

The Statistics of Running Faster

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Questions:

1. Which is the best world record?
2. What will the mile record be in 2040?
3. How much do we slow as we get older?

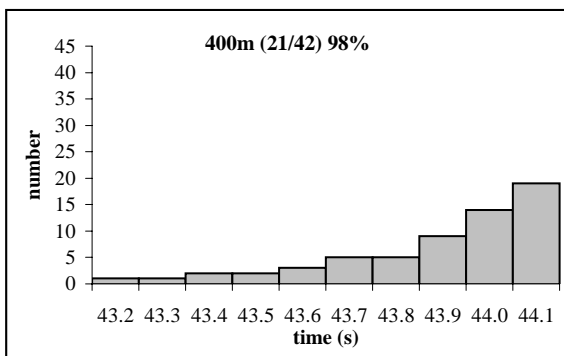
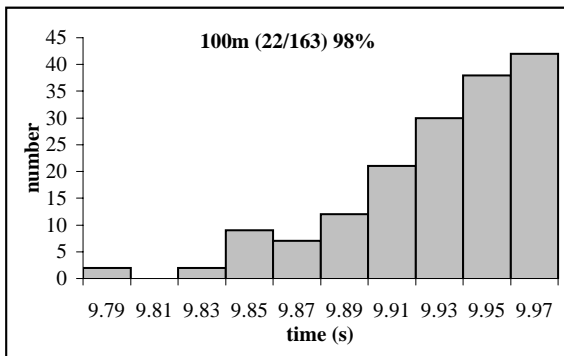
1. Which is the best world record?

dist(m)	Men	Women	ratio
100	<u>9.79</u>	10.49	93%
200	19.32	21.34	91%
400	<u>43.18</u>	47.60	91%
800	101.1	113.3	89%
1500	206.0	230.5	89%
1609	<u>223.1</u>	252.6	88%
3000	440.7	486.1	91%
5000	759	868	87%
10000	1583	1772	89%
42195	7565	8447	90%

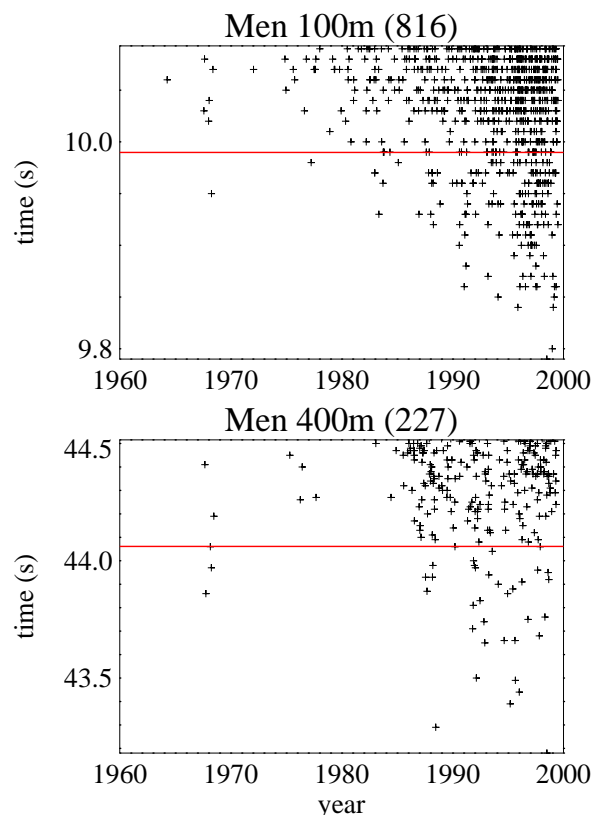
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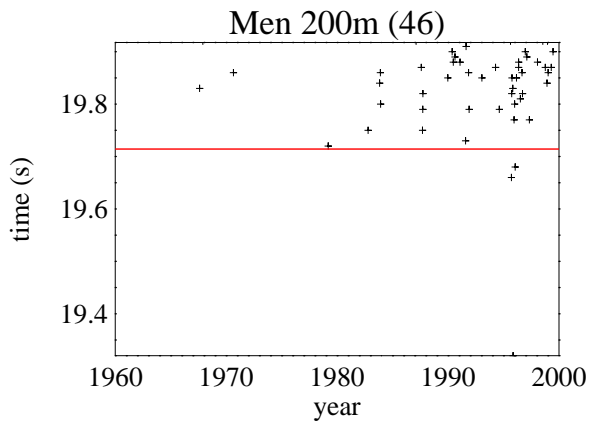
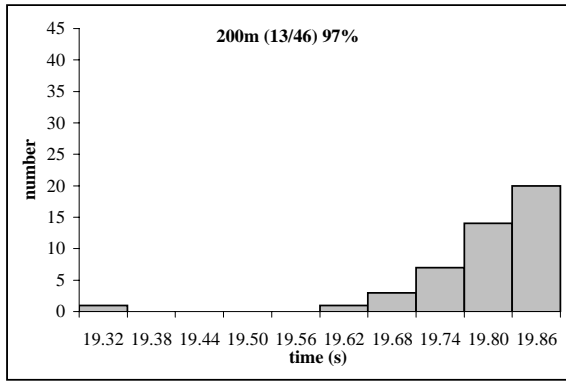
All-time best performances



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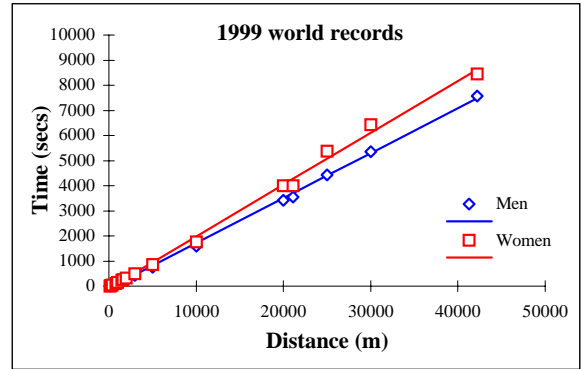
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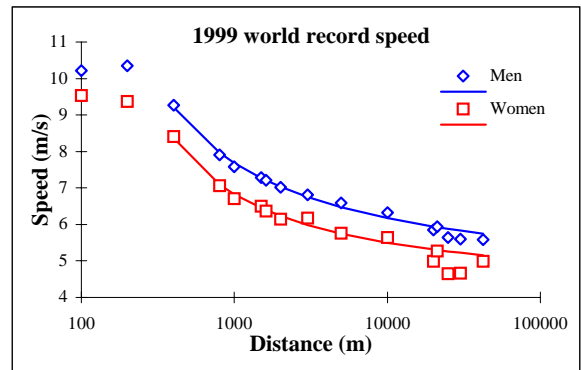
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Performances at other distances

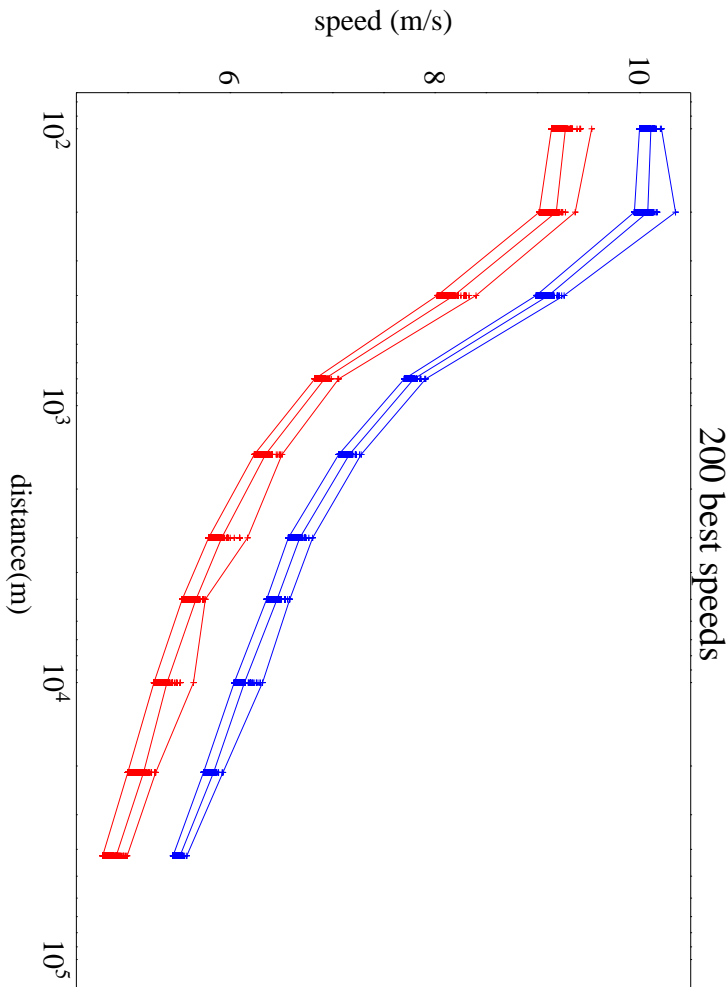
Time doubles with distance



Speed shows more features



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dist(m)	%WR speed	
	Men	Women
100	99.2%	100.1%
200	100.9%	99.3%
400	99.9%	99.9%
800	99.7%	99.3%
1500	99.8%	99.8%
1609	99.5%	98.4%
3000	100.1%	101.5%
5000	100.1%	98.9%
10000	101.1%	102.0%
42195	99.4%	99.5%

Use % WR speed to compare

Individual athlete has own speed curve

- calculator:

www.rdg.ac.uk/~snsgrubb/athletics/runcalc.html

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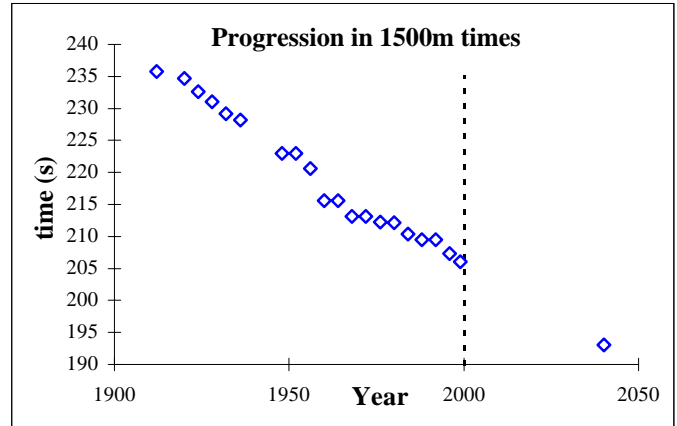
British Records

dist(m)	Men	Women	%WR	speed
100	9.87	11.10	98.4%	94.6%
200	19.87	22.10	98.1%	95.9%
400	44.36	49.42	97.2%	96.2%
800	101.7	116.2	99.1%	96.8%
1500	209.7	238.1	98.1%	96.7%
1609	226.3	257.2	98.1%	96.6%
3000	452.8	507.4	97.4%	97.3%
5000	780	884	97.4%	97.2%
10000	1638	1827	97.7%	99.0%
42195	7633	8756	98.5%	96.0%

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2. What will the mile WR be in 2040?

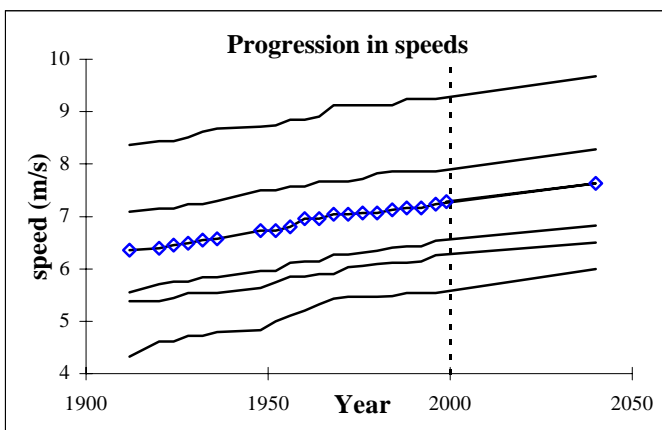
- 1913 – mile record = 4:14
- 1954 – 4 minute mile
- 1999 – 3:43 mile
 - 7:58 2 miles - Komen 20/7/97
 - 10km @ 4:15/mile
 - 3:26 1500m



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Performances in other years

All distances - speed



Putting them together with model for speed gives more information on progression

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How fast will we run?

Dist(m)	Record, 1999	Chapman-Richards		
		Predicted lower bound	Diff	% of limit
400	43.18	40.80	2.4	94.5
800	1:41.1	1:34.8	6.3	93.8
1500	3:26	3:13	13.0	93.7
5000	12:39	11:55	44	94.2
10000	26:23	25:00	1:23	94.7
42195	2:06:05	1:55:25	10:40	91.5

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3. How much do we slow down?

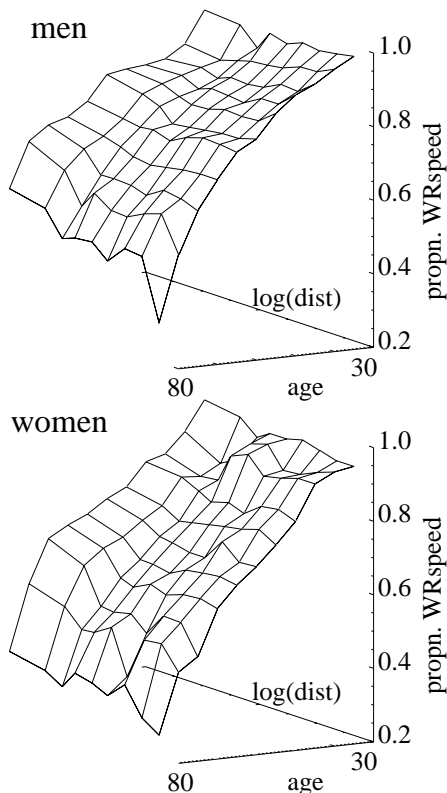
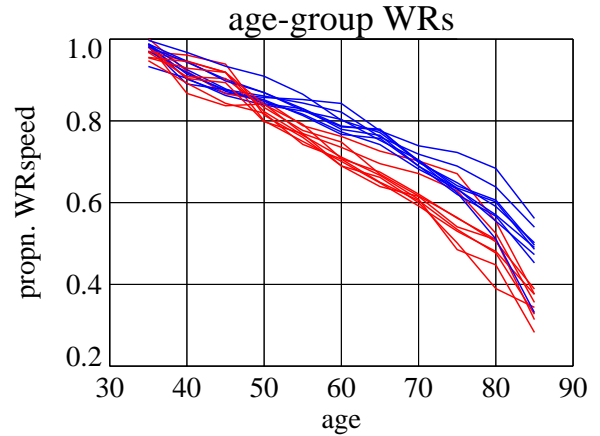
Age-group WRs

21 (of 8x2x12=192) records broken at WAVA Champs (Gateshead, August):

dist(m)	AGE 50		M/W	ALL/50	
	M	W		M	W
100	11.20	12.90	87%	87%	81%
200	22.90	<u>26.52</u>	86%	84%	80%
400	51.60	58.51	88%	84%	81%
800	119.5	142.0	84%	85%	80%
1500	245.2	294.3	83%	84%	78%
3000	533.1	624.0	85%	83%	78%
5000	896	1046	86%	85%	83%
10000	1861.9	2211	84%	85%	80%
42195	8370	10127	83%	90%	83%

Performances by athletes of different ages/gender

Age-WR speeds - **relative** to overall WR

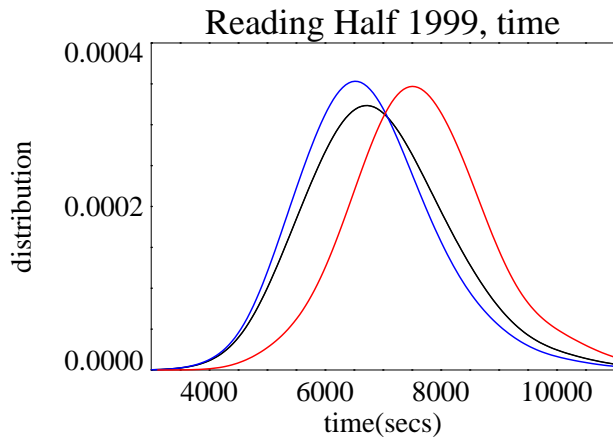


Comparing athletics performances

- **Data** - WRs, all time best times
how far from these is a WR?
- **Speed** - slowing with distance
reference curve - **%WRspeed**
- WR **progression**
- **Age-group WRs** - slowing with age

4. How good was my race?

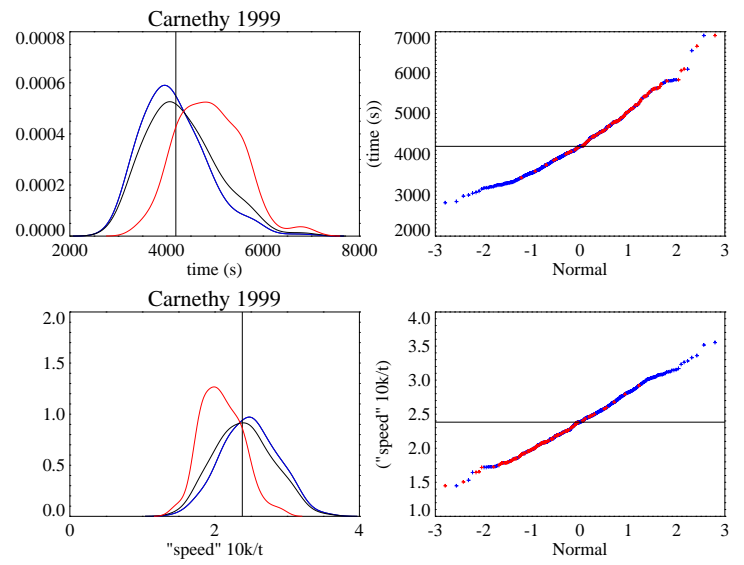
Reading half marathon 1999:
4500 runners, 3500 men



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Hill race

10km, but climbing (304 men, 81 women)



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