

# Analysis at Olympic in Athens

Event: Men 20km (Aug.20)

Data: Three-dimensional analysis with two VTR cameras (sixty fields per second) which were fixed on 2km circuit.

Judgement: Summary and time result were obtained after competition.

Subject: Athletes whose 2km split time was almost the same were picked up as subjects.

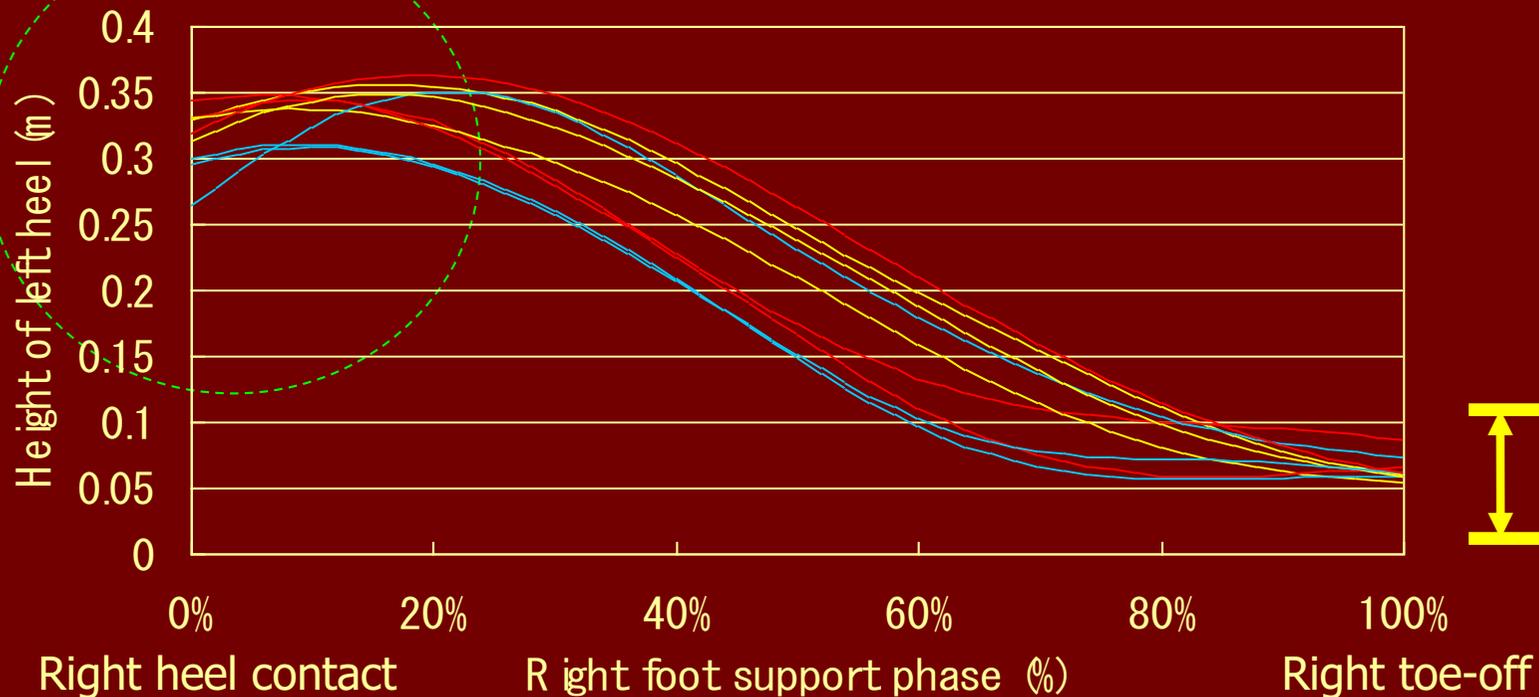
Walking Speed, Step frequency, support time, and flight time

	No Caution NO red card		Caution (Loss of Contact)		Disqualified (Loss of Contact)	
	A	B	C	D	E	F
Walking speed (m/sec)	4.19	4.28	4.36	4.20	4.19	4.11
Step frequency (Step/sec)	3.33	3.33	3.33	3.42	3.53	3.42
Step time (sec)	0.300	0.300	0.300	0.292	0.283	0.292
Support time (sec)	0.283	0.275	0.267	0.267	0.267	0.267
Flight time (sec)	0.017	0.025	0.033	0.025	0.017	0.025

## Analysis of Athens 2004 (Loss of contact)

- No Caution/Warning
- More than 2 cautions
- More than 2 warnings

Change of the left heel height during the right foot support phase



\* Athletes are likely to be cautioned and warned with the loss of contact, when their left heel height is higher at the heel contact of right foot.

# Result of analysis (Loss of Contact)

No Caution and Warning



Heel-Height : Low

Warning ~3



Heel-Height : High

**CLEAR DIFFERENCE !:** Back leg heel height at the heel contact of front leg

Caution ~4



Heel-Height at contact : Low

Warning ~3



Heel-Height at contact : High



Heel-height at swing: High



Heel-height at swing: Low

No warning with low heel height at contact  
nevertheless high heel at swing !

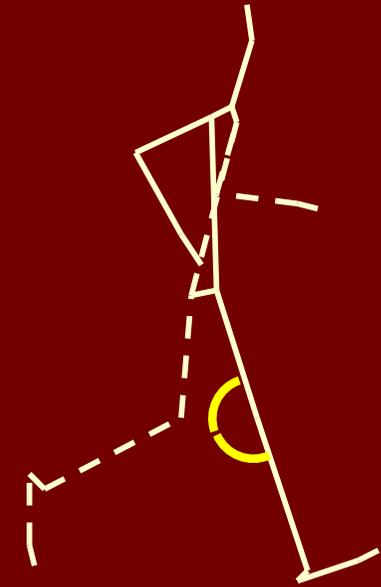
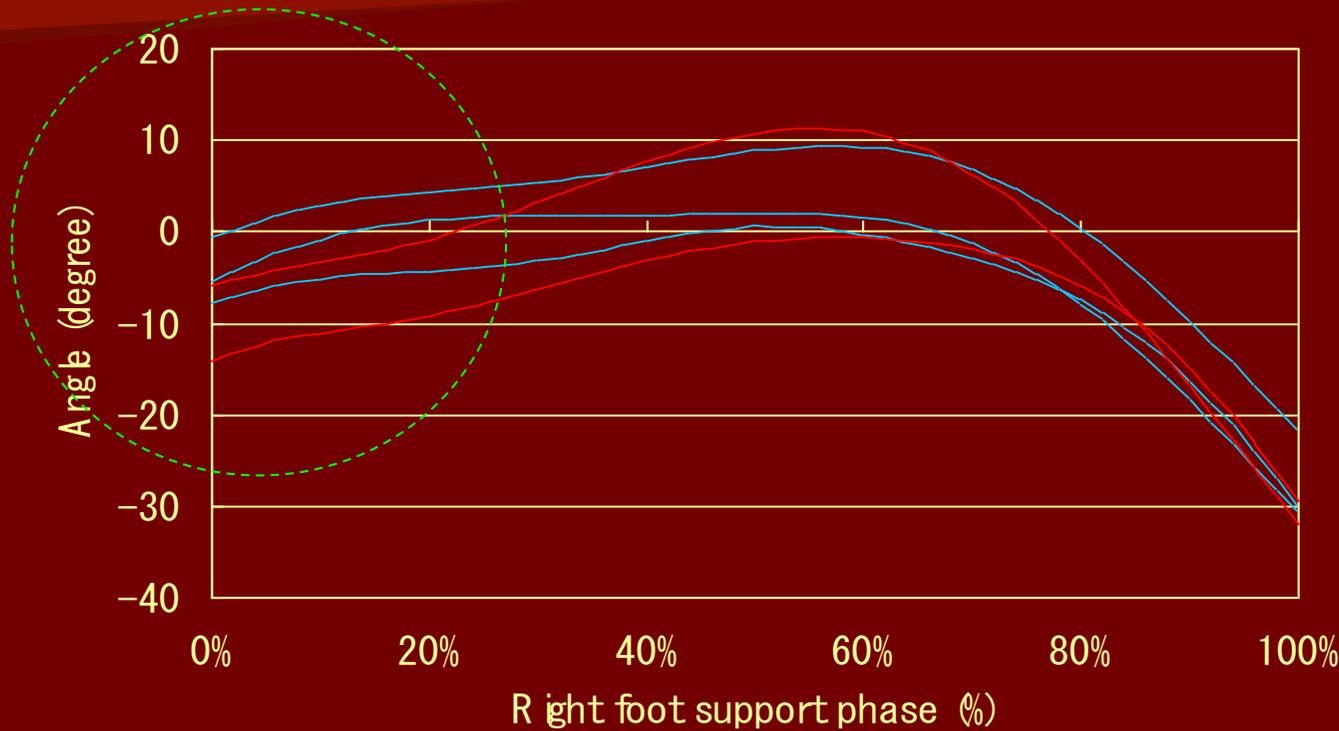
## Walking Speed, Step length and Step frequency

	No Caution No red card		Red Card (Bent knee)	
	A	B	C	D
Walking speed (m/sec)	4.19	4.28	4.07	4.05
Step length (m)	1.26	1.28	1.25	1.15
Support distance (m)	1.11	1.10	1.04	1.00
Flight distance (m)	0.15	0.18	0.21	0.14
Step frequency (step/sec)	3.33	3.33	3.24	3.53
Step time (sec)	0.30	0.30	0.31	0.28
Support time (sec)	0.28	0.27	0.28	0.27
Flight time (sec)	0.02	0.03	0.03	0.01

# Analysis of Athens 2004 (Bent Knee)

- No Caution/Warning
- More than 1 warning

Change of the right knee angle during the right foot support phase



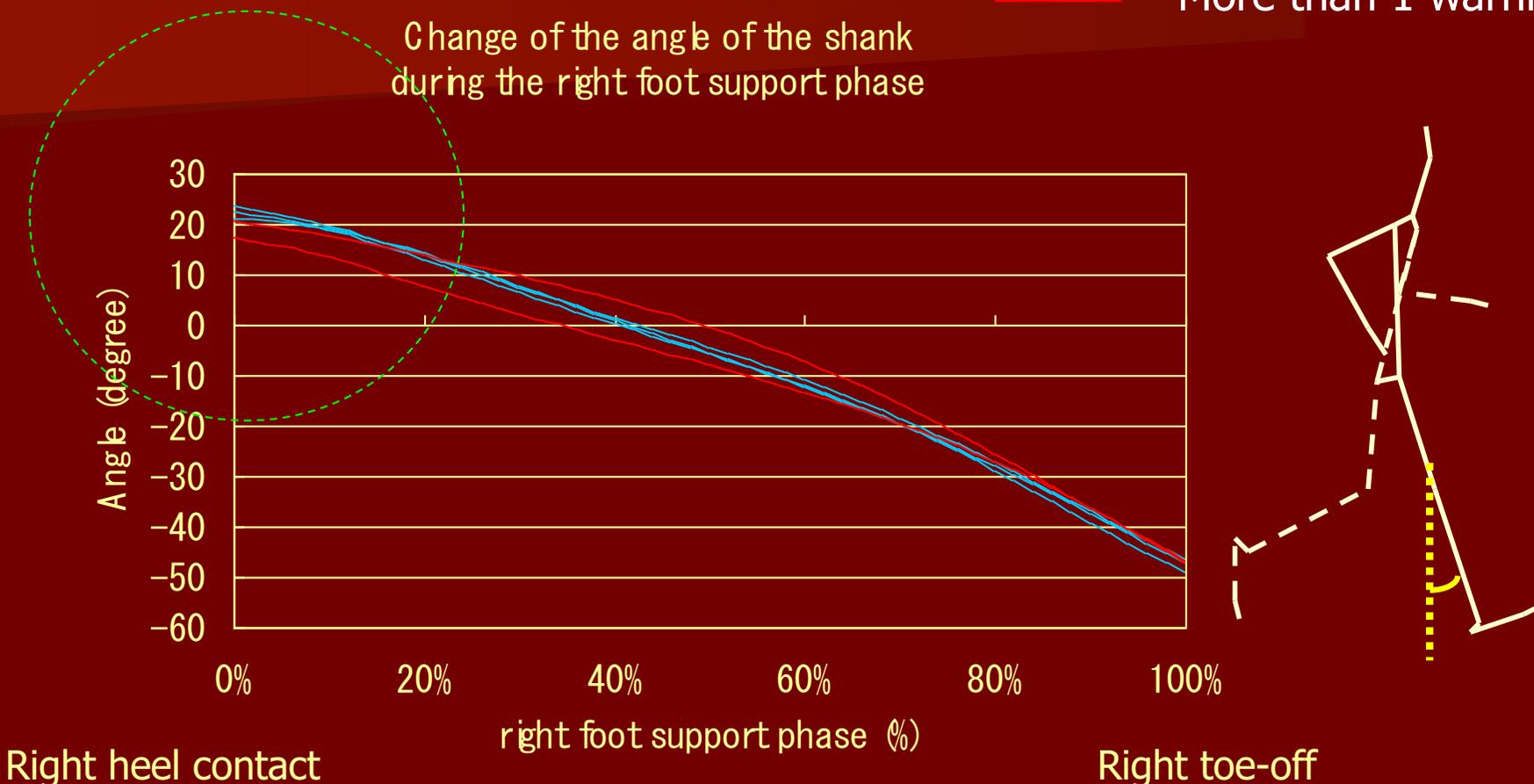
Right heel contact

Right toe-off

Support knee was a little bit bended when athletes have not received any caution/warning.

## Analysis of Athens 2004 (Bent Knee)

- No Caution/Warning
- More than 1 warning



The angle of the shank at heel contact was small when athletes received warning.

# Result of analysis (Bent Knee)

No Caution and Warning



Angle of the shank at heel contact: Large

Warning <1



Angle of the shank at heel contact: Small

**CLEAR DIFFERENCE !: Angle of the shank at heel contact**