PerPot Results

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Systematic tests were run exemplarily in cooperation with Mark Pfeiffer from the Institute of Sport Science, University of Bayreuth, Germany. In a double blind test data of 14 athletes were analysed. The athletes completed a step test on a treadmill (starting speed: 6km/h, step length: 3 Min., step raise: 1 km/h, intermission: variable, until blood test). The calculated IAT-values were sent back and compared to the results of the common lactate-tests. Figure 4 presents the results of the 3 most common lactate procedures compared to the PerPot simulation.

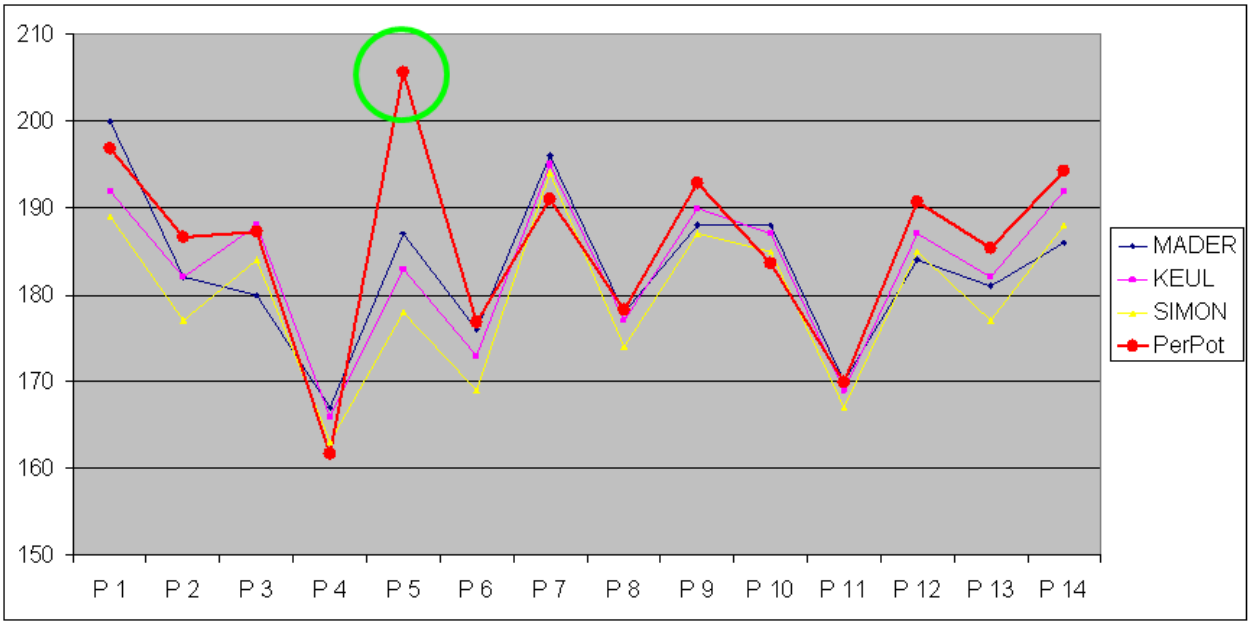

Figure 4: Three IAT lactate tests of 14 athletes compared to PerPot tests. (Note that the connection of the discrete values was done only to clarify the range of variation.)

It turns out that the PerPot results are perfectly in the range – despite athlete P5, where PerPot shows a quite different value. The reason is that P5 has a pathologic high level of heart rate, which could be recognized by PerPot simulation but could not by lactate-analysis.

Of course, not always the results are that perfect. But during the 18 month since Munich there have been a lot of tests which show that simulation-based run optimization works surprisingly well (also see Endler & Perl (to appear 2011)):

The recruited persons have different sex, age and running pre-condition to cover a wide range of conditional states. Figure 7 shows all long distance results (marathon and half marathon). Moreover, the simulation was used successfully for shorter distances (see Endler (2011)).

Person / Year of birth	Marathon / Half marathon	Year	PerPot time	Finishing time	Deviation
Stefan Endler / 1983					
	Marathon München	2009	2:57:00	2:56:54	-0,06%
weather	Marathon Rom	2010	2:59:00	3:10:53	6,64%
illness	Marathon Mainz	2010	2:55:00	3:13:57	10,83%
illness	Half marathon Worms	2010	1:22:45	1:31:31	10,59%
	Half marathon Frankfurt	2011	1:28:32	1:30:11	1,12%
	Half marathon Mittelrhein	2011	1:30:25	1:29:24	-1,14%
Marion Endler / 1958					
weather	Marathon Rom	2010	4:25:00	4:39:38	5,52%
	Half marathon Mainz	2010	1:57:00	2:00:22	2,88%
	Half marathon Frankfurt	2011	1:59:26	2:01:29	1,72%
	Half marathon Mainz	2011	2:10:31	2:10:38	0,09%
Peter Kossok / 1939					
	Marathon Mainz	2010	4:10:45	2:18:44 (HM)	
	Half marathon Mainz	2011	2:06:36	2:07:38	0,82%
Daniel Roth / 1983					
	Half marathon Frankfurt	2010	1:23:30	1:27:30	4,79%
	Marathon Mainz	2010	2:58:15	3:01:25	1,78%
	Half marathon Worms	2010	1:25:00	1:24:13	-0,93%
unkown	Marathon Köln	2010	2:58:20	3:14:46	9,21%
	Half marathon Frankfurt	2011	1:26:43	1:25:35	-1,32%
	Marathon Mainz	2011	3:06:11	3:04:14	-1,06%
Egor Dranischnikow / 1981					
	Half marathon Mittelrhein	2010	1:45:00	1:47:30	2,38%
Ulrich Heil / 1980					
	Half marathon Frankfurt	2011	1:43:46	1:46:42	2,83%
	Half marathon Mainz	2011	1:41:17	1:42:05	0,79%
Christoph Morrison / 1980					
	Half marathon Mittelrhein	2011	2:27:13	2:24:16	-2,04%

Figure 7: Marathon and half marathon results of the last two years. Highlighted are results with negative (green) or large positive (orange, red) deviations between finishing time and simulated time. In case of positive deviations the reasons were added.

The normal difference between the simulated PerPot time and the finishing time is about ±2%. There are only a few larger deviations, which normally are caused by specific reasons or conditions:

The simulation is based on the last step test before the competition. If the time difference between that calibration day and the competition day is too long, running conditions like weather as well as personal state and parameters can change meanwhile.

One example was the Rom marathon 2010. The calibration process was run in Germany at a temperature of about zero degrees Celsius, while the temperature in Rom during the marathon was about twenty degrees Celsius.

Another reason can be an illness after calibration, which causes a significant reduction of the runner's maximum performance.