

A History of the Pull in Olympic Weightlifting
(short version January 2010 - based on film and video analysis)

by John Garhammer, Ph.D.

SportsEd^{TV}

INTRODUCTION

The following is an abbreviated form of the much longer presentation that I gave for coaches, officials, administrators and athletes at the American Championships in Mobile, AL in December 2009. It does, however, include a few new slides that I had not previously assembled. I want to emphasize that the information presented here is NOT MY OPINION. I emphasize body / bar positions that are part of the snatch and clean pull as executed by (1) World and Olympic champions and record holders; (2) USA National champions and record holders; and (3) Pan American champions. These positions can clearly be seen by anyone who watches the many hours of film and video that I have taken from 1978 to 2009. These visual records include the 1978 World Weightlifting Champions (WWC), 1982 and 1983 Record Makers meets in which many world record holders competed, 1984 Olympics, 1987 (1st) Women's WWC, 1998 WWC, 1999 Jr. WWC, 2003 WWC and 2009 Pan American Championships. I have also analyzed top lifts from many national level meets and they do not differ from what is shown here. I have included a few example sequences from USA Nationals in the current presentation. Also included here is a small amount of material related to balance on the feet during the snatch or clean pull, and bar trajectory characteristics.

WHAT TO LOOK FOR

The following three slides relate to the pull technique that I learned about early in my competitive career (1964 -> current and including 110 meets) mainly through the writings of Carl Miller, who was the Coaching Coordinator for our national governing body in the 1970's. It was called the “double knee bend” technique. The key characteristics of this technique are: (1) a 1st pull from lift-off until the bar reaches knee level, during which the hip and shoulder joints rise at the same speed so that lines drawn from the hip to shoulder are parallel (see the two stick figure slides); (2) this is followed by a reorientation of the body (transition phase) where the hips move forward and downward and the torso moves to a vertical or near vertical position (see the hip joint tracing on the two stick figures, and photo sequence of Lee James); (3) then the 2nd pull - an explosive “jumping” action (triple extension – hip, knee and ankle joints) with a rapid forceful shrugging of the shoulder girdle. This is ideal for most (see Lee James sequence) but some athletes lift the hips faster than the shoulders during the 1st pull, and some do not reach a completely vertical torso position before initiation of the 2nd pull. These “variations” are likely due to anthropometric differences (body segment length differences) and / or specific muscle group strengths and weaknesses. As you view the following lifting sequences / positions look for the movement characteristics and variations listed above. No matter what words / terminology you use or are used to hearing, it is the movement pattern characteristics that are important for coaching technique!

Phases of the Snatch pull in Weightlifting

Lee James, 90 Kg USA silver medalist 1976 Olympic Games



← 1st Pull →

← Transition → | ← 2nd Pull → |
(ends in the Power Position shown) (triple extension with shrug)

Advantages of the second knee bend (pictures 3-4):

1. reduced load on the torso extensor muscles
2. re-utilization of the hip & knee musculature through the strongest part of their range of motion
3. elastic energy storage and stretch reflex for enhancement of the 2nd pull (pictures 4-5) thrust force

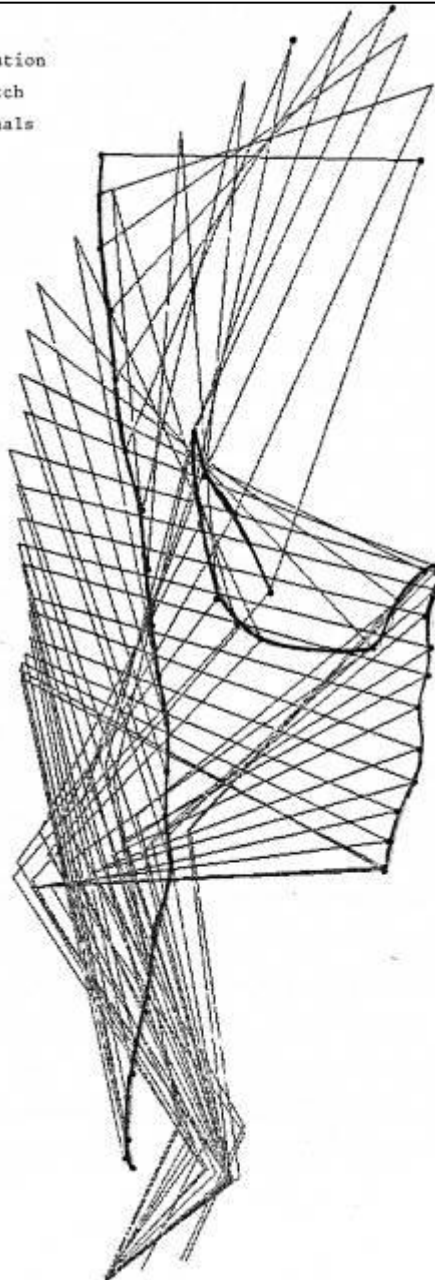
FIGURE 1B: Stick Figure Representation

Lee James 142.5 Kg Snatch

1975 U.S. Senior Nationals

Bar and Hip Positions

Manually Connected



Urrutia 155 SN 1978 WWC

192.5 CL 1978 WWC



Urrutia – 1978 World Champion: 2nd Pull (Power Position to top pull position)



Rigert 170 SN
1978 WWC

These two athletes established over 150 world records during their careers!

Alexeev 240 CL
1978 WWC



Rusev 1978 WWC
4CL – 180 K (world record)



Four years apart
and 20 Kg up!
Same technique!



Rusev 1982 RM3
2CL – 200 K





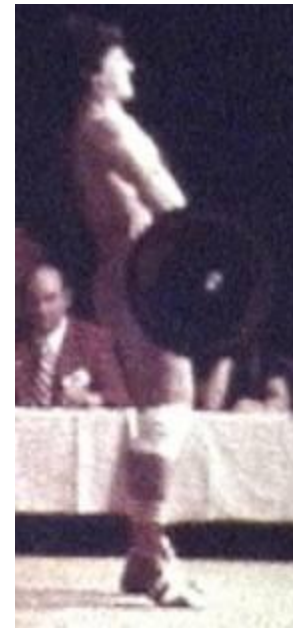
Blagoev 186 S WR



Manolov 136 S WR



Michels 182 S AR



Pervy 160 S



Rusev 155 S



Schake
152 S AR



Zlatev
172 S



Top Pull Positions
Snatch Lift
Record Makers III
Atlantic City 1982

AR => American Record
WR=> World Record



Manolov 171 C WR
C



Michels 210 C



Pervy 210 C



Pisarenko 225 C



Schake 177



Sots
215 C



Zlatev
215 C



Top Pull Positions
Clean Lift
Record Makers III
Atlantic City 1982



Jeff Michels
3rd SN – 182.5 Kg
Record Makers III
Atlantic City 1982
(American Record
3 for the day !
171.5, 177.5, 182.5 Kg)





Cal Shake
Record Makers III
Atlantic City 1982
4th SN – 152.5 Kg
(American Record
3 for the day: 140,
145, 150, 152.5 Kg !)



These graphs show the vertical velocity of the bar during the SN pull. During the “transition” phase between 1st and 2nd pull many lifters have a decrease in bar velocity. It is usually greater for bigger / taller athletes. During the last decade or so more and more athletes show a leveling of velocity during the transition and a few show an almost continuous rise in velocity during the entire pull. It is not a different technique but a smoother pull due, in part, to optimal anthropometrics. See later slides for examples.

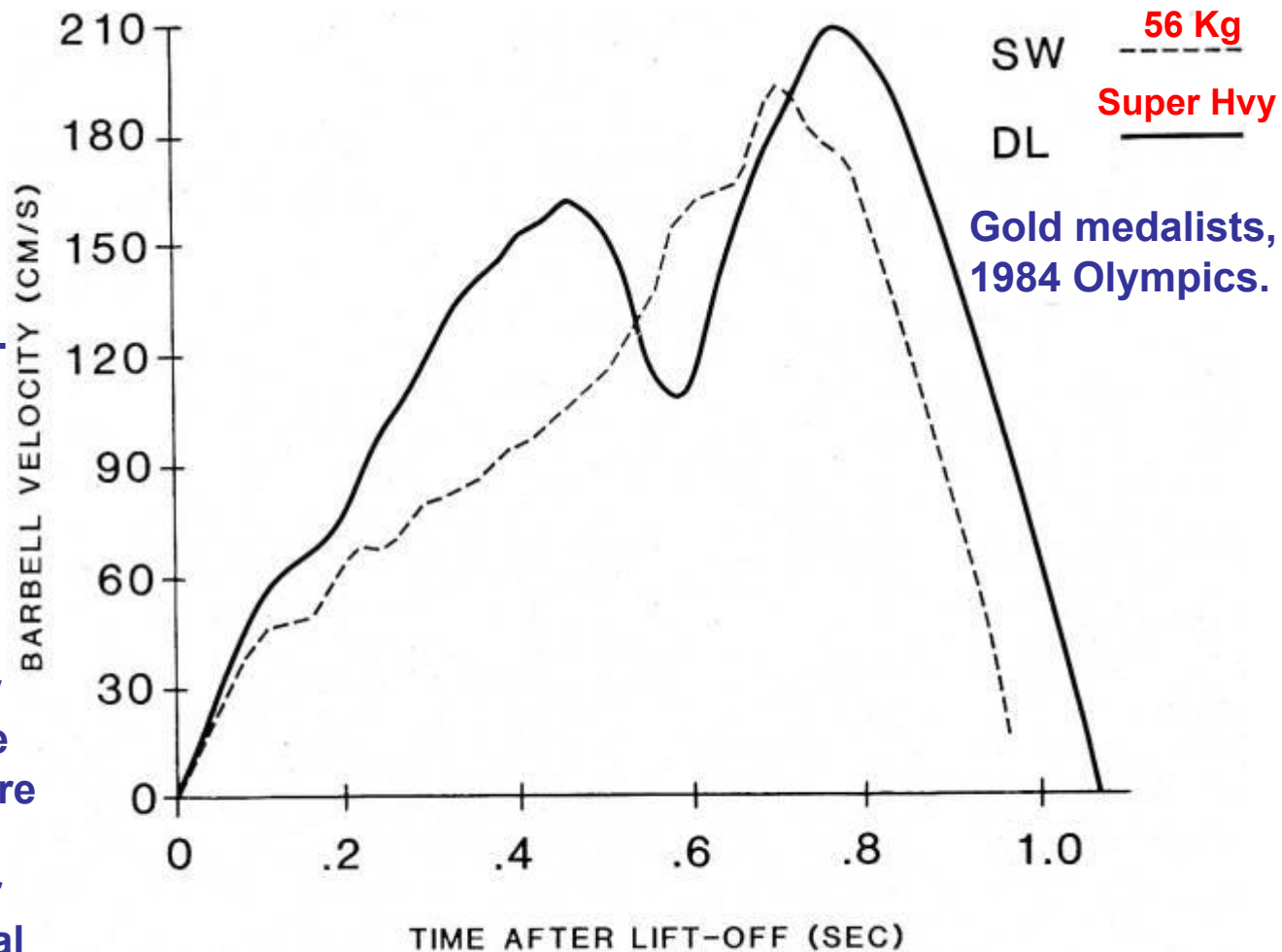


Figure 2 — Barbell velocities for the first attempt snatch of SW with 120 Kg and the second attempt snatch of DL with 172.5 Kg.



Robin Byrd (former World Champion) - 3rd SN 62.5 Kg (48 Kg Class)
1st Women's WWC 1987



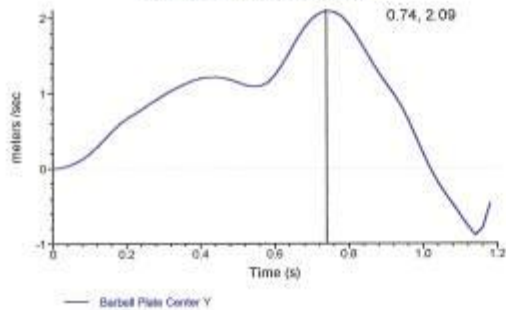
Xiaoyu 3rd SN – 75 Kg (48 Kg Class) 1st Women's WWC 1987
World Champion 1987 - 88 - 89

1998 WWC Lahti, Finland
1999 Jr. WWC Savannah, USA

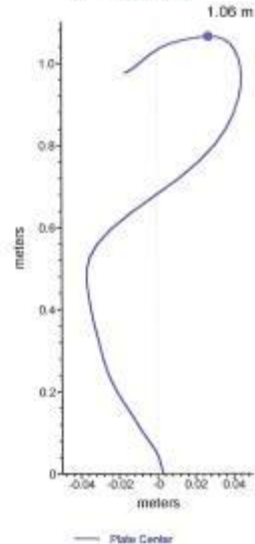
Robin (Byrd) Goad 2nd SN 82.5 Kg



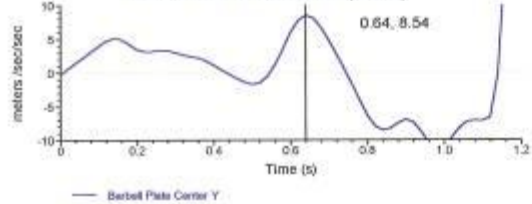
Vertical Bar Velocity (m/s)



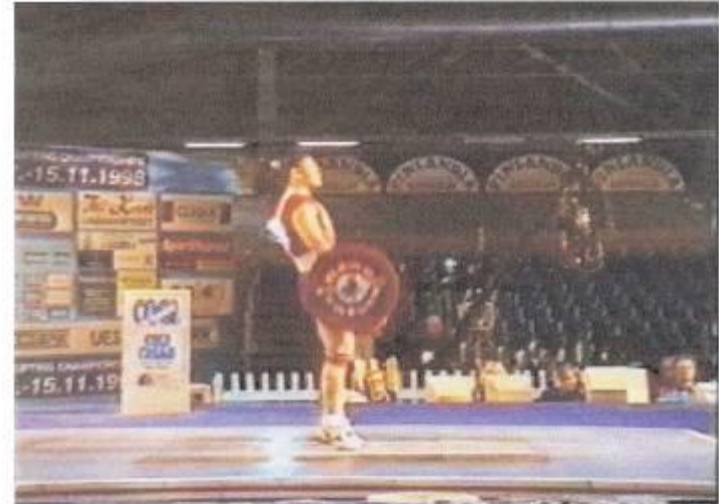
Bar Trajectory



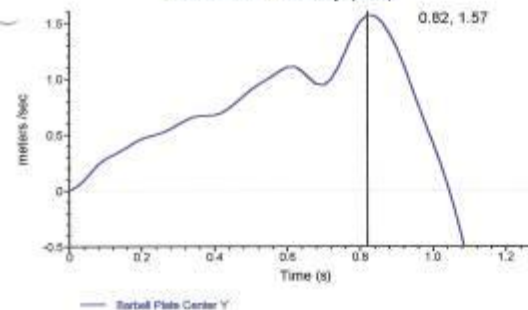
Vertical Bar Acceleration (m/s/s)



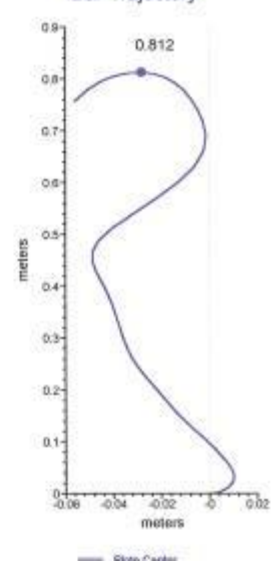
Chen JL 2nd Clean 122.5 Kg (98 Worlds)



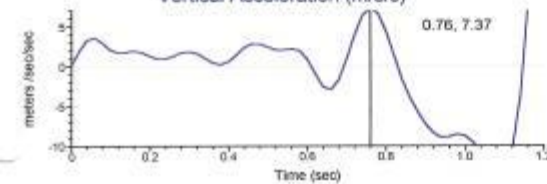
Vertical Bar Velocity (m/s)



Bar Trajectory

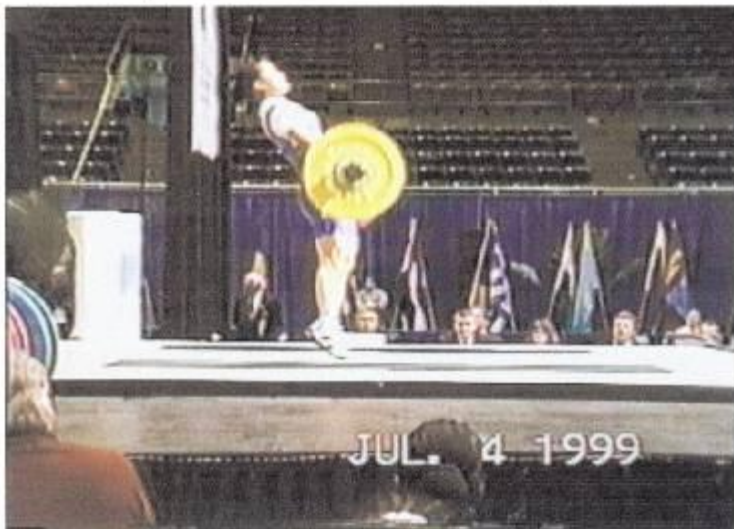


Vertical Acceleration (m/s/s)

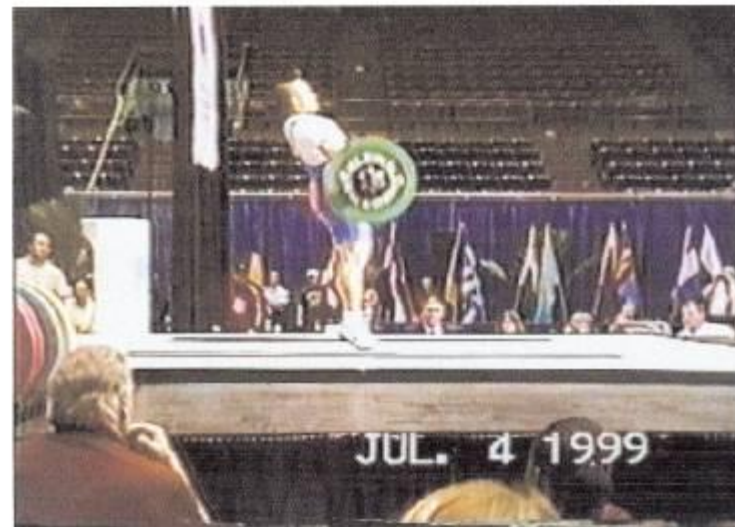


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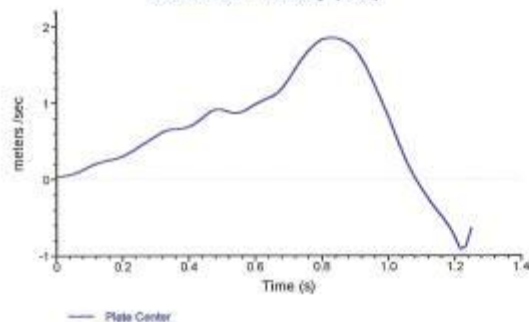
Y. Chen 3rd SN 102.5 Kg (Jr.W) (WR)



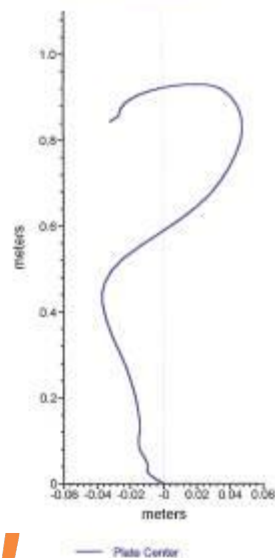
Zhiyong Shi 3rd SN 150 Kg (WR)



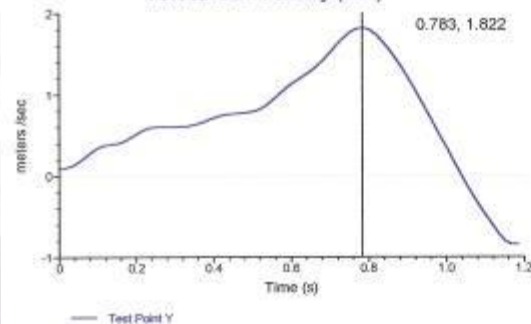
Vertical Bar Velocity (m/s)



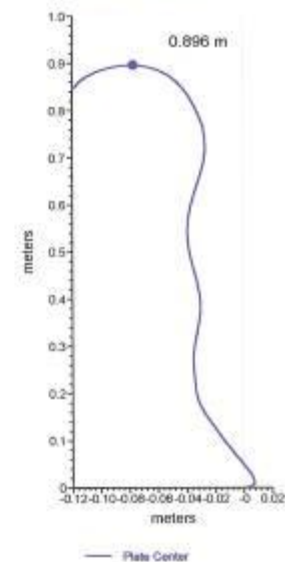
Bar Trajectory



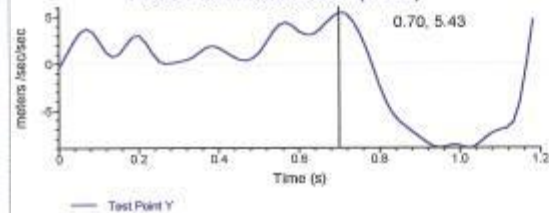
Vertical Bar Velocity (m/s)



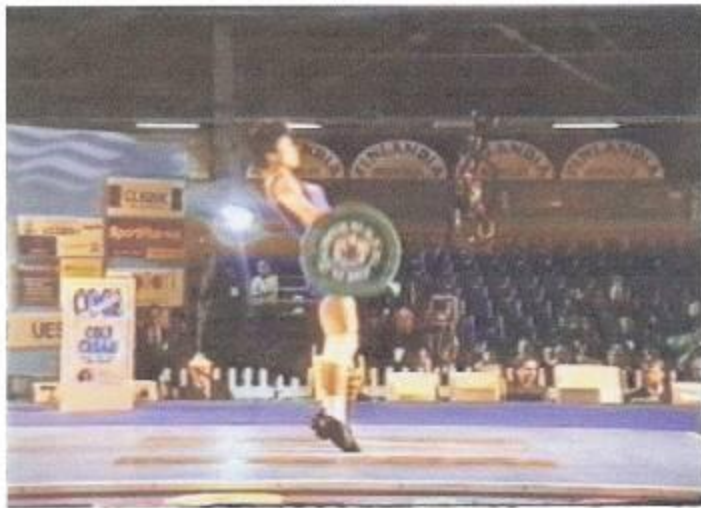
Bar Trajectory



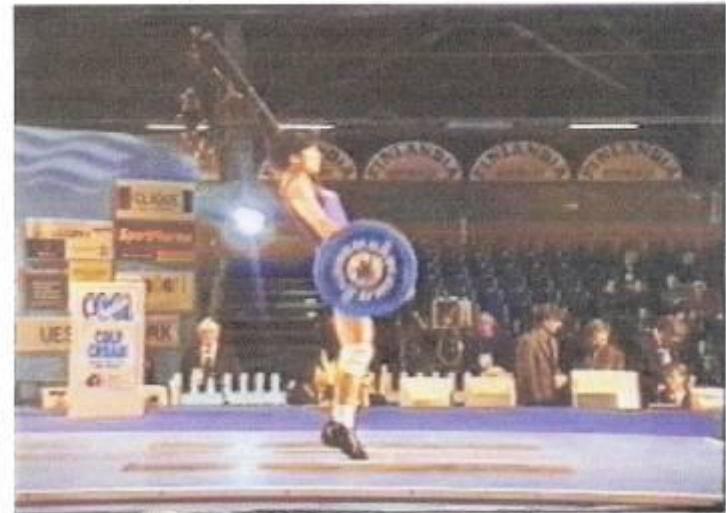
Vertical Bar Acceleration (m/s/s)



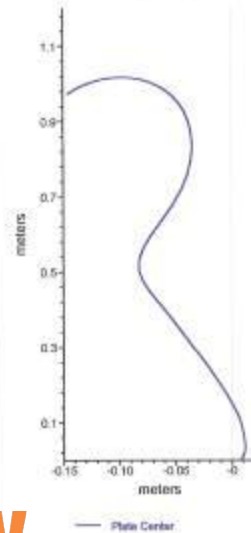
Wang 3rd SN 92.5 Kg



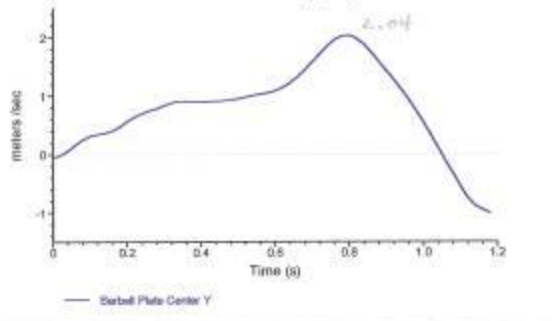
Wang 3rd Clean 117.5 Kg (World Rec)



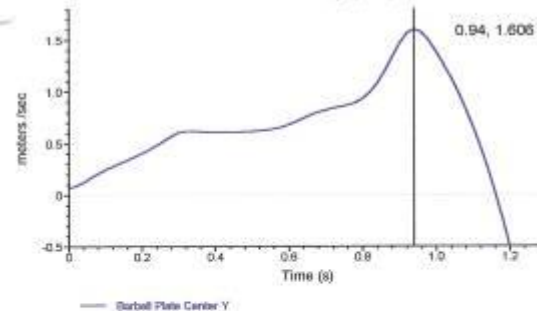
Bar Trajectory



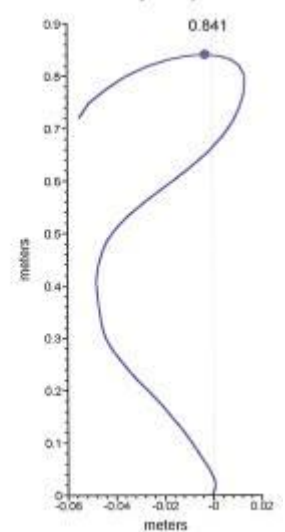
Vertical Bar Velocity (m/s)



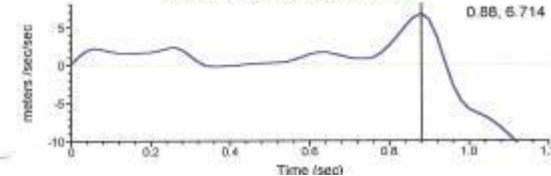
Vertical Bar Velocity (m/s)



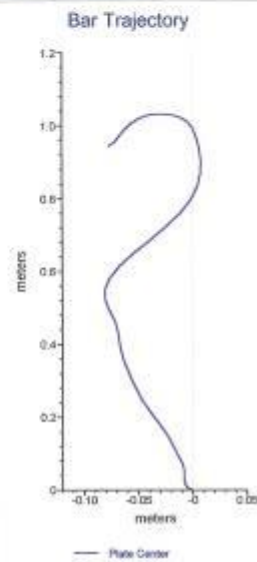
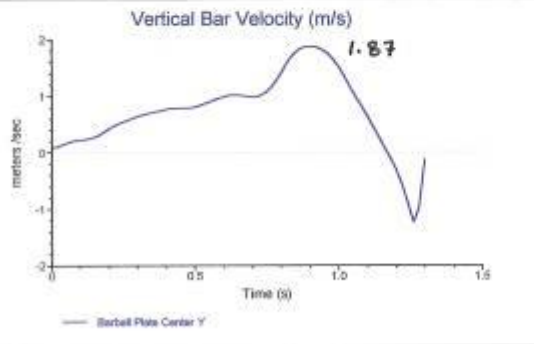
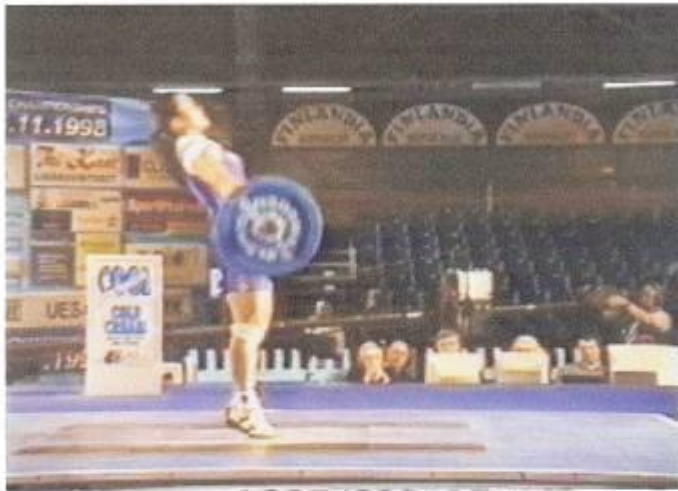
Bar Trajectory



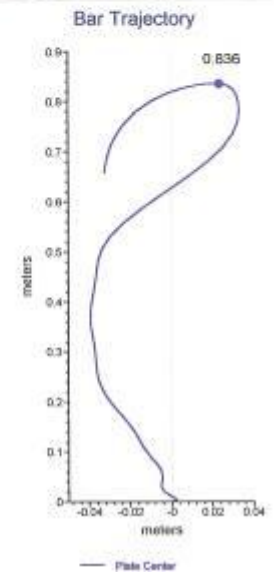
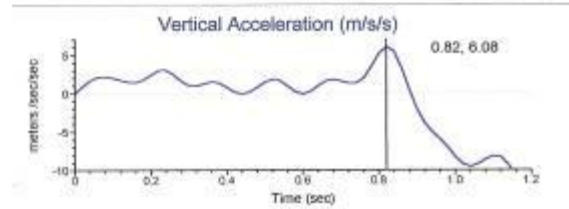
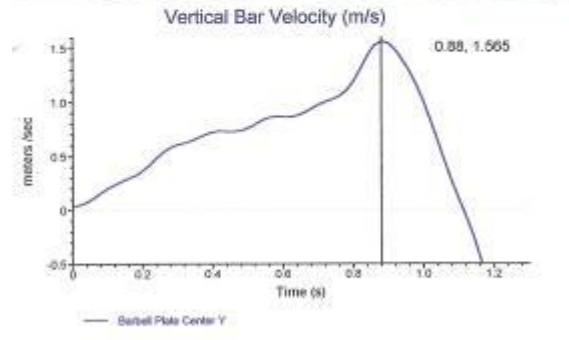
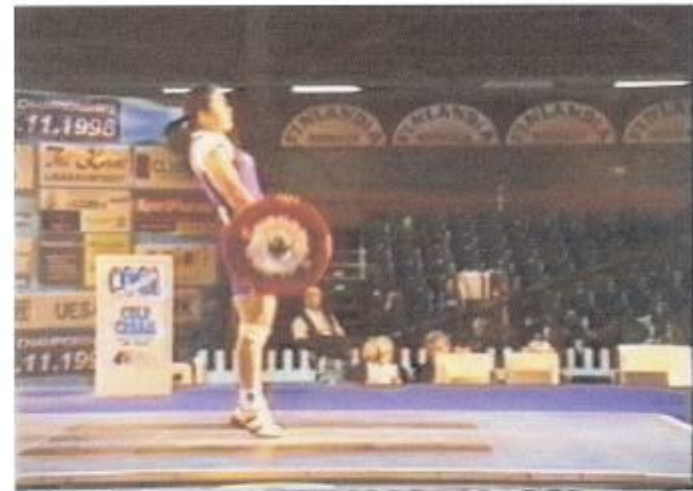
Vertical Acceleration (m/s/s)



Tang Weifang 2nd SN 110.5 Kg



Tang Weifang 1st Clean 130 Kg (98 Worlds)

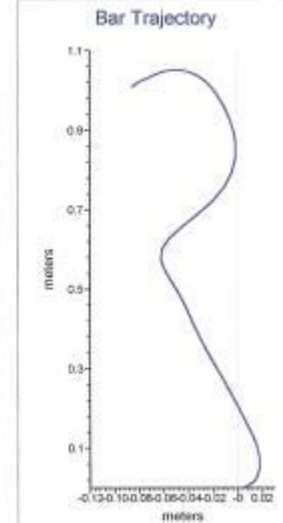
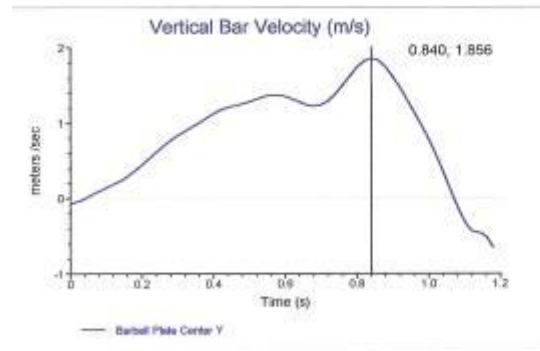
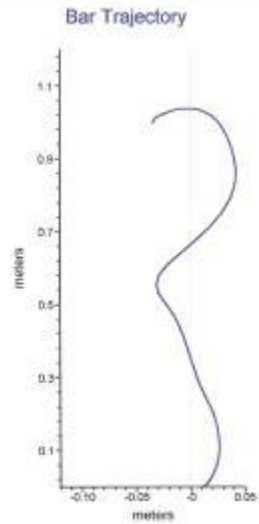
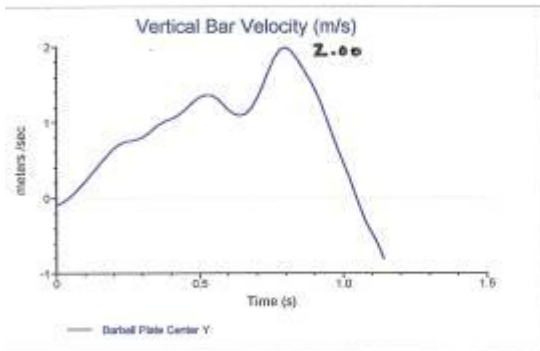
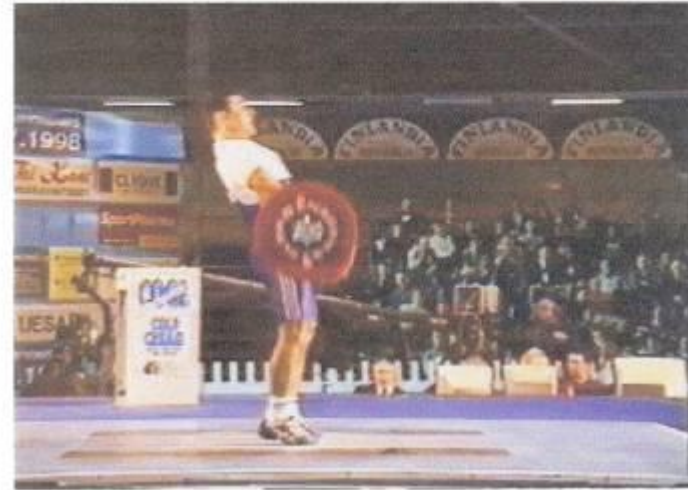


Triple Olympic Gold Medalists!

Dimas 3rd SN 178 Kg WR



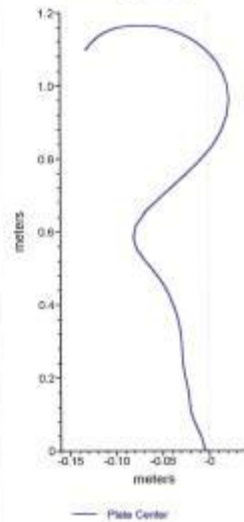
Kakiasvilis 2nd SN 180 Kg



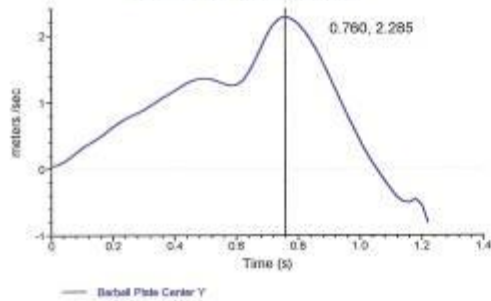
T
Gonghong Wang 2nd SN 110 Kg



Bar Trajectory



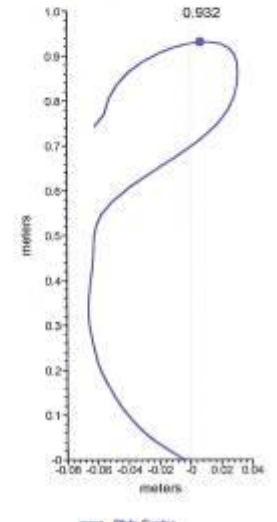
Vertical Bar Velocity (m/s)



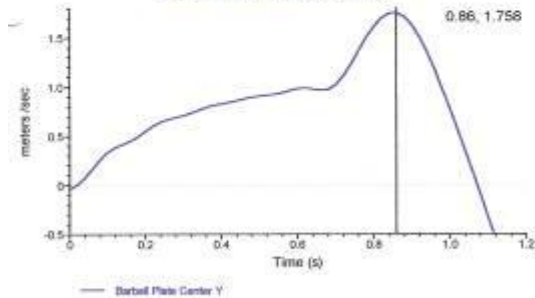
Tang Gonghong 2nd Clean 145 Kg (98 Worlds)



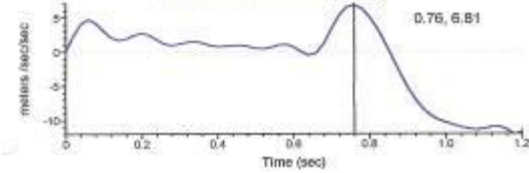
Bar Trajectory



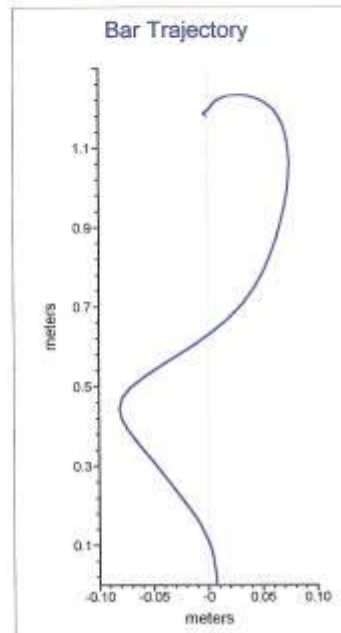
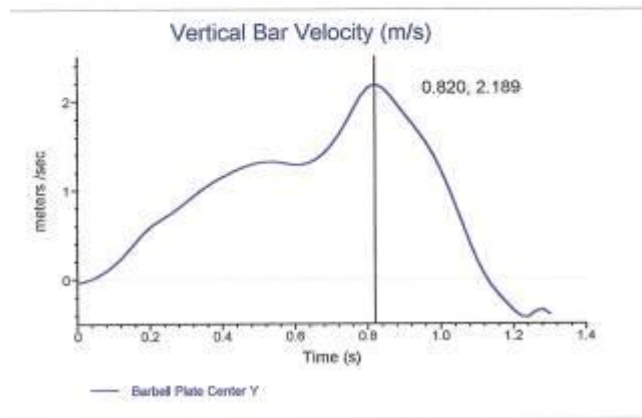
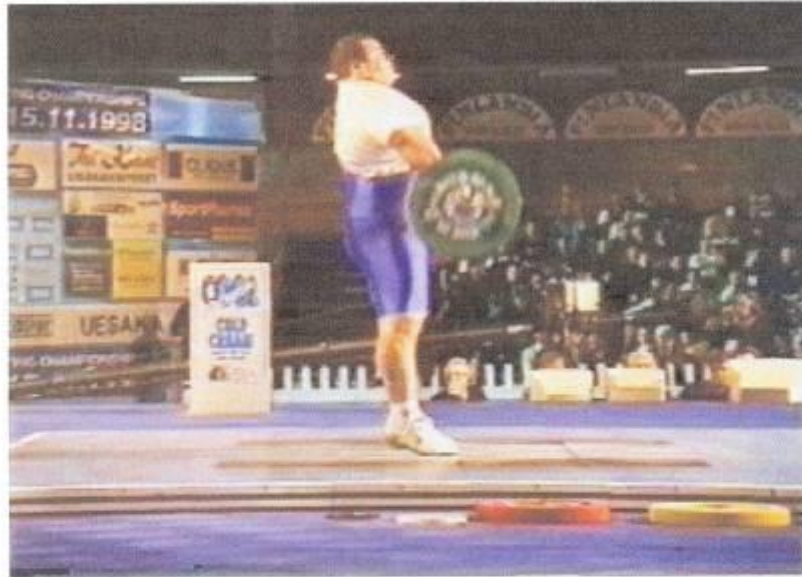
Vertical Bar Velocity (m/s)



Vertical Acceleration (m/s/s)



Andrei Tchermekine 2nd SN 197.5 Kg



Doreen | 17.5 Kg Split Clean



2003 Nationals

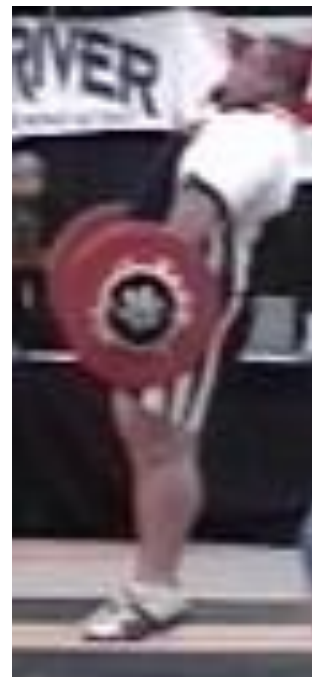
Pete Kelly – 167.5 Snatch
American Open, Savannah, December 8, 2002



Jodi Wilhite 70 Kg SN - 2003 USAW Nationals



Hamman 190 SN Attempt – 2003 USAW Nationals



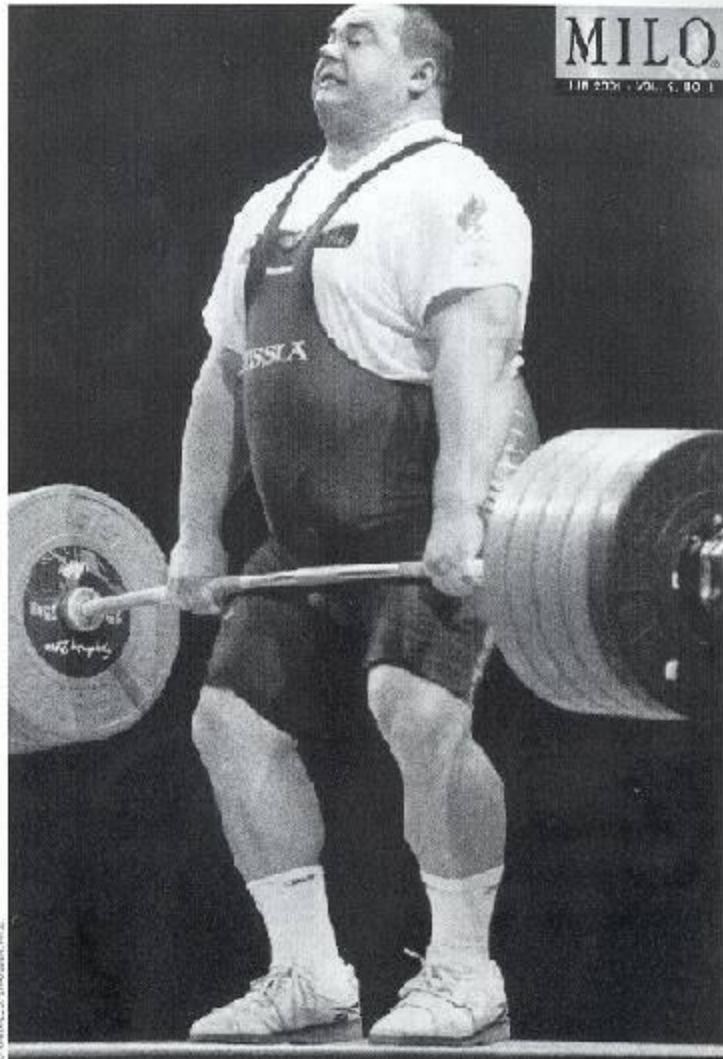
Haworth 128 SN – 2003 USAW Nationals



Ingrid Marcum: 90 Kg Snatch (3rd attempt)
American Open, Savannah, December 2002



World Record C&J Attempt 272.5 Kg (600 lbs.) Sydney Olympics, 2000



The *POWER POSITION*, after the “scoop” at the beginning of the 2nd pull. Note the straight arms, knees re-bent, shoulders over the bar - starting to jump with the barbell!

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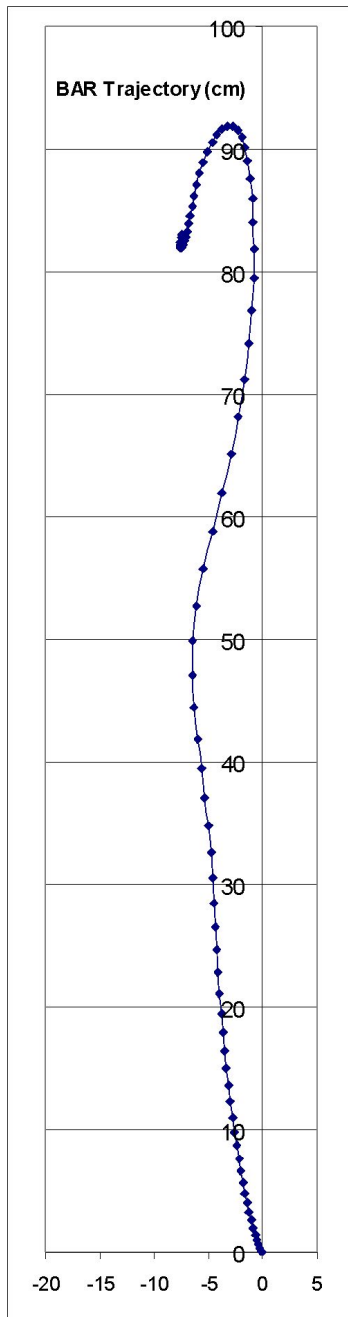
2009 Pan Ams

Valencia 83 Kg SN

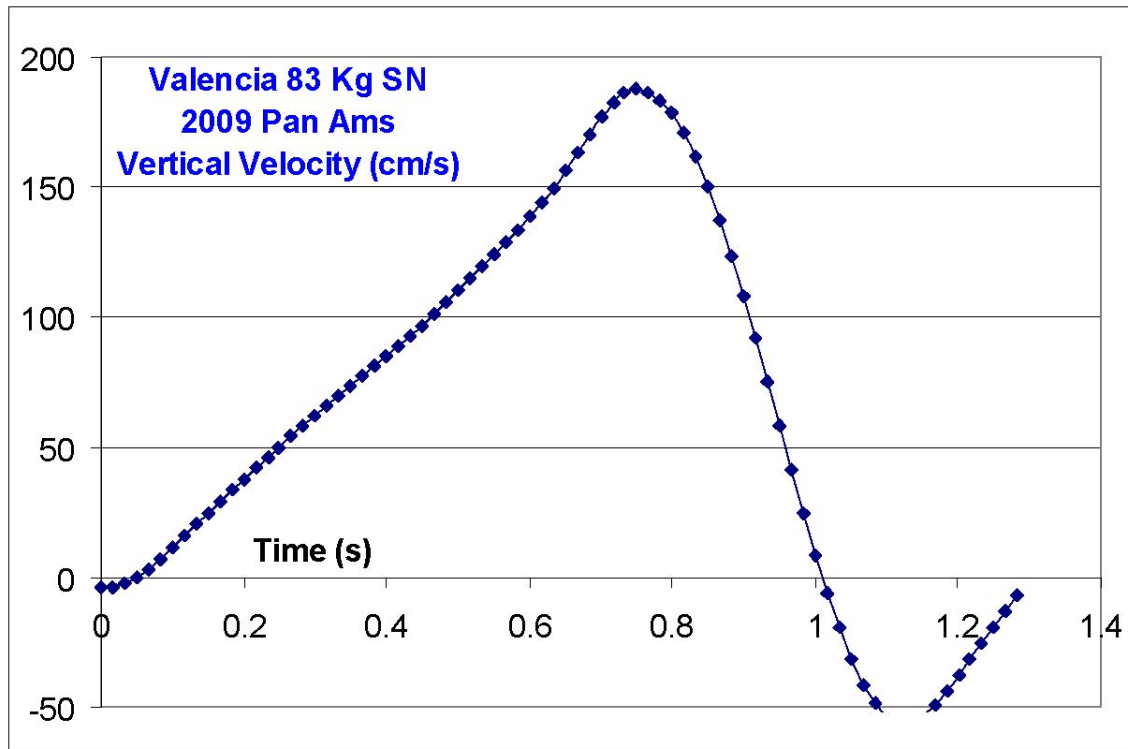


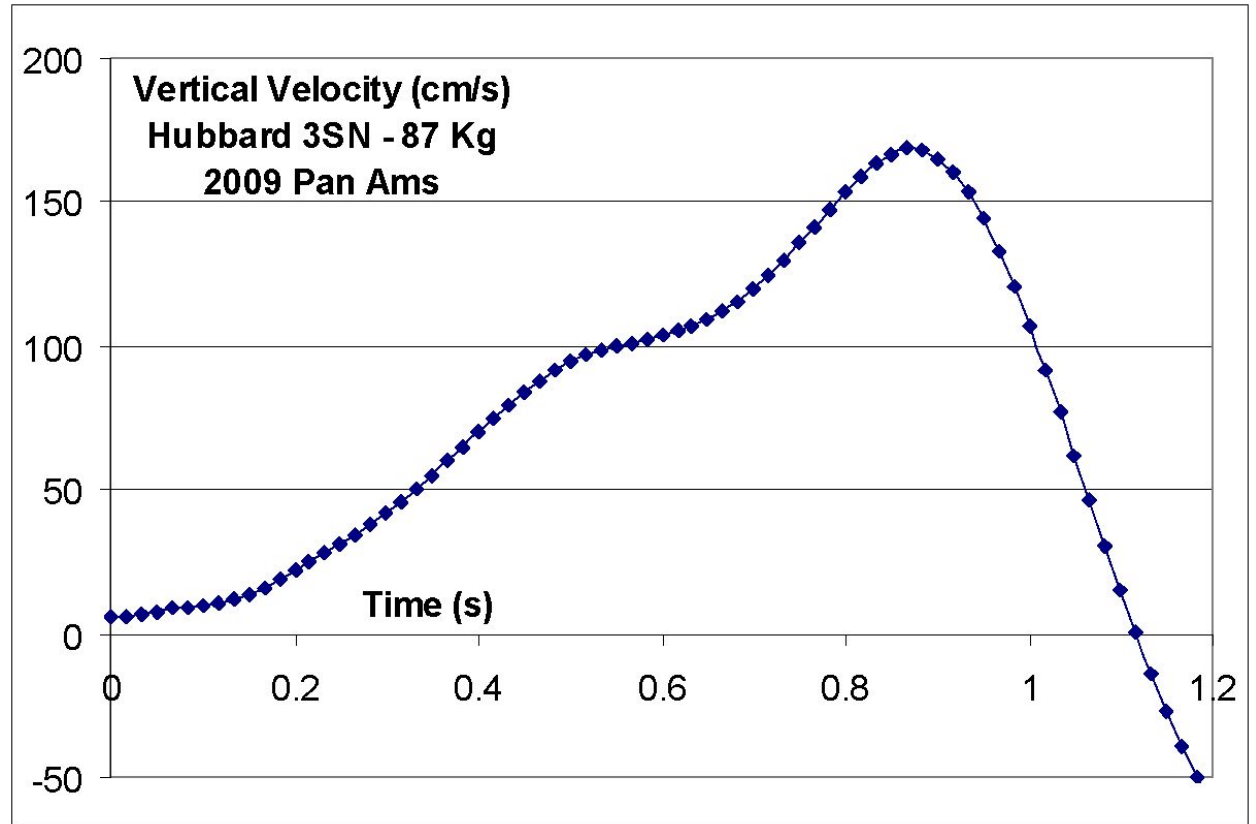
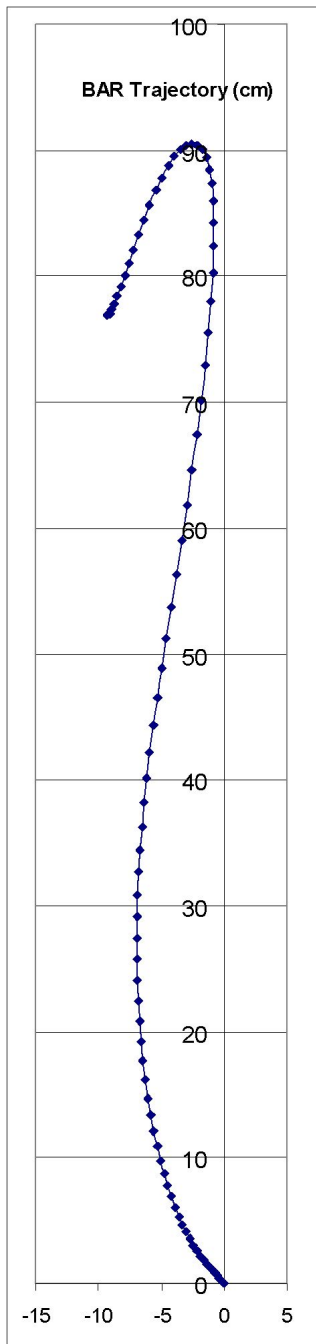
Hubbard 87 Kg SN





Rare example of continuously increasing bar velocity during the pull! See previous slide – no difference in pull pattern.



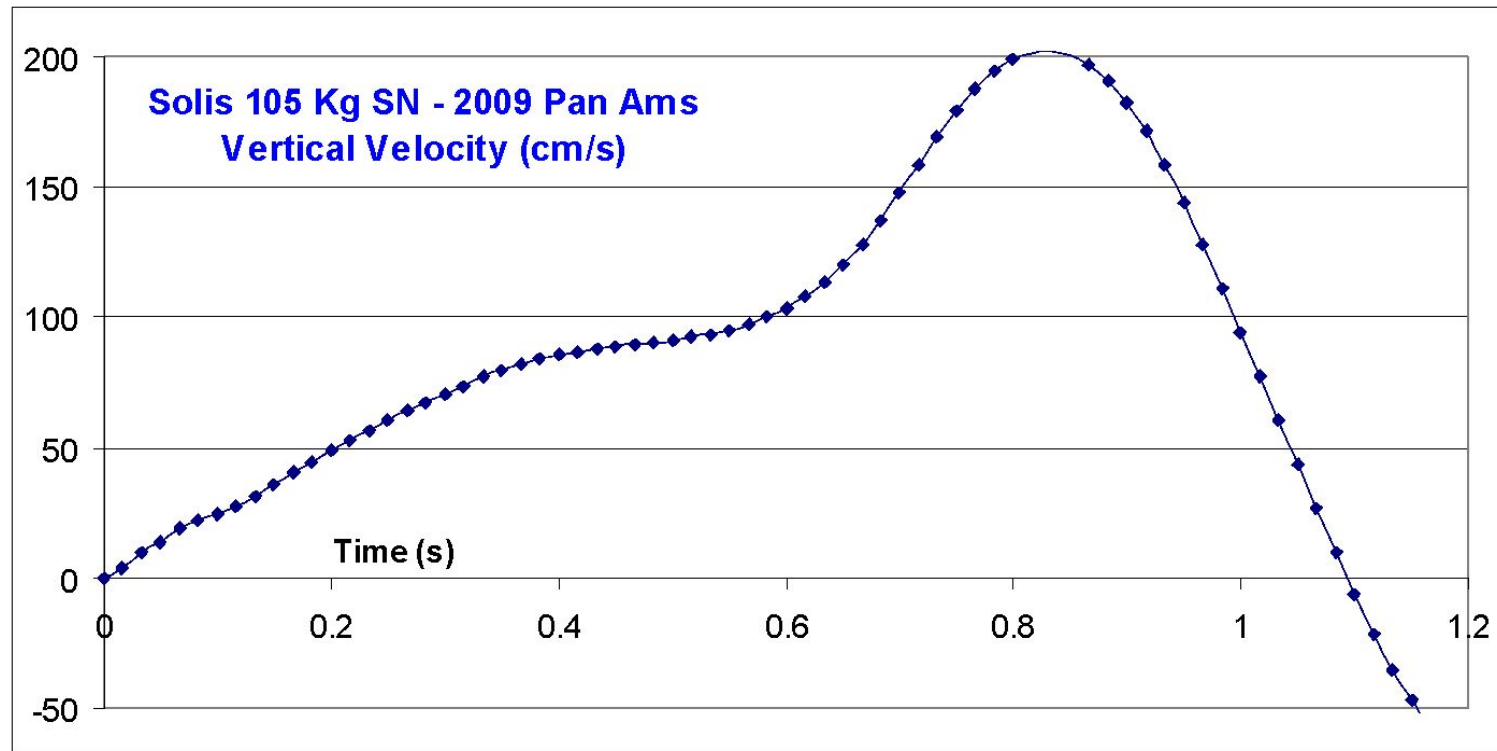


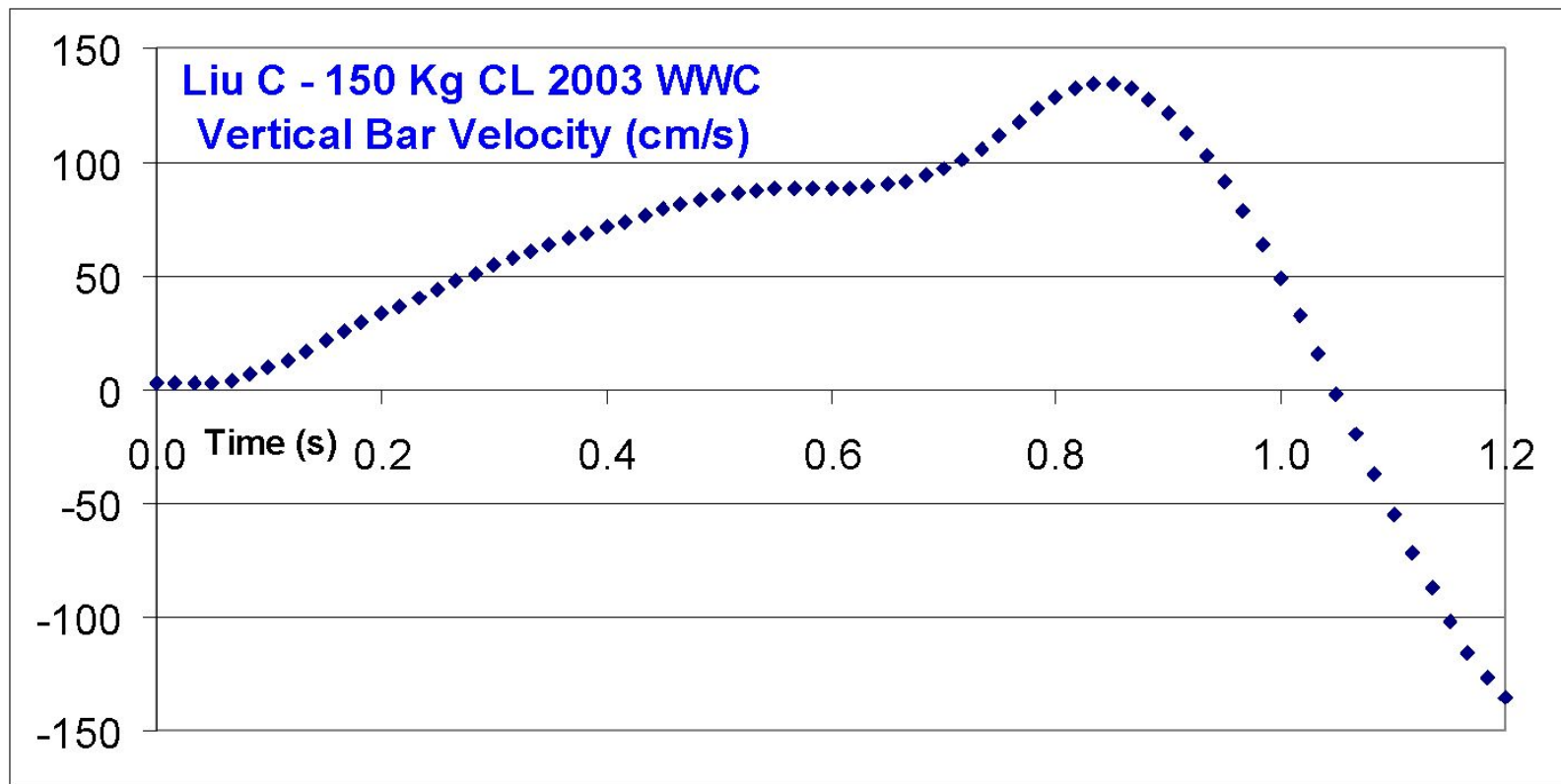
2009 Pan Ams
Solis 105 Kg SN



2003 WWC Liu C 142 Kg CL







Bar Trajectory and Balance on the Feet

The next slide shows how balance on the feet moves from between the ankles and balls of the feet at lift-off backward (toward the heels) during the 1st pull, and then moves forward to the balls of the feet during the transition and 2nd pull. This example is for five lifts of Mario Martinez (many times USA National Champion, American record holder and silver medalist at the 1984 Olympic Games). The magnitude of the balance shift backward and forward varies from athlete to athlete but always occurs. In fact, during the SN or CL pull, as balance shifts backward the bar moves backward toward the lifter's body and as balance moves forward toward the balls of the feet the bar moves forward relative to the lifter's body. Thus, bar movement is correlated with balance changes on the feet (assuming good technique). In recent years more and more lifters jump back slightly (about 1/2 a shoe length) to catch the bar in SNs and CLs.

x 40 cm

1SN	2SN	3SN
130Kg	145Kg	155Kg

1CL	2CL
170Kg	185Kg

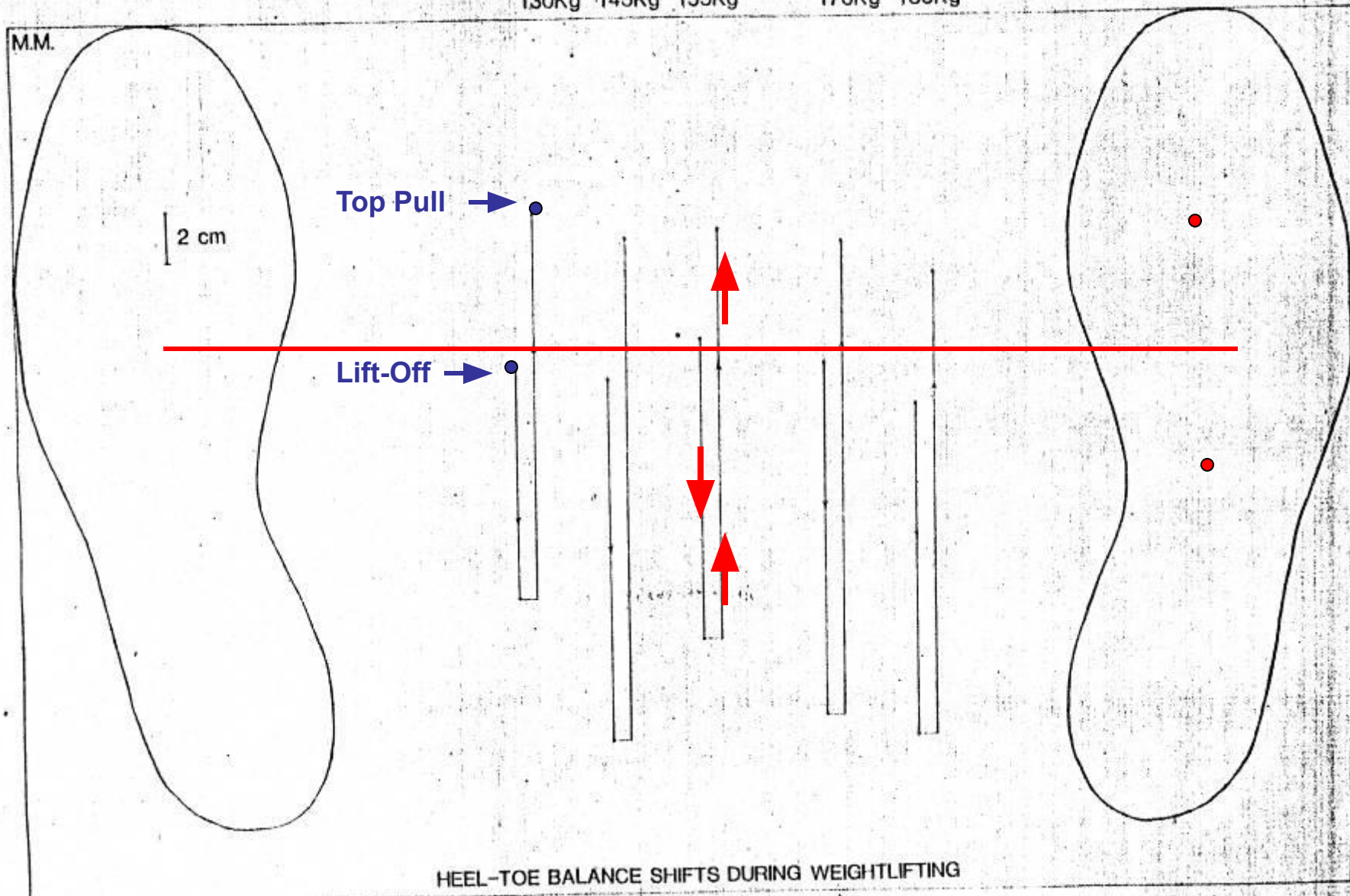
M.M.

2 cm

Top Pull

Lift-Off

HEEL-TOE BALANCE SHIFTS DURING WEIGHTLIFTING



SUMMARY

The pull patterns illustrated in this presentation are a well distributed representation of how elite weightlifters executed the Snatch and Clean pull in major competitions between 1978 and 2009. It is clear that these patterns contain all the primary elements of what was called the “double knee bend” technique as taught in the 1970’s and illustrated in the first few slides of this presentation. There are some small differences, such as how close to vertical the torso is at the end of the transition to the power position, which is the position to start the second pull. Hundreds of additional lifts from the same major competitions and U.S. National Championships and American Championships have been analyzed from film or video to support what has been presented in this short overview.

John Garhammer Ph.D
January 2010