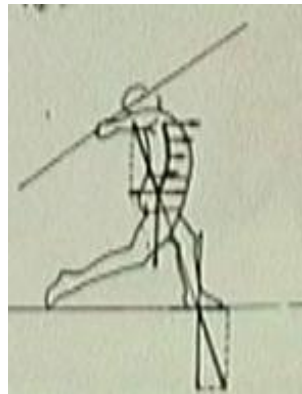
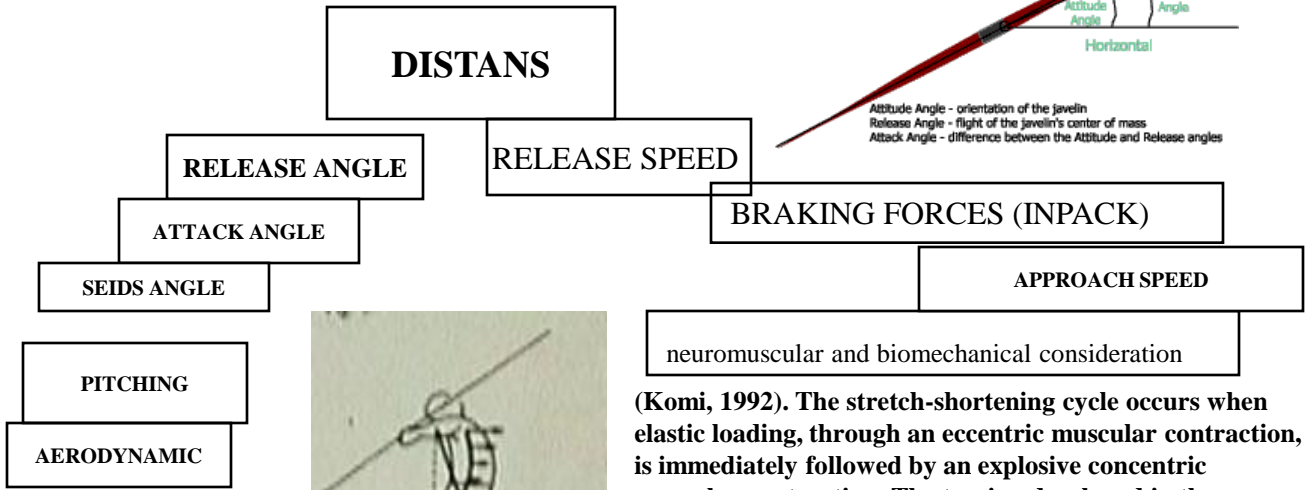
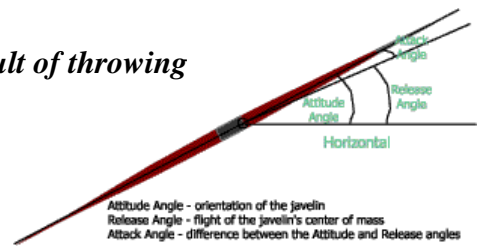


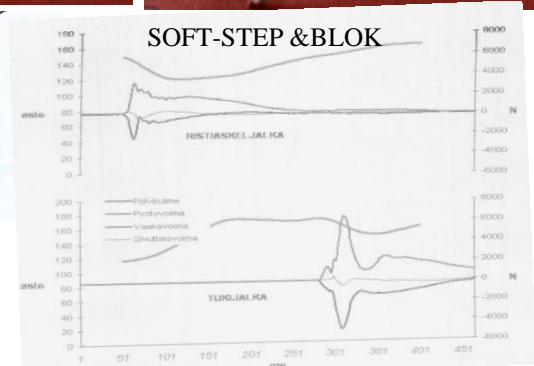
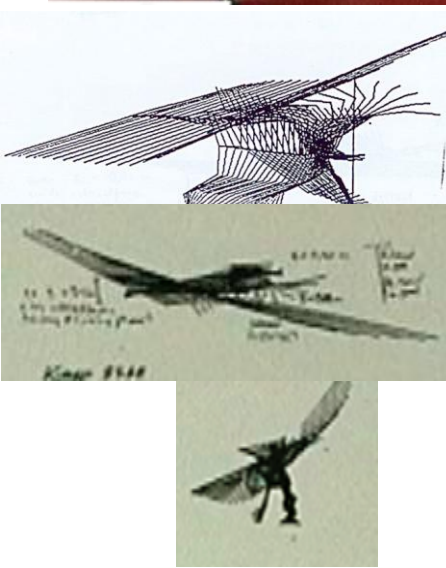
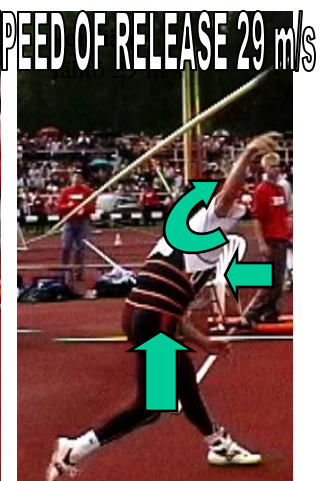
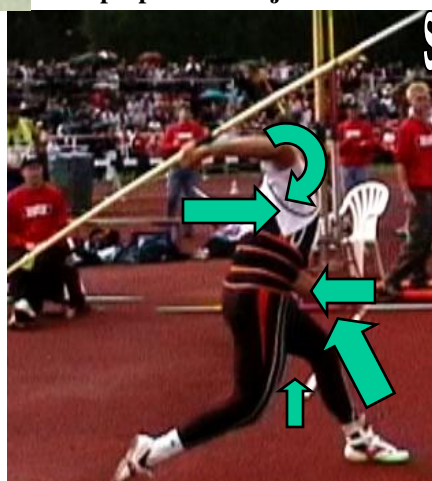
TEKNIQUE IFLUENCE ON JAVELIN FLICHT

There are factors that influence flight are directly a result of throwing



neuromuscular and biomechanical consideration

(Komi, 1992). The stretch-shortening cycle occurs when elastic loading, through an eccentric muscular contraction, is immediately followed by an explosive concentric muscular contraction. The tension developed in the musculo-tendinous junction by the eccentric loading of the muscle causes it to act in similar manner to a rubber band. When this stored energy is released it helps to increase the strength of the following concentric contraction. These neuromuscular considerations have huge ramifications for the preparation of javelin throwers.

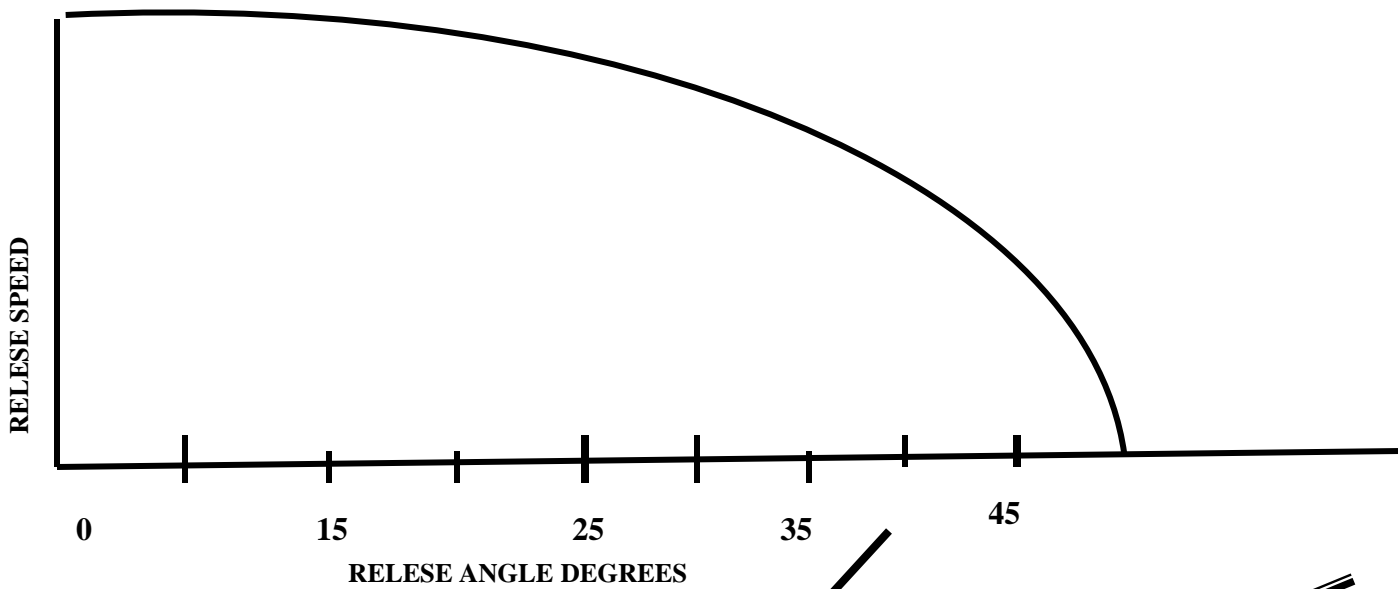
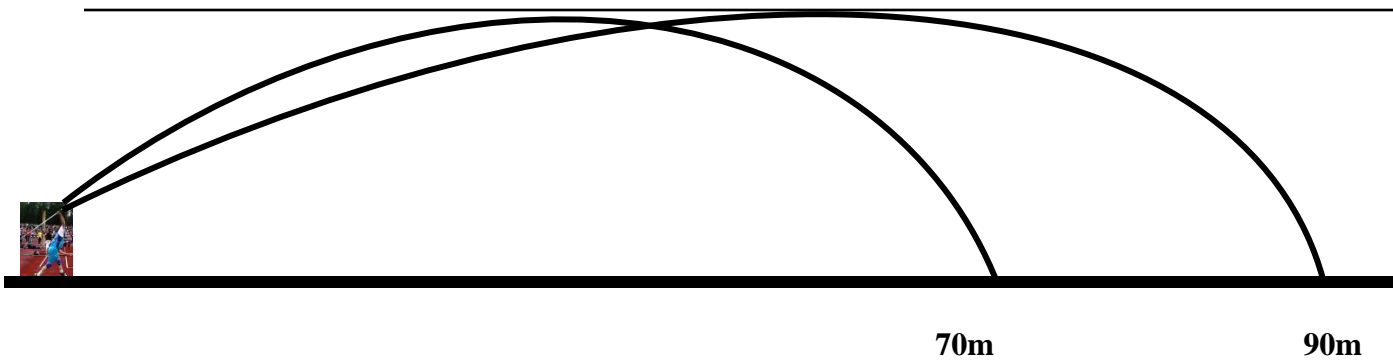


TIME OF PULL
120-130 m/s

While it may take a bit more time to master, once learned, the soft-step will allow for constant improvement in performance. As the thrower becomes more comfortable with the technique and can increase his speed, he'll be able to throw farther.

MOST IMPORTANT MAIN POINTS FOR JAVELIN THROW

ANGLE OF RELEASE

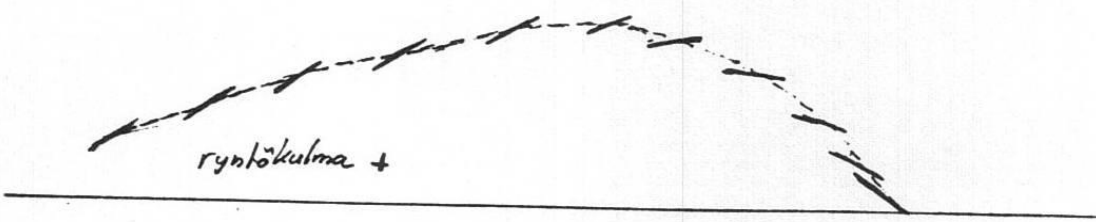
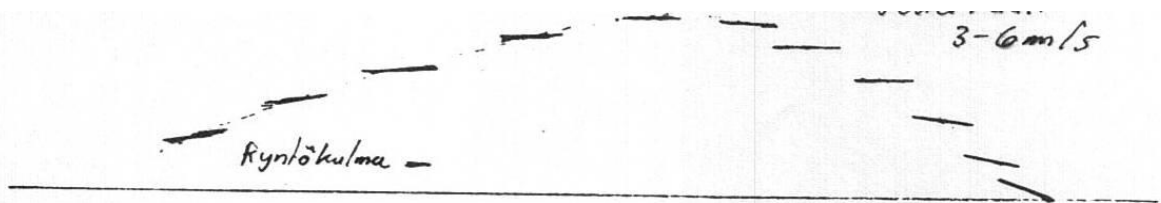


BEST RELEASE ANGLE FOR JAVELIN

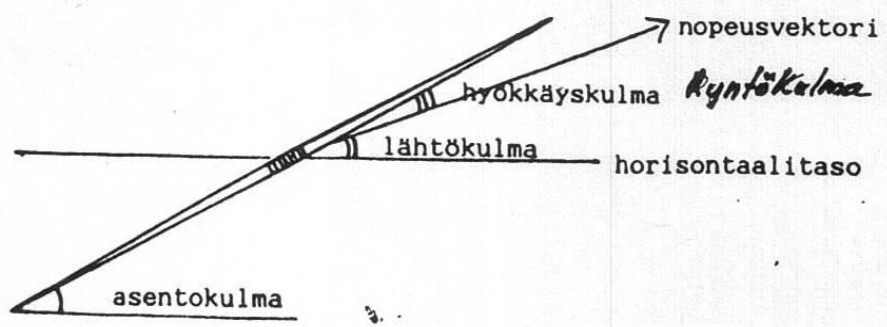
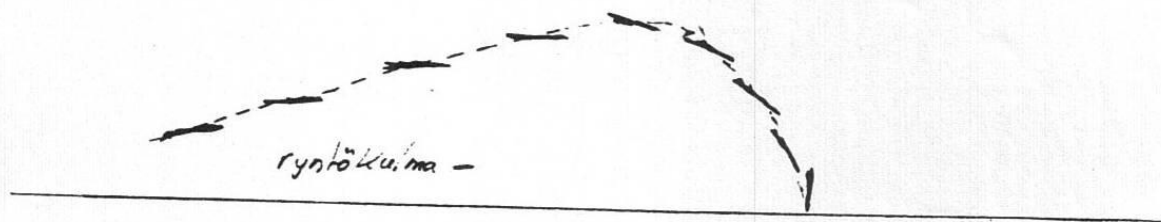
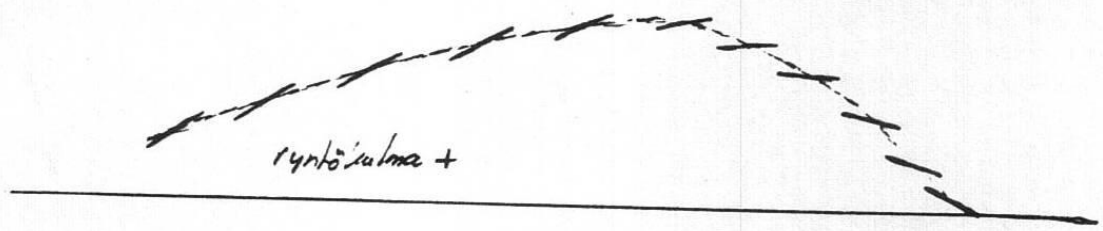
WAHAT IT'S THE PEST FOR YOU ????



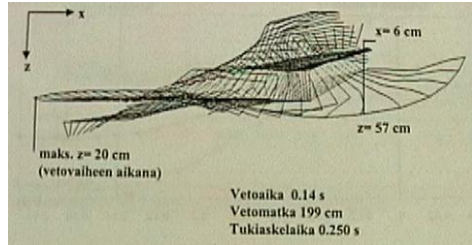
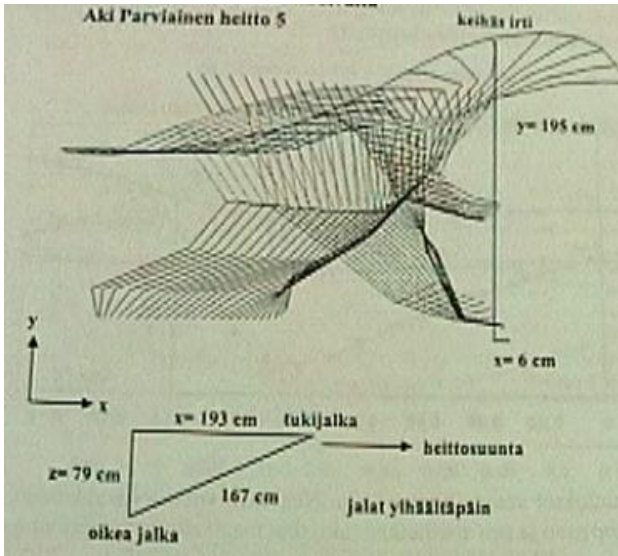
BEST RELEASE ANGLE SPEED FOR JAVELIN THROWER



Sandvik Sambion XL



Biomechanical Aspects of the men Javelin Throw



SUL

Javelin head coach

Finland

Kari Ihalainen



Time and length of last step is calculated: time begins run when right legs toe touches the track and stops when left legs heel touches the track. The length is: distance between right and left leg.



Time of pull and length is calculated when front legs heel touches the track and it ends when javelin releases from grip.



The distance from track to releasing point is releasing height

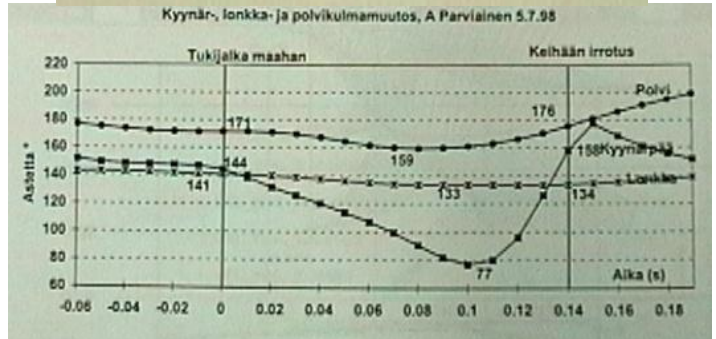
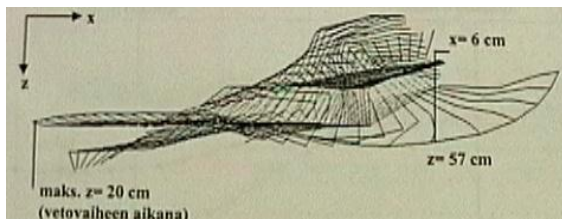
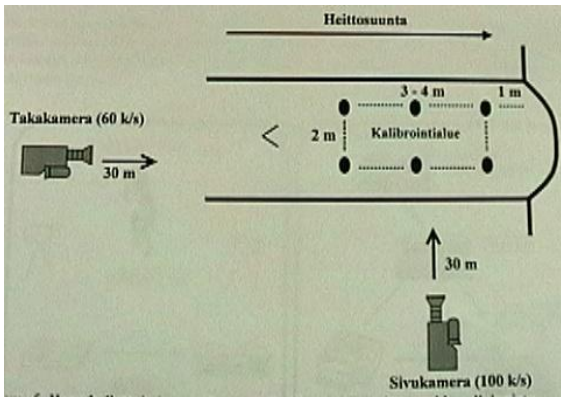


7/22/1995 5.7.1998
85,60m 82,74m
 AKI AKI
 PARVIAINEN PARVIAINEN

6/22/1996 8/8/1994 7/22/1995
92,50m 85,20m 87,68m
 JAN STEVE SEPPÖ
 ZELEZNY BACKLEY RÄTY

length of pull c/m	222	199	183	206	187
length of last step c/m	220	193	203	186	186
time of pull sec.	140	140	110	140	120
time of last step m/s.	245	250	160	190	230
releasing height cm	191	195	162	187	179

Biomechanical Aspects of the men Javelin Throw



NOTE!!

Block

Releasing

ANGLES OVER 180 DEGREE MEANS THAT FRONT LEG IS OVER EXTENDED



knee angle and elbow angle is measured when front leg hits the track

knee angle and elbow angle is measured when these are in minimum during pull

knee angle and elbow angle is measured when releasing javelin from grip.



7/22/1995 5.7.1998
85,60m 82,74m
AKI AKI
PARVIAINEN PARVIAINEN

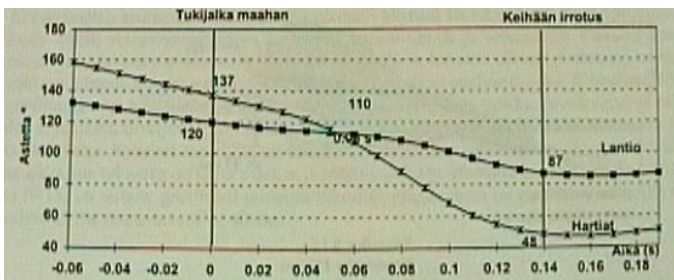
6/22/1996 8/8/1994 7/22/1995
92,50m 85,20m 87,68m
JAN STEVE SEPPO
ZELEZNY BACKLEY RÄTY

knee angle when front leg hits track	177	171	183	181	183
knee angle minimum during pull	152	159	183	182	190
knee angle when releasing	166	176	195	187	202
elbow angle when begin pull	143	144	147	154	117
elbow angle minimum during pull	84	77	93	136	93
elbow angle when releasing	152	158	139	155	160

Biomechanical Aspects of the men Javelin Throw

SUMMARY

Main differences between Zelesny and others Jan Zelesny use body rotation more then others in pulling moment



hip angle when front leg hits track (degree)

hip angle when releasing

shoulder angle when front leg hits track

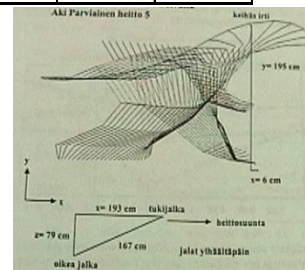
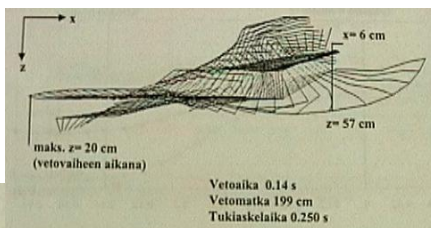
shoulder angle when releasing

body-front leg angle when front leg hits the track

body-front leg angle when releasing

7/22/1995	5.7.1998	6/22/1996	8/8/1994	7/22/1995
85,60m	82,74m	92,50m	85,20m	87,68m
AKI	AKI	JAN	STEVE	SEPPO
PARVIAINEN	PARVIAINEN	ZELEZNY	BACKLEY	RÄTY

129	120	131	117	110
99	87	87	93	100
149	137	178	145	133
57	48	62	55	45
134	141	141	138	138
117	134	123	126	129



7/22/1995	5.7.1998	6/22/1996	8/8/1994	7/22/1995
85,60m	82,74m	92,50m	85,20m	87,68m
AKI	AKI	JAN	STEVE	SEPPO
PARVIAINEN	PARVIAINEN	ZELEZNY	BACKLEY	RÄTY

releasing point from front leg toe cm

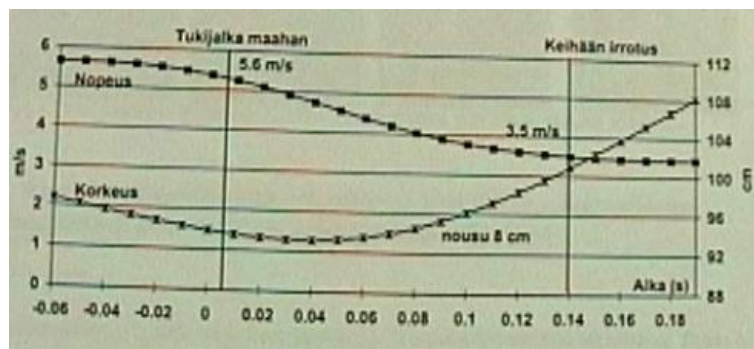
distance between right and left leg (vertical) c/m

moving to right during pull cm

releasing point from front leg c/m

-12	6	30	2	20
66	79	55	77	48
24	20	62	22	20
38	57	68	51	48

change of center of gravity c. g. must raise during the pull speed must increase when releasing



Block

releasing

the speed of c. g.

speed when front leg touches track

body speed decreasing in releasing moment

7/22/1995	5.7.1998	6/22/1996	8/8/1994	7/22/1995
85,60m	82,74m	92,50m	85,20m	87,68m
AKI	AKI	JAN	STEVE	SEPPO
PARVIAINEN	PARVIAINEN	ZELEZNY	BACKLEY	RÄTY

speed of c. g. when the front leg hits track m/s

speed of c. g. in releasing moment m/s

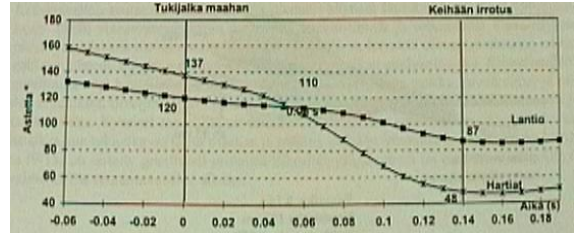
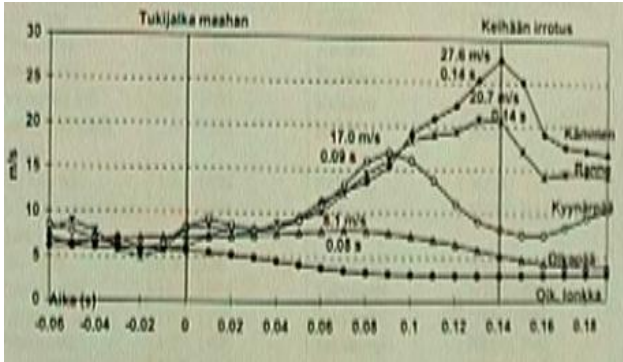
raise of c.g. from lowest point to releasing point

6.6	5.6	6.6	6.4	4.8
3.4	3.5	3.2	2.9	2.6
5	8	4	5	3

Biomechanical Aspects of the men Javelin Throw

	7/22/1995	5.7.1998	6/22/1996	8/8/1994	7/22/1995
	85,60m	82,74m	92,50m	85,20m	87,68m
	AKI	AKI	JAN	STEVE	SEPPO
	PARVIAINEN	PARVIAINEN	ZELEZNY	BACKLEY	RÄTY

highest speed of shoulder m/s	10.8	8.1	9.1	11.2	9.3
highest speed of elbow m/s	16	17	15.1	14.4	15.2
highest speed of wrist m/s	22.5	20.7	21	24.8	22.2
highest speed of hand m/s	28	27.6	28.7	30.8	27.7

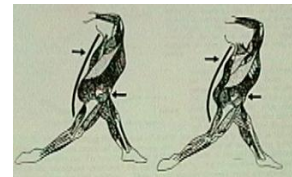
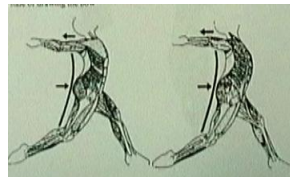
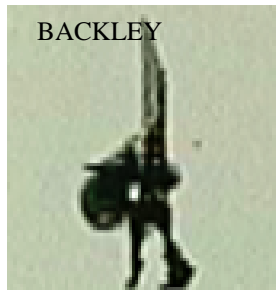


Block

Releasing

	7/22/1995	5.7.1998	6/22/1996	8/8/1994	7/22/1995
	85,60m	82,74m	92,50m	85,20m	87,68m
	AKI	AKI	JAN	STEVE	SEPPO
	PARVIAINEN	PARVIAINEN	ZELEZNY	BACKLEY	RÄTY

cross point of hip and shoulder during pull (time)	0.09	0.06	0.06	0.10	0.09
highest speed of shoulder during pull sec.	0.08	0.03	0.06	0.08	0.06
highest speed of elbow during pull sec.	0.09	0.10	0.07	0.09	0.08
highest speed of wrist during pull sec.	0.12	0.13	0.09	0.14	0.11
highest speed of hand during pull sec.	0.13	0.13	0.10	0.14	0.13
pulling time from begin to end sec.	0.14	0.14	0.11	0.14	0.13



powers that are directed to Zelesny's body and how these change during the pull

picture from behind



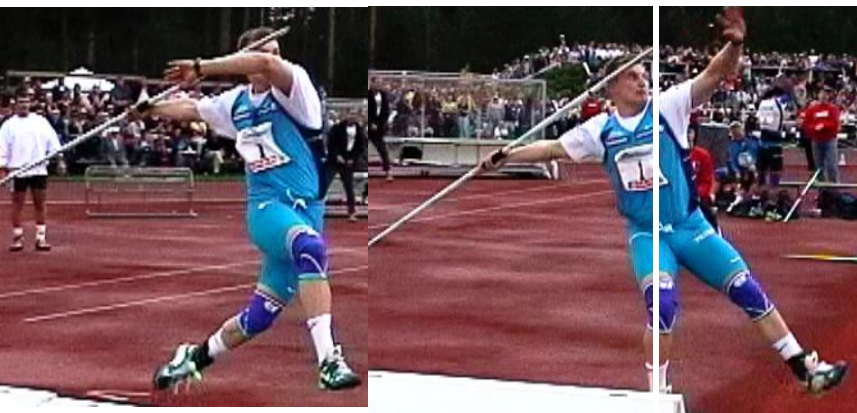
picture from above

upper body rotation will help thrower if he can pull javelin straight front

GROSSOVER

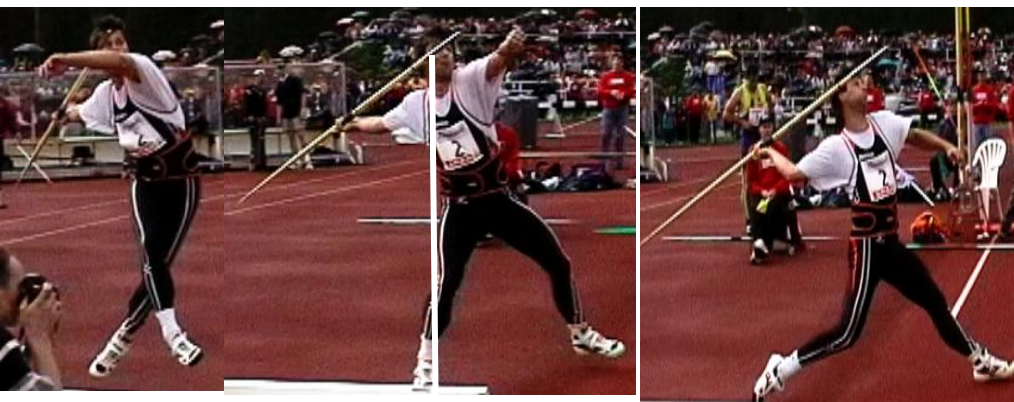


KEEPING THE CENTER OF GRAVITY MOVING LEVEL AND FORWARD IS KEY LONG THROWS, AND THE SOFT-STEP ACTION IS THE KEY TO THIS HAPPENING



THE MOST CRITICAL ASPECT OF THROWING

IDEALLY, THIS IS DONE WITHOUT LOSING ANY SPEED

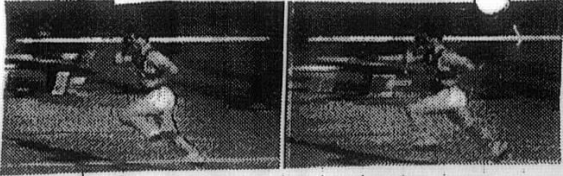


THERE IS NOT A WILLFUL DRIVE OR PUSH OF THE RIGHT KNEE INSTEAD THE ACTION IS AN ACTIVE TURNING INWARD OR DROPPING ACTION

GROSSOVER STEP ARE THE KEY RHYTHM AND RELAXATION

GROSSOVER STEP LENGTH IT'S THE SAME WHAT IS YOUR JAVELIN LENGTH (MEN 2.6m-3m WUOMEN 2.4m-2.6m)

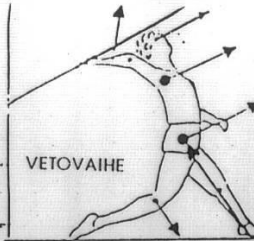
KEIHÄÄNHEITTO TEKNIikka



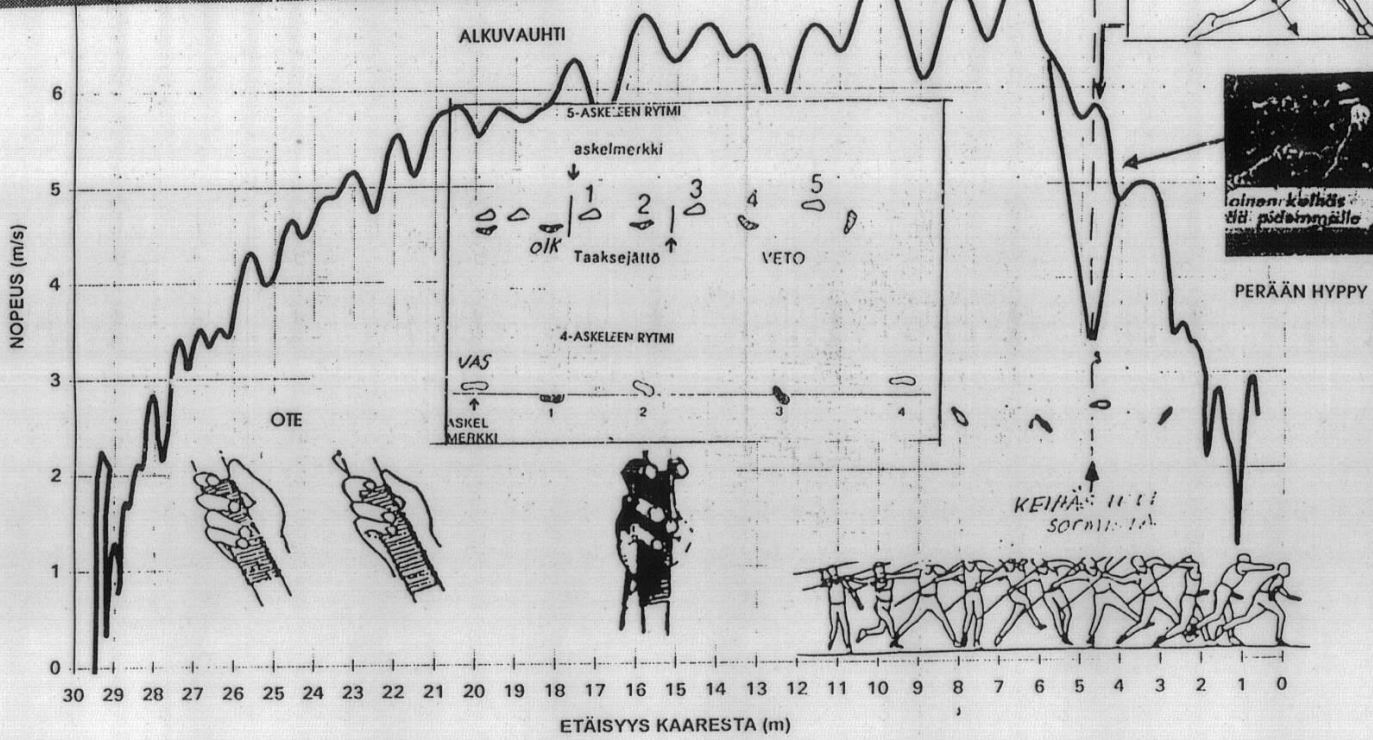
HEITTOASKELEET
KEIHÄÄN TAAKSEVIENII

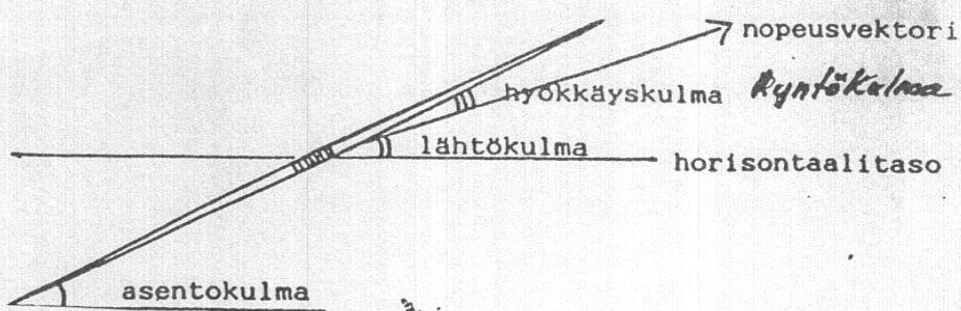


RISTIASKELVAIHE



VETOVAIHE

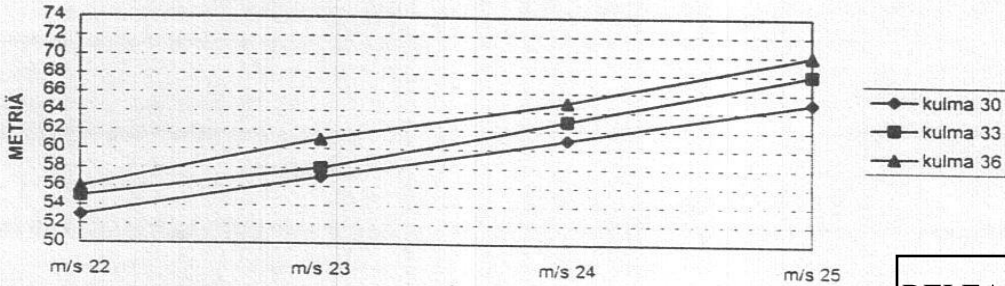




Tykin lähtökulma	Lähtönopeus	Diana 60 / 1	Diana 60 / 2	Diana 70	Diana 80	Nemeth 65	Nemeth 75	Apollo	Keskiarvo	Diana 70 vanha	Erotus vanha-uudet
30	23.0	57,10	56,40	57,29	56,94	56,76	57,55	57,07	57,02	58,02	1,00
	24.5	63,26	62,83	63,69	63,59	63,35	63,65	63,53	63,41	64,27	0,86
	26.0	69,41	69,25	70,10	70,24	69,93	69,75	69,99	69,81	70,52	0,71
33	23.0	59,32	59,10	59,01	59,39	58,74	59,68	59,69	59,27	60,65	1,38
	24.5	65,97	65,55	66,21	66,31	65,59	65,98	66,40	66,00	67,46	1,46
	26.0	72,62	72,00	73,40	73,24	72,44	72,28	73,11	72,73	74,27	1,55
36	23.0	60,94	61,02	62,36	61,04	60,53	61,99	61,33	61,32	63,35	2,04
	24.5	67,75	67,33	68,60	67,87	67,39	68,30	67,87	67,87	70,48	2,61
	26.0	74,57	73,63	74,84	74,71	74,25	74,61	74,40	74,43	77,61	3,18

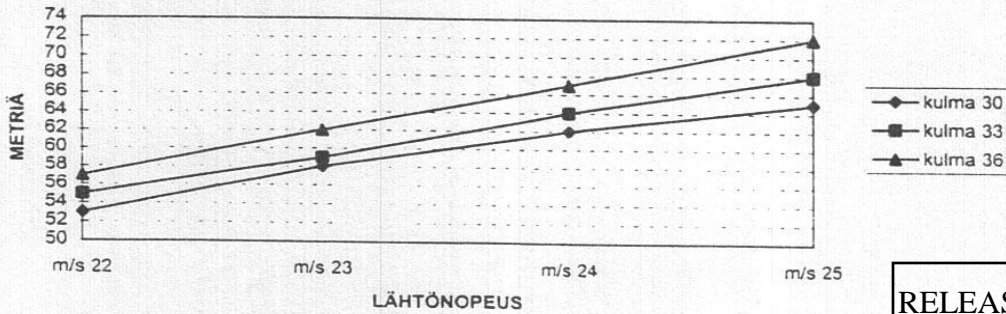
Keihäiden lentopituudet (m) kolmella lähtökulmalla (astetta) ja kolmella lähtönopeudella (m/s). Keskiarvo kuvaa uusien sääntöjen mukaisten keihäiden keskiarvoa ja erotus vanhan Dianan ja uusien keihäiden eroa.

NAISTEN KEIHÄS NEMETH 75m



RELEASE SPEED

NAISTEN KEIHÄS 1998 DIANA 80 m vanha malli 1998



RELEASE SPEED

