

AN ANALYSIS OF MARK PRIOR'S PITCHING MOTION & MECHANICS

11/07/2005

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General Comments About Mark Prior

- RHP
- 6' 5"
- 230 lbs.
- Pitches...
 - Fastball (mid to upper 90s).
 - Curveball.
 - Had trouble with the command of his curve in 2004 which allowed hitters to sit on his fastball.
 - Mediocre changeup.
- Injuries...
 - Shoulder problems/tightness/irritation in posterior rotator cuff (February-March 2006).
 - In rear of shoulder near armpit (possibly Teres Minor muscle).
 - Inflamed elbow and irritated ulnar nerve (March 2005).
 - Inflamed elbow (2004).
 - Irritated ulnar nerve (2004).
 - Achilles tendon problem (2004).
 - Shoulder injury due to collision with Marcus Giles (July 2003).
- **11/07/2005**
 - The root cause of his elbow problems may be that he rapidly extends his elbow 135 or more degrees immediately before releasing the ball.
 - Ulnar nerve and other elbow problems could also be due to the fact that much of his motion takes place with his elbow bent at a 90 degree (or even greater) angle, which focuses the stress on the elbow joint.
 - He moves his elbows significantly behind and above his shoulders, so look for rotator cuff problems later on in his career.
 - His achilles tendon problem could be related to the fact that in some cases he uses a lunge-style delivery and releases the ball with his glove-side knee bent approximately 100 degrees.

Comments About Mark Prior's Pitching Motion and Mechanics

● 12/29/2005...

- I believe you only have to look at the injuries that Paul Byrd has had to see what is in store for Mark Prior down the road.
Anthony Reyes has many of the same flaws and has had serious injury problems.
- Snap throwing motion.
Something like a catcher's (except for how he breaks his hands).
- Motion starts out looking good (good hand break and long initial arm swing) then falls apart (when he turns over his pitching arm).
- Significant horizontal Pitching Forearm Looping leads to flat pitching arm plane and lowers his release point.
- Stiffens his glove-side knee as he releases the ball.
- His use of the lunge-style delivery will tend to make him more hittable by flattening the plane of his pitches and reducing the amount that his hips can rotate. It may also contribute to arm problems since more of his velocity will have to come from his arm and shoulder than from the rotation of his hips and shoulders.
- What is interesting is that in some of the pictures he is releasing the ball using a lunge-style delivery but in other pictures he has his knee almost fully extended. I wonder if at some point he has modified his motion as a result of the injuries he has experienced.
- I would submit that some of Mark Prior's supposedly non-pitching-related problems (e.g. broken elbow due to line drive) were due to the poor position he finished in.
- He pronates upon the release of his pitches which, given his elbow problems, means that pronating is not the panacea that some make it out to be.
The problem is that he pronates too late to protect his elbow.

● 2/27/2006...

- A report has come out of Spring Training that Prior has problems/tightness with his shoulder.
I believe that this is related to the fact that he takes his elbows both above and behind his shoulders.

● 3/23/2006...

- The reports of Mark Prior's shoulder problems have been confirmed. Evidently, he appears to be having with his posterior Rotator Cuff (probably Teres Minor). Since he doesn't have as abbreviated a delivery as does Andy Pettitte (who has had similar problems), I wonder if this is related to the fact that he sometimes appears to lock his glove-side knee as he releases the ball. This may cause problems by limiting the ability of his legs to absorb some of the shock of his delivery.
- I am beginning to wonder if I see signs of Early Pronation in Prior's delivery. This could explain why his elbow problems seem to not involve his UCL but instead have been related to his Ulnar Nerve and possibly to the fossa of the Olecranon.

Injury Risk Rating = Worse Than Average

Year	Ag	Tm	Lg	W	L	G	GS	CG	SHO	GF	SV	IP	H	R	ER	HR	BB	SO	HBP	WP	BFP	IBB	BK	ERA	*lgERA	*ERA+	WHIP
2002	21	CHC	NL	6	6	19	19	1	0	0	0	116.7	98	45	43	14	38	147	7	1	486	0	0	3.32	4.03	122	1.166
2003	22	CHC	NL	18	6	30	30	3	1	0	0	211.3	183	67	57	15	50	245	9	9	863	4	0	2.43	4.24	175	1.103
2004	23	CHC	NL	6	4	21	21	0	0	0	0	118.7	112	53	53	14	48	139	3	2	510	2	1	4.02	4.53	113	1.348
2005	24	CHC	NL	11	7	27	27	1	0	0	0	166.7	143	73	68	25	59	188	4	4	701	2	1	3.67	4.27	116	1.212
4 Yr WL%				.641	41	23	97	97	5	1	0	613.3	536	238	221	68	195	719	23	16	2560	8	2	3.24	4.27	132	1.192
162 Game Avg				14	8	34	34	1	0	0	0	214.7	187	83	77	23	68	252	8	5	897	2	0	3.24	4.27	132	1.192

Glossary

- GS = Glove Side
- PAS = Pitching Arm Side



1. 1



2. 1



2



3



4



3. 1



2



4. 1



5. 1



2

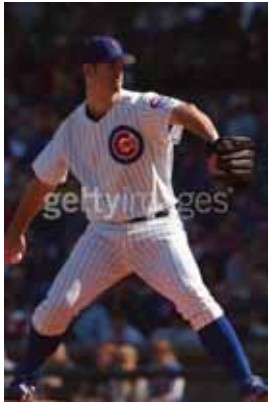


6. 1



7. 1

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8. 1

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9. 1

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10. 1



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11. 1



2



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12. 1



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13. 1



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14. 1



15. 1



16. 1



2



3

12/29/2005: Prior really looks quite good up to this point. His eyes are locked on the target. His hand break is good. He has a nice long arm swing. He doesn't have too much reverse-rotation in his shoulders (they are pretty much pointed at the target). His glove is pointed almost directly at the target. He is striding with his glove-side foot low to the ground.



17. 1

12/29/2005: In the above frame Prior starts to do something that is potentially problematic. He lifts his elbows above and behind his shoulders. This could leave him vulnerable to an impingement injury of the rotator cuff muscles of his shoulder.



18. 1



2



3

12/29/2005: In the above frames, Prior's arms are fully extended, and now he will start flexing his elbows so that his upper arms are at the level of his shoulders while his forearms are pointing vertically downward.



19. 1



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20. 1



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21. 1



2



22. 1



23. 1

2



24. 1

2

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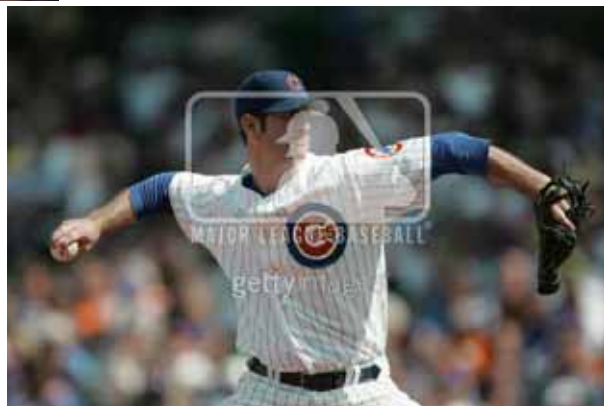
12/29/2005: Notice that his glove-side toe is pointing down at the ground in pictures 20.2 and 24.3. It is these little variations in one's motions that make the difference between whether a pitch is a ball or a strike.



25. 1



26. 1



2



27. 1



2



28. 1



2



29. 1



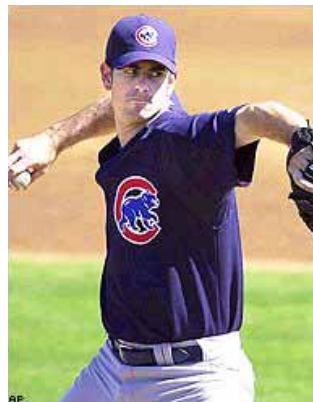
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30. 1

2

12/29/2005: Frames 30.2, 31.1. and 31.2 raise a huge red flag in my mind. Notice how Prior's elbows are well above and behind his shoulders. This is terrible for his shoulders and I predict that, if he continues to do this, then Prior will end up with serious rotator cuff problems in the next few years.



31. 1

2



32. 1 2

3/23/2006: Mark Prior has a very unusual arm action. Instead of coming to the traditional high cocked position with his PAS forearm vertical, Prior instead brings the ball past his ear in such a way that his PAS hand ends up making a horizontal loop. This horizontal loop may contribute to the problems with his Ulnar Nerve.



33. 1 2 3



34. 1



2



3



4



35. 1



2



3



36. 1



2



3



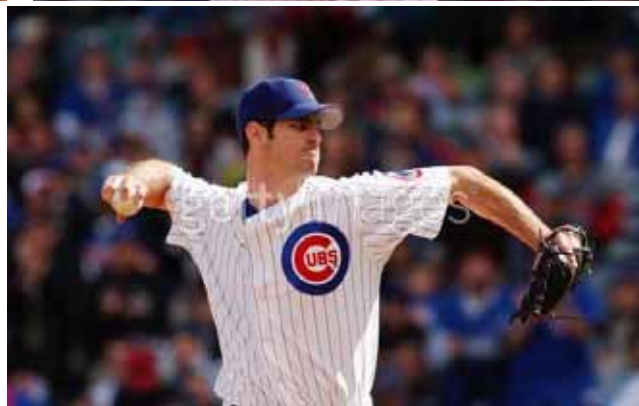
37. 1

2



38. 1

2



39. 1

2



40. 1



41. 1



2



3



42. 1



2



43. 1



2



44. 1



2



3



45. 1



46. 1

2

3

4

GLOVE-SIDE FOOT PLANTED.

12/29/2005: Forearm is not yet up and ready for shoulders to start turning.



47. 1

2

3



48. 1



2



3



49. 1



2



3



50. 1



2



51. 1



2



52. 1



2

3/23/2006: Notice how in frames 52.1 and 52.2 Mark Prior brings his PAS hand very close to his PAS ear.



53. 1



2



54. 1



2



55. 1



2



56. 1

SHOULDERS JUST STARTING TO TURN.

12/29/2005: Notice that Prior isn't at the traditional High Cocked (or High Guard or "L") position (in which the elbow is bent 90 degrees at the moment that the shoulders start to turn). Instead, at the moment that his shoulders start to turn, Prior's elbow is bent approximately 135 degrees. This will lessen the Reverse Pitching Forearm Bounce that he will experience. However, before releasing the ball, Prior's PAS elbow will rapidly extend those 135 degrees. This rapid (and greater than average) extension of his elbow is likely a significant contributing factor to his elbow problems.



57. 1



2



3



58. 1



2



3



59. 1



2



3



4



60. 1



2



3



4



61. 1



2



3



4



62. 1



2



63. 1



2



64. 1

2



65. 1

2



3

4



66. 1

2

3



67. 1

2



68. 1

2

3

4



69. 1



70. 1



2



3



71. 1



2



3



72. 1



2



73. 1



2



3



74. 1



75. 1

2



76. 1

2

3

4

RELEASE POINT.

12/29/2005: Notice that in picture 81.4, Prior's hand is behind his elbow. This means that he is not powerfully pronating his forerarm. If he was powerfully pronating at this point (and had pronated well before this point), his pitching-arm-side hand would be in front of his pitching-arm-side elbow.



77. 1

2



78. 1

2

3/23/2006: Mark Prior appears to be stiffening his GS knee in frame 78.1. I believe this may be related to the problems he experienced with the muscles in his posterior rotator cuff because it could limit the ability of his legs to absorb some of the shock of his delivery (and may focus more of the shock on his arm and shoulder).



79. 1



2



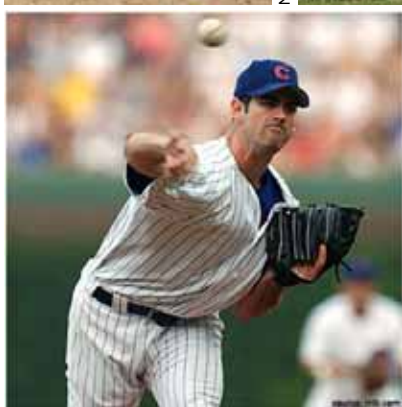
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80. 1



2



81. 1



2

12/29/2005: As you can see in pictures 86.1 and 86.2, Mark Prior does vigorously pronate his pitching forearm. However, as you can see in picture 81.1, he does this only after releasing the ball, which will keep his olecranon from slamming into its fossa but does not reduce the load on his UCL.



82. 1

2



83. 1



2



84. 1

2



85. 1



2



3



4



86. 1



87. 1



88. 1



89. 1



2



3