It's a Wrap! Reviewing the 1997 Outdoor Season

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Throughout the summer, I've written articles highlighting this year's 100m performances, and ranking them according to their wind-corrected values. Now that the fall months draw to a close, and the temperature drops to a nippy 15 celsius at night (well, for some of us), it seems only natural to wrap up the year with a rundown of the 1997 rankings.

Of course, it wouldn't be exciting to just give the official rankings, so I will also present the wind-corrected rankings, and will offer comparison to the adjusted value of the athlete's best 100m performance of 1996. Mind you, this won't necessarily be the *best* wind-corrected performance, but it can offer an insight into how an athlete has progressed over the course of a year.

As a quick refresher, a 100m time t_w assisted by a wind w (the wind speed) can be corrected to an equivalent time t_0 as run with no wind (w = 0 m/s),

$$t_0 \approx \left[1.03 - 0.03 \times \left(1 - \frac{w \times t_w}{100}\right)^2\right] \times t_w . \tag{1}$$

This comes about because approximately 3% of the athlete's effort is spent fighting atmospheric drag. A tail-wind implicitly boosts a race time, hile a head-wind can take away a sprinter's chance at a possible World Record. (as an interesting aside: this also says that it takes more energy to run into a head-wind than you get from a tail-wind assistance. So, a 400m can be handicapped by a sufficiently strong wind, since running with the wind on one straight does not compensate for fighting the head-wind on the other straight).

The next logical step in this review would be to make some predictions for the upcoming indoor season, based on how everyone performed outdoors over 50 and 60m (using appropriate splits from Athens, and other meets when available). Tables 1, 5 show the top 5 wind-corrected rankings for men and women, while Tables 2, 6 give the official rankings.

Men's 1997 Rankings

This summer's competition was a veritable roller coaster for both the men and women, full of very unexpected ups and downs. One of the bigger surprises was the rise of Maurice Greene to the top-ranked sprinter of the year. His 9.86s victory (9.88s wind-corrected) marked almost a 0.2s improvement over his 1996 PB of 10.08s (with -0.3 m/s wind; 10.07s wind-corrected), which was ranked 28th in the 1996 IAAF list! Of the top 5 wind-corrected times, his showed the largest improvement of 1.9%. Bailey came close to matching his best from '96 (that is, his wind-corrected PB) with his Abbotsford run of 9.89s (10.03s, -2.1 m/s). Ato Boldon chimes in at 3rd fastest after wind-correction, and although he clocked the most sub-9.90s performances of the year (9.89s in Modesto, and 9.87s in Athens), his best wind-corrected performance came out of Stuttgart. Since this time was run in still conditions (9.90s, +0.0 m/s), it's an official wind-corrected time! However, it also matches his best wind-corrected performance of 1996 (9.90s; 9.93s, -0.6 m/s).

Fredericks rounds out fourth on the 1997 rankings, with his late-season 9.92s (9.90s, +0.2 m/s) from Brussels (since he finished 4th in Athens, it seems that Frank truly was the 4th best in the world this year!). Unfortunately, Fredericks also shows the worst improvement from last year of the five, not being able to match his incredible 1996 wind-adjusted mark of 9.84s (9.86s, -0.4 m/s) from Lausanne. Interestingly enough, 5th ranked Tim Montgomery showed similar improvement to Greene since last year, where he also ran 10.07s (10.08, -0.3). In fact, Montgomery was ranked 27th, just above Greene on the 1996 IAAF top 50 list. A most impressive showing by the Americans in Athens.

Although the peak performances of Bailey, Boldon, and Fredericks did not surpass their 1996 bests, Table 3 presents a quick glimpse of their top 5 times of each year. Also present is the average of each time, and the although not necessarily appropriate for an ordered set of data, the standard deviation is offered to give an idea of the variance of the times. Only Fredericks does not better his 1996 average, while Bailey tops his by 0.02s, and Boldon by 0.01s. It's interesting to note that both Fredericks and Boldon had faster

averages than Bailey in 1996. Sometimes, it all comes down to just one race.

While Fredericks posted the fastest average of 1996, Boldon takes it for 1997, and although he could not better his top time of 9.90s, he shows an impressive ability to run repeat fast times over the two years (standard deviations of 0.023 asnd 0.029s respectively). Meanwhile, Bailey has also improved his knack to do same, but Fredericks clearly takes the cake with a '97 standard deviation of 0.019s! One could say that he has consistently run the most fast times this year. His top 5 marks for 1997 fall in an interval of 0.05s, compared to Bailey and Boldon's 0.09s interval.

As a note of national interest, sixth place is given in Table 1. Thanks in part to a strong head-wind, the National Championships in Abbotsford not only produced Bailey's 2nd place 9.89s, but also gave Robert Esmie a wind-corrected sub-10s clocking at 9.96s, good enough to rank him 6th in the world! His 9.96s clocking shows a 3% (0.3s!) improvement over his 1996 PB of 10.27A (10.18A, +1.5), which essentially matches his next fastest time of 10.28s (real still air PB, +0.0 m/s wind). Experimental evidence for wind-correction!

Women's 1997 Rankings

The women's list are no less impressive than the men's. In fact, they are in a sense *more* impressive. A quick examination of Table 5 shows that two of the five individuals were not ranked in the top 50 last year. Additionally, 3 of the official top 5 in Table 6 were similarly unranked! The emergence of Marion Jones onto the sprint scene this year showed a virtually unparalleled rise to the top of the 100m podium. To be a newcomer to the sport and capture gold at the World Championships in the same year is a feat until itself. Table 4 attests to her exclusive domination of the event this summer.

On the way up, Jones bumped Jamaican sprint legend Merlene Ottey down a notch from her 1996 throne. To the very end, Jones also dominated the wind-corrected rankings, but in an impressive show in Tokyo on September 6th, Ottey chalked up a 10.81s into a 0.4 m/s head-wind. This adjusted to a 10.79 s in still conditions, and put her 0.03 s under Jones' fastest wind-corrected dash (10.82; 10.76 s, +0.9 m/s). It was also her fastest wind-corrected time ever, bettering her previous adjusted PB of 10.80 s, a mark she set twice (Zurich, 07 Aug 1991; and 16 Aug 1993). Almost two decades

in the sport has certainly paid off for Merlene!

Meanwhile, 200m world champion Zhanna Pintussevich put in a 10.88s (10.85s, +0.4 m/s) showing to capture 3rd on both the wind-corrected and official lists. Like Boldon, Devers could not manage to surpass her 1996 wind-corrected mark of 10.92s (10.89, +0.5 m/s), well off her best 10.75s (10.82, -1.0 m/s) from the Barcelona Olympics in 1992.

As with the men's list, fifth place is a variable: Sevatheda Fynes holds the wind-corrected spot with a head-wind 10.98s (11.07s, -1.2 m/s), but officially Christine Arron (also unranked in 1996!) takes it with 11.03s (-0.3 m/s). Once again, Christine Arron was not ranked in the IAAF's top 50 list from 1996! Each athlete who was ranked on the 1996 list (Ottey, Devers) showed drops in their top performances of 1997.

Split Comparison to Indoor Marks

Indoor races, by their nature, are not influenced by wind effects for obvious reasons. So, most indoor performances should be comparable to each other on an implicitly equal footing. The only times which cannot be immediately compared to others are those sprints which are run at altitude. For example, both Donovan Bailey's 50m WR (5.56s) and Obadele Thompson's 55m WB ("World Best") of 5.99s were run at altitude, a factor which mysteriously increases sprint potential.

Since we can correct outdoor races to get an idea of what the times might have been in still air conditions, it should also be possible to break down the 100m races to determine the 50m and 60m splits devoid of wind effects. To do so, the formula given above requires slight modification: the 100 in the denominator of the fraction represents the distance of the race. So, by replacing 100 with either 50 or 60, we can wind-correct the splits.

Table 7 shows the corrected splits for the men's and women's 100m finals from Athens, which can be compared to the times in Table 8. In the case of the men, every competitor considered in Table 7 marked a faster performance than the best indoor 50m of last winter (5.60s... Aside: is this the first time the men's short sprint lists have been headed by two people named M. Green[e]?). Likewise with the 60m splits, the leaders from Athens surpass the indoor 1997 marks over the same distance. Ato Boldon shaved

0.03s off his indoor season best (which of course does not account for reaction time, so technically he may have actually run the same raw time with a different reaction).

Note that in running his Athens final, Maurice Greene tied both the 50m and 60m indoor world records for the distances (60m - 6.41s, Andre Cason, Madrid, 14 Feb 1992). Greene's best indoor 60m mark for 1997 was 6.54s, slower than all of the others' top indoor performances. At the USATF Championships 100m final in Indianapolis (13 Jun), he and Tim Montgomery both split at 50m in 5.57s (5.56s, +0.2 m/s), 0.01s off the indoor WR. Although outdoor racing seems to be, in general, faster than indoor racing (perhaps a physiological effect?), these findings suggest that interesting things may be in store for the coming 1998 indoor season!

The women's lists are lacking somewhat, due to insufficient data. Note that World Bronze medallist Fynes is not listed in Table 7 (not my fault; the appropriate data wasn't recorded). However, there's enough given to make the same stab as with the men's lists. In this case, the splits correct to times which are much closer to the indoor marks from last winter. Only Jones and Pintussevich surpass the 50 leader (6.05s, Privalova), but Pintussevich betters her indoor mark by 0.2s! The performances of Arron, Miller, Paschke, and Ottey are similar to the indoor 50m list. All times are slower than Privalova's WR of 5.96s (Madrid, 9 Feb 1995). Jones marked a 50m split of 6.13s (6.08, +1.1) at the USATF Championships.

For the 60m, Pintussevich again betters her indoor time over the equivalent distance by roughly 0.2s, but Paschke and Ottey failed to improve theirs. In their defense, Paschke's wind-corrected split of 7.18s is only 0.01s slower than her '97 best indoor (could be a factor of reaction time), while Ottey was by no means running her perfect race in Athens! Perhaps someone should have timed her 60m false start for comparsion?

The Shape of Things to Come?

And so, as 1998 approaches, we gear up for the new indoor season. Come March, it will be interesting to compare the 1998 indoor lists with the analysis in this article. Many times, the 50m and 60m rankings can be filled with names unknown to the top 10 outdoor performances. Will we see such a phenomenon again?

The trend in particle physics is to make predictions based on mathematically abstract models, and hope they unfold in real life. If the prediction comes true, the theoretician revels in the publicity, and makes more predictions based on the original model. If it doesn't come true, the theoretician writes a paper explaining why it didn't, and blames it away as a statistical manifestation. Looks like my work for the spring issue of Athletics is cut out for me either way!

Acknowledgements

The IAAF Top 50 lists mentioned herein, as well as the 1997 indoor rankings, can be found at the IAAF website, http://www.iaaf.org/. Other results were obtained from the OTFA, Track and Field News, and the Track and Field Statistics website (http://www.uta.fi/~csmipe/sport/index.html) maintained by Mika Perkivmdki (csmipe@uta.fi).

Rank	Athlete	1997 best	1996 best	Difference	% improved
1	Maurice Greene	9.88	10.07	+0.19s	+1.9
		(9.86, +0.2)	(10.08, -0.3)		
2	Donovan Bailey	9.89	9.88	+0.01s	+0.1
		(10.03, -2.1)	(9.84, +0.7)		
3	Ato Boldon	9.90	9.90	+0.00s	+0.0
		(9.90, +0.0)	(9.93, -0.6)		
4	Frank Fredericks	9.92	9.84	-0.08s	-0.8
		(9.90, +0.2)	(9.86, -0.4)		
5	Tim Montgomery	9.94	10.07	+0.13s	+1.3
		(9.92, +0.2)	(10.08, -0.3)		
6	Robert Esmie	9.96	10.27A	+0.31s	+3.0
		(10.10, -2.1)	(10.18A, +1.5)		
			10.28	+0.32s	+3.0
			(10.28, +0.0)		

Table 1: Men's wind-corrected 1997 World Rankings, with best 1996 performance.

1997 rank	${f Athlete}$	1996 rank	1996 best	1997 best	Difference
1	Greene	28	10.08 (-0.3)	9.86 (+0.2)	+0.18
2	Boldon	3	9.90 (+0.7)	9.87 (+1.3)	+0.03
3	Fredericks	2	9.86 (-0.4)	9.90 (+0.2)	-0.04
4	Bailey	1	9.84 (+0.7)	9.91 (+0.2)	-0.07
5	Jon Drummond	6	9.98 (-0.1)	9.92 (+0.8)	+0.06

Table 2: Men's official 1997 rankings, with change from 1996 rankings

Athlete	1996 bests	1997 bests
Bailey	9.88 (9.84, +0.7)	9.89 (10.03, -2.1)
	$9.91 \ (9.93, -0.4)$	9.93 (9.91, +0.2)
	9.97 (10.00, -0.5)	9.94 (9.91, +0.5)
	9.98 (9.98, +0.0)	9.95 (9.99, -0.7)
	10.04 (9.95, +1.5)	9.98 (10.07, -1.5)
Average	9.956	9.938
Std. Dev.	0.056	0.029
Fredericks	9.84 (9.86, -0.4)	9.92 (9.90, +0.2)
	$9.91 \ (9.94, -0.5)$	9.94 (9.98, -0.7)
	9.93 (9.89, +0.7)	9.96 (9.93, +0.5)
	9.97 (9.87, +1.9)	9.97 (9.94, +0.5)
	10.00 (9.93, +1.1)	9.97 (9.95, +0.2)
Average	9.930	9.952
Std. Dev.	0.055	0.019
Boldon	9.90 (9.93, -0.6)	9.90 (9.90, +0.0)
	9.92 (9.94, -0.4)	9.94 (9.89, 0.8)
	9.94 (9.95, -0.4)	9.95 (9.87, +1.3)
	9.94 (9.90, +0.7)	9.95 (10.00, -0.8)
	9.97 (9.92, +0.8)	9.99 (9.95, +0.6)
Average	9.934	9.946
Std. Dev.	0.023	0.029

Table 3: Top 5 1996 and 1997 wind-corrected performances for Bailey, Fredericks, and Boldon, listing average and standard deviation.

Maurice	Greene		Marion .	Jones	
10.19 (10.19, +0.0)	25 May	1 (f)			
10.05 (9.96, +1.5)	12 Jun	1 (h)	11.05 (10.98, +0.9)	12 Jun	1 (h)
$10.10 \ (10.08, +0.2)$	12 Jun	1 (sf)	10.93 (10.92, +0.1)	12 Jun	1 (sf)
9.92 (9.90, +0.2)	13 Jun	1 (f)	11.05 (10.97, +1.1)	13 Jun	1 (f)
10.13 (10.23, -1.5)	25 Jun	4 (f)	11.07 (11.23, -1.9)	27 Jun	1 (f)
9.96 (9.90, +1.0)	02 Jul	1 (f)	10.94 (10.90, +0.5)	02 Jul	2(f)
10.05 (10.01, +0.6)	07 Jul	2(f)	$11.06 \ (11.06, +0.0)$	04 Jul	1 (f)
$10.04 \ (10.04, +0.0)$	13 Jul	2 (f)			
$10.38 \ (10.32, +1.0)$	02 Aug	1 (h)	11.04 (11.09, -0.7)	02 Aug	1 (h)
9.98 (9.90, +1.3)	02 Aug	1 (qf)	10.99 (10.96, +0.3)	02 Aug	1 (qf)
9.93 (9.90, +0.5)	03 Aug	1 (sf)	10.94 (10.94, -0.1)	03 Aug	1 (sf)
9.88 (9.86, +0.2)	03 Aug	1 (f)	$10.86 \ (10.83, +0.4)$	03 Aug	1 (f)
9.95 (9.99, -0.7)	13 Aug	2 (f)	10.88 (10.97, -1.2)	13 Aug	2 (f)
$10.09 \ (10.06, +0.4)$	16 Aug	3(f)			
9.94 (9.91, +0.1)	22 Aug	2 (f)	$10.82 \ (10.76, +0.9)$	22 Aug	1 (f)
			$10.87 \ (10.81, +0.8)$	16 Aug	1 (f)

Table 4: Progression for 1997 100m World Champions, indicating placing in race (h - heat; qf - quarter-final; sf - semi-final; f - final).

Rank	Athlete	1997 best	1996 best	Difference	% improved
1	Merlene Ottey	10.79	10.83	+0.04s	+0.4
		(10.81, -0.4)	(10.74, +1.3)		
2	Marion Jones	10.82		— <u>-</u>	
		(10.76, +0.9)			
3	Zhanna Pintussevich	10.88		— <u>-</u>	_
		(10.85, +0.4)			
4	Gail Devers	10.92	10.92	+0.00s	+0.0
		(10.89, +0.5)	(10.83, +1.3)		
5	Sevatheda Fynes	10.98	11.16	+0.18s	+1.6
		(11.07, -1.2)	(11.24, -1.0)		

Table 5: Women's wind-corrected 1997 World Rankings, with best 1996 performance and improvement.

1997 rank	Athlete	1996 rank	1996 best	1997 best	Difference
1	Jones	NR		10.76 (+0.9)	
2	Ottey	1	10.74 (+1.3)	10.83 (+0.4)	-0.09s
3	Pintussevich	NR	<u>_</u>	10.85 (+0.8)	
4	Devers	3	10.83 (+1.3)	10.88 (+0.8)	-0.05s
5	Christine Arron	NR		11.03 (-0.3)	

Table 6: Women's official 1997 rankings, with change from 1996 rankings.

	$50 { m m \ split}$	60m split	1997 indoor 60m best
Men			
Greene	5.56 (5.55)	6.41 (6.40)	6.54 (Atlanta, 01 Mar)
Bailey	5.59(5.58)	6.44 (6.43)	6.51 (Maebashi, 08 Feb)
Montgomery	5.57(5.56)	6.43 (6.42)	6.51 (Atlanta, 01 Mar)
Fredericks	5.59(5.58)	6.45 (6.44)	
Boldon	5.59 (5/58)	6.46 (6.45)	6.49 (Birmingham, 23 Feb)
Women			
Jones	6.04 (6.02)	6.99(6.96)	
Pintussevich	6.04 (6.02)	6.99(6.96)	7.21 (Madrid, 05 Feb)
Arron	6.19(6.17)	7.14(7.12)	
Miller	6.19(6.17)	7.16(7.14)	
Paschke	6.20(6,18)	7.18 (7.16)	7.17 (Sindelfingen, 01 Mar)
Ottey	6.26 (6.24)	7.23 (7.21)	7.10 (Birmingham, 23 Feb)

Table 7: Comparison of wind-corrected (official) 50m and 60m splits from 1997 WC final with athlete's 1997 indoor best at 60m.

50m	(WR 5.56A Donovan Baile	y CAN Reno, 9 Feb 1996)
5.60	Michael Green JAM	Liivin (16 Feb)
5.65	Deji Aliu NGR	Madrid (05 Feb)
5.67	Bruny Surin CAN	Hamilton (18 Jan)
5.68	Darren Braithwaite GBR	Madrid (05 Feb)
5.70	Robert Esmie CAN	Hamilton (18 Jan)
60m	(WR 6.41 Andre Cason US	SA Madrid, 14 Feb 1992)
6.49	Michael Green JAM	Liivin (16 Feb)
6.49	Ato Boldon TRI	Birmingham (23 Feb)
6.49	Randall Evans USA	Atlanta (01 Mar)
6.50	Bruny Surin CAN	Paris Bercy (07 Mar)
6.50	Charalambos Papadias GRE	Paris Bercy (07 Mar)
6.51	Donovan Bailey CAN	Maebashi (08 Feb)
6.51	Tim Montgomery USA	Atlanta (01 Mar)
6.51	Linford Christie GBR	Sindelfingen (01 Mar)
6.52	Ray Stewart JAM	Liivin (16 Feb)
6.52	Davidson Ezinwa NGR	Paris Bercy (07 Mar)
6.54	Maurice Greene USA	Atlanta (01 Mar)
6.54	Robert Esmie CAN	Paris Bercy (07 Mar)

Table 8: Men's 1997 indoor rankings, 50m and 60m (best performance only).

50m	50m (WR 5.96 Irina Privalova RUS Madrid, 9 Feb 1995)			
6.05	Irina Privalova RUS	Liivin (16 Feb)		
6.08	Christy Opara NGR	Liivin (16 Feb)		
6.14	Fridirique Bangui FRA	Liivin (16 Feb)		
6.19	Odiah Sidibi FRA	Liivin (16 Feb)		
6.24	Zhanna Pintussevich UKR	Madrid (05 Feb)		
60m	(WR 6.92 Irina Privalova R	US Madrid, 11 Feb 1993 / 9 Feb 1995)		
7.00	Gail Devers USA	Atlanta (01 Mar)		
7.02	Irina Privalova RUS	Gent (12 Feb)		
7.02	Christy Opara NGR	Gent (12 Feb)		
7.05	Chioma Ajunwa NGR	Erfurt (05 Feb)		
7.12	Gwen Torrence USA	Fairfax (22 Feb)		
7.14	Carlette Guidry-White USA	New York (07 Feb)		
7.15	Ekaterini Thanou GRE	Pireus (14 Feb)		
7.16	Odiah Sidibi FRA	Liivin (16 Feb)		
7.17	Endurance Ojokolo NGR	Birmingham (23 Feb)		
7.17	Melanie Paschke GER	Sindelfingen (01 Mar)		
7.19	Michelle Freeman JAM	Chemnitz (29 Jan)		
7.20	Merlene Frazer JAM	Dortmund (09 Feb)		
7.20	Juliet Cuthbert JAM	Dortmund (09 Feb)		
7.20	Ekaterini Koffa GRE	Pireus (14 Feb)		
7.21	Zhanna Pintussevich UKR	Madrid (05 Feb)		
7.21	Nadezhda Roshchupkina RUS	Volgograd (21 Feb)		

Table 9: Women's 1997 indoor rankings, $50\mathrm{m}$ and $60\mathrm{m}$ (best performance only).