

Quantifying The Effect of Pitching Metrics

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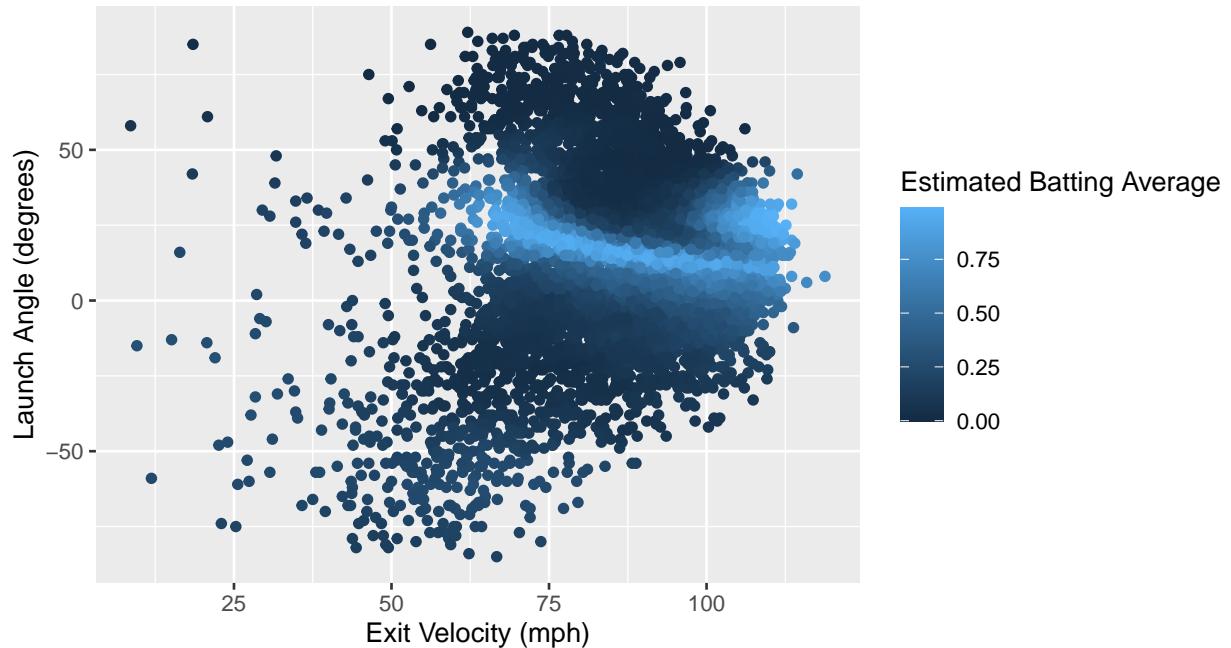
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Introduction

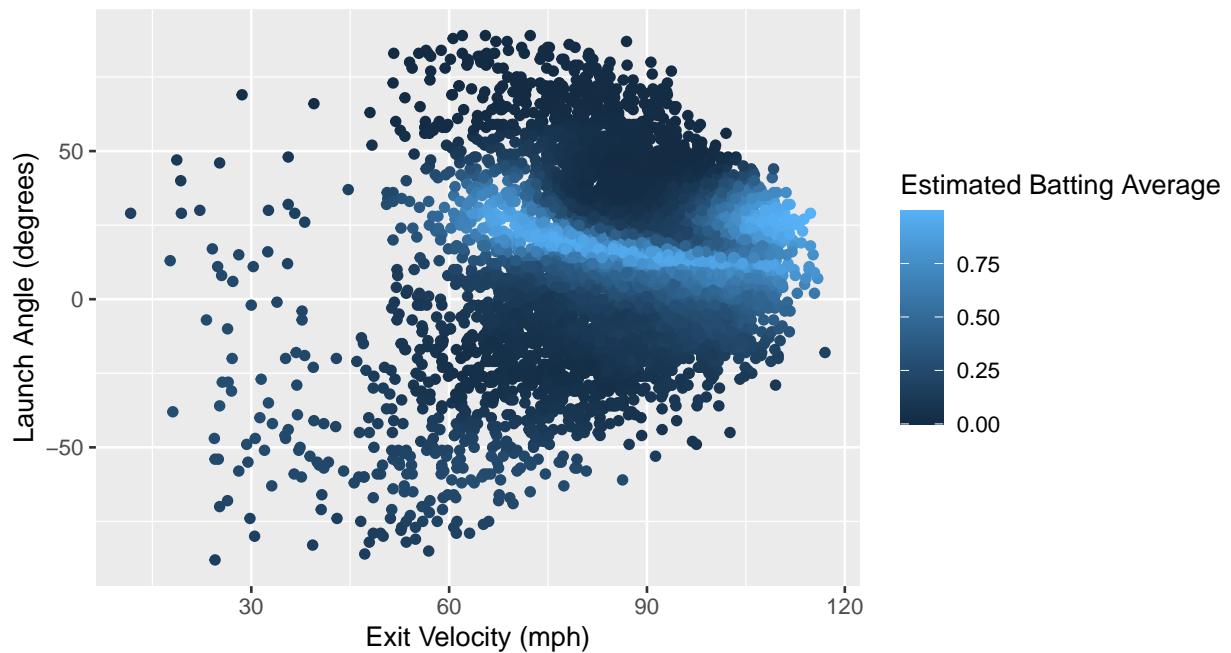
The methodology of analyzing the performance of pitchers has drastically changed over time. At the surface one can evaluate at pitcher's win-loss record to determine their impact on the teams' performance. It's a results-based model, but includes several factors far out of a pitcher's control, fundamentally the

General EDA

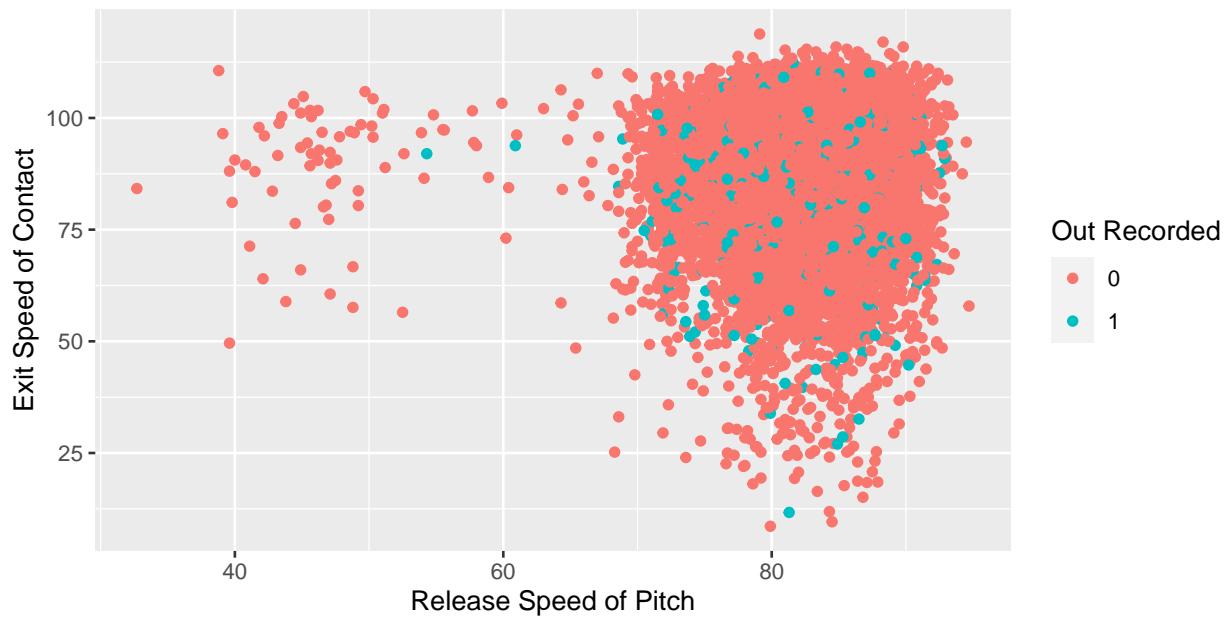
Right-Handed Speed/Angle Breakdown



Left-Handed Speed/Angle Breakdown



No Relationship For Release Speed and Launch Speed/Out Made



Righty EDA

Right-Handed Breakdown

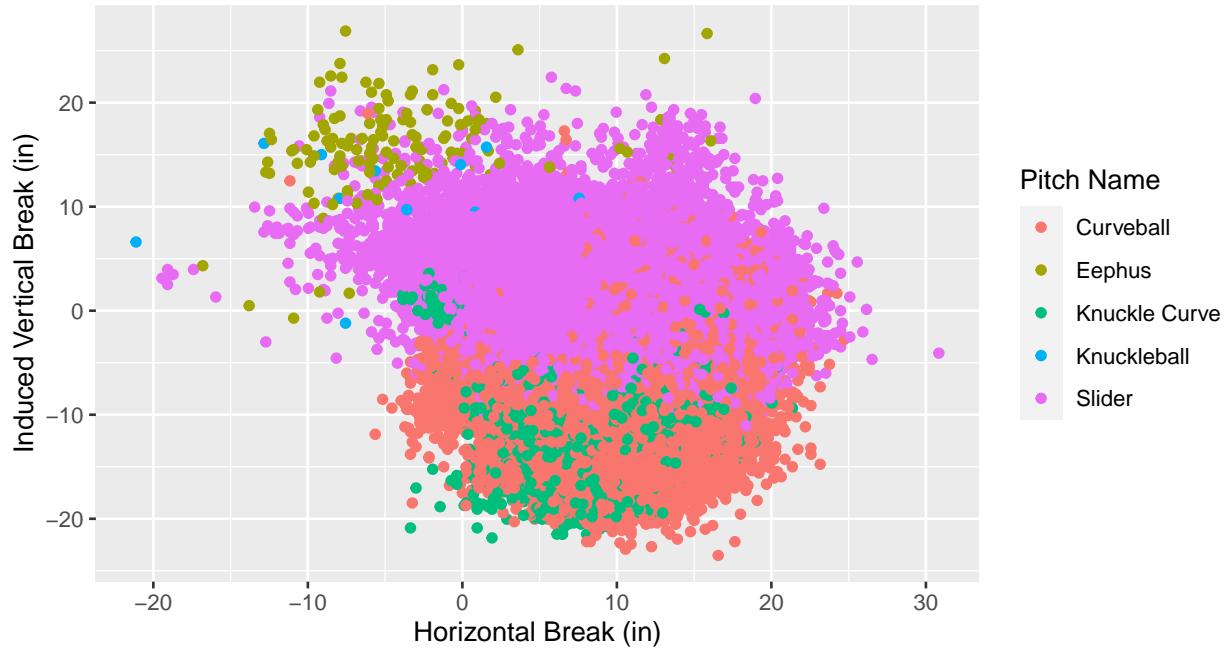


Table 1: Average RH Pitch Type Metrics

pitch_name	release_speed	release_spin	hor_break	vert_break	tilt
Curveball	79.37	2565.31	9.61	-9.55	44.17
Eephus	50.76	1203.93	-3.91	15.81	212.69
Knuckle Curve	81.55	2571.51	8.04	-10.67	47.75
Knuckleball	55.37	582.53	-2.23	7.79	209.95
Slider	84.91	2450.96	6.89	1.97	108.48

pitch_type	pitch_name	n
CS	Curveball	15
CU	Curveball	9589
EP	Eephus	138
KC	Knuckle Curve	2646
KN	Knuckleball	19
SL	Slider	27526

Lefty EDA

Left-Handed Breakdown

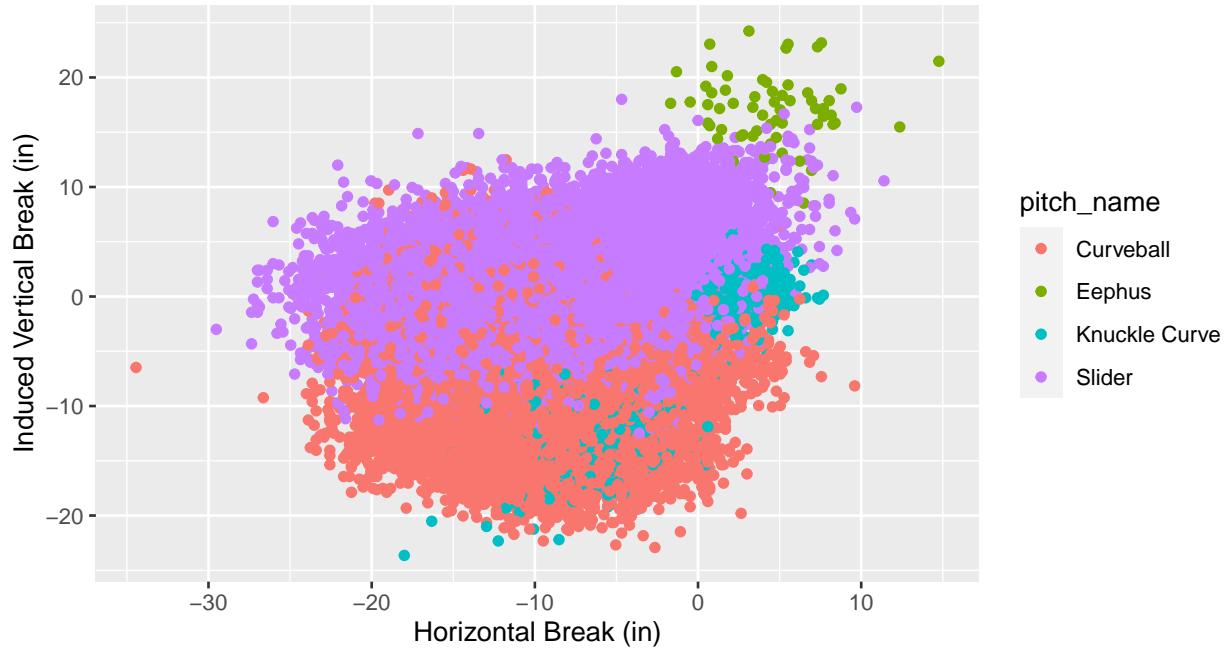


Table 3: Average LH Pitch Type Metrics

pitch_type	release_speed	release_spin	hor_break	vert_break	tilt
CS	65.45	2354.13	-18.82	-10.63	309.67
CU	78.25	2467.87	-9.12	-8.63	314.16
EP	45.14	1224.42	4.53	17.15	157.29
KC	78.94	2289.64	-3.17	-7.70	249.31
SL	84.00	2365.35	-6.48	1.76	245.80

pitch_type	pitch_name	n
CS	Curveball	15
CU	Curveball	11433
EP	Eephus	62
KC	Knuckle Curve	1423
SL	Slider	23553

Methodology

Creating Right Handed Models

Curveball

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	0.6968	0.6029	1.1556	0.2478

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	release_speed	-0.0084	0.0072	-1.1681	0.2428
fixed	NA	hor_break	0.0100	0.0054	1.8501	0.0643
fixed	NA	ind_vert_break	-0.0023	0.0049	-0.4727	0.6364
fixed	NA	mean_centered_spinrate	0.0004	0.0002	2.4063	0.0161
ran_pars	player_name	sd_(Intercept)	0.2035	NA	NA	NA

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	0.0310	0.0552	0.5609	0.5749
fixed	NA	hor_break	0.0120	0.0051	2.3420	0.0192
fixed	NA	mean_centered_spinrate	0.0005	0.0002	2.5876	0.0097
ran_pars	player_name	sd_(Intercept)	0.2028	NA	NA	NA

Knuckle-Curve

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	1.1453	1.4630	0.7828	0.4337
fixed	NA	release_speed	-0.0117	0.0170	-0.6859	0.4928
fixed	NA	hor_break	0.0124	0.0117	1.0626	0.2880
fixed	NA	ind_vert_break	0.0050	0.0108	0.4644	0.6424
fixed	NA	mean_centered_spinrate	-0.0003	0.0003	-1.0225	0.3065
ran_pars	player_name	sd_(Intercept)	0.2066	NA	NA	NA

Slider

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	1.2135	0.4627	2.6227	0.0087
fixed	NA	release_speed	-0.0116	0.0053	-2.1712	0.0299
fixed	NA	hor_break	-0.0008	0.0033	-0.2500	0.8026
fixed	NA	ind_vert_break	0.0052	0.0036	1.4618	0.1438
fixed	NA	mean_centered_spinrate	0.0003	0.0001	3.2805	0.0010
ran_pars	player_name	sd_(Intercept)	0.2176	NA	NA	NA

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	1.1590	0.4077	2.8425	0.0045
fixed	NA	release_speed	-0.0110	0.0048	-2.2855	0.0223
fixed	NA	ind_vert_break	0.0054	0.0035	1.5242	0.1274
fixed	NA	mean_centered_spinrate	0.0003	0.0001	3.3171	0.0009
ran_pars	player_name	sd_(Intercept)	0.2175	NA	NA	NA

Creating Left Handed Models

Curve

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	0.1513	0.7162	0.2113	0.8326
fixed	NA	release_speed	0.0002	0.0088	0.0181	0.9856
fixed	NA	hor_break	-0.0074	0.0054	-1.3842	0.1663
fixed	NA	ind_vert_break	0.0044	0.0045	0.9851	0.3246
fixed	NA	mean_centered_spinrate	0.0004	0.0002	2.0856	0.0370
ran_pars	player_name	sd_(Intercept)	0.1672	NA	NA	NA

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	0.1254	0.0539	2.3274	0.0199
fixed	NA	hor_break	-0.0074	0.0051	-1.4518	0.1466
fixed	NA	mean_centered_spinrate	0.0004	0.0002	2.2587	0.0239
ran_pars	player_name	sd_(Intercept)	0.1717	NA	NA	NA

Knuckle-Curve

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	1.1453	1.4630	0.7828	0.4337
fixed	NA	release_speed	-0.0117	0.0170	-0.6859	0.4928
fixed	NA	hor_break	0.0124	0.0117	1.0626	0.2880
fixed	NA	ind_vert_break	0.0050	0.0108	0.4644	0.6424
fixed	NA	mean_centered_spinrate	-0.0003	0.0003	-1.0225	0.3065
ran_pars	player_name	sd_(Intercept)	0.2066	NA	NA	NA

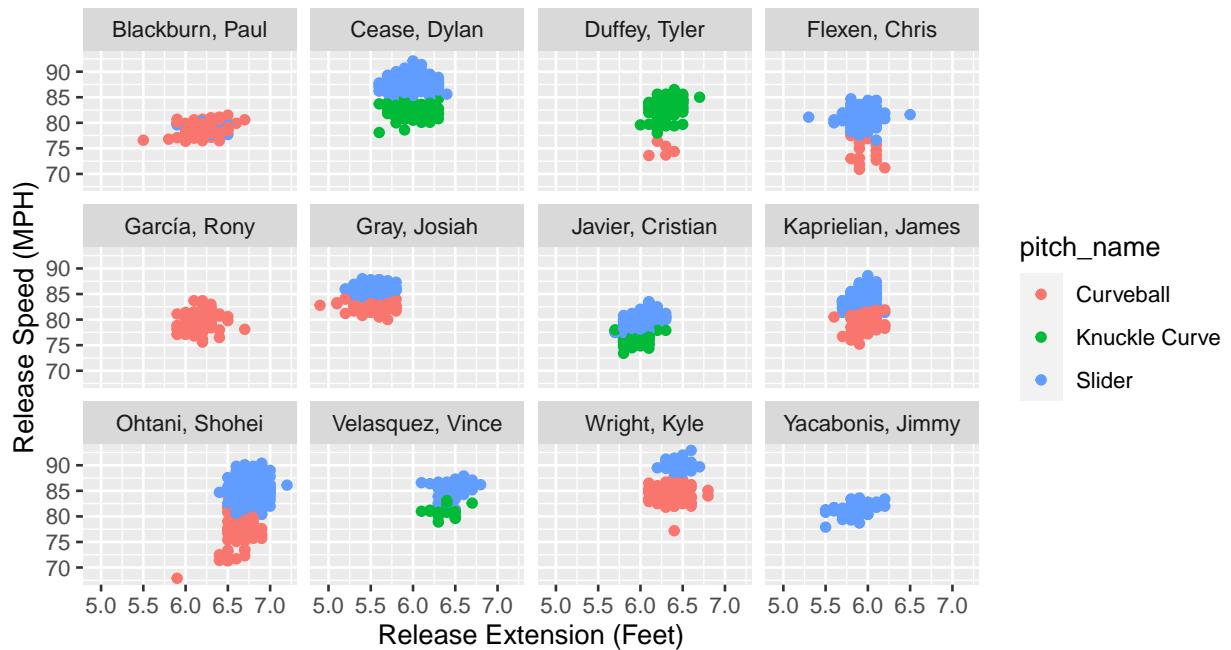
Slider

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	0.4237	0.5495	0.7709	0.4407
fixed	NA	release_speed	-0.0028	0.0065	-0.4402	0.6598
fixed	NA	hor_break	-0.0058	0.0037	-1.5461	0.1221
fixed	NA	ind_vert_break	0.0154	0.0042	3.7060	0.0002
fixed	NA	mean_centered_spinrate	0.0002	0.0001	1.6229	0.1046
ran_pars	player_name	sd_(Intercept)	0.1494	NA	NA	NA

effect	group	term	estimate	std.error	statistic	p.value
fixed	NA	(Intercept)	0.1821	0.0324	5.6191	0.0000
fixed	NA	hor_break	-0.0066	0.0032	-2.0412	0.0412
fixed	NA	ind_vert_break	0.0150	0.0041	3.7075	0.0002
fixed	NA	mean_centered_spinrate	0.0002	0.0001	1.7296	0.0837
ran_pars	player_name	sd_(Intercept)	0.1467	NA	NA	NA

Appendix

Inconclusive Evidence of Righty Extension/Speed Relationship



Inconclusive Evidence of Lefty Extension/Speed Relationship

