Practical Implementation of Sabermetrics "Moneyball" in Athletics

Jon Nachtigal

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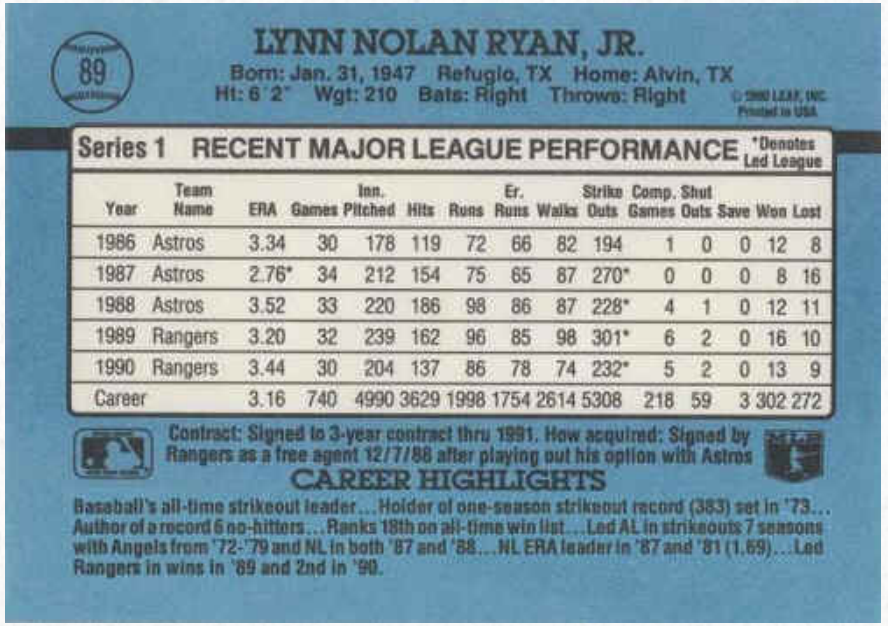

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LYNN NOLAN RYAN, JR.

Born: Jan. 31, 1947 Refugio, TX Home: Alvin, TX
Ht: 6' 2" Wgt: 210 Bats: Right Throws: Right

Series 1 **RECENT MAJOR LEAGUE PERFORMANCE** *Denotes Led League

Year	Team Name	ERA	Games	Inn. Pitched	Hits	Runs	Er. Runs	Walks	Strike Outs	Comp. Games	Shut Outs	Save	Won	Lost
1986	Astros	3.34	30	178	119	72	66	82	194	1	0	0	12	8
1987	Astros	2.76*	34	212	154	75	65	87	270*	0	0	0	8	16
1988	Astros	3.52	33	220	186	98	86	87	228*	4	1	0	12	11
1989	Rangers	3.20	32	239	162	96	85	98	301*	6	2	0	16	10
1990	Rangers	3.44	30	204	137	86	78	74	232*	5	2	0	13	9
Career		3.16	740	4990	3629	1998	1754	2614	5308	218	59	3	302	272

Contract: Signed to 3-year contract thru 1991. How acquired: Signed by Rangers as a free agent 12/7/88 after playing out his option with Astros

CAREER HIGHLIGHTS

Baseball's all-time strikeout leader...Holder of one-season strikeout record (383) set in '73... Author of a record 6 no-hitters...Ranks 18th on all-time win list...Led AL in strikeouts 7 seasons with Angels from '72-'79 and NL in both '87 and '88...NL ERA leader in '87 and '81 (1.69)...Led Rangers in wins in '89 and 2nd in '90.

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"Sabermetrics does not begin with the numbers. It begins with issues."

– Bill James

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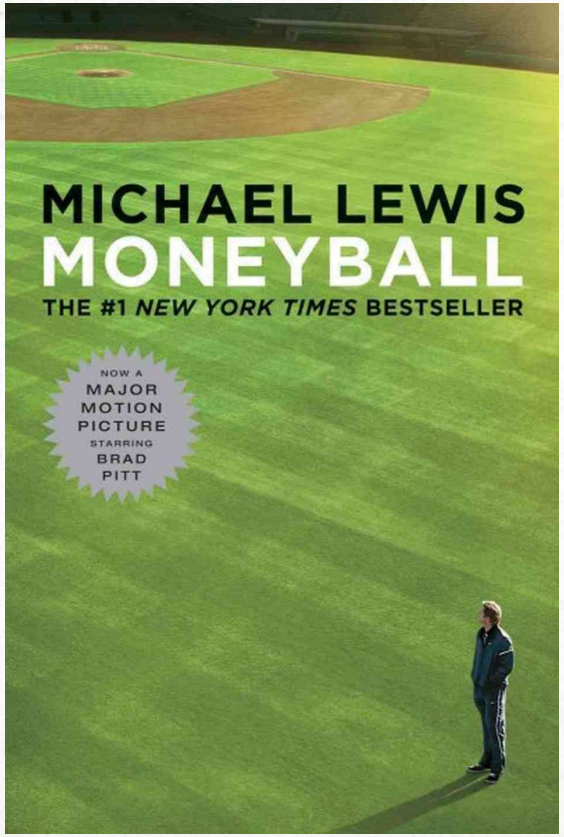

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Moneyball Theory

- Think outside the box
- Acquire undervalued assets
- Rid team of overvalued assets

- Combines statistical analysis with expert decision making
- Not a one-size-fits-all model

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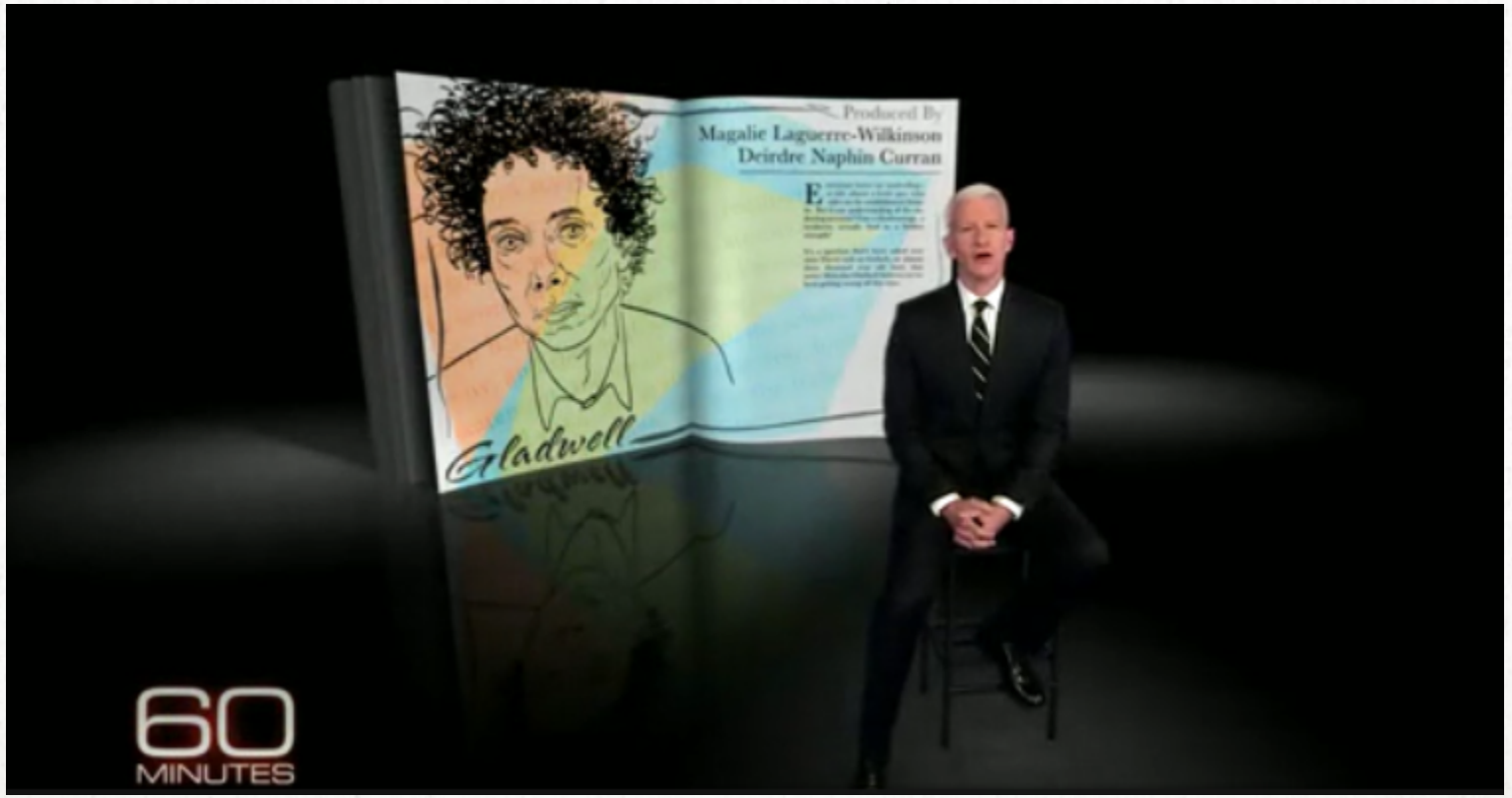

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Wearables

Catapult

Teambuildr/Kinduct

Motus

Zepp

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Reasoning

- Inductive reasoning - Specific instances into a generalized conclusion
- Deductive reasoning – Generalized principles that are known to be true into a specific conclusion

Note: The accuracy of inductive reasoning can be questionable.

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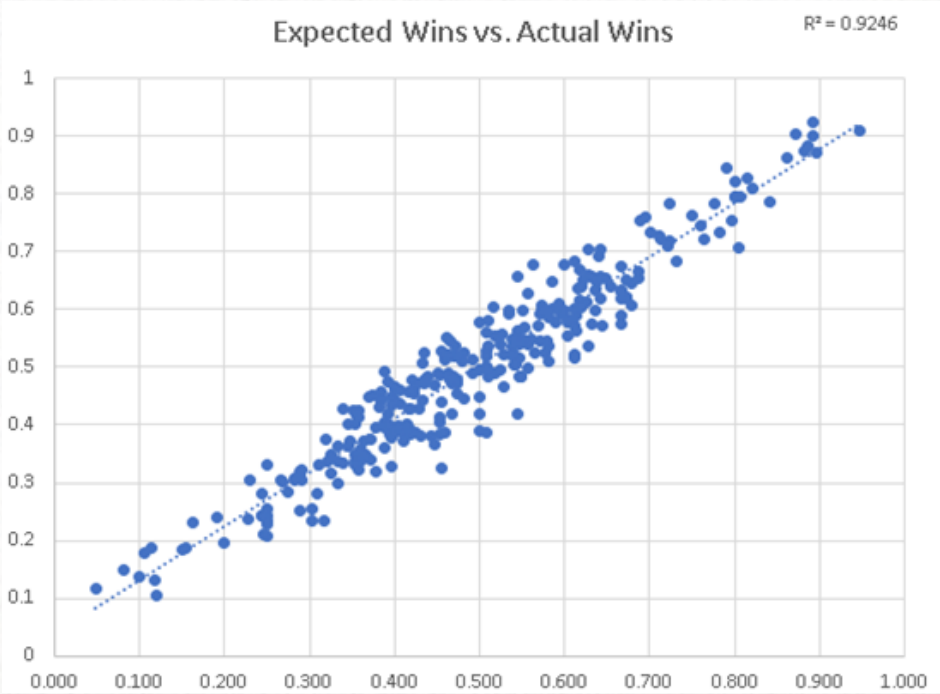
$$\text{Winning Percentage} = \frac{\text{Run Scored}^2}{\text{Runs Scored}^2 + \text{Runs Allowed}^2}$$



Longwood Softball - 2017

Runs Scored: 199

Runs Allowed: 198

Expected Record: 27.6 - 27.4

Actual Record: 28 - 27

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Marginal Run Values by Event, i.e. Linear Weights - CMS 2016

The number of additional runs scored if one more of a particular event occurred (according to the various models). That is, if a team was able to hit one more single in the game in this 5.6 runs per game environment (**Note**: actually CMS scored 5.375 runs/game in 2016), this team would score 0.47 more runs.

Event	Markov
Walk	0.500
Single	0.629
Double	0.936
Triple	1.214
Homerun	1.560
Out, sans K	-0.458
Strikeout	-0.459

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Hit By Pitches – D-I 2015

Rank	Institution	HBP
1	Florida	127
2	Minnesota	77
3	Tennessee	76
4	La.-Monroe	73
5	Mississippi St.	72
6	Auburn	66
6	Oregon	66
8	Michigan	65
9	Michigan St.	64
9	Troy	64

Walks – D-I 2015

Rank	Institution	BB
1	Auburn	359
2	Michigan	332
3	Florida St.	305
3	Oklahoma	305
5	UCLA	292
5	Florida	292
7	New Mexico St.	286
8	Arizona St.	283
9	Texas A&M	274
10	Washington	270

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Run Expectancy Matrix – CMS 2016

The average number of runs, from this base/out state, to the end of the inning.

Bases	0 outs	1 out	2 outs
xxx	0.766	0.394	0.134
1xx	1.290	0.739	0.290
x2x	1.449	0.893	0.422
xx3	1.662	1.130	0.463
12x	2.015	1.274	0.590
1x3	2.191	1.481	0.625
x23	2.350	1.635	0.757
123	2.938	2.058	0.985

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	R1 vs. R2 (Stolen base or stretching a single into a double)		
	0 outs	1 outs	2 outs
Probability	≥ .86	≥ .81	≥ .70

=0.86*1.489+(1-0.86)*0.41

	R2 vs. R3 (Stolen base or stretching a double into a triple)		
	0 outs	1 outs	2 outs
Probability	≥ .84	≥ .77	≥ .92

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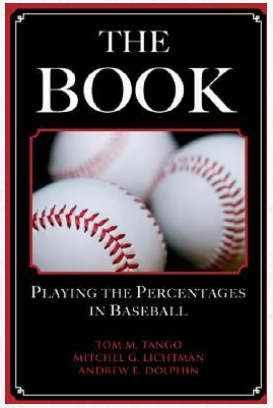
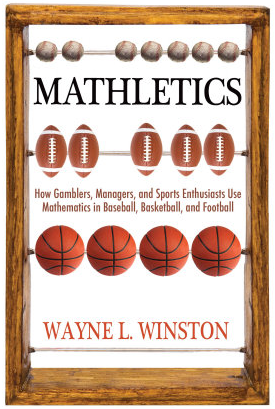
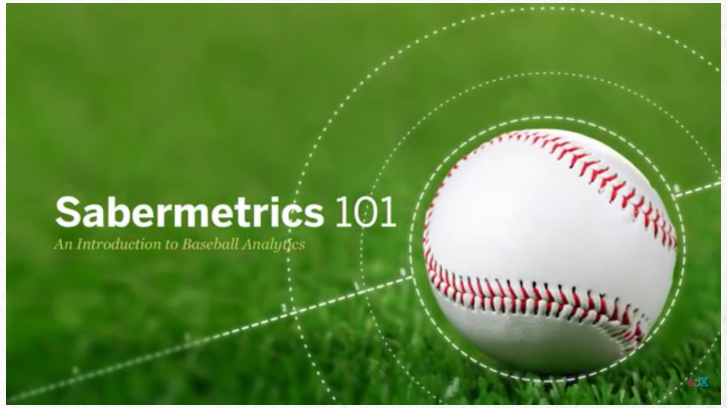
Resources





FANGRAPHS

BP Baseball Prospectus



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Questions?/Comments?