legendary Honus Wagner in 1908. Wagner was 47 Wins Shares Above Bench in that memorable year. In 1984, Ripken was 24 Win Shares Above Bench. Big difference.

Wins Above Replacement (WAR) is essentially the original linear weights system updated and abetted by computing power and the fantastic Retrosheet database. Sean Smith has done the calculating and generously made the results available to all at his website (<http://www.baseballprojection.com/>). According to Sean’s WAR, Ripken’s 1984 ranks more highly—the 132nd best season of all time—and higher than his 1983 season. However, WAR really likes Ripken’s other MVP year, 1991, ranking it 36th among all seasons.

Ripken had three MVP-type years. In 1983, his first MVP year, he “created” 43 runs above average at bat (according to Sean’s approach) and was nine runs above average in the field. The next year, his offensive output declined a bit (36 runs above average) but his fielding runs jumped up to 20. In 1991, he put both sides of his excellent game together: 48 batting runs and 20 fielding runs. His MVP selection that year was a no-brainer, though Cecil Fielder did receive nine first-place votes. According to WAR, Fielder was almost eight wins worse than Ripken.

In the WAR files, Wagner’s 1908 is the 20th-best year of all time. In first place is the Babe, in 1923.

WPA provides another reason to exalt Ripken’s 1984. He batted .381 in high-leverage situations (LI of 1.5 or more) that year, with a .979 OPS. Overall, his bat contributed 3.7 WPA in ’84. But several players ranked more highly. The American League leader was Ripken’s teammate Eddie Murray, who had a 1.107 OPS in high-leverage situations (and he had more of them, too). Murray finished with 7.3 WPA, three-and-a-half more than Ripken.

In fact, if you replace the “runs created” portion of WAR with WPA, Murray has a higher WAR than Ripken in 1984. That’s right. If you think of it this way, Ripken’s 1984 wasn’t even the best year on his own team.

There are many ways to skin this cat. Always will be. Don’t let anyone tell you otherwise.

# In All Probability

by Dave Studenmund

In baseball, you can't take anything for granted. Teams with big leads can lose games. Batters on hot streaks can suddenly go cold. Even teams with a lock on the Wild Card slot can lose their grip.

This isn't as true in many other sports. In a basketball or football game, there comes a time when you know which team is going to win. Over the season, schedules are shorter, so titles are determined more quickly. It's easier to predict next year's NBA leading scorer than next year's major league batting leader.

Baseball is just more unpredictable than other sports. It doesn't have a timer, it has innings. Teams are never out of time, they just keep playing until they've run out of outs. This is why it's so dramatic. This is why it breaks your heart. This is why it's a game of probabilities.

There are no better examples in recent baseball history than four games played on the last day of the 2011 season. Tampa Bay and Boston were tied for the Wild Card in the American League; Atlanta and St. Louis were tied for the Wild Card in the National. They each played different opponents on the last day, and the potential outcomes ranged from two clearcut Wild Card winners and a day off to two playoff games the next day.

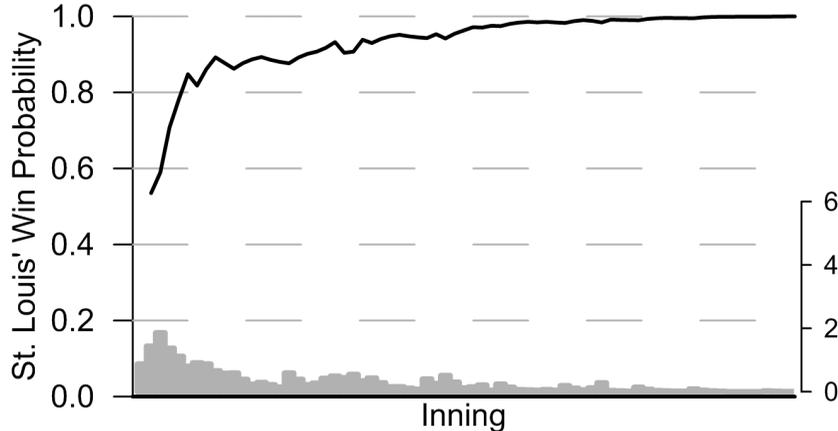
Let's look at each game through the lens of Win Probability (sometimes called Win Expectancy). Instead of tracking the score at each point of the game, we'll track the probability of each team winning that game. Win Probability is a relatively simple extension of the score, inning and base/out situation, expressed as the percent probability that the team in question is going to win the game.

Win Probability (or WP, to keep it simple) treats all teams and all players equally. Each team is given a 50 percent chance of winning in the beginning of the game, and the probabilities don't change based on who's at bat. It doesn't presuppose anything about the quality of the teams. It's a simple, straightforward way to measure the ins and outs of a game.

First up: St. Louis against the Astros. A WP game graph is on the next page.

The Cardinals put this game away quickly. Seven of their first eight hitters had hits (all singles with one double) and they scored five runs in the top of the first. By the end of the first, the Cardinals had an 85 percent probability of winning. Chris Carpenter took care of that extra 15 percent with nine

## Playoff Bound: The Cardinals skunk the Astros



shutout innings and St. Louis finished with an 8-0 victory and assurance of at least a playoff game the next day.

Not much to see here. However, the action was intense in Atlanta, where the Braves played the Phillies (graph on the next page).

This game was a low-scoring affair for the first six innings. The Phillies and Braves both scored a run in the first, keeping the Win Probability relatively even. Then Atlanta added two runs in the third on a Dan Uggla homer. With a 3-1 lead, the Braves' Win Probability climbed over 80 percent as the game continued. Even a Philadelphia run in the seventh, which cut the score to 3-2, didn't drag their chances of a win below 80 percent.

By the top of the ninth, with closer Craig Kimbrel on the mound and a 3-2 lead, the Braves' Win Probability was 86 percent. However, Placido Polanco singled (WP dropped to 74 percent), Ben Francisco walked after an out (still 74 percent), Jimmy Rollins walked to load the bases (55 percent) and Chase Utley hit a sacrifice fly. The score was tied and both teams were essentially back to a 50 percent probability of winning.

See those gray bars in the next graph? Those measure a thing called "Leverage Index." Leverage Index (or LI) is an outgrowth of Win Probability as it measures the criticality of each moment of a game by assessing the potential variety of outcomes in each plate appearance. The more variable the potential impact on a team's probability of winning the game (in other words, the more critical it is), the higher the LI.

An average Leverage Index is 1.0. Not too critical, but not insignificant either. Just right.

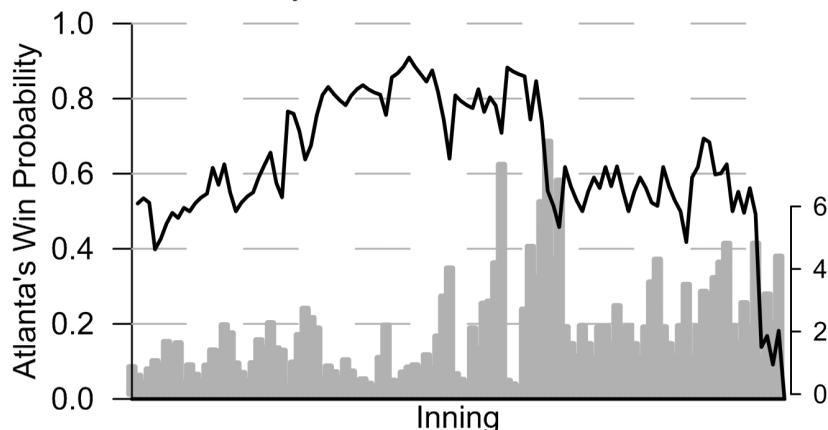
Leverage Index helps fill in the game story. On the graph, you can see two moments when the game's LI jumped over 7.0 (Be sure to use the

## The Year in Frivolity: April

The Red Sox begin the season by losing their first six games. Only Bud Selig, Red Sox owner John Henry, general manager Theo Epstein and a few lawyers are aware that these losses were intentional and were designed to make the AL East race appear to be competitive. "Having Boston leading the division by 10 games before Memorial Day would kill attendance," the top secret memo read, "so while throwing a half-dozen games at the outset may seem troubling, it's the only way to avoid embarrassment for the rest of the league."

## Not Playoff Bound: The Braves lose in 13

The Yankees find themselves involved in a controversy when, on Opening Day, a team employee is spotted behind home plate, wearing a headset and relaying signals to Yankees hitters. When confronted with the evidence that the Yankees are perhaps realizing an unfair advantage as a result of this, general manager Brian Cashman says, "That's nonsense. Why would we do such a thing? Our \$200 million plus payroll is all of the unfair advantage we require."



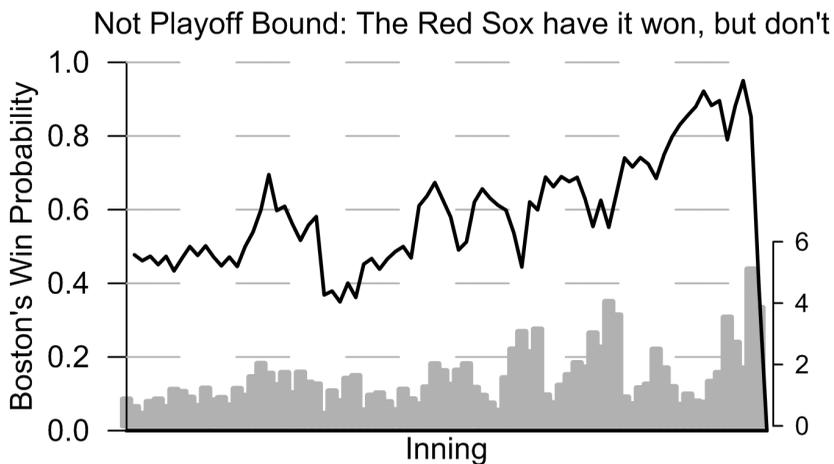
scale on the right of the graph). To put that in perspective, there were only 137 times that a game LI climbed over 7.0 over the course of the entire season for all teams. That encompasses nearly 200,000 plays and plate appearances, or less than 0.1 percent.

The first instance was in the top of the eighth. The Phillies were down 3-2, but they loaded the bases with two out. The Braves' WP was down somewhat, but the outcome of the duel between Raul Ibanez at the plate and Jonny Venters on the mound would have a huge impact on the game. Ibanez struck out and the game continued.

When Chase Utley came to the plate in the top of the ninth, with the Phillies still down a run, one out and the bases loaded, the LI jumped up to 8.1, which is very, very critical—the highest bar on that graph and the 58th most critical in-game moment of any game any time during the season. Utley's sacrifice fly was certainly a "clutch hit," even though it wasn't technically a hit.

As you can see, things stayed critical throughout the game's four extra innings. Neither team mounted much of a threat in innings 10 through 12, except for the bottom of the 12th. That's when the Braves had a runner on second with one out (WP of 68 percent and LI of 3.2) and runners on first and third with two out (WP of 62 percent and LI of 4.8) but couldn't capitalize on either situation.

The Phillies scored a run in the top of the 13th, however, on a walk, Utley single and RBI single by Hunter Pence. When Pence was at the plate (two out and runners on first and third), the LI was 4.8. After his single, the Braves' Win Probability dropped all the way to 14 percent; Pence's single accounted for a 35 percent drop. David Herndon closed out the bottom of the 13th for the Phils, and Atlanta was out of the postseason.



The Braves' game Win Probability dropped to zero, as did their chances of appearing in the World Series.

Let's turn to the American League Wild Card situation, where things were even more dramatic.

The Red Sox, who were playing the Orioles in Baltimore, took the first lead on a Dustin Pedroia single in the top of the third (70 percent Win Probability for the Sox) but Baltimore shortstop J.J. Hardy responded in the bottom of the third with a two-run home run and Boston's Win Probability dropped to 40 percent.

The Sox came back to score on a balk in the top of the fourth and then Pedroia hit a solo home run in the fifth to put Boston up 3-2—Win Probability up to 60 percent. The score stood at 3-2 until the bottom of the ninth, and you can see how Win Probability crept up as the game went on. Innings are time in baseball. By the ninth, the Red Sox had a 90 percent Win Probability.

Jonathan Papelbon struck out the first two Orioles and Boston's Win Probability was all the way up to 95 percent at this point. At least a Wild Card playoff game seemed at hand—perhaps sole possession of the Wild Card slot, depending on the outcome of the Tampa Bay/New York game.

The probabilities were good, but the outcomes did not favor the Red Sox this year. Chris Davis hit a double to right (WP down to 85 percent), Nolan Reimold smashed a ground rule double that drove in Davis (WP down to 40 percent) and then Robert Andino singled him home. Win Probability: zero.

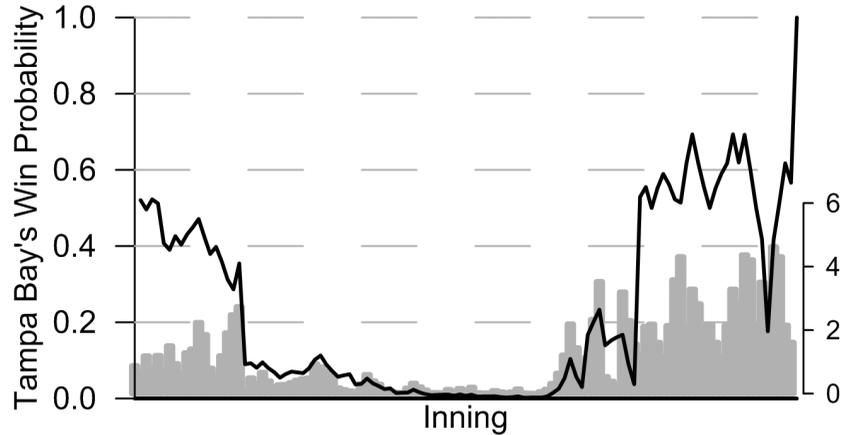
Davis' double was worth 10 percent of Win Probability, but Reimold's was the really key hit. It changed the game's Win Probability by 46 percent. Andino's hit finished the job by adding another 40 percent to the

Manny Ramirez abruptly retires from baseball after it is revealed that he tested positive for performance-enhancing drugs during spring training. This being his second drug-related offense, his retirement preempts a mandatory 100-game suspension. Because it's Manny, no one is really sure if he's aware of what's happening to him, so it is decided that he be told that he is going to a farm up north where he will have more room to run around and will be much happier.

Chipper Jones records his 2,500th career hit, his 1,500th career RBI and his 500th career double during the month of April. When asked about it he said "I really like round numbers."

Tampa Bay Rays outfielder Sam Fuld roars out of the gate to post a 1.035 OPS as of April 18. His hard-charging outfield play combined with his sabermetrically-oriented mind makes him an instant sensation with brainy baseball fans. Brainy fans who are so smitten that they manage to forget everything they ever learned about small sample sizes and past performance serving as a reasonable indicator of future performance. Fuld's bobblehead does look quite fetching, however, on the mantle next to the brainy fans' Brian Bannister bobbleheads.

## Playoff Bound: The Rays Persevere



total. In just three at-bats, the Orioles changed their own probability of winning the game from 5 per cent to 100 percent. These are the things that happen in baseball.

All eyes turned to Tampa Bay. This game had barely started, in front of 29,518 Tampa Bay fans, when the Yankees took a 5-0 lead in the second inning, thanks primarily to a grand slam home run by Mark Teixeira. Tampa's Win Probability was down to 10 percent in the second, and it would continue to decline—all the way to 0.3 percent (seriously)—as the Yankees padded their lead to 7-0 by the bottom of the eighth.

But probabilities are only that: probabilities. A single, double, hit-by-pitch, walk, another HBP, sacrifice fly and Evan Longoria home run later, the Rays had clawed back to trail by just one run. John Jaso singled and stole second, but the Rays couldn't capitalize and they finished the eighth down by a run. This was an incredible comeback, yet still the Rays' Win Probability was only 10 percent going into the bottom of the ninth.

Cory Wade was on the mound for the Yankees and he quickly recorded two outs, bringing Dan Johnson to bat. This wasn't even an auspicious at-bat by leverage standards, holding only a 1.55 LI. But Johnson turned Tampa's winning probability from 4 percent to 53 percent with one swing of the bat, a home run just down the right-field line. It was true baseball magic.

The drama didn't stop there. The Rays and Yankees went into extra innings. In the top of the 12th, the Yankees had runners on first and third with no outs; Tampa's WP was less than 20 percent. But the Rays got an out at the plate and Jake McGee retired the last two batters to keep them in the game. And then—more magic!—Longoria sealed a postseason appearance for Tampa with a home run in the bottom of the 12th. Final score: 8-7 Rays.

And so finished perhaps the greatest day in baseball history.

Okay, what do I mean by that? Well, having four critical games on the last day of the season, and then seeing three of those four games turn into heart-wrenching affairs, well, it just doesn't happen. I doubt it's ever happened to this degree before.

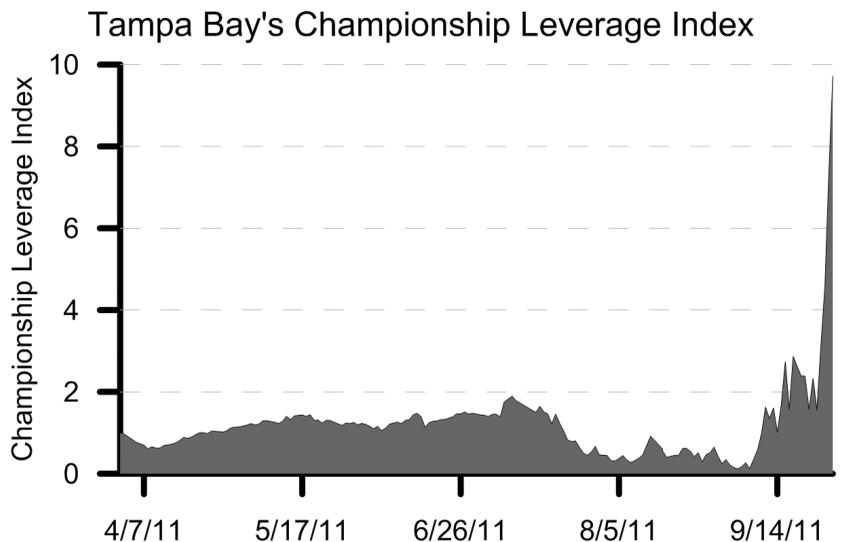
Think of it this way: we know that these **games** were dramatic; we've even quantified it through the use of WP and LI. But we also know that they occurred at a dramatic moment in the **season**. And we can quantify that, too.

Let's call on another set of probabilities: the probability of each team making the postseason as the regular season progresses. A number of sites on the Internet calculate each team's postseason probability during the year (try [coolstandings.com](http://coolstandings.com) or [baseballprospectus.com](http://baseballprospectus.com)), but we've added a wrinkle for the *Hardball Times Annual*: Championship Leverage Index.

Championship Leverage Index (CLI) was introduced a couple of years ago by Sky Andrecheck, and its purpose is simple: CLI measures the criticality of a game in the context of a pennant race, the same way LI measures the criticality of a plate appearance in a game.

A "neutral" game has a CLI of 1.0. Teams that fall out of the pennant race quickly, such as Houston in 2011, open the year at 1.0 and never have another game of even average criticality. Other teams build a big lead quickly—the Phillies for example—and never have a CLI above 1.5. When you have a big lead in your division, things just aren't so critical.

And then there are teams like Tampa Bay.



Derek Jeter starts the season with a dreadful 7-for-34 stretch. The most likely culprit: the revamped swing he and hitting coach Kevin Long worked on in the offseason. The second most likely culprit: Father Time. Because he's Derek Jeter, he has Long and Father Time killed. He doesn't even bother to make it look like an accident because, hey, he's Derek Jeter.

Josh Hamilton breaks a bone in his arm while sliding into home on a tag-up play from third base, landing on the disabled list. After the incident, Hamilton is asked why he bothered to try to score on the play. Hamilton says his third base coach told him to go. Hamilton then explains just how opposed he was to the idea of going and that he did so against his better judgment. The third base coach then joins Hamilton on the disabled list, suffering from multiple injuries as a result of being thrown under the bus.

Tampa's CLI was generally between 1.0 and 2.0 until August, when it appeared that the Rays were out of postseason contention and the Red Sox had wrapped things up. That changed in September and the Rays' CLI climbed all month long, to top out at 9.7 on the last day of the year.

Of course, all four contending teams had a CLI of 9.7 on the last day of the year, which means that their games were about 10 times more critical to making the postseason than a neutral game. Four times 10 equals 40 times more drama in one day.

Here's another way to think of it. When Utley hit his sacrifice fly to tie the Braves in the bottom of the ninth with one out, the Leverage Index of that moment was 8. Multiply that by 10 (the CLI) and you have a moment that was 80 times more critical to the Braves than a "neutral" game moment. That is heart-stopping drama.

Unfortunately, we don't have CLI for all previous years. But I think you'll be hard pressed to find a night in major league history with so many championship-critical moments, all within a few hours of each other.

---

There are lots of other things you can do with game and season probabilities. It's fun to find the biggest plays of the year, measured by the change in Win Probability. This is called Win Probability Added, because it measures the difference in Win Probability before and after the play. Of course, lots of times the Win Probability goes down too, but the name "Win Probability Added" (or WPA) puts a positive spin on things.

For example, on June 21, the Nationals and Mariners were playing each other in an interleague game. The Nationals were losing, 5-3, with two out in the bottom of the ninth and runners on first and second. Washington had already scored two runs in the bottom of the ninth to make things close, but the Nationals' WP was still only 8 percent.

Wilson Ramos changed that with a swing of the bat, a three-run home run that won the game for the Nationals, 6-5. This created a WPA of 92 percent for Ramos and the Nationals (we tend to use this format for WPA: 0.92) but certainly a negative result for Mariners pitcher David Pauley.

According to WPA, that was the single biggest hit of the season.

Now, before you start complimenting Ramos on his clutch hitting, consider something that happened on Aug. 17. The Nationals were trailing the Reds, 2-0, going into the bottom of the ninth. Ryan Zimmerman led off with a home run, cutting the lead to 2-1, and the Nationals proceeded to load the bases against Francisco Cordero with only one out. Their WP was actually above 50 percent at that point and the LI of the situation was a sky-high 9.2.

Unfortunately, Ramos grounded into a double play, 4-6-3, and the game was over. The Reds won.

Actually, no one cost his team more with double plays than Ramos. Ramos grounded into 19 double plays (admittedly, a subset of all double plays) for a total WPA of -2.36, or about 0.12 per DP. Why did his double plays hurt the Nationals so much? Because he tended to hit them in high leverage situations: The average LI of all his GIDPs was 2.45.

Ramos was in rarefied company. The second- and third-most hurtful double play hitters were Albert Pujols (-2.35, average LI of 1.7) and David Ortiz (-2.13, average LI of 1.65).

On the defensive side, the biggest impact plays tend to be those just like Ramos': double plays in one-run games with one out and runners on base in the bottom of the ninth. The biggest non-DP play of the year occurred on May 5, when Nationals reliever Drew Storen struck out the Marlins' Wes Helms looking. This strikeout registered a WPA of 0.30, as the Marlins had runners on second and third and were down by a run with one out. The Leverage Index of that situation was 6.0.

We could review individual plays like this all day long. Let's go one better and group them together to see how individual players fared over the full season. For instance, we know that Leverage Index is indicative of how critical a situation is. Well, who delivered the most in critical situations?

One way of answering this is to isolate high-LI plate appearances. About 10 percent of all plate appearances have a Leverage Index of 2.0 or more, so we'll just look at those. Which batters performed best in those situations? We could calculate their batting average or slugging average or some such thing, but let's just add up their WPA in those situations.

The list is topped by some of the best hitters in baseball, with a surprise in the No. 10 spot.

The Barry Bonds trial takes place and ends with a not guilty verdict on most perjury counts, a hung jury on a final perjury count and a guilty verdict on one count of obstruction of justice. America breathes a sigh of relief as the nation's streets are finally safe again.

Reds pitcher Mike Leake is arrested while allegedly trying to steal a handful of \$9 t-shirts from a Macy's store in Cincinnati. Because he is a first-time offender, Leake is steered into a diversion program where he has to take a class ("You and cheap t-shirts: a primer"); do community service ("Kids, don't steal cheap t-shirts") and go through counseling ("Mike, you weren't angry at the t-shirts; you were angry at your father, weren't you?").

-Craig Calcaterra

Player	Plays	WPA
Votto, Joey	80	3.53
Fielder, Prince	71	3.16
Abreu, Bobby	71	3.10
Berkman, Lance	69	2.96
Cabrera, Miguel	67	2.57
Hafner, Travis	47	2.48
Hamilton, Josh	41	2.34
Howard, Ryan	75	2.29
Damon, Johnny	65	2.27
Bautista, Jose	73	2.20
Morgan, Nyjer	44	2.18

I don't mean to overlook the terrific clutch performance of Joey Votto (who was intentionally walked in seven of those 80 high-LI situations, "unintentionally" walked in another nine, and also hit five home runs and seven doubles) and others (Bobby Abreu?), but what about Nyjer Morgan?

In 44 high-LI situations, the Brewers outfielder hit six singles, six doubles and a triple. He also walked three times, was hit by a pitch three times and hit a couple of sacrifice flies. The Brewers had a lot of things go right for them this year, but Morgan was an unexpected surprise, particularly in those clutch situations.

Okay, so let's put this all together. Who were the overall most productive hitters? Which ones led the majors in total WPA?

Name	WPA
Bautista, Jose	7.86
Fielder, Prince	7.52
Cabrera, Miguel	7.31
Votto, Joey	6.69
Kemp, Matt	6.43
Braun, Ryan	6.30
Ellsbury, Jacoby	5.66
Berkman, Lance	5.40
Howard, Ryan	5.14
Hamilton, Josh	4.60

First of all, let's recognize that total WPA is a reflection of a player's playing time, number of high-leverage opportunities and performance in those opportunities. There may be some significant differences between WPA rankings and standard baseball stats. Having said that, there are no big surprises here. These were the best hitters in baseball.

The fact that Prince Fielder is ranked above Triple Threat Matt Kemp, or teammate Ryan Braun, may surprise you. But take a look at the previous table—Prince Fielder posted the second highest contribution in high-LI situations. WPA rankings like this reward production and timing.

Let's flip this around and look at things from the other side of the diamond. Theoretically, WPA could be split between pitchers and fielders, but that is a very tricky thing to do. People have tried, but no one has yet found a way to legitimately separate the two. So all defensive WPA credits (and debits) accrue to pitchers. We won't discuss fielding today.

Here's a list of the top pitchers in WPA. I'm going to put starters and relievers on the same list even though that creates some problems. WPA effectively treats them differently, because the best relievers are often brought into games in only high-LI situations. So, if they're good, they'll register a high WPA in many fewer innings than starters typically accrue. In fact, relief pitchers sometimes top the leader board of top WPA pitchers in specific years.

Not this year, however.

Name	WPA	LI
Verlander, Justin	5.14	0.94
Clippard, Tyler	5.01	1.52
Weaver, Jered	4.63	0.99
Kennedy, Ian	4.57	1.07
Axford, John	4.29	1.87
Venters, Jonny	4.28	1.79
Robertson, David	4.26	1.68
Valverde, Jose	4.17	1.76
Beckett, Josh	3.89	1.01
Halladay, Roy	3.82	1.11

I added each pitcher's average Leverage Index to the table, so that you can more easily pick out the starters and relievers. Starters will usually have an LI around 1.0. Elite relievers will have an LI over 1.5.

CLI provides an easy way to present how "critical" each team's season was. You can almost think of it as a "Drama Index."

Below is a table of the total CLI of each American League team. The Rangers and Angels were in a tight race in the American League West for a while so they come out on top of this table.

The Red Sox, on the other hand, rank only fifth despite their late-season drama. This is because the middle of their summer was relatively quiet.

Team	CLI
TEX	212
LAA	211
TBR	192
DET	185
BOS	182
CLE	176
NYY	148
CHW	108
SEA	94
TOR	88
OAK	77
KCR	68
BAL	64
MIN	48

Here are the CLI totals for each National League team. The Cardinals and Braves, who fought for the Wild Card slot while also putting some pressure on their division leaders, are at the top.

The Giants, who made the NL West competitive for a while, are third.

The Astros had the least “dramatic” year of any major league team.

Team	CLI
STL	222
ATL	207
SFG	202
ARI	191
MIL	167
CIN	122
PHI	120
PIT	118
COL	105
FLA	95
NYM	80
WSN	72
LAD	67
SDP	51
CHC	51
HOU	31

- Dave Studenmund

Among the starters, Justin Verlander’s big year is reinforced by the numbers. He led every pitcher in WPA, even the top relievers. However, his season wasn’t “historic” in a WPA sense. His total of 5.14 is typical of pitching WPA leaders from previous years—even a bit on the low side. You can’t pull a “Verlander for MVP” argument out of his WPA stats.

How about the No. 2 guy? The Nationals’ Tyler Clippard didn’t register a single save this year, but WPA says he was the best reliever in the majors. Clippard pitched in 72 games with an ERA of 1.83. He also pitched in very important situations—his average Leverage Index was 1.52, only slightly below that of a pure “closer,” such as John Axford. Clippard also pitched more innings than the typical closer and he pitched extremely well in high-LI situations. For instance, batters hit only .087 against him when the LI was over 1.5.

To further illustrate the point, here’s a list of “clutch” pitchers, those who performed best in high-LI situations (over 2.0). Jose Valverde, he of the 49 saves, is first, but Clippard is second. In fact, this list contains a number of non-closers, even a few starting pitchers.

Name	Plays	WPA
Valverde, Jose	122	4.28
Clippard, Tyler	91	3.90
Axford, John	128	3.44
Robertson, David	86	2.99
Sale, Chris	96	2.95
Putz, J.J.	106	2.91
Madson, Ryan	102	2.77
Venters, Jonny	118	2.72
Harang, Aaron	70	2.62
Jackson, Edwin	63	2.50

Who knew that Aaron Harang and Edwin Jackson performed as well, if not better than, their relief counterparts in high-LI situations?

The above table also highlights the importance of setup men. Many of us lament the advent of the modern-day closer, the flamethrower whose only role is to enter the game in the ninth inning with a save situation. However, since the closer role has become more confined to a single inning and type of situation, the role of setup men, such as Clippard, Robertson and Venters, has become nearly as important.

You can rank relievers by the Leverage Index when they first enter the game. This is a way of asking, “When the game is on the line, who do managers turn to most?” Here is a list of the top 10 in “initial” Leverage Index for relievers with at least 20 appearances. I’ve added saves so you can spot the closers and the setup men.

Name	Games	Team	LI	WPA	Saves
Walden, Jordan	62	LAA	2.108	0.005	32
Perez, Chris	64	CLE	2.079	-0.005	36
Rivera, Mariano	64	NYA	1.973	0.020	44
Putz, J.J.	60	ARI	1.910	0.007	45
Salas, Fernando	68	STL	1.880	-0.005	24
Wilson, Brian	57	SFG	1.861	-0.005	36
Bell, Heath	64	SD	1.833	-0.003	43
Wright, Wesley	21	HOU	1.824	0.007	0
Downs, Scott	60	LAA	1.823	0.000	1
Storen, Drew	73	WAS	1.775	0.006	43
Soria, Joakim	60	KC	1.774	0.004	28

Wesley Wright was Houston’s LOOGY (Left-handed One Out GuY) in the last month of the season. He entered the game when a left-handed batter was up, and often left soon after. These were usually high-leverage situations, and he performed spectacularly well in those limited appearances.

Scott Downs was the Angels’ LOOGY, though his role was a bit broader than Wright’s. Still, you can see from this chart that another recently developed bullpen role—the LOOGY—also plays a critical role in a team’s success.

One last thing. You know how some closers enter a game and immediately make things worse, only to (usually) get out a jam of their own making? You know how others closers seem to just close the door the minute they enter the game?

Well, I included the average WPA of each reliever’s first appearance in the above table. Take a look and you’ll see that no one was better than Mariano Rivera at immediately shutting things down. A few closers, however, tended to make things worse when they first entered. These included Chris Perez, Fernando Salas, Brian Wilson and Heath Bell. These “closers” had their fans reaching for the Tums before the inning was finished.

A lot of people have their own ideas about the Most Valuable Player award—some of them perhaps more enlightened than others—but I thought Joe Posnanski got it right when he said that there are basically two camps: those who believe the MVP should be the best player, regardless of which team he played on, and those who believe that the MVP should reflect the “narrative” of the season, in which the MVP should play for a contending team—preferably one going to the postseason.

One problem is that one of these camps has metrics; the other doesn't. You can use your own preferred stat—whether it's OPS or WAR—to choose which player was “best.” But at least you have a metric.

On the other hand, everyone seems to have their own idea of what a good “narrative” is and no metric to refer to. In many years, the MVP vote seems to be a popularity vote among sportswriters for the year's best narrative.

You can probably tell where I'm going with this. WPA can help fill this gap. WPA is a quantification of the narrative of the game. When a batter hits a dramatic game-winning home run in the ninth, WPA captures that. When a starting pitcher pitches a shutout in a tight game, WPA reflects that.

And when you add a game's Championship Leverage to the equation, you can quantify a player's impact on the most important games of the year.

In that vein, here are the top 10 batters in “Championship LI WPA” (what a mouthful). To calculate “CL\_WPA,” I took each batter's WPA in a game and multiplied it by the CLI of that game for his team. This puts an enormous emphasis on the last games of the season for the four Wild Card contenders, as you'll see:

Player	WPA	CL_WPA
Longoria, Evan	3.93	9.19
Ellsbury, Jacoby	5.66	7.93
Fielder, Prince	7.52	7.66
Berkman, Lance	5.40	7.17
Hamilton, Josh	4.60	6.96
Cabrera, Miguel	7.31	6.36
Pujols, Albert	4.34	6.10
Votto, Joey	6.69	5.79
Braun, Ryan	6.30	5.63
Upton, Justin	2.69	5.05

I've included each player's original WPA, so you can see what adding his CLI does to the results. That big game by Longoria on Sept. 28 vaulted him to the top of the charts. The rest of these batters all did well overall, but their

teams also played in critical games and they performed particularly well in those games—and that’s what makes this our list of MVP candidates.

Am I totally serious here? Do I think that Longoria should have been the American League MVP? No, not really. That would be putting too much emphasis on one game.

Am I being a little serious? Do I think Jacoby Ellsbury and Prince Fielder deserve MVP awards, based at least in part on this ranking?

Why yes, I do.

**Resources:** You can find WPA and LI statistics all year long at FanGraphs and Baseball Reference. All WPA and LI figures in this article have been graciously supplied by FanGraphs.

# This Game Is Rigged: The Orioles' Amazing Bullpen

by Dave Studenmund

The Baltimore Orioles bullpen set a record this year. They posted a Win Probability Added (WPA) total of almost 14 (13.9, to be exact), the most in major league history by a good margin. What does that mean? It means that Baltimore, which finished 93-69—a 12-game advantage over a .500 record—owes that entire difference to its bullpen. Combined, the starting pitchers and batters were two games below .500. At least, that is what WPA says.

There are lots of problems with thinking about baseball this way, but hang in there with me for a few minutes, because I'd like to tell you the story of the Baltimore bullpen. It's an amazing tale.

Let me start by asking you a question. Which game would you rather win, the first game of the World Series or the last one? The last one, I hope. If you win the first one, you still have to win three more games. If you win the last one, that's it, the trophy is yours.

Here's another one. Which out would you rather make, the first out of a game or the last one? The first one, I hope. If you make the last out of a game, your team probably has lost (exception: walk-off wins with at least one out).

Timing matters. When things unfold, they unfold in an order. Fortunes rise and fall based on that order, and so do our spirits and our attentions. Win Probability is just about the only statistic that reflects the unfolding of a game.

When a batter hits a home run in the first inning of a tie game, that's a good thing. When he hits a home run in the ninth inning of a tie game, that's a great thing. WPA—which calculates the change in win probability of an event based on the score, inning, outs and base situation—captures the difference between these two events. In essence, it puts a number to the story as the story unfolds.

Once a game is over, a run is a run. Once the season is over, a win is a win. It doesn't matter when you hit or won it. After-the-fact stats are the best way to judge a player's value or a team's performance. But when the competition is afoot, timing matters a great deal. Real-time contribution, instead of value, is the thing that captures the essence of timing. And measuring real-time contribution is the best way to understand what the Orioles accomplished this year.

The surprising O's were no one's idea of a contending team before the season began. However, they started out strong, in second place with a 14-9 tally at the end of April, scoring 96 runs and allowing 84. Few thought they could keep it going. By

the end of May, however, they were in first place in the American League East with a 29-22 record. At this point, they had scored 230 runs and allowed 222. This means that, in May, the Orioles actually allowed more runs ( $222-84=138$ ) than they scored ( $230-96=134$ ), but still improved their record and climbed the standings into first place.

By the end of June, Baltimore still was three-and-a-half games ahead of a .500 pace (42-35), in second place. At this stage of the season, they had scored 327 runs and allowed 349—a negative run differential of 22. It's very difficult to be above .500 when you've allowed that many more runs than you've scored.

**Sidebar:** *When a team is, say 12-10, you often hear people say that they are two games above .500. But that's not really true. They're just one game above .500, because if they were to lose one of their games instead of winning it, their record would be 11-11. It would take just one game to even their record. For this article, we would say that the team is two wins above .500, but one game above .500. The difference is critical when discussing WPA, because 0.5 WPA equals a win, but 1.0 WPA equals a game (changing a loss to a win).*

In 1984, the Mets finished 90-72, in second place in the NL East, despite allowing 24 more runs than they scored. That is the worst run differential for a team with a winning percentage above .550 in major league history. If Baltimore had maintained their 2012 pace, they would have shattered that record.

And they tried. By the end of July, the Orioles were 55-49, in second place, and they had a run differential of -51 runs. That's NEGATIVE 51 RUNS!

Here's a simple rule of thumb: for every ten-run difference in run differential, teams will average one game away from .500. So if you know that a team has a run differential of -51 runs after 104 games, you'd expect them to have a record around 47-57. The O's were 55-49 instead, a difference of eight games. The major league record for a run/win difference over a full season belongs to the 1905 Tigers, who were about 13 games better than expected. The Orioles were in another world, one in which runs take flight and records warp.

Full major league seasons have a way of bringing record-setting paces back to earth. By the end of August, the Orioles were 73-58, with a run differential of -39 (yes, that's still negative)—an 11.5 game difference. More importantly, however, they were playing better. Their winning pace hadn't slowed; their run differential had improved.

September and October finally brought some real normalcy back to Camden Yards. Baltimore maintained its winning ways, finishing 93-69, 12 games above .500 and qualifying for the postseason. They also posted a run differential of POSITIVE seven runs. They didn't break the Tigers' record, but they came close.

How did they do it? The simple answer is easy: they won close games. The Orioles were 29-9 in one-run games and 25-14 in two-run games. They were 39-46 in all other games. Said in the language of runs, Baltimore won when run differentials were narrow; they gave up games when run differentials were large.

Well, how did they do this? Timing and luck, but also the bullpen. Baltimore famously did not give up a lead after the seventh inning during the regular season (we won't talk about their postseason woes here). Although the Orioles' bullpen was fifth in overall major league ERA (3.00; the Reds were first at 2.65), they were first in pitching when it counted.

Let's look at some numbers. Here's a list of the top five team bullpens in WPA:

Baltimore	13.9
Texas	8.0
Atlanta	7.1
Tampa Bay	7.1
Oakland	6.6

As you can see, the Orioles blew the competition out of the water—nearly six games better than the No. 2 team, Texas. As I said in the intro, that WPA mark is the highest of any bullpen ever.

The leader of the pen was closer Jim Johnson. Johnson was drafted by the Orioles out of high school in 2001. A good starter throughout his minor league career, Johnson blossomed when moved to the bullpen in 2008, where he was able to take full advantage of his 95-mile-per-hour sinker. Johnson took over Baltimore's closer duties in the second half of 2011, and this year he led all major league pitchers in WPA:

Jim Johnson/BAL	5.4
Fernando Rodney/TB	4.8
Craig Kimbrel/ATL	4.2
Justin Verlander/DET	4.0
Chris Sale/CHW	3.7

As you can see, WPA favors relievers because they get more opportunities to pitch at the end of close games. We'll come back to that issue for starting pitchers later. In the meantime, the key takeaway here is that Johnson—despite a relatively pedestrian ERA of 2.49 (pedestrian when compared to ERAs like Fernando Rodney's 0.60 or Craig Kimbrel's 1.01)—led all relievers in contributing to wins. He did it by—pay attention, you're going to hear this a lot—pitching best when it counted most.

To measure critical situations, I like to use something called Leverage Index (LI). Leverage Index measures the criticality of each individual situation by calculating the potential range of win probability outcomes that arise from that situation. Early innings have less leverage because teams have time to attempt to come back and win. Late innings have much more leverage, because they are more likely to cement a win or loss.

The average LI is 1.0, and the maximum (which is reached only a few times a season) is around 10. The leaders in bullpen LI last year (with a minimum of 100 batters faced) were:

Jonathan Broxton/KC	2.64
Jim Johnson/BAL	2.07
Addison Reed/CHW	2.01
Rafael Betancourt/COL	2.00
Brett Myers/HOU	1.90

As you can see, only Jonathan Broxton, while pitching in Kansas City (he was traded to Cincinnati in midseason), pitched innings that were more critical than Johnson's innings. That's what happens when your team plays lots of close games.

By the way, Broxton's WPA total was only 1.00 despite pitching in a bunch of high-leverage innings. The difference was that Broxton didn't pitch well in the most critical situations.

I'm going to throw one more WPA-related creation at you: WPA/LI, which is sometimes called Situational Wins. The math is exactly how it looks: we take a pitcher's WPA and divide it by LI, each situation at a time, and then we add it up. The result is a stat that shows how well a pitcher (or batter) did without all that critical situation stuff. It's a performance metric that is influenced by the simple aspects of the situation.

Anyway, Broxton had one appearance in which the LI was above nine. His WPA/LI in that appearance was -0.012 (that's a negative sign). He actually didn't pitch badly—he got Coco Crisp to ground out with the bases loaded—but a run scored on the play because there were fewer than two outs.

**Sidebar:** An average WPA/LI, in absolute terms, is 0.035 per play. That is, an average play swings 0.035 wins in either direction, depending on your point of view (batter vs. pitcher). That 0.035 wins is also the average swing in WPA, which is what you get when your average Leverage Index is one. Don't forget, however, that once you include negatives in the result, the overall average of WPA and WPA/LI is zero. Every step forward for one team is an equal step backward for another.

Broxton wasn't really penalized too badly for giving up the run. After all, he got an out. On the other hand, Crisp did what he was supposed to do—he drove in the run by putting the ball in play. With no one on, that would have been a negative WPA/LI for Crisp, but with a runner on third it was a positive event. This is a good example of what WPA/LI captures and what normal counting stats don't.

Broxton faced six more situations with an LI between seven and eight and posted a positive WPA/LI only half the time. He gave up two singles and a walk, and netted two fly outs and one strikeout. Broxton definitely had a mixed record in critical situations.

Back in Baltimore, Johnson had one situation with an LI above ten (ground out; WPA/LI of 0.026) and 28 situations (plate appearances, mostly) with an LI between 4 and 10. In those 28 situations, he posted a positive WPA/LI 18 times and an overall average of 0.011. In all other less-leveraged situations, his WPA/LI was 0.007. In other words, the more critical the situation, the better he pitched.

Johnson was the star of the bullpen, but he wasn't the only superb reliever on the Orioles roster. Their next two best relievers were waiver pickups off the Rangers' roster: Pedro Strop and Darren O'Day.

Strop was the Orioles' setup man, and his LI was second on the team behind Johnson (1.68). He also finished with 1.23 WPA and 0.35 WPA/LI total. These aren't impressive totals for a pitcher with a devastating sinker, an ERA of 2.44, a 5-2 record and plentiful opportunities in the Baltimore bullpen. Strop didn't always pitch to the situation.

In his one very high-leverage situation, Strop walked Kyle Seagar with the bases loaded. In 21 situations with a Leverage Index between four and eight, he basically broke even (0.001 average WPA/LI). On the other hand, in 76 situations with the LI between two and four (typical high-profile setup situations), Strop was very good (average WPA/LI of 0.005). When the LI was below two, he once again broke even.

Strop contributed to the Orioles' remarkable record most when he played the standard, eighth-inning setup role. Manager Buck Showalter managed to find the right spots for Strop, bringing him in before the eighth inning only five times.

O'Day was a more versatile reliever and the overlooked key to the bullpen's success. The side-armed pitcher appeared in 69 games and posted a 2.28 ERA. Although his average Leverage Index was 1.12, he was fifth among all major league relievers with a 3.42 WPA.

No one was better than O'Day at rising to the occasion. In 51 situations with the LI between two and six, he posted a 0.010 WPA/LI, similar to Johnson's record. He also pitched in 27 low-LI situations (below two), but his WPA/LI was just 0.003.

No AL reliever came close to matching O'Day's ability to deliver the most when the game truly mattered. Although Showalter liked to use the side-armed pitcher against right-handed batters, O'Day held his own against lefties and sometimes stayed in the

game for more than one inning. His versatility helped the Orioles a number of times, and O'Day was particularly impressive down the stretch, when he posted WPA game totals over 0.10 in four different outings.

Other relievers contributed to Baltimore's record-setting effort. Luis Ayala, a free agent pickup from the Yankees, appeared in 66 games with a 2.64 ERA. His WPA total was 1.23, and his average Leverage Index was 1.12. He is another pitcher who achieved better results when the situation was more critical, though not as extremely as O'Day did.

Left-hander Troy Patton, one of the pieces Baltimore acquired in the trade that sent Miguel Tejada to the Astros back in 2007, was in his second full major-league season. He has a strong sinker/slider combination that is particularly tough on lefties. Showalter liked to use him primarily against left-handed batters, but Patton handled right-handed batters too. His ERA was 2.43 in 54 games, and he had a 0.99 WPA and an average LI of 0.86.

Brian Matusz was dropped from the starting rotation and sent to the bullpen in the second half of the year, where he proved to be an effective reliever (0.017 average WPA/LI), as Showalter used him against left-handed batters frequently.

And no review of the Orioles' bullpen is complete without mentioning first baseman Chris Davis' appearance on the mound in the final two innings of a 17-inning, 9-6 win over Boston. Davis not only got the win, but he picked up 0.20 WPA wins.

This may be the easiest way to understand how the Orioles broke the major league record for bullpen WPA and won all those close games:

- Oriole relievers pitched more innings than the average team (their 545 innings was the fourth-highest total in the majors).
- They pitched well. Their WPA/LI was second-highest in the majors (5.5 vs. Tampa Bay's 6.0)
- Their Leverage Index was higher than average (1.09 vs. 1.03, though many teams were higher; Cincinnati's LI was 1.18, for example).
- Most importantly, they pitched to the situation. Check out the following table of bullpen situations:

LI	% of Situations		Average WPA/LI	
	League	BAL	League	BAL
4+	3.29%	3.61%	0.0009	0.0077
2-4	14.22%	16.82%	0.0018	0.0077
0-2	82.49%	79.56%	0.0013	0.0010

Here you can see that they pitched in relatively more high-leverage situations (16.8 percent vs. 14.2 percent of total situations had an LI between two and four) and, more importantly—thanks to the remarkable clutch performances of O’Day, Johnson and Ayala—they performed much better than the league average in those situations (0.0077 vs. 0.0018). They had an even more lopsided advantage in the most critical situations (LI higher than four).

Okay, let’s move onto batting. You didn’t hear much about him after the season was over, but it was Joey Votto who actually led the major leagues in batting WPA last year. His 6.32 WPA led second-place Mike Trout by a full game.

At 4.81, Votto’s WPA/LI was lower than his WPA. This means he did a fine job of matching his performance to the situation, because you increase your overall WPA by posting a better WPA/LI in higher-leverage situations. For most batters (those with an average Leverage Index close to one), you can calculate their clutch performance by subtracting WPA/LI from their WPA. This is a quick and easy way to calculate the “O’Day effect” of performing better in more important situations.

Votto’s figure wasn’t the most clutch in the majors last year—that distinction belongs to Jimmy Rollins—but it was close. You can find this stat by looking up Clutch on FanGraphs.com, in the Win Probability section.

Would it surprise you to find out that the Orioles’ bullpen was first in the majors in Clutch last year (7.19)? Would it surprise you to find out that this was also a new major league record?

Sorry, back to batting. The Orioles scored 712 runs last year, eight runs below the major league average. Their WPA was -0.81, almost exactly what you would expect, given their number of runs scored. Yet Orioles hitters contributed to Baltimore’s amazing record, too. Their Clutch score was 1.77.

Baltimore’s top WPA contributor with the bat was Adam Jones, who hit .287/.334/.505, and finished with a WPA of 3.03 and a Clutch score of 1.09. His biggest hit of the year was a single to left with two outs in the 11th inning of a July 13 game against the Tigers. The Leverage Index for that situation was 6.7.

Yes, Jones rose to the occasion, too. When the LI of a situation was between zero and two, his average WPA/LI was 0.002. When it was between two and four, his average WPA/LI was 0.008. And when the LI rose above four, his average WPA/LI was 0.010. No other Baltimore batter contributed quite the way Jones did.

WPA is unkind to starting pitching because starters don’t often get to pitch in high-leverage situations. At least, not these days. That’s why we prefer to rank starters by WPA/LI. It won’t surprise you to find out that Justin Verlander led the majors in pitching WPA/LI, at 4.46. His Clutch score was negative, but that obviously wasn’t a large issue for the big guy.

Jason Hammel led the Orioles’ rotation in WPA/LI with a 1.43 mark, despite missing much of the second half. Baltimore starters weren’t a dynamic bunch, but

they were surprisingly solid. They don't enter into this story because they weren't really factors in the quirkiness of the Orioles' year, but don't count them out in future years.

### **Other WPA Stories in 2012**

In the current implementation of WPA, each team starts out with a 50 percent chance of winning a game (other implementations could give the home team a 54 percent chance, or could factor in the quality of the starting pitchers, but Fangraphs and Baseball Reference don't do that). The winning team moves toward a 100 percent chance of winning by the end of the game; the losing team moves toward zero.

So the quickest, least competitive game would have only 0.5 WPA points in total. The winning team would take over right away and crush the opponent, effectively reaching nearly 100 percent very early in the game.

The least competitive game of 2012 was played between the Giants and Astros on June 13. The Giants, in their friendly home confines, rolled out to a 2-0 lead by the end of the first, a 5-0 lead by the end of the second and a 7-0 lead by the end of the third. They eventually won the game by a score of 10-0, and there was a total of only 0.62 WPA points accrued during the game.

Oh, and Matt Cain pitched a perfect game.

Since the game was a rout, Cain picked up only 0.12 WPA points on his perfect day. On the other hand, he did post a WPA/LI of 0.505. Not bad.

The most competitive game of 2012 was the May 17 affair between Colorado and Arizona in Denver. The Rockies had a 4-2 lead after six innings (77 percent probability of winning), but the Diamondbacks scored one in the seventh and four in the eighth to take a 7-4 lead (an 87 percent probability of victory for them). The Rockies scored three in the eighth to tie things up (all runs scored with two outs), but Arizona took the game in the top of the ninth on a Justin Upton home run (worth 0.4 WPA points itself).

Given all the ups and downs, this game totaled 9.45 WPA points before being settled, the largest total for a nine-inning game.

Felix Hernandez turned in the two best pitching performances of the year according to his WPA totals. On August 8, he pitched a complete-game, 1-0 victory over the Yankees in Yankee Stadium. Hernandez struck out six and gave up only two hits while making a lone second-inning run stand for the Mariners victory. His WPA total was 0.85.

Three weeks later, on August 27, he did the same thing against the Twins, this time making an eighth-inning run hold up for the Seattle victory. His 0.82 WPA total was the second-best single-game total in the majors.

On June 8, the Diamondbacks were playing an interleague game against the A's and were losing, 8-6, with two runners on and two outs in the bottom of the ninth.

Ryan Roberts hit a home run off Brian Fuentes to win it for Arizona, 9-8. In WPA terms, that was the biggest hit of the year, worth 0.90 WPA.

The biggest batting day of the year was Votto's May 13th. The Reds first baseman was 4-for-5 with three home runs and six RBI, which is, you know, pretty impressive. But the key thing is that his last home run was a grand slam in the bottom of the ninth, with two outs and the Reds losing, 6-5. That is how you win ballgames. Votto's WPA was 1.05 that day.

On July 13, San Diego second baseman Everth Cabrera was on third base with two outs in the top of the ninth and his team down by a run to the Dodgers. When Kenley Jansen got a little too focused on dirt in his shoe, Cabrera took off and stole home. Will Venable scored, too, because when Jansen threw home to try to nail Cabrera, he did so wildly. The Padres took the lead and, eventually, the game. That play, including the stolen base and error, was the biggest stolen-base play of the year, at 0.65 WPA.

*Sidebar: This play is a good illustration of the hazards of using play-by-play data on an automated basis to create stats like WPA. This play was a single event in the record books, but it's unclear how credit should be allocated between Cabrera and Venable. Dealing with fielding errors is also problematic.*

Cabrera was the best basestealer in the majors last year, with his stolen bases accounting for 1.15 WPA points. That's what you get when you steal 44 bases and get caught only four times.

Raul Ibanez faced James Shields 17 times in 2012, and hit two doubles, one triple and two home runs. He was also walked four times. All of which added up to a 0.84 WPA total in that one batter/pitcher matchup, the most lopsided in the majors last year (minimum five plate appearances).

At the other end of the spreadsheet, the Twins' Glen Perkins was brought in seven times to face the Royals' left-handed batter Mike Moustakas, all in high-leverage situations. Perkins had Moustakas' number, as he struck him out four times and allowed only one hit. That was the most lopsided matchup for pitchers in 2012.

Finally, I want to return to Rollins' big year in the clutch. Overall, Rollins only hit .250/.316/.427. But in 188 plate appearances in which the Leverage Index was over 1.5, Rollins hit .368/.397/.585, a remarkable performance in the clutch. And this is where I remind you that clutch performances are almost entirely random and Rollins almost certainly won't approach this level of clutchiness again. Almost certainly...

### **Win Probability, the Math**

Win Probability tables are nothing more than Run Expectancy tables built on top of each other. You know those Run Expectancy tables? The ones that say that with

no one on and zero outs, the average team will score 0.55 runs in the inning? Or with a runner on second and one out, an average team will score 0.73 runs in the rest of the inning?

I highly recommend them, because they are the foundation of much of sabermetrics these days. You can find modeled Run Expectancy tables at Tangotiger's site. Try this URL:

*[http://www.insidethebook.com/ee/index.php/site/article/run\\_expectancy\\_by\\_run\\_environment/](http://www.insidethebook.com/ee/index.php/site/article/run_expectancy_by_run_environment/)*

You can also find a terrific piece of research highlighting year-by-year run expectancy changes at Retrosheet:

*[http://www.retrosheet.org/Research/RuaneT/valueadd\\_art.htm](http://www.retrosheet.org/Research/RuaneT/valueadd_art.htm)*

As I said, Win Probability tables are simply Run Expectancy tables built on top of each other. You start with a potential game-ending situation—say a runner on first with two out in the bottom of the ninth—and you add the run expectancy table to see how probable it is the team will score enough runs to tie or win. And then you move backwards from there, to the beginning of the game.

Perhaps this sounds complicated, but it really isn't. I created the tables myself, in Excel, and you can download the Excel spreadsheet at the following website to see exactly how it's done:

*<ftp://ftp.baseballgraphs.com/wpa/>*

The results match closely with actual experience, which verifies the model. The reason you want to use the model instead of experience, by the way, is because you find some strange variations in specific situations in the real world. That's because there's not enough data to smooth things out. The model takes care of that.

As for Leverage Index, that is simply based on the range of possible win expectancy outcomes from the play in question. The larger the range of potential outcomes, the higher the leverage. It's been calculated by Tom Tango, but you can create a quick Leverage Index yourself simply by taking the difference between the current win expectancy and the win expectancy if the batter strikes out. This will work for all situations except when there's a runner on third with fewer than two outs.

### **One Last Point**

I sometimes hear people say that Leverage Index doesn't work because getting outs in high leverage situations doesn't seem to correlate with winning. I found this hard to believe, so I decided to investigate it myself. In 2012...

- If a team got an out with an LI between 1.5 and 2, it won the game 60% of the time.
- If it got an out with leverage between 2 and 2.5, it won 62% of the time.
- If it got an out with leverage between 2.5 and 3, it won 68% of the time.
- If it got an out with leverage between 3 and 4, it won 69% of the time.
- If it got an out with leverage between 4 and 5, it won 71% of the time.
- If it got an out with leverage over 5, it won 76% of the time.

As you can see, when pitchers succeed in high-leverage situations, their teams are more likely to win the game. WPA isn't for everyone, but it does what it says it does.

# The Story Stat, Circa 2014

by Dave Studenmund

## Jeter's Last Game in the Bronx

Derek Jeter's very last game in Yankee Stadium, the last game in which he took the field as a shortstop, was his finest. Silly statement, no? After all, he went just 2-for-5, scored a run and batted in three. Pretty good, but not great, right? Let's review his at-bats from the perspective of Win Probability Added (WPA) instead, and you may see what I'm hinting at.

After Baltimore had taken a two-run lead in top of the first inning, Jeter hit a double in the bottom half, scoring a runner with no one out. He subsequently advanced to third on a wild pitch and scored on an error. In other words, he was in the middle of three different plays in which the Yankees tied the score. Before he batted, the Yankees had just a 37 percent chance of winning. After he was done, they had a 58 percent chance.

In the second inning, with the score still tied, Jeter hit into a fielder's choice to make the last out of the inning. If this had been the first out of the inning, he might have made a significant negative impact on his team's chance of winning. With two outs, however, the impact wasn't as great, and the Yankees' chances dropped from 52 percent to 50 percent.

Jeter struck out swinging in the fifth, another two-point drop in the Yankees' win probability. Not a big loss. But in the seventh inning, with one out, the bases loaded and the score still tied, Jeter hit a ground ball to shortstop that J.J. Hardy booted for an error. Two runs scored on the play, and the Yankees' win probability jumped from 74 percent to 93 percent. Before the inning was over, the Yankees held a 5-2 lead.

On that play, Jeter didn't really make a positive contribution in the form of a hit, a walk or whatever. He was the recipient of a Baltimore error. Still, the play had the same impact as a single and, after all, isn't Jeter known for somehow taking advantage of his opponents' mistakes? Let's acknowledge that we're telling the Story of Jeter here; we're not trying to measure the exact impact of his batting line. The Story is that the Yankees took the lead on a Jeter batted ball.

The Orioles slugged a couple of home runs in the top of the ninth to tie the game, setting the stage for more of the Jeter Story. In the bottom of the ninth, Jose Pirela singled to lead off and was subsequently sacrificed to second. At this stage, the Yankees had a decent chance of breaking the tie, and their probability of winning was 62 percent. Jeter sealed it by singling to right, as you may recall. The run scored, and the Yankees won Derek Jeter's very last home game.

Jeter's final hit was the one that grabbed the headlines, but the remarkable thing about this string of events is that he was centrally involved in all three of the Yankees' scoring displays. He not only singled and doubled, but Jeter took advantage of a wild pitch and two errors. His two outs had minimal negative impact because of when they occurred.

In fact, when you add up all the win probability increases and decreases, you find that this was the finest game of Jeter's career. All in all, his plays added 62.8 percentage points to the Yankees' win. (Kudos to Ben Lindbergh of *Grantland* for pointing it out at the time.) For perspective, the second-best total of his career came on April 11, 2006, when he added 53.2 points to a Yankees win (primarily due to a three-run homer in the bottom of the eighth that handed Mariano Rivera a 9-7 lead).

We figure that each team starts a game with a 50 percent probability of winning. At the end of the game, one team sits at 100 percent and the other sits at zero percent. There are a lot of swings up and down between the beginning and the end, but one way of looking at Jeter's 0.63 WPA is that he made up the difference between the start of the game and winning (and then some) all by himself (0.63 being more than 0.50). Quibble with my approach, but it was a remarkable capstone to a remarkable career.

### **A Game for the Ages**

Jeter's Last Home Game wasn't the biggest batting game of the year, however. That distinction belongs to the Orioles' Nelson Cruz. On Sunday, Sept. 7, when playing the Rays at Tampa Bay, Cruz ...

- Singled in the first with two outs (very small impact on his team's probability of winning)
- Grounded out to lead off the top of the fourth (same)
- Homered with a runner on first in the top of the sixth, to put the Orioles on the scoreboard and pull within 3-2 of the Rays (helped a lot)
- Walked in the bottom of the seventh with the Orioles down 4-2 (helped a little)
- Came to bat with the bases loaded and one out in the top of the ninth and the Orioles down 4-2 and tripled to put the O's on top. However, Tampa tied the score in the bottom of the ninth. (almost won the game)
- Homered in the top of the 11th with a man on to put the Orioles ahead for good, 7-5 (won the game)

When you add up the impact of all of these plays, Cruz added 1.24 WPA to the Orioles' cause. This was the biggest total of the year. In fact, this total was historically great; it was the second-highest single-game WPA batting total in the last 40 years (1974 is the first year for which we have complete play-by-play data).

The only bigger game was turned in by Brian Daubach of the Red Sox on Aug. 21, 2000. I'll let you look up the details of that game on the internet.

The funny thing is that Cruz racked up only 2.88 WPA over the entire season, which means he accrued almost half of his net positive total in one game.

### **The Biggest Game of the Year**

You know how we were talking about Derek Jeter and taking advantage of opponents' mistakes? Well, the biggest game of the year ended on a mistake.

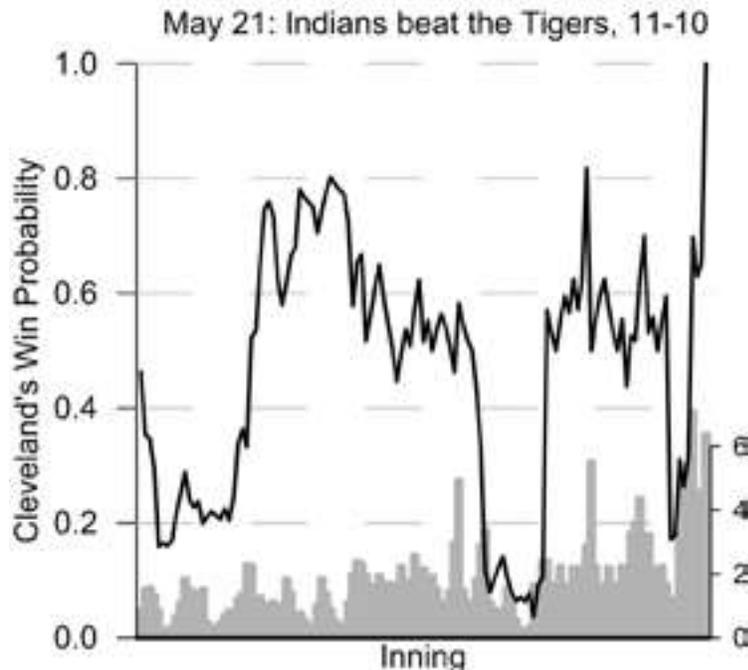
When I say "biggest" game, I mean the one with the most in-game drama. When teams swap leads, or just threaten to take a lead, win probability moves up and down a lot. When one team takes an early lead and cruises to a win, win probability basically moves in just one direction.

So I use swings in win probability to quantify how much drama there was in each game. Specifically, I take all the swings in win probability and divide by the number of innings in the game. (If not for this last step, all extra-inning games would be ranked ahead of nine-inning games.)

So it is that the game with the highest "drama" in 2014 was played on May 21 between the Tigers and Indians in Cleveland. The Indians had taken the first two games of the series and were going for the sweep with a victory in the third. This is how the game unfolded:

- The Tigers jumped out to a 4-0 lead in the top of the first against Indians starter Zach McAllister.
- The Indians scored one in the bottom of the first and five more in the bottom of the second to take a 6-4 lead against Max Scherzer, the Tigers' starter and reigning American League Cy Young Award winner.
- The Tigers scored a run in top of the third, and the Indians scored one of their own in the bottom of the third. The Indians maintained a two-run lead.
- The Tigers tied things up, 7-7, with two runs in the top of the fifth. At this point, McAllister was out of the game, but Scherzer was hanging in there.
- The score stayed tied until the top of the eighth, though both teams threatened to score in nearly every inning. There was only one 1-2-3 frame along the way.
- The Tigers took a 9-7 lead in the top of the eighth on a single, walk, error and single. Batters subsequently went down in order in the bottom of the eighth and top of the ninth.
- In the bottom of the ninth, David Murphy hit a home run with Michael Brantley on base to tie the game.
- A few threats were pulled together in extra innings, but no team actually scored until the top of the 13th, when Alex Avila homered for the Tigers.
- The Indians bounced back and won the game in the bottom of the 13th by scoring two runs on a single, sacrifice bunt, hit batter, single, ground out, intentional walk and balk by the pitcher, Al Albuquerque.

Yes, the biggest game of the year ended on a walk-off balk. This is what that the game looked like graphically:



The black line shows the Indians' win probability at each point of the game. The gray bars at the bottom are the Leverage Index (scale from 0.0 to 6.0 on the right), which uses WPA to measure the criticality at each stage of the game. For Leverage Index, 1.0 is average. Naturally, as the game progressed, the plays became more critical.

There were lots of other games with big swings in win probability last year. April 10 in San Francisco; April 3 in Chicago (South side); April 23 in Colorado; Sept. 5 in Boston. Look them up, or better yet, watch them on MLB.tv during the offseason. They are sure to be entertaining.

The year's biggest game ended on a mistake, but it wasn't the year's biggest mistake.

### **Taking Advantage of Mistakes**

The biggest mistake of the year occurred in the bottom of the eighth on April 14. The Padres were down by a run and batting against the Rockies with the bases loaded and two outs when Rex Brothers uncorked a wild pitch and catcher Wilin Rosario threw wildly to try to catch the runner. Two runs scored, and the Padres went on to win the game.

I guess that's two mistakes, but it was one play. Okay, the biggest single mistake of the year was a dropped fly ball by Jayson Werth of the Nationals on Sept. 3 against

the Dodgers. The Nationals held a one-run lead with two outs in the bottom of the ninth and a runner on first. Jason Turner lofted a fly ball down the right-field line, and Werth seemed to lose it in the sun. The ball glanced off his glove and the runner scored from first, snatching a near-victory from the Nationals. For the moment, anyway—Washington won the game in the 13th.

The batter (or sometimes baserunner) who took the most advantage of mistakes by the opposing team was Asdrubal Cabrera, who garnered 1.31 WPA on opponents' mistakes. He was the runner on third when Albuquerque balked on May 21, and he also reached base on an error against the Pirates in the bottom of the seventh on Aug. 17. The latter play tied the score, and the Nats subsequently won with a run in the ninth.

Altogether, Cabrera was involved in 23 different “mistake” plays by the opposition. Starling Marte was involved in the most mistake plays this past year, 27, but those didn't have quite the same game impact as did Cabrera's. To give you an idea of the types of plays included in my analysis, Marte's total included:

- 12 errors
- 10 wild pitches
- Three errors on fielders' choices
- One passed ball
- One defensive indifference

I know I really shouldn't call defensive indifference a “mistake;” maybe an intentional mistake? Don't worry. The WPA impact of defensive indifference is always extremely small.

By the way, Jeter was involved in 19 mistakes by opponents and ranked 10th in the majors in total “mistake” WPA.

Let's switch sides and ask ourselves “Which pitcher suffered the most from his own team's (and sometimes his own) mistakes?” The answer is Mets reliever Jeurys Familia, who accrued -1.35 WPA (that's a negative) points based on mistakes.

About half of that total was due to nine wild pitches he threw. There were also two errors committed by his fielders, two more errors on sacrifice bunts, an error on a fielder's choice and a passed ball. None of his wild pitches had the same impact that Brothers' did, but nine is a lot for someone who pitched only 77 innings. Familia pitched a lot of high-leverage innings, which is why his mistakes tended to have a bigger impact than the average pitcher's.

Which team took the most advantage of opponents' mistakes? The White Sox did, as they racked up 6.4 WPA points on 60 errors (alone worth nearly 3.0 WPA) and 57 wild pitches (another 2.0 WPA). The Phillies and Twins were close behind the Sox. The team that took the least advantage of mistakes was Colorado, with only 3.1 mistake WPA points. In other words, the difference between the Sox and Rox in taking advantage of mistakes was worth three games in the standings.

Remember that WPA is based not only on how often an event, like a wild pitch, happens, but *when* it happens. The more critical the situation, the bigger impact an event will have. The White Sox saw 57 wild pitches and the Rockies saw 44, but the average Leverage Index of a Sox wild pitch was 1.76, while the Rockies' was 1.23.

Our next-to-last mistake question is: Which team suffered the most from its own mistakes? That would be the Atlanta Braves, with a -6.25 WPA on their own mistakes (followed closely by the Indians and Pirates). Their 73 wild pitches yielded -2.5 WPA, and their errors accounted for another -2.67 WPA. If you're a Braves fan and you thought, "The Braves really hurt themselves with mistakes at the wrong time!" during the season, you were right.

The team that suffered the least from its own mistakes was Cincinnati, with only -3.37 WPA.

For our final thought, let's put the two results together and ask, "Which team most helped its cause by taking advantage of others' mistakes and not hurting themselves with its own?" In other words, which teams had the higher positive "mistake WPA" when batting and the lowest negative "mistake WPA" when pitching?

The answer is the Minnesota Twins, who scored a net positive 1.95 "mistake WPA," followed closely by the Rays. The team that hurt itself the most in this category was Colorado, with a net -2.11 "mistake WPA."

And that was the story of the mistake in 2014. Just for fun though, here's a table with the top five teams by mistake WPA:

<b>"Mistake WPA" Leaders, 2014</b>			
<b>Team</b>	<b>Bat</b>	<b>Pitch</b>	<b>Total</b>
Minnesota	5.9	-4.0	1.9
Tampa Bay	5.7	-3.9	1.8
Arizona	5.6	-4.0	1.6
Washington	5.5	-4.0	1.6
Cincinnati	4.8	-3.4	1.5

### **The Royals and the Athletics**

In general, a team's wins and losses follow a pattern that is predicted by the number of runs it scores and the number of runs it allows. This is called the Pythagorean Formula, and I'll describe it at the end of this article. Suffice to say that when a team scores more runs than it allows, it wins more games than it loses. When it scores a lot more runs than it allows, it wins a lot more games than it loses. As a general rule, every 10-run difference turns a loss into a win in a team's record, and vice versa.

In 2014, the Oakland A's scored 729 runs and allowed 572. This was the biggest run difference in the majors, and you would have expected a team with this many

runs scored and allowed to win about 99 games. The A's won 88. The Kansas City Royals, on the other hand, scored 651 runs and allowed 624, which normally would compute to about 84 wins. They won 89 games instead.

Usually, when I see differences like this, I look at each team's record in close games (games decided by just one or two runs). Winning close games is often a key ingredient in making the most of your runs. KC was 22-25 in close games and the A's were 21-28. That's a difference, but not a huge difference.

Let's use WPA instead. On average, American League teams scored 677 runs and allowed 670 (bless the National League!). This means the A's scored 51 runs more than average and allowed nearly 100 fewer runs than average. Since a win is worth about 10 runs, you would expect their batting WPA to be around 5.0 and their pitching WPA to be around 10.0. Unfortunately, for A's fans, those figures were actually 1.75 and 5.3. Let's create two handy-dandy tables to compare the two teams:

Kansas City-Oakland Batting WPA Comparison					
Team	RS	Avg	Exp WPA	WPA	Diff
Oakland	729	677	5.16	1.75	-3.41
Kansas City	651	677	-2.64	-0.55	2.09

Kansas City-Oakland Pitching WPA Comparison					
Team	RA	Avg	Exp WPA	WPA	Diff
Oakland	572	670	9.81	5.33	-4.49
Kansas City	624	670	4.61	8.89	4.27

These are just estimates, but I hope you get the drift. The A's fell short of their batting expectations by nearly three-and-a-half games, and missed their defensive expectations by nearly 4.5 games. The Royals, on the other hand, exceeded expectations by 2.1 and 4.3 games, respectively. As a result, these two teams with vastly different run differentials met as equals in the Wild Card playoff game.

When you see differences like these, timing of events usually plays a key role. The A's probably didn't score runs (and stop runs from scoring) when it counted as well as the Royals did. Timing is often the difference between winning and losing. Timing happens to be what WPA measures.

So let me throw a few numbers at you for perspective. For this next analysis, I'm going to combine WPA and LI into a single stat called Situational Wins (or WPA/LI). The math is as simple as it looks: you divide the WPA of each play by its LI. This takes the criticality out of the situation and simply measures how well each team "won" or "lost" each play on an isolated basis. I'm not going to go into more detail here, but I'll put a link or two at the end of the article for those of you who are interested.

Anyway, using Leverage Index to group events into levels of criticality, we find that AL teams added batting Situational Wins along these lines:

- When LI was between 0 and 1, batting teams posted an average WPA/LI of 0.7 (per 10,000 plays; all the following figures are per 10,000 plays).
- For an LI between 1 and 2, batting teams posted an average WPA of -0.7 (that's a negative; batters lost some ground when the LI rose).
- For LI between 2 and 3, batting teams posted an average WPA of -7.2 (that's a really big drop).
- For any LI above 3, the batting teams posted an average WPA of 2.6. (that's a positive number; for some reason, batting teams bucked the trend at the upper reaches of LI).

Generally, this pattern makes sense. When situations become more critical, pitching teams bring in their best relievers and more strategies are brought into play to stop runs from scoring. Batting teams tend to create fewer Situational Wins when situations get more critical. The head scratcher is that batting teams were actually more productive when LI rose above 3.0. I don't know why this is, but I just love finding more topics to research.

So how did the 2014 A's and Royals batters line up?

Kansas City-Oakland Batting LI Comparison			
LI	Avg	Oak	KC
0-1	0.73	3.49	-15.22
1-2	-0.68	7.34	-3.61
2-3	-7.19	-4.83	22.05
3+	2.55	3.61	10.69

Oakland's bats were good across the spectrum, except for a dip when LI was between two and three. Kansas City, on the other hand, was pretty bad in unimportant situations and much better than Oakland in critical situations. In fact, KC was the worst batting team in the major leagues in unimportant situations (LI under 1.0) and the third-best batting team when LI was between two and three!

Remember, the higher the Leverage Index, the more impact plays have on the eventual outcome of the game. This is why we call it "Leverage Index." The Royals were much better than the A's at leveraging their runs into wins, despite the fact that they scored many fewer runs.

Next, we'll switch sides and view things from a pitching perspective. These average pitching figures will differ from the average batting figures (besides being the negative equivalent) because of the influence of inter-league games. We're just looking at American League teams here.

How did the Oakland and KC pitchers and fielders perform as situations became more critical?

Kansas City-Oakland Pitching LI Comparison			
LI	Avg	Oak	KC
0-1	-0.88	17.45	5.84
1-2	2.76	-2.63	9.92
2-3	7.53	40.37	20.52
3+	1.21	12.51	22.40

Take a good look at that Royals' column. As the criticality rose, so did their performance. It's really striking. They pitched well enough in unimportant situations, but they pitched better and better as situations became more potent.

The A's, once again, pitched really well when it didn't really matter. In this case, they were second in the majors in non-critical pitching (the Nationals were first). They also did well in critical situations (first in the majors with an LI between two and three), but their upward trend wasn't as clear as Kansas City's.

On FanGraphs' website, you can find a stat called "Clutch." It's a measure of how well players impacted their teams' chances of winning. Players who perform relatively better in high-leverage situations have positive clutch scores; those who don't have negative clutch scores.

Among all qualified major league batters last year, the top two leaders in Clutch were the Royals' Alex Gordon and Sal Perez. On the mound, the Royals' Aaron Crow was second in the majors in Clutch (behind the Mets' Carlos Torres).

As a team, the Royals were first in clutch batting; the A's were 15th. On the mound, the Royals were fifth in clutch pitching; the A's were 27th.

### **Bullpens**

There's no doubt Kansas City's vaunted bullpen played a big role in its success. Managers are able to deploy their relievers according to the criticality of the situation. For instance, the average Leverage Index when Wade Davis (he of the 1.00 ERA) entered the game was 1.45. When Aaron Crow (4.12 ERA) entered the game, it was 0.96. When Louis Coleman (5.56 ERA) entered the game, it was 0.52.

This wasn't just smart bullpen management by manager Ned Yost. It was superb performance by KC's best relievers when they were being counted on. WPA is a great way to judge the performance of bullpens, because WPA takes both the performance and impact of the bullpen into account.

Here is a list of the top five bullpens in 2014:

Top Five Bullpens, 2014			
Team	WPA	WPA/LI	LI
KC	7.64	4.04	0.98
SD	7.13	3.72	0.94
BAL	6.24	2.54	1.15
LAA	6.21	3.89	1.06
STL	5.67	3.49	1.26

The Royals led the majors in bullpen WPA and were third in WPA/LI. That's impressive. And while there's a big drop in WPA from fourth to fifth place, I kept the Cardinals in the mix to show that they led the majors in average Leverage Index. One footnote: the Oakland bullpen was second in the majors in WPA/LI but 16th in WPA—proof once again that the A's just didn't perform when it mattered most.

### Matchups

Speaking of bullpens, Twins ace Glen Perkins had a couple of interesting matchups against the White Sox last year. In seven plate appearances against Dayan Viciedo, Perkins gave up a home run, triple, double and single. In the other at-bats, Viciedo grounded out, struck out and flew out. Adding up all the pluses and minuses in WPA (that home run was a biggie, giving the White Sox a 7-6 win in the bottom of the ninth of a Sept. 13 game), this was the most lopsided matchup in favor of a batter.

On the other hand, Perkins faced the Sox's Alexei Ramirez seven times—once when the LI was nearly six and two other times when it was over three—and retired him all seven times. Ramirez flied out three times, lined out, hit into two fielder's choices, and struck out. Adding up all the pluses and minuses in WPA, this was the most lopsided matchup of 2014 in favor of a pitcher.

That crazy Glen Perkins. Go figure.

### The Best

So who were the winningest batters last year? Here's a list of the top five:

Top Five Batters by WPA, 2014			
Batter	WPA	WPA/LI	LI
Mike Trout	6.88	5.38	0.97
Giancarlo Stanton	5.18	5.42	1.09
Andrew McCutchen	4.90	5.24	0.99
Buster Posey	4.81	3.20	0.97
Jayson Werth	4.68	4.09	1.00

When you rank batters by WPA, you're not really saying these were the best batters. You are saying that these batters arguably had the biggest impact on their teams' records. WPA measures real-time impact, and that's what you see in these numbers.

Of course, we find the usual suspects on this list, but you might be surprised to see Buster Posey at number four—I know I was. Posey had a fine year, but it didn't appear to be on a par with Trout, Stanton or McCutchen. And WPA doesn't care that Posey is a catcher.

But Posey had a Clutch score of 1.78, tied for fifth-best in the majors. The Giants had their winning ways, too.

### References & Resources

- Ben Lindbergh, Grantland, "The Captain Bids Adieu: Derek Jeter's Surprisingly, Belatedly Great Good-bye," [grantland.com/the-triangle/derek-jeter-yankee-stadium-farewell-heroics](http://grantland.com/the-triangle/derek-jeter-yankee-stadium-farewell-heroics)
- Dave Studeman, The Hardball Times, "10 Lessons I Have Learned about Win Probability," [hardballtimes.com/10-lessons-i-have-learned-about-win-probability-added](http://hardballtimes.com/10-lessons-i-have-learned-about-win-probability-added)
- Dave Studeman, The Hardball Times, "The One About Win Probability," [hardballtimes.com/the-one-about-win-probability](http://hardballtimes.com/the-one-about-win-probability)
- Dave Studeman, The Hardball Times, "Talking Situational Wins," [hardballtimes.com/talking-situational-wins](http://hardballtimes.com/talking-situational-wins)

### Pythagorean Formula

The Pythagorean Formula converts a team's Run Differential into a projected Win/Loss record. The formula is  $RS^2/(RS^2+RA^2)$ . Teams' actual win/loss records tend to mirror their Pythagorean records, and variances usually can be attributed to luck. Invented by Bill James.

You can improve the accuracy of the Pythagorean formula by using a different exponent (the "2" in the formula). In particular, a sabermetrician named US Patriot discovered the best exponent can be calculated this way:  $(RS/G+RA/G)^{.287}$ , where  $RS/G$  is Runs Scored per game and  $RA/G$  is Runs Allowed per game. This is called the PythagPat formula.

# The Most Storied Postseasons

by Dave Studenmund

Poor Hal Smith. If not for Yogi Berra, Mickey Mantle, Harvey Haddix and, finally, Bill Mazerowski, Hal Smith would be a legend in Pittsburgh. Every young Pirates fan would know the story of the backup catcher who smashed the biggest hit in post-season history, the one that gave the Pirates the 1960 World Series championship. For it was Hal Smith, their elders would say, who hit the incredible seventh-game, eighth-inning, three-run home run that capped the Pirates' five-run comeback for their magnificent World Series victory against the juggernaut Yankees.

That would indeed be the story if the Yankees, particularly Berra and Mantle, hadn't delivered their own clutch hits off Haddix in the top of the ninth, tying the game and necessitating a bottom of the ninth...which Mazerowski led off with one of the most famous home runs of all time. So it is Mazerowski's hit we celebrate today; it is the picture of Maz crossing home plate that is so iconic now. Poor Hal Smith.

Still, Smith deserves a special place in history, for his home run is the most important hit in the history of Major League Baseball. Don't believe me? Read on.

Earlier in these pages, Brad Johnson described a statistic called Championships Added (which I'll sometimes call ChampsAdded to save space). It is simply the Win Probability Added (WPA) of each play in a game multiplied by the championship value of that game. The math is laid out in Brad's article, and I'll include a couple of web references at the end of this article for further reading.

Let's use Hal Smith as an example. The last game of a World Series is always worth a full championship, because the difference between winning and losing is one and zero championships. In this particular seventh game, the Pirates had just a 30 percent probability of winning before Smith's smash. After the smash, their win probability was over 90 percent. That hit was worth 0.6 Championships all by itself.

To put that in perspective, consider this: the Pirates and Yankees played 154 games during the regular season to win their league pennant and claim 0.5 world championships; the league winner is presumed to have a 50 percent chance of winning the World Series. So Smith accomplished more in one at-bat than the entire Pirates team accomplished in the entire regular season! Time raises the stakes at a rapid pace, until the seventh game of the World Series culminates in the fullest stakes.

Championships Added, like Win Probability Added, is a story stat. It is a wonderful tool for quantifying the most important stories of the postseason. It doesn't really measure value or worth; it certainly doesn't measure potential. It measures the leaps and bounds of each play. Instead of calling these performances the "best" or "great-

est,” I’m going to call them “the most important” or “the most storied.”\* This is what we’re measuring when we calculate Championships Added.

\* *Webster’s defines storied as “celebrated in or associated with stories or legends.” I think it works.*

My contention is that Smith’s hit should be more celebrated, more associated with legend, than Mazeroski’s. Think about it. The Pirates were trailing when Smith came to bat; two men were already out. The clock was ticking loudly. Mazeroski’s homer, though more memorable because it ended the game, came with none out in a tie game just one inning later. Smith really deserves to be recognized for having stroked the most important hit in the history of baseball.

Don’t feel bad for Mazeroski, however. His home run ranks as the fifth-most-important hit of all time.

Two years later, the Yankees were involved in a slightly different thing: The most critical at-bat of all time. Like ChampsAdded, criticality is easy to calculate. It’s simply the Leverage Index of an at-bat (as measured by the game situation) multiplied by the championship value of the game.

I wrote about the most critical at-bats on the Internet last year. In case you missed it, I’ll put a link to that article at the end of this one. The most critical at-bat of all time was Willie McCovey’s lineout to end the seventh game of the 1962 World Series with the Giants down by a run and runners on second and third with two outs. Another fun fact you might not have known were it not for ChampsAdded.

This is what I intend to do for the next couple of pages: Use the ChampsAdded statistic to highlight some of the most important plays, games and series in post-season history. In particular, I’m going to tell you who had the second-, third- and fourth-most important hits in history, while I also cover a few other subjects along the way.

## **Most Storied Games**

It is fitting that the most important hit of the postseason occurred in the seventh game of the 1960 World Series, because that game was the most-storied nine-inning postseason game of all time. It was full of lead swings and several late-inning comebacks.

The Pirates had taken a 4-0 lead after the first two innings, with Cy Young Award winner Vern Law on the mound. However, the 1960 Yankee bats, led by Mantle, Maris and Berra, were not impressed by awards (they had already reached double figures in runs scored in three of the previous six games) and batted back to a 7-4 lead heading into the bottom of the eighth. That’s when the Pirates scored five to take a 9-7 lead, only to see the Yankees score two more to tie it in the top of the ninth.

Only to see Bill Mazeroski, who won a Gold Glove in 1960 but was hardly known for his bat, hit a home run.

When you take all the swings in that game, all the tilts of Win Probability from one team to the other, and then when you multiply those swings by a full championship (it being the seventh game of the World Series), you come up with a total of 4.5. So 4.5 championships swung back and forth in that single game. There has never been another nine-inning game like it.

However, there have been three other final games that contained more drama than the 1960 seventh. They just had to go into extra innings to make it.

### **1924: *Giants vs. Senators***

6.1 championships were swapped in this 12-inning gutbuster. The game was intriguing from the start.

The Senators' player-manager, Bucky Harris, switched pitchers after the original starter, Curly Ogden, faced just two batters. He brought in the left-handed George Mogridge to face the Giants. By starting a right-hander, Harris got Bill Terry into the lineup, batting fifth, but Terry didn't handle lefties well, so the switcheroo gave the Senators an advantage.

The strategy seemed to work well, as Mogridge took a 1-0 lead (behind a home run by Harris) into the top of the sixth. Unfortunately, the Senators' fielders didn't cooperate, and two errors led to three New York runs in the sixth. The Giants held a 3-1 lead into the bottom of the eighth, but the Senators managed to load the bases with two outs, when Harris stepped up to the plate and hit a grounder to third base. The ball took a bad hop over Freddie Lindstrom's head, and the Senators tied the game.

The Harris hit, which was a single due to the bad hop, was the seventh-most important hit of all time (0.35 ChampsAdded). You might also call it the most critical bad hop of all time.

The game remained tied for several innings, until the Senators came to bat in the bottom of the 12th. With one out, Muddy Ruel doubled, Walter Johnson (batting for himself) reached on an error, and the next batter, Earl McNeely, hit a potential groundball double play to third base...where the ball once again took a bad hop over Lindstrom's head and Ruel raced home with the winning run.

### **1997: *Marlins vs. Indians***

That great Indians team of the late 1990s made it to the World Series twice, but 1997 was the closest they ever came to winning it all. The seventh game was a low-scoring affair, and the Indians had a 2-0 lead heading into the bottom of the seventh. That's when the Marlins' Bobby Bonilla hit a solo home run to cut the lead to one, where it stayed until the ninth.

The Indians worked mightily to score an insurance run in the ninth, placing runners at first and third with one out, but they failed to score. In the bottom of the ninth, Craig Counsell came to bat with runners on first and third and one out and

he promptly hit a hard sacrifice “finer” to right to tie things up. That at-bat was the third-most critical at-bat of all time.

The Marlins threatened to score in the 10th, and then did score in the bottom of the 11th after Counsell (who else?) reached base on a critical error by second baseman Tony Fernandez. The two-out, game-winning single was delivered by Edgar Renteria.

Renteria’s hit was the ninth-most important hit of all time. In all, the Marlins and Indians swapped 4.75 championships in this one game. The next year, Wayne Huizenga broke up the Marlins and the Indians have not made it back to the World Series.

### **1912: Giants vs. Red Sox**

You have to go back to 1912 to find the third-most storied final game of all time, the third-most important hit of all time, as well as the fourth-most critical at-bat and the first truly great World Series. It was so great that it included a tie game.

The seven-game series was stretched to eight games due to a tie in the second game, and the eighth, final game was stretched to 10 innings. The Giants took a 2-1 lead with a run in the top of the 10th inning, but they gave the Red Sox a golden opportunity when Fred Snodgrass dropped Clyde Engle’s flyball to start the bottom of the frame.

A couple of batters later, the great Tris Speaker faced the great Christy Mathewson with one out, runners on first and third and the Sox still down by a run. The at-bat ranks as the fourth-most critical at-bat of all time. Speaker singled to right, tying the game and setting up the eventual winning sacrifice fly by Larry Gardner. See, the Red Sox always come through in the clutch.

4.72 championships were swapped in this one game. Speaker’s single was worth 0.38 ChampsAdded (third-most ever) and in the Series he accounted for 0.45 ChampsAdded, the eighth-highest series total of all.

### **Most Storied Series by a Batter**

Thanks to his home run, Hal Smith’s performance in the entire 1960 World Series also ranks as the all-time performance in a full Series (0.66 ChampsAdded). No other batter accumulated more ChampsAdded in a full series than Smith did in 1960. It helps that Smith batted only eight times in the Series, so he didn’t have a lot of opportunities to pull his total down.

Extra fun fact about 1960: Mantle’s series ChampsAdded total ranks as the 11th-largest of all time. It was a storied time.

The second-most storied postseason series batting performance was turned in a little more recently, by one David Freese of the St. Louis Cardinals in 2011. You may remember Game Six of that World Series...you should, because it is the most-storied Game Six of all time.

The Cardinals, who were behind 3-2 in games, were also down by three runs with two innings to go. They tied it, thanks primarily to Freese's two-out triple in the bottom of the ninth, only to give up two runs to the Rangers in the top of the 10th. They tied it again in the bottom half, thanks primarily to Lance Berkman's two-out single, and then finally won it in the bottom of the 11th on a home run by Mr. Freese.

Overall, that was the 10th most-storied game in postseason history, but it was the highest-ranked game that wasn't a final game. The Cardinals went on to beat the Rangers in the seventh game and take home the World Series trophy. Fittingly, Freese—who amassed 0.6 ChampsAdded across all seven games, was named the Series Most Valuable Player.

## **A Little Sidebar**

You may be surprised to learn that two other teams have come closer to winning the World Series than the Rangers did, only to see the other team come back to win it all. Here's a list of the teams that had compiled the highest Championship Expectancy (the probability of winning the championship, which is Win Probability at any point in time during a game times the championship value of the game) without winning it all in the end:

### **1. 1986 Boston Red Sox**

It was the 10th inning of the sixth game of the Series. The Red Sox had just taken a two-run lead (one run off the bat of postseason hero Dave Henderson) in the top of the inning and their closer, Calvin Schiraldi, was on the mound. Two outs, no one on. The Red Sox had a 99.4 percent Championship Expectancy. Three singles, one wild pitch and an error later, they had lost the game, subsequently lost Game Seven the next day and took 18 years to recover.

### **2. 2002 San Francisco Giants**

The Giants had a 5-0 lead over the Angels with one out in bottom of the seventh inning of the sixth game of this Series—a Championship Expectancy of 98.5 percent. Unfortunately for Bay area fans, Scott Spiezio hit a three-run homer in the bottom of the seventh, Darin Erstad hit a solo shot in the bottom of the eighth, Tim Salmon and Garret Anderson singled and Troy Glaus hit a two-run double to give the Angels a remarkable come-from-behind win after Troy Percival retired the side in order in the top of the ninth.

The Angels went on to win the seventh game, 4-1, and the World Series championship trophy went to Southern California instead.

### **3. 2011 Texas Rangers**

At their peak in that sixth game (bottom of the ninth, one out, up by two), the Rangers had a 98.1 percent Championship Expectancy.

#### **4. 1968 St. Louis Cardinals**

The Cardinals, led by Bob Gibson's 1.12 ERA, seemed invincible. When they were leading the Tigers in the World Series by a 3-0 score in the fourth inning of the fifth game (three runs were a whole lot of runs in those days), already up 3-1 in games, they were almost truly invincible, with a 96.7 percent Championship Expectancy.

Eventual Series MVP Micky Lolich gave up no more runs that game, Mickey Stanley hit a home run and Al Kaline hit a huge two-run single in the seventh and that was the game...and the Series. The Tigers won the sixth game easily (13-1) and Lolich outdueled Gibson by a 4-1 score in the seventh game to win it all for the Tigers.

#### **5. 1960 New York Yankees**

The Yankees held a 7-5 lead with two outs in the bottom of the eighth inning and a Championship Expectancy of 93.7 percent. One single and a Hal Smith later, and they were goners. This one is notable in that it's the first one on our list to occur in the seventh game.

#### **6. 1985 St. Louis Cardinals**

This one hurts most of all. The Cardinals had a 1-0 lead in the bottom of the ninth of the sixth game of the Series. Championship Expectancy of 91.8 percent. But umpire Don Denkinger called the first batter, Jorge Orta, safe at first even though replays showed he was clearly out. The Royals went on to score two runs on a Dane Iorg single off of Todd Worrell and win the game, 2-1. The Cardinals never had a chance in the seventh game, losing 11-0.

#### **7. 1979 Baltimore Orioles**

The Orioles held a 3-1 lead in the fifth game of the Series against the Pirates, and they held a 1-0 lead heading into the bottom of the sixth with Cy Young Award winner Mike Flanagan on the mount. Their Championship Expectancy was 91.7 percent.

The Pirates were having none of it. Pittsburgh scored two runs in the bottom of the sixth and cruised to a 7-1 victory over the O's. They proceeded to sweep the final two games from the Orioles in Baltimore and win the Series.

The seventh game of this Series included the second most-critical at-bat of all time, with Eddie Murray at the plate in the eighth inning, two outs, the Orioles down by two and runners on second and third. Murray flew out to the warning track, the Pirates scored two more in the ninth and that was that.

I love the fact that the two most critical at-bats of all time involved two of the greatest hitters of all time (Murray and Willie McCovey). The fourth-most critical at-bat involved the great Tris Speaker. The third-most critical at-bat involved, well, Craig Counsell.

## Back to the Most Storied Series by a Batter

The third-most storied postseason series batting performance was Bucky Harris' 1924 Series (0.57 ChampsAdded). We've already talked about that one, but it was so good that it's worth repeating.

Regarding the fourth batter on our list, Chris Jaffe wrote a special piece about the 1972 World Series for the 2010 *Annual*, in which he said:

*"The 1972 classic, while a great Series throughout, lacked that one special game. If one made up a list of the 50 greatest games in World Series history, it's possible none would come from 1972."*

Also...

*"It peaked at the wrong time, with its most impressive highlights occurring Games Four and Five. Looking at baseball history, it's Games Six and Seven that are best remembered."*

Yet there is one way in which the 1972 Series stands out. The underrated Gene Tenace had a sensational seven games that year, going 8-for-23 with four home runs and winning the Series Most Valuable Player Award trophy. What's more, Tenace's home runs all came in critical situations: All four of his homers gave the A's a lead (that was in Games One—in which he hit two home runs in his first two at-bats—Three and Five). Overall, he contributed 0.5 ChampsAdded in 1972, the fourth-highest total of all time.

The fifth-highest Series total might come as a surprise to you.

The 1925 World Series was a repeat of the 1924 version, with the Senators and Pirates playing each other once again, but it was the Pirates who won the Series this time—this time in just seven games. This series is notorious for Walter Johnson's performance. The Big Train was outstanding in his first two starts, but his final start, in the seventh game, was marred by a steady downpour and poor fielding support.

People talk about Johnson when they talk about the 1925 World Series, but they should also talk about Max Carey. Carey, the Pirates' center fielder, had put up a career year in 1925 after deciding to separate his hands on the bat, a la Ty Cobb. He also had a terrific Series, batting .458 and scoring six runs. In the deciding seventh game, he doubled three times and stole a base. Altogether, his 0.49 ChampsAdded is the fifth-highest total ever.

## Other Storied Hits

The second most-important hit of all time occurred in the seventh game of the Diamondbacks/Yankees series in 2001. I know what you're thinking. Luis Gonzalez's single off Mariano Rivera to win it all for the Diamondbacks must be it, right? After all, it capped a two-run bottom of the ninth that resulted in a tremendously dramatic 3-2 Game Seven win against the greatest closer of all time, right?

Wrong. The second-most important hit occurred two batters earlier, when Tony Womack smacked a double down the right-field line with one out and runners on first and second. That hit tied the game and was worth half a championship (literally 0.50 ChampsAdded). Gonzalez’s single was worth “only” 0.16 championships; after all, the bases were loaded with just one out. Even if Gonzalez had hit into a double play, the game would have gone into extra innings. If Womack had hit into a double play, the Series would have been over.

In fact, Womack’s at-bat ranks as the fifth-most critical of all time. That swing of possible events—from a home run to a double play—gave it a level of criticality rarely seen in postseason history. And Womack delivered.

I hope you remember that the third-most important hit was Tris Speaker’s single in the 1912 World Series. It was worth 0.38 ChampsAdded.

The fourth-most important hit didn’t come in the seventh game of a World Series. In fact, it wasn’t hit in a World Series at all. The fourth most-important hit ever was Atlanta’s Francisco Cabrera’s single to left in the 1992 National League Championship Series against the Pirates.

The Braves were losing, 2-0, heading into the bottom of the ninth inning of the final game of that NLCS. But they scored a run on a Ron Gant sacrifice fly, then loaded the bases for Cabrera with two outs. Cabrera’s single scored David Justice, and a sliding Sid Bream beat Barry Bonds’ throw to give the Braves the pennant.

Before Cabrera’s hit, the Braves had just a 26 percent probability of winning the series. After the hit, they had won it all. 100 percent. Cabrera’s single had such a huge impact that it breaks through the list of World Series hits to take over the fourth spot all-time, at 0.37 ChampsAdded.

And then there was the fifth, Mazeroski (also 0.37 ChampsAdded).

I know that I’ve wandered around a little bit here, so let me conclude this section with two tables of the biggest single hits and the biggest series of all time, as measured by ChampsAdded totals.

Single Hit Leaders	Total
Hal Smith	0.636
Tony Womack	0.498
Tris Speaker	0.382
Francisco Cabrera	0.368
Bill Mazeroski	0.367

Series Leaders	Series	Total
Hal Smith	1960	0.656
David Freese	2011	0.602
Bucky Harris	1924	0.573

Gene Tenace	1972	0.504
Max Carey	1925	0.494

## The Most Storied Postseason Careers

Career totals for ChampsAdded can be misleading, because it's easy to have a big impact with just one hit. Hal Smith, for instance, with just eight postseason at-bats, has the fifth-highest total ever.

The 10 highest career ChampsAdded totals are...

Batter	Total
Mickey Mantle	0.856
David Freese	0.836
Pete Rose	0.814
Lance Berkman	0.745
Hal Smith	0.656
Lou Gehrig	0.636
Dwight Evans	0.599
Tris Speaker	0.560
Reggie Jackson	0.550
Yogi Berra	0.547

Mickey Mantle batted .257/.374/.535 in the postseason, in 273 plate appearances, all in the World Series. His biggest Series were 1960, 1952, 1964 and 1953. He never really had a bad Series. His home run in the seventh game of the 1952 Series, which gave the Yankees the lead for good, was his second-biggest hit (after his single in 1960) and biggest home run.

David Freese is still playing, though perhaps for not too much longer.

Pete Rose had a long career and played with many teams that made the postseason. His best Series was in 1975, the fabled Carlton Fisk/Bernie Carbo series against the Red Sox. His biggest hit was a seventh-inning single that tied the seventh game.

Lance Berkman's 2011 World Series was the seventh-highest ChampsAdded series of all time, thanks mostly to two big hits in the sixth game. Like Mantle, he was a steady postseason performer and batted .317/.417/.532 overall.

Hal Smith.

Talk about postseason performers. Lou Gehrig batted .361/.477/.731 in the postseason and certainly suffers in ChampsAdded because his teams were rarely challenged, even in the World Series. From a ChampsAdded perspective, his most notable Series was in 1928, when the Yankees swept the Cardinals. Gehrig batted .545/.706/1.727 (1.727. That was his slugging percentage). In his next postseason, in 1932, he hit .529/.600/1.118.

As I said earlier, ChampsAdded doesn't measure value.

I'll finish extemporizing on the career ChampsAdded list with Dwight Evans. Evans appeared in the postseason only four times, in the World Series only twice, and he batted just .239/.333/.425 in those appearances. But he made his hits count.

This is a list of what Evans did in the three most critical at-bats of his postseason career (listed in descending order of criticality):

- Doubled to score two runs and pull the Red Sox within one run of the Mets in the eighth inning of the final game of the 1986 Series.
- Walked with the bases loaded in the third inning of the final game of the 1975 Series against the Reds.
- Walked to lead off the bottom of the eighth inning with the seventh game tied against the Reds in the 1975 Series.

Evans might be the anti-Gehrig. His basic stats don't look particularly good, but he had opportunities to do the right thing in the right situation, and he often did.

### And Finally...

Ron Gant appeared in the postseason in six different years, with the Braves, Reds and A's. In 210 plate appearances, he batted .228/.292/.402. What's more, in the 10 most critical at-bats of his postseason career, in descending order, he...

- Lined out
- Struck out looking
- Grounded out
- Flew out
- Grounded out
- Grounded out
- Hit a line drive into a double play
- Grounded into a double play
- Lined out
- Fouled out

His -0.82 ChampsAdded is the worst career total ever.

### References and Resources

- Dave Studenmund, The Hardball Times, "The One About Win Probability" ([hardballtimes.com/main/article/the-one-about-win-probability](http://hardballtimes.com/main/article/the-one-about-win-probability))
- Dave Studenmund, The Hardball Times, "The most critical at-bat of all time" ([hardballtimes.com/main/article/the-most-critical-at-bat-of-all-time](http://hardballtimes.com/main/article/the-most-critical-at-bat-of-all-time))
- Dave Studenmund, Baseball Prospectus, "Tensest Series of all time" ([baseballprospectus.com/article.php?articleid=16359](http://baseballprospectus.com/article.php?articleid=16359))

# The most critical at-bat of all time

by Dave Studeman

March 28, 2012

What has been the most critical at-bat in the history of major league baseball? Think about it.

Perhaps you want some definitions. By most critical, I mean the at-bat in which the championship of major league baseball most hung in the balance. By history, I mean every year since 1901, when baseball donned its modern form.

Any ideas?

Okay, let's discuss criticality. For an at-bat to be critical, it has to occur in late-season games. I think that's obvious, but just in case it's not: When a game occurs early in the season, there is time left for the team to overcome its loss, or lose its lead. But when a game occurs late in the season, there's no time left for major changes. You might not want to call late-season games more important, but you can call them more critical.

Let's keep the clock moving forward. If late-season games are more critical, it stands to reason that postseason games are even more critical. World Series games are most critical. The seventh game of the World Series is the most, most critical.

Within that seventh game, late innings will be most critical. In fact, let's just flash forward all the way to the bottom of the ninth. Take it to the extreme... two outs in the bottom of the ninth. The last tick of the clock.

The score and baserunning situation also have to be considered. A tie score is obviously tense and critical, but tie games go into extra innings if an out is made. So let's give the visiting team a one-run lead in the bottom of the ninth.

And baserunners? Put the tying and winning runs on second and third, and then you've got one heck of a critical situation: An out means the visiting team wins, but most base hits result in a home team win. That's a swing of one full world championship.

So this is our hypothetical really, really critical situation: bottom of the ninth with two outs in the seventh game in the World Series, visiting team leading by one, runners on second and third. It's happened once in the history of major league baseball. Recognize it yet?

'Twas in 1962. The Yankees and Giants had played a terrific World Series, and the seventh game was one for the history books. The wind was blowing in at Candlestick, resulting in a terrific pitcher's duel, the only 1-0 seventh game that doesn't evoke a Hall of Fame credentials debate.

The Yankees had scored their lone run on a double play grounder by **Tony Kubek** with the bases loaded. Yankee **Ralph Terry**, having given up just two hits and no walks, was shutting out the Giants entering the bottom of the ninth.

**Matty Alou** led off the ninth with a perfect drag bunt to reach first, but Terry retired the next two batters, putting the Yankees one out away from victory. However, **Willie Mays** lined a double to right, **Roger Maris** quickly got the ball back to the infield and Alou stopped at third. Thus it was that **Willie McCovey**, one of the greatest batters in major league history, came to the plate in the most critical at-bat of all time.

Terry was obviously tiring; McCovey had hit a two-out triple off him in the seventh. Plus, McCovey was a lefty batter, Terry was a righty, first base was open and **Orlando Cepeda**, a right-handed batter, was on deck.

Manager **Ralph Houk** didn't relieve Terry and he didn't have Terry walk McCovey, two curious choices that would rarely be made today. He had Terry pitch to McCovey. The outcome was so dramatic that it resulted in the only *Peanuts* comic strip to ever comment on current events, when **Charlie Brown** cried, "Why couldn't he have hit the ball three feet higher!?"

"He" was McCovey, and three feet was the difference between **Bobby Richardson's** head and a line drive base hit. Richardson caught the ball for the final out, the Yankees dodged a bullet and the Giants just missed out on a world championship.

There's never been a moment equivalent to it.

Yet there are moments that have come close. We can even quantify how close thanks to the work of others. Sky Andrecheck (now with the Indians) developed a system to **quantify the criticality of each postseason game**, and I've combined Sky's metrics with **Tangotiger's Leverage Index** to determine the most critical at-bats of all time. As you can imagine, each one occurred in the seventh game of a World Series.

---

### More from The Hardball Times



#### A Hardball Times Update

by RJ McDaniel

Goodbye for now.

---

Here they are:

## The second most critical at-bat of all time, remembered only by Orioles fans

In 1979, the Pirates were leading the Orioles by one run in the bottom of the eighth inning. It was the year of Family in Pittsburgh, when **Willie Stargell** set the bar and tone for **Dave Parker** and the rest of **Chuck Tanner's** team. The Orioles also had a terrific year, led by switch-hitting sluggers **Ken Singleton** and **Eddie Murray**.

The O's threatened by placing runners on second and third with two out in the bottom of the eighth. Singleton was up, but Tanner chose to walk him to have **Kent Tekulve** pitch to Murray. It was an understandable but still dubious move, registering a slight decrease in the Pirates' win expectancy and adding significantly to the criticality of the situation.

Like McCovey, Murray came close to a big hit, hitting a long fly to Parker on the warning track in right field for the final out of the inning. The Pirates scored two more runs in the top of the ninth to seal their world championship, and the moment was ultimately forgotten by all but the most rabid, disappointed, Baltimore fans.

## The third, and overlooked

You may remember the seventh game of the 1997 Series as a crazy 11-inning affair capped by **Edgar Renteria**'s two-out RBI single with the bases loaded for a Marlins victory. That was a mighty critical at-bat, but there was an earlier, more critical at-bat.

In the bottom of the ninth, the Indians were still leading the game by a run with closer **Jose Mesa** on the mound and **Craig Counsell** at bat. Runners were on first and third; one out. Counsell hit a hard sacrifice fly (really, it was more of a line drive than fly ball) to deep right, tying the score and setting the stage for Renteria's slightly less critical moment (yet more memorable hit) in the 11th.

## The fourth was a classic

The 1912 World Series was the first truly legendary series. The seven-game series was stretched to eight games due to a tie in the second game, and the eighth, final game was stretched to 10 innings. The Giants took a 2-1 lead with a run in the top of the 10th, but they gave the Red Sox a golden opportunity when **Fred Snodgrass** dropped **Clyde Engle**'s flyball to start the bottom of the tenth inning.

A couple of batters later, the great **Tris Speaker** faced the great **Christy Mathewson** with one out and runners on first and third and the Sox still down by a run. Speaker singled to right, tying the game and setting up the eventual sacrifice fly.

Mathewson's travails in this Series inspired some of the most memorable sections of *The Celebrant*, one of the best baseball novels ever written.

Sidebar: Speaker's at-bat was slightly less crucial than Counsell's—even though they both faced identical out/score/baserunner/inning situations—because Speaker's implied run environment was slightly higher than Counsell's. We can debate this one until the cows come home, but you can see the impact that run environments have on Leverage Index in the **Hardball Times' WPA Inquirer**.

## The fifth and also overlooked

How about the seventh game of the 2001 World Series—probably the worst moment in **Mariano Rivera**'s career? Arizona staged a big comeback in the bottom of the ninth (against history's greatest closer) to take the game and World Series, capped by

**Luis Gonzalez's** soft line drive over the infield.

But that was not the most critical moment in the inning. The most critical moment occurred two at-bats earlier with **Tony Womack** at the plate. The D-backs, down by a run, had placed runners on first and second with one out when Womack stepped into the batter's box. His double was the big hit of the game—one of the biggest in postseason history—though most of us remember Gonzalez' final hit much more vividly.

## **The sixth was not so overlooked**

The Renteria single in 1997, just over **Charles Nagy's** head.

Time for another quick sidebar. Criticality is measured by the range of potential outcomes of a situation. For instance, Renteria stepped to the plate in an obviously critical situation, but the score was tied. The result of an out would have been more extra innings, not a Marlins loss.

In the earlier, ninth-inning at-bat by Counsell, the Marlins were very close to a loss because they were down by a run, but they were also close to a tie and kind of close to a win due to the out/baserunner situation. The range of possibilities was wider in Counsell's at-bat, and that's why it ranks slightly above Renteria's in criticality.

By the way, have you noticed that batters have gotten hits, or hit the ball hard, in each of our top six most critical situations?

## **The seventh involves The Cat and The Hat**

Head all the way back to 1946, when the Cardinals and Red Sox played a tight seven-game series. The score had been tied in the bottom of the eighth when **Harry "The Hat" Walker** doubled and **Enos Slaughter** scored on his famous "mad dash" from first base to give the Cardinals the lead.

The visiting Red Sox came back in the top of the ninth, however. They had runners on second and third with one out when **Roy Partee** stepped up to face **Harry "The Cat" Brecheen**. (Yes, we're talking about The Cat and The Hat. Both named Harry.) Unfortunately for Sox fans, Partee fouled out and the Cardinals were World Champs when pinch hitter **Tom McBride** subsequently grounded out.

One last sidebar: Why was Partee's at-bat more critical than McBride's? After all, there was only one out with Partee at bat but two out with McBride at the plate, right? Shouldn't McBride's be considered more critical?

The difference is that a Red Sox win was more possible with one out than it was with two out. In other words, the range of outcomes was meatier with one out than two outs. Sure, the Red Sox were more desperate with two outs than with one out, but we're not measuring desperation here. Criticality is our concern.

## The eighth and ninth came in succession

Our last two most critical at-bats (I'm going to stop at nine because that is the maximum proposed length of any World Series. Also my fingers are tired.) occurred in the same inning of the same game against the same pitcher. It was the seventh game of the 1972 Series between the Reds and A's, and **Rollie Fingers**—the second greatest postseason reliever of all time—was on the mound.

The 1972 Series was loaded with terrific moments; these were just two of them. In the bottom of the eighth, down by two runs, the Reds' **Pete Rose** and **Joe Morgan** led off with hits. One out and an intentional walk to **Johnny Bench** later, the Reds had the bases loaded with **Tony Perez** at the plate.

Perez was known as an RBI man, and he didn't disappoint. He lofted a sacrifice fly to right, scoring Rose and moving Morgan to third. But here's the thing: The sacrifice fly actually lowered the Reds' probability of winning because it added a second out. It was a critical at-bat, the ninth most critical of all time, but Fingers came out the winner overall, not Perez.

Bench then stole second with **Denis Menke** at the plate and suddenly the two teams were in a situation that was even more critical than Perez' at-bat. With runners on second and third, two out and down by a run, Menke's at-bat situation closely mimicked Willie McCovey's—but Menke's critical moment came in the eighth inning. McCovey's came in the ninth.

Anyway, Menke flew out to left field and the A's wrapped up their world championship in the next inning.

There they are, the most critical moments in major league history. Have I ruined your enjoyment of the game by quantifying what seems, at its core, emotional?

Maybe, but I hope I've also added a little nuance to your appreciation of this most nuanced of games.

## A technical note

You may be wondering how the criticality of a game is specifically determined. Here's the math...

It all comes down to the range of possible outcomes of a game (i.e. a win or loss). When two teams play a seventh game of a World Series, there is one full world championship at stake. Think of the possible outcomes: One team wins and is 1-0 in championships; the other team loses and is 0-1 in championships. One minus zero is one, so we give the seventh game a criticality value of one.

When two teams play the sixth game of a World Series, there are two possible outcomes. The team that is ahead in the series might win, which would give it a championship. Or it could lose, which would result in a seventh game... which the team has a 50 percent chance of winning. The difference is one minus 0.5, or 0.5.

Conversely, the trailing team could win, which would give it a 50 percent probability of winning the seventh game, or could lose and lose the championship overall. The difference is 0.5 minus one, or 0.5. Same as the leading team.

The sixth game is half as critical as the seventh.

In all cases, a postseason game is equally critical to the leading and trailing team.

You can use this approach for all games in a series. You can even apply it to previous series. For instance, the final game of a League Championship Series will be worth 0.5 world championships, because the winner has a 50 percent probability of winning the World Series while the loser gets zero world championships. So you see that the final game of a league championships series is as critical as the sixth game of the World Series.

That's the math behind **Sky Andrecheck's system**. (Sky adds an additional wrinkle by comparing each postseason game to an average regular season game.) It's also the general idea behind Tangotiger's in-game Leverage Index, though in-game LI is much more complex due to the many different possible outcomes of a plate appearance.

## References & Resources

This little history lesson would have been impossible without the contributions of Sky Andrecheck and Tangotiger. Plus, I owe Sean Forman of **BaseballReference** a big show of thanks for contributing the postseason play-by-play data for this exercise.

---

Dave Studeman was called a "national treasure" by Rob Neyer. Seriously. Follow his sporadic tweets [@dastudes](https://twitter.com/dastudes).

---