



Alexander Ferrauti, Ruhr University Bochum: VTV Coaches workshop, Belgium 15.-16.12. 2006

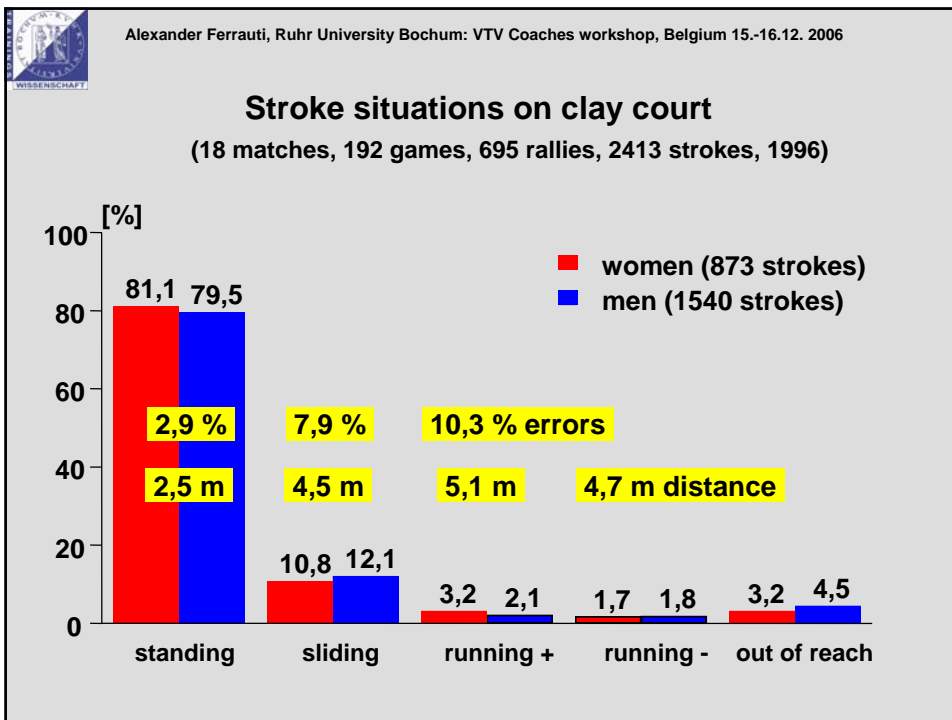
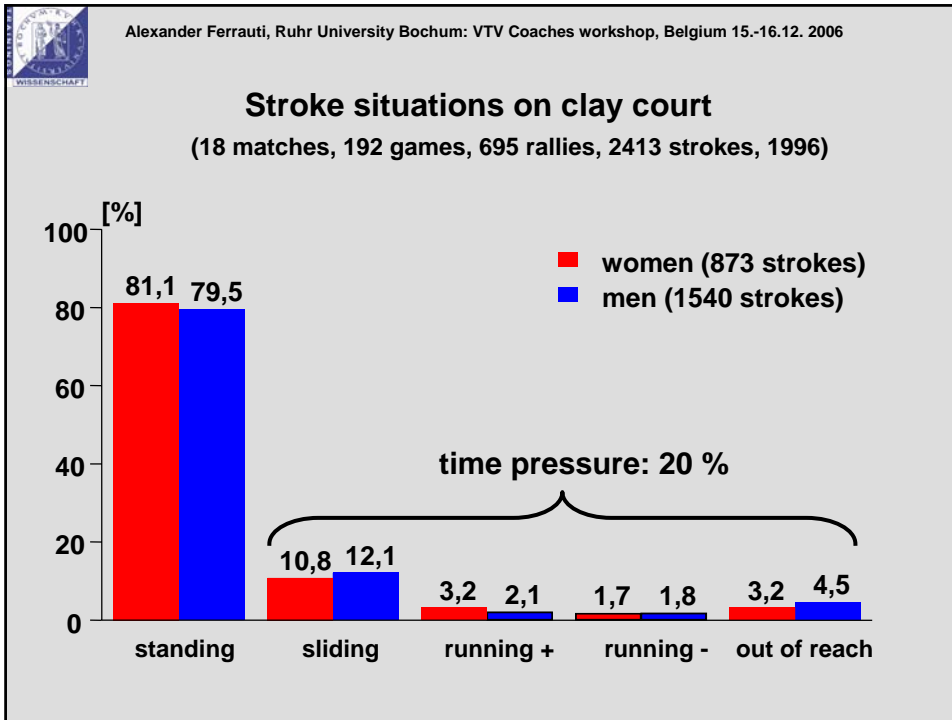
Diagnostics of running speed and stroke velocity in tennis



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running speed

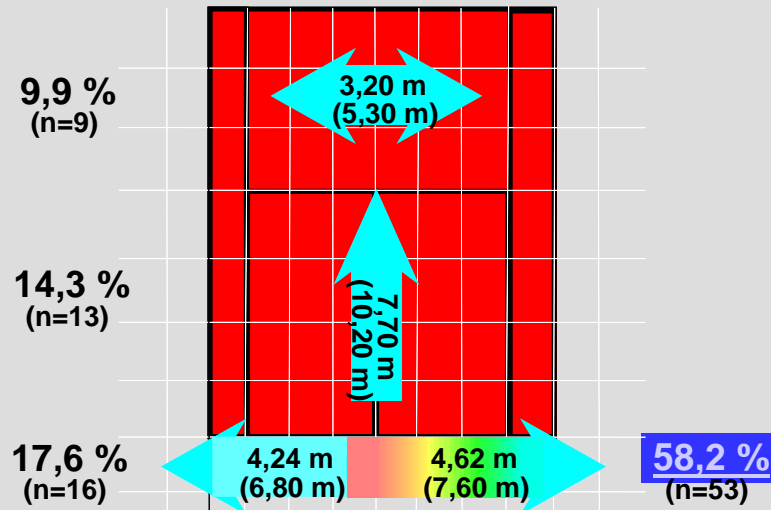






Running distances under time pressure

(n = 91 strokes of 18 clay court matches)



Scientific Tests

1. 5, 10, 20 m sprint with double light barrier system
2. Tennisspecific shuttle run (with light barrier)
3. Counter Movement Jump (sensible platform or mat)
4. Squat Jump (platform)
5. Drop Jump (platform)
6. Foot Tapping Test (platform)
7. Leg Press (isometric strength)

Simple Tests

1. Net-baseline or Sideline Sprint (Stopwatch)
2. Tennisspecific shuttle run (Stopwatch)
3. Jump and Reach Test
4. Standing Long Jump
5. 3er Hopp
6. Leg Press (Repetition Maximum)



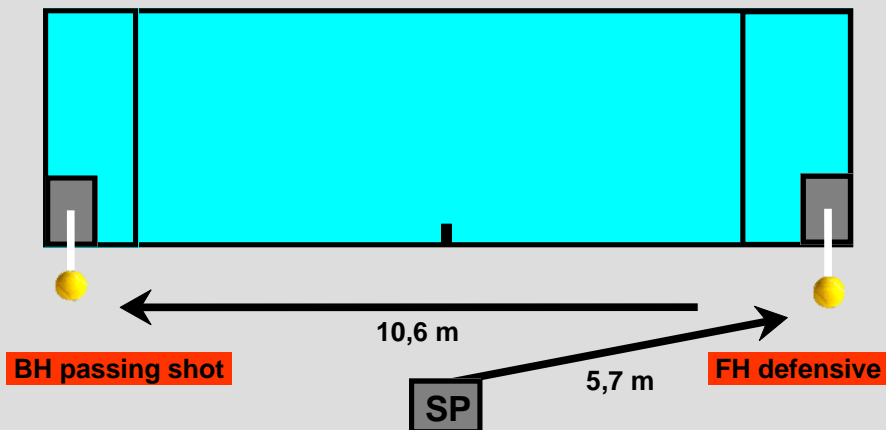
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Baseline sprint test

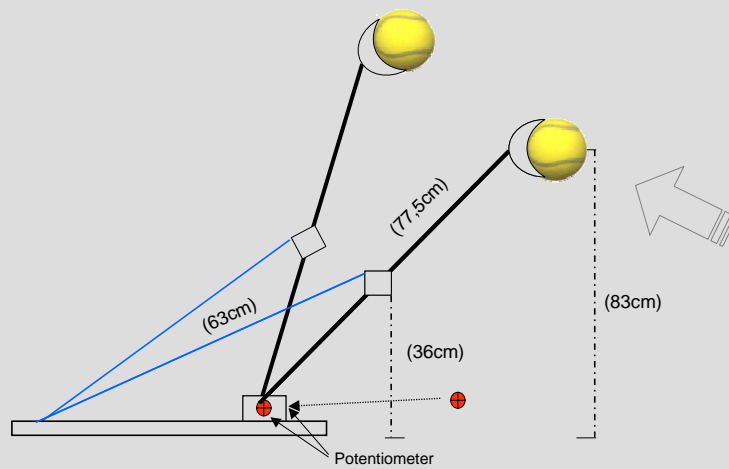
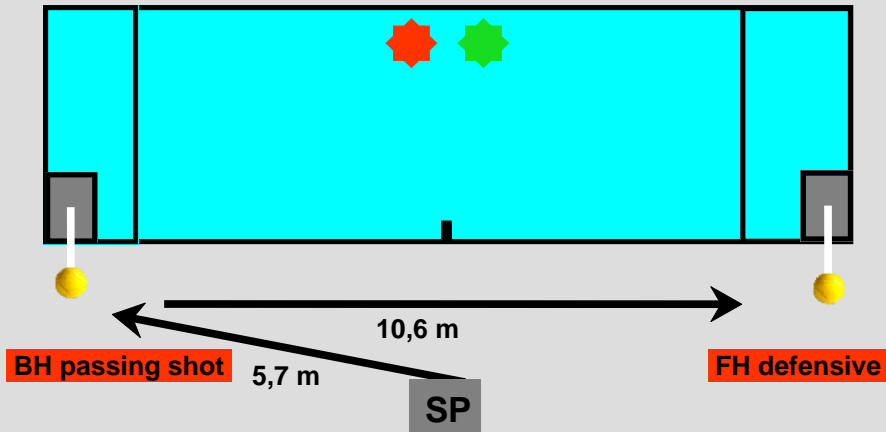
Tennisspecific shuttle run





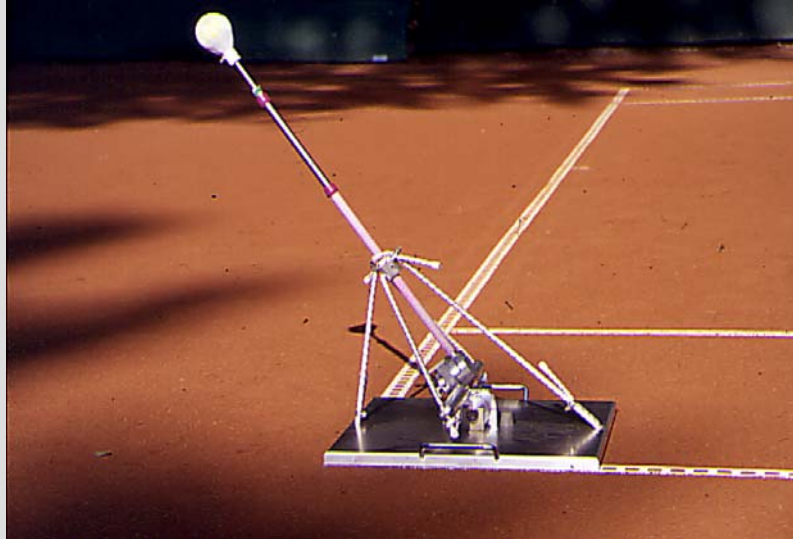
Baseline sprint test

Tennisspecific shuttle run





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Richtungswechsel Sprint-Test

Tennisspecific shuttle run II



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Jumping force

- Counter Movement Jumps
- Drop Jumps

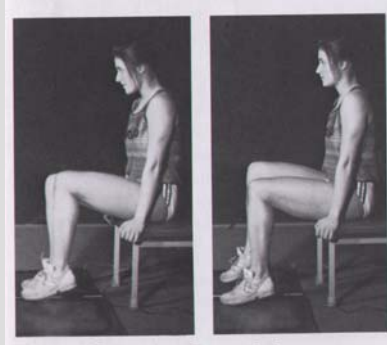




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Tapping-Test

(3s fastest intervall out of 5 s)



(Bauersfeld/Voß 1992, 26)



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Maximum Isometric strength

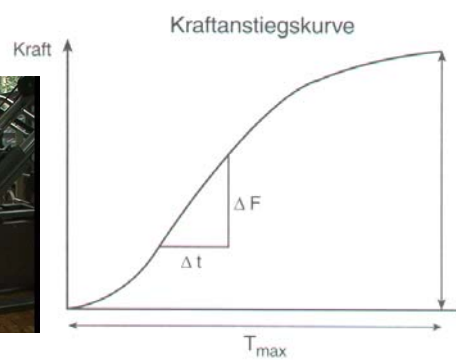
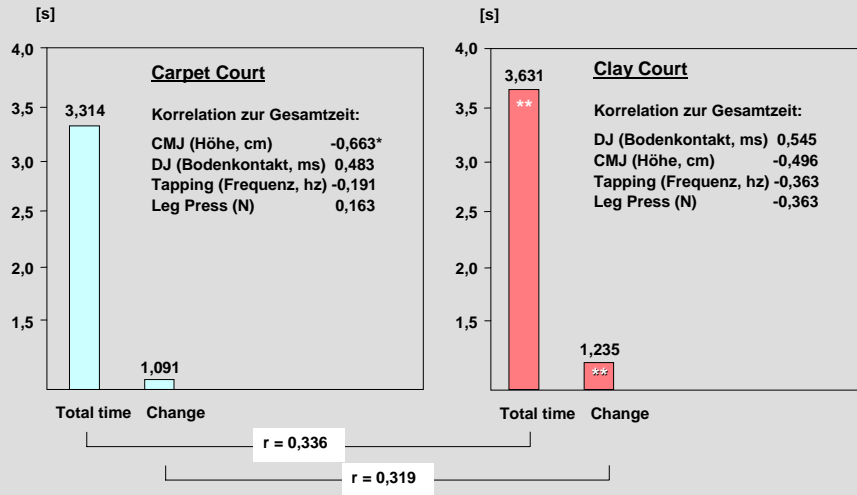


Abb. 2.23: Die Kraftanstiegskurve zur Bestimmung der Maximalkraft sowie der Schnellkraft mit ihren Komponenten Startkraft und Explosivkraft (nach BÜHLE & SCHMIDBLEICHER, 1981).

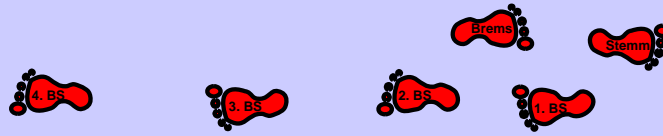
(Hohmann et al. 2002, 81)



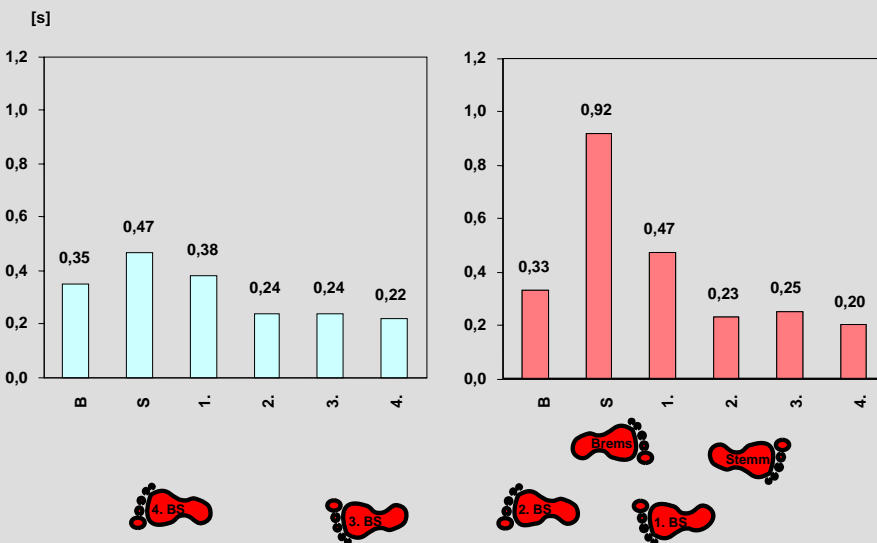
Tennisspecific shuttle run



Ground Contact Times in a real game situation



Ground Contact Times in a real game situation





Scientific Tests Recommendations (2/year U12-U16)

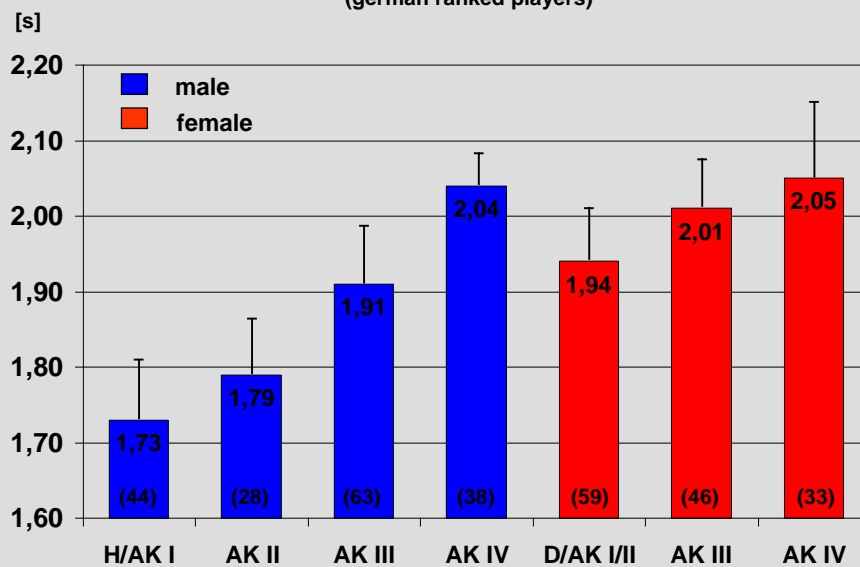
1. 5, 10, 20 m sprint with double light barrier system
2. Tennisspecific shuttle run (with light barrier)
3. Counter Movement Jump (sensible platform or mat)

Simple Tests Recommendations

1. Net-baseline or Sideline Sprint (Stopwatch)
2. Tennisspecific shuttle run (Stopwatch)
3. Standing Long Jump



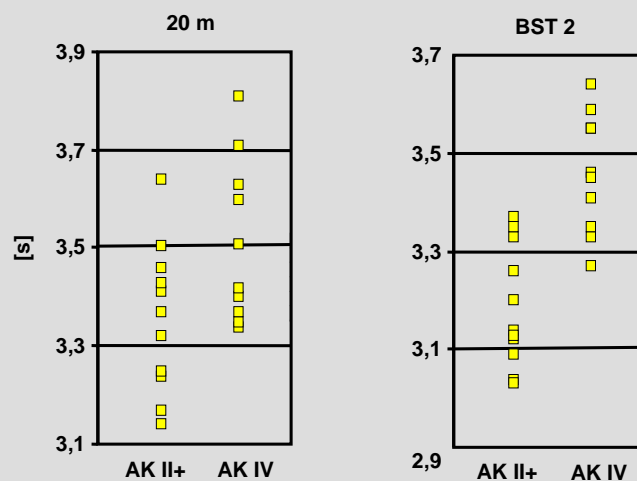
10 m - Sprint (german ranked players)

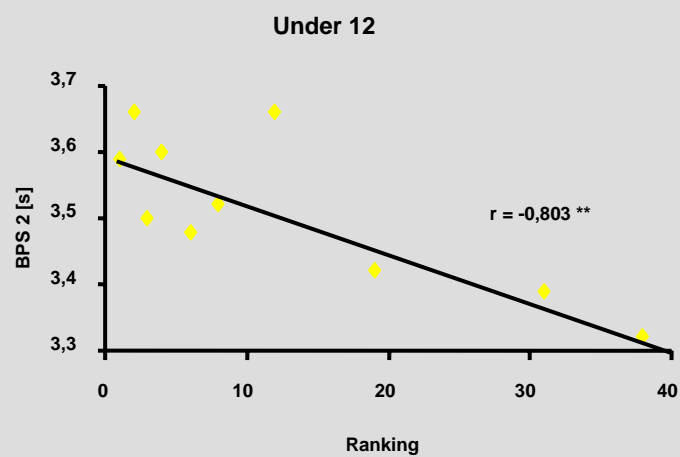
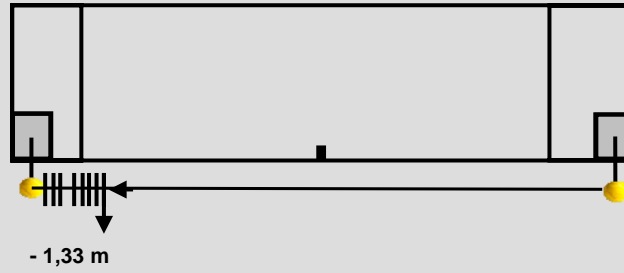




Individual analysis

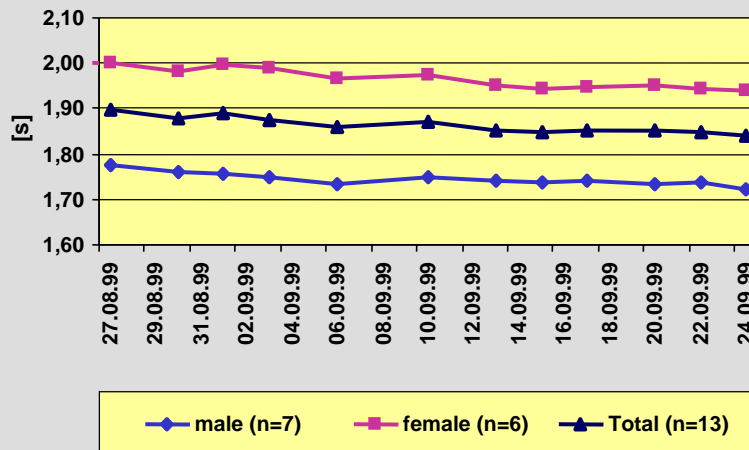
U 12 female	5m			10m			20m			BST 2		
	[s]	Rang	Urteil	[s]	Rang	Urteil	[s]	Rang	Urteil	[s]	Rang	Urteil
J. H.	1,10	1	++	1,92	1	++	3,36	1	++	3,32	1	++
L. S.	1,11	2	++	1,97	2	+	3,53	6	+	3,42	3	+
M. K.	1,13	3	+	1,97	2	+	3,46	4	+	3,39	2	++
A. K.	1,14	4	+	1,97	2	+	3,43	2	++	3,50	5	±
C. D.	1,14	4	+	1,97	2	+	3,45	3	+	3,52	6	±
A. S.	1,15	6	+	1,99	6	+	3,46	4	+	3,48	4	+
A. G.	1,18	7	±	2,07	7	-	3,64	7	-	3,59	7	-
T. P.	1,20	8	-	2,07	7	-	3,64	7	-	3,66	9	--
T. M.	1,22	9	-	2,12	9	--	3,74	9	--	3,66	9	--
C. K.	1,32	10	--	2,21	10	--	3,84	10	--	3,60	8	-



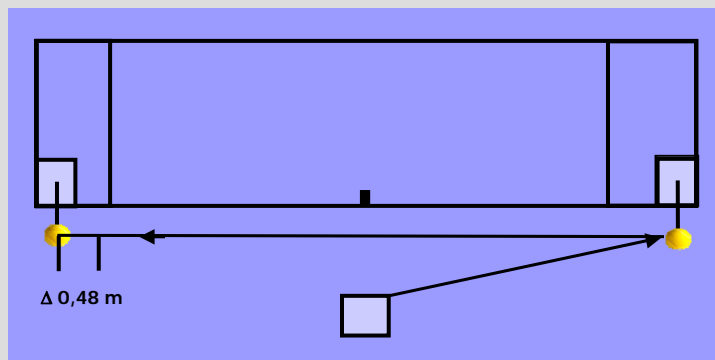




Time course of training effects (10 m Sprint)



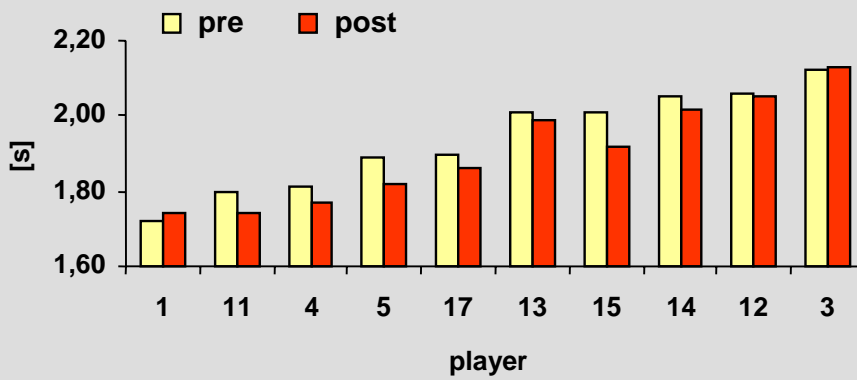
Training effects as net distance gain during game situation



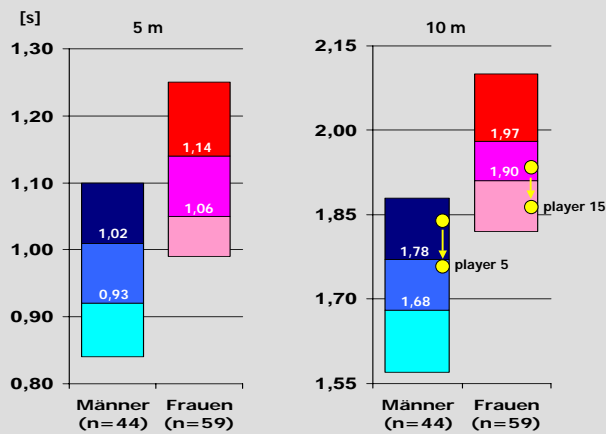


Individual training effects

(10 m Sprint)

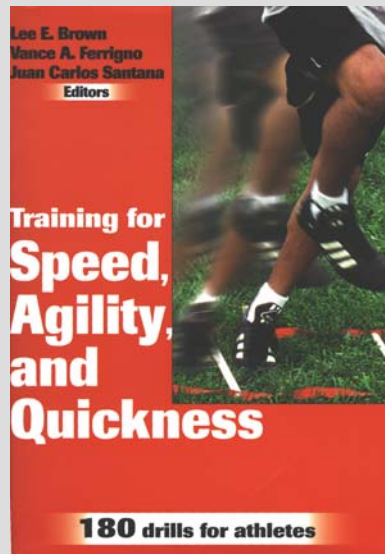


Individual training effects compared to norm values





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Stroke velocity

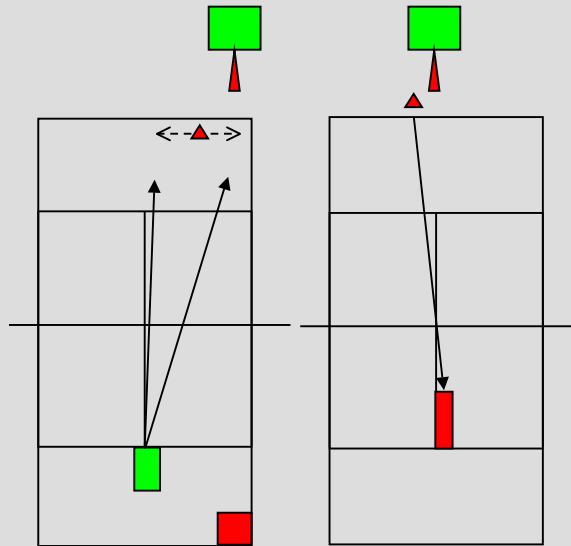


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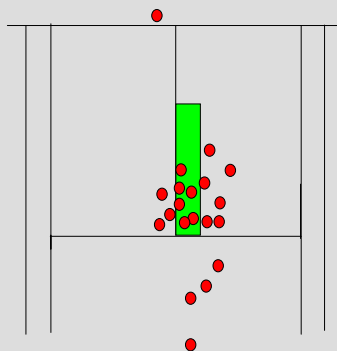


Service and forhand velocity



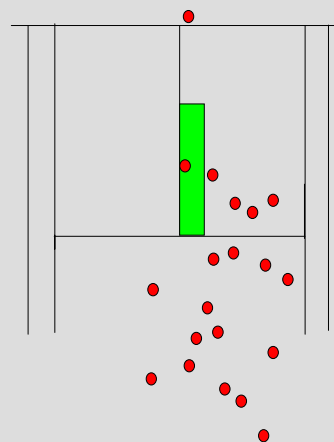
Player 7

Mean velocity 129,0 km/h
inside: 60 %
Mean target distance: 78 cm



Player 6

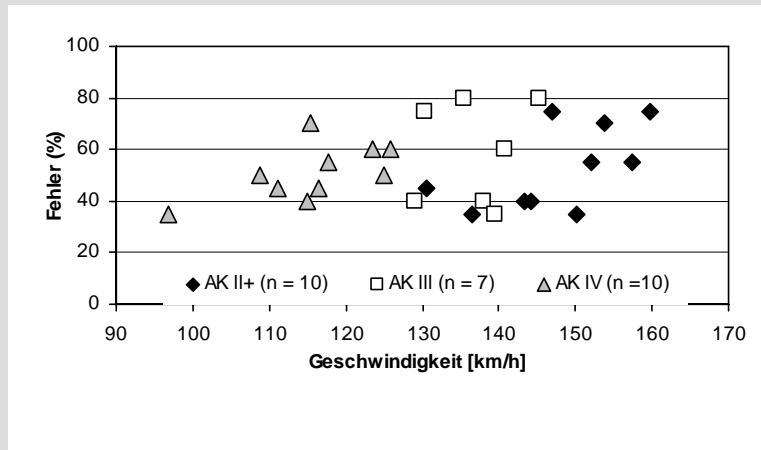
mean velocity 130,3 km/h
inside: 25 %
Mean target distance: 308 cm





Service velocity

female german U12/U14 players



Service power study

In cooperation with Kenneth Bastians from the VTV (Belgium)
(Flemish tennis federation)

Complex training

combines technical training with conditioning

Theory 1

lighter weights lead to faster movements
improvement of fast motoric patterns
increased neural frequency
transfer to faster stroke movements

Theory 2

heavier weights lead to a better pre activation
improvement of reactive force
increased recruitment of muscle fibers
transfer to faster stroke movements



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Service power study

In cooperation with Kenneth Bastians from the VTV (Belgium)
(Flamish tennis federation)

1 Short term intervention effects

13 top Belgium U12 and U14 male and female juniors

3 experimental days (cross over)

4 serie of 6 maximum 1st services (total 24)

no intervention vs heavy intervention (3x4 600 g throws) vs light intervention (3x4 200 g throws)

2 Long term intervention effects

14 top Belgium U12 and U14 male and female juniors

2 intervention groups (n=7 light and n=7 heavy)

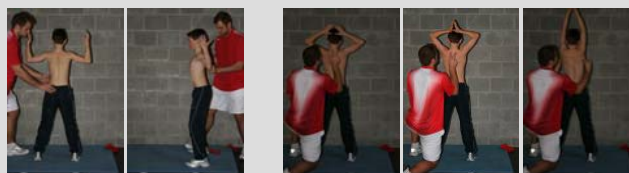
7 weeks (2 x 20 min/ week)

acompanied by shoulder prevention program (2 x/week)



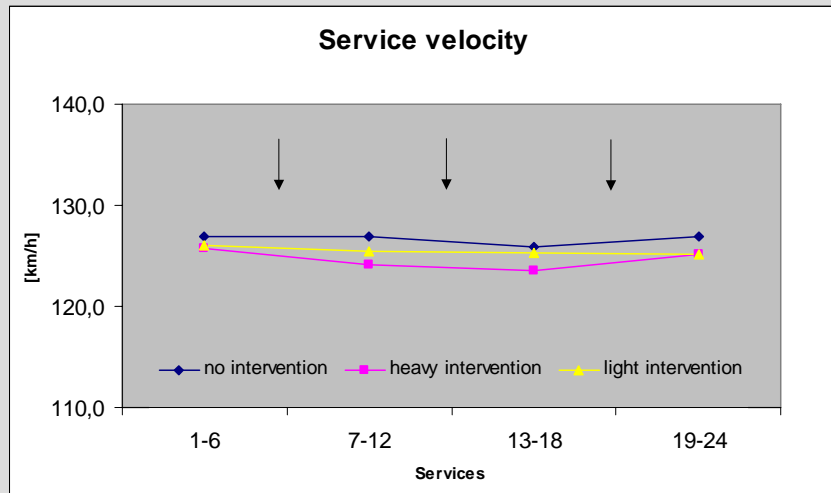
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Shoulder prevention program

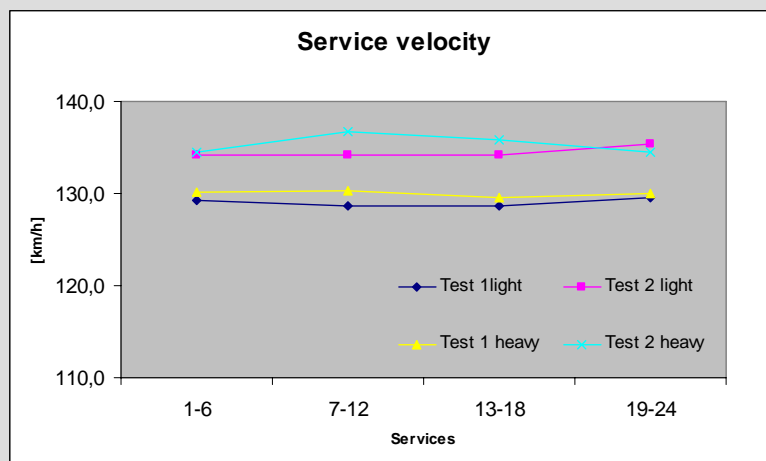




Short term intervention effects



Long term intervention effects





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Summary and recommendations

- Any intervention is useful to increase service velocity
- A priority list of training aims is necessary
- A focus on the most important aims is necessary
- The risk in complex sports is, that the mixture of training inputs concentrates too less on the key points
- But which are the key points???



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