THE PERFECT RACE

How Father Time (age) and Mother Nature (wind) affect sprint times of the world's fastest athletes

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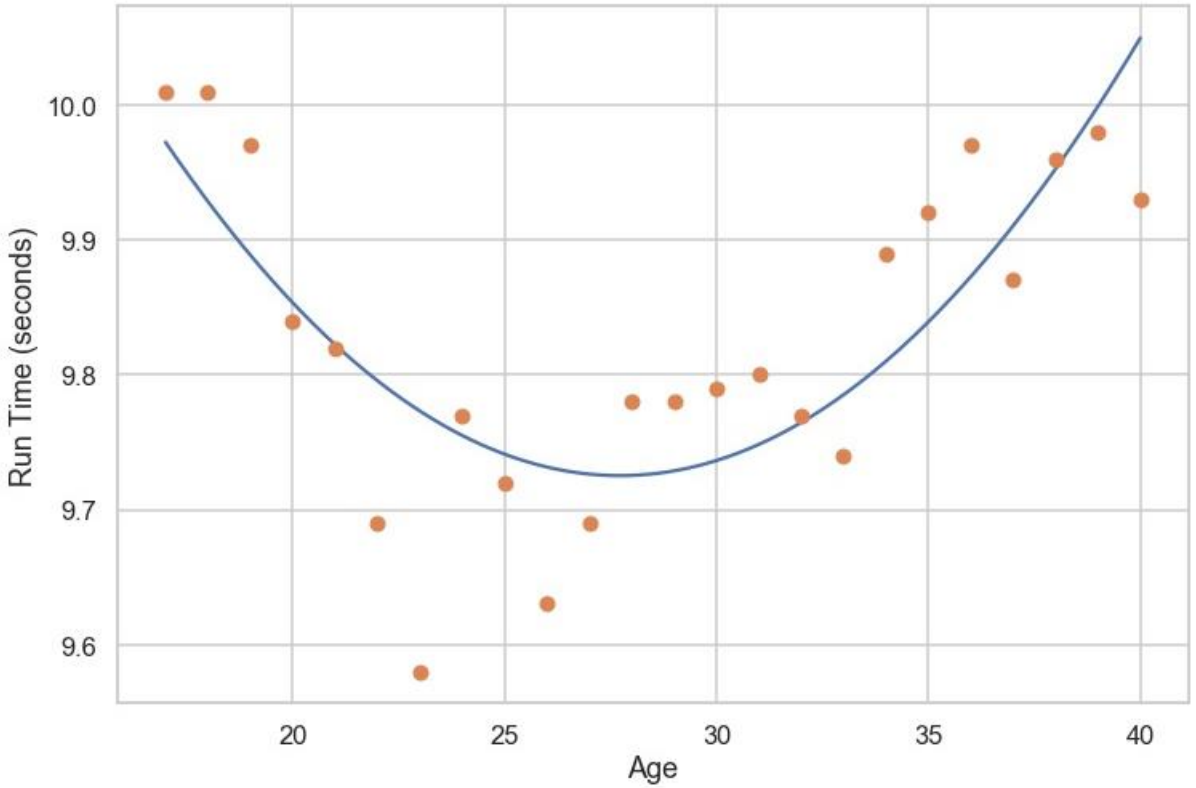
OPTIMIZING FOR SPEED

- **Objective:** Sprinters train their whole lives often for one chance at Olympic gold. With the 2020 games approaching, we make a data supported recommendation to the International Olympic Committee (IOC).
- **Age:** Analyze the impact of age on sprint times
- **Wind:** Analyze the impact of headwind and tailwind on sprint times

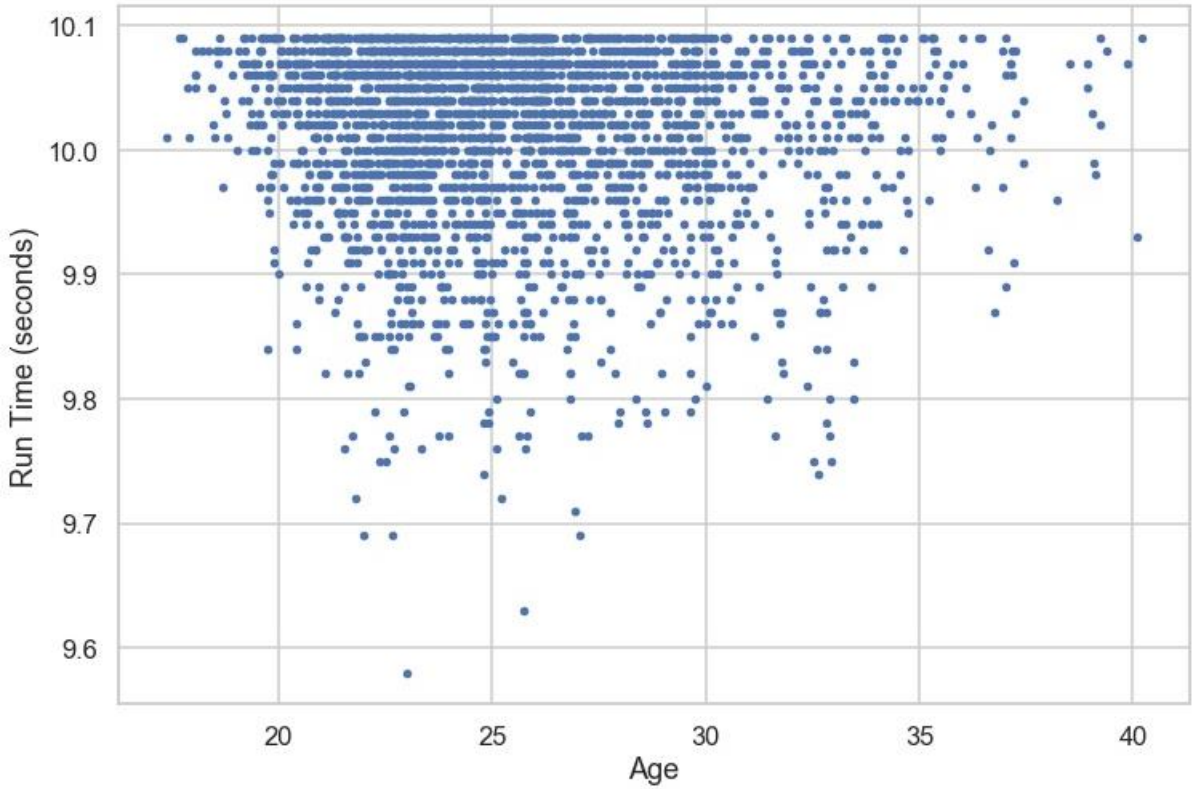
Fastest Men's 100m Sprint Times By Age



IS THERE AN OPTIMAL SPRINT AGE?

- ✓ Plotting only lowest times run by age yields a parabolic pattern.
- ✓ The minimum of the best-fit curve suggests an optimal age of 28.
- ✓ We tested whether this pattern holds for the complete dataset: Is mean run time of ages 27-29 lower than other ages?

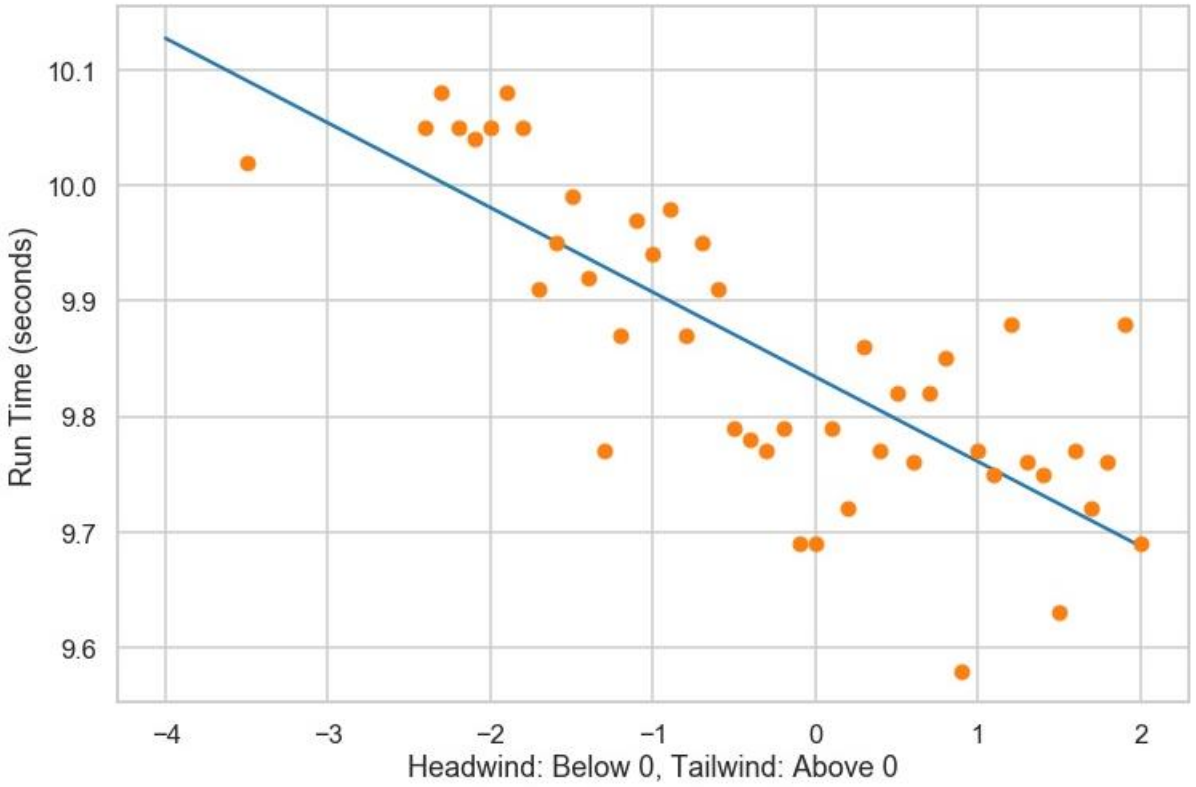
Men's 100m Sprint Times By Age



WE CAN'T SAY WITH 95% CONFIDENCE THAT AGE MATTERS

- ✓ While sprinters 27-29 put up low times, they also put up high times.
- ✓ Mean run time of 27-29 age group is lower than other ages, but difference is not significant at the 5% level.
- ✓ Therefore, we cannot say that mean run time of optimal age group is different from other ages group.

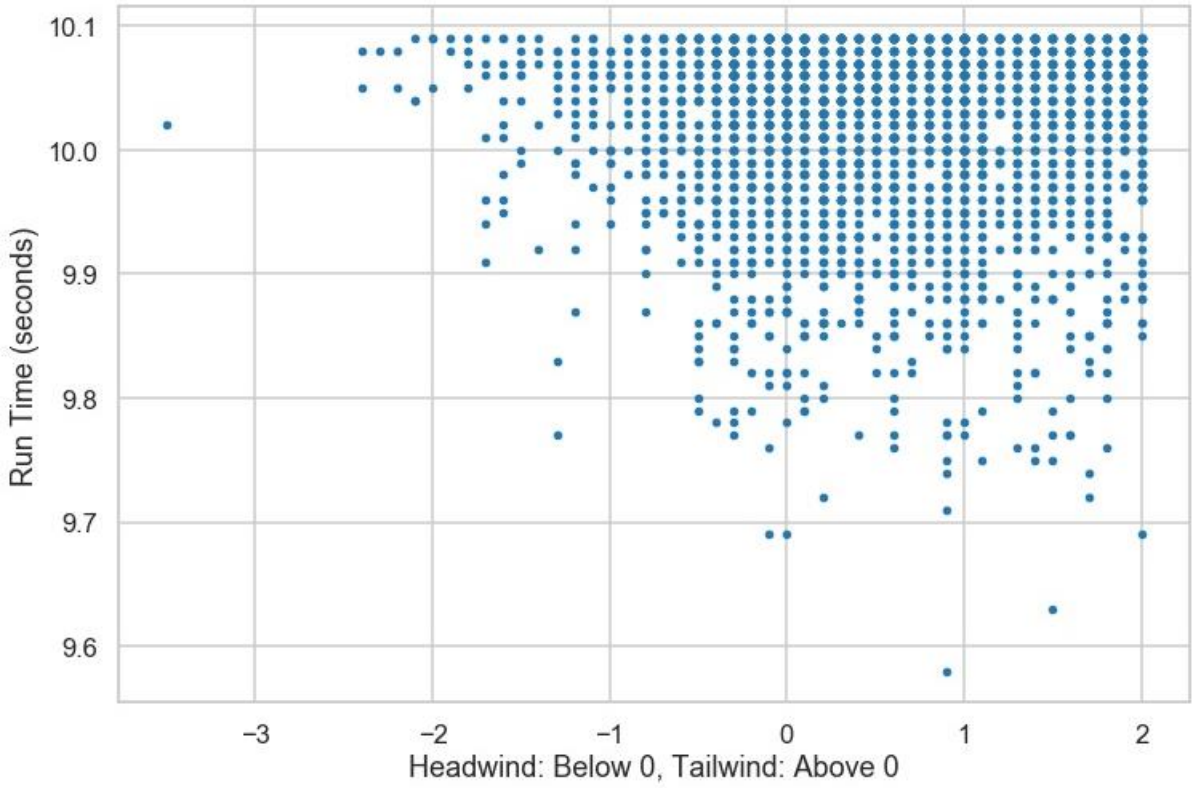
Fastest Men's 100m Sprint Times by Wind



DOES WIND IMPACT SPEED?

- ✓ Plotting only lowest times run by windspeed yielded a linear pattern.
- ✓ The best-fit line suggests tailwind helps runners and headwind hurts runners.
- ✓ We tested whether this pattern holds for the complete data set: Is mean run time of tailwind races lower than headwind races?

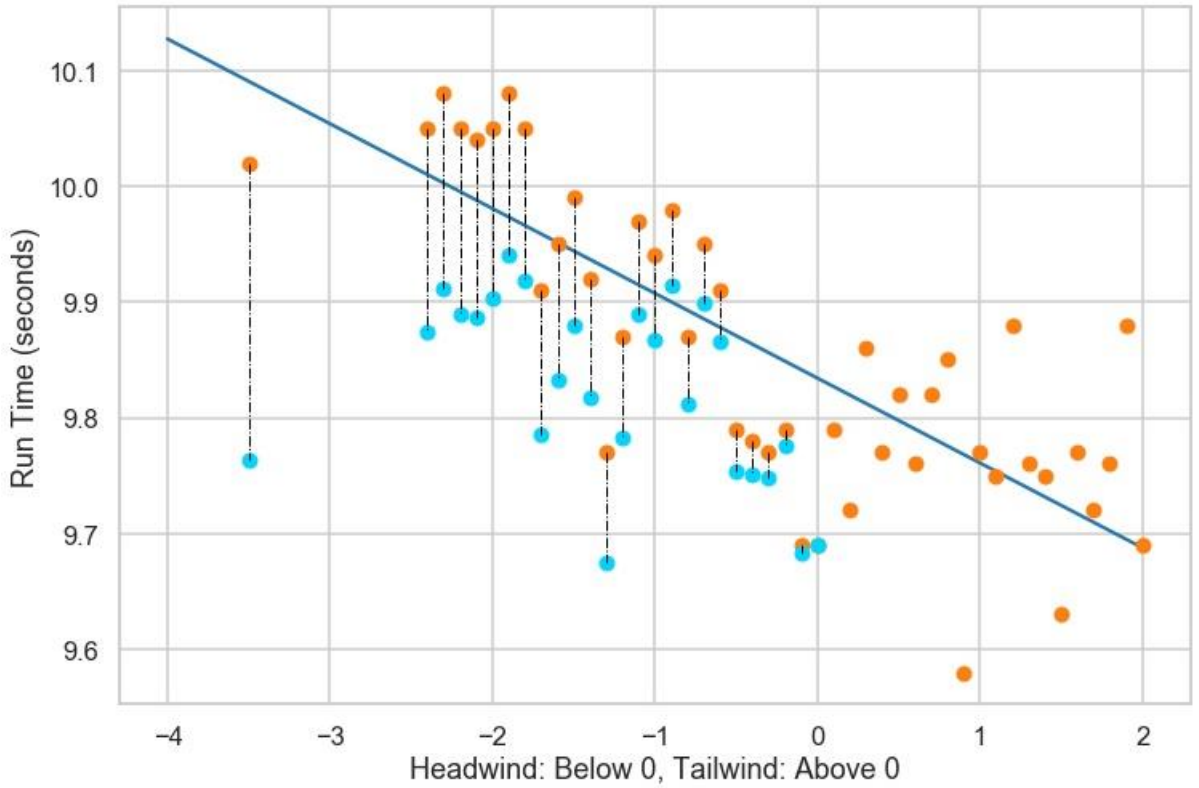
Men's 100m Sprint Times By Wind



WE CAN SAY WITH 95% CONFIDENCE THAT WIND MATTERS

- ✓ While higher times are recorded in all wind conditions, lower times are mainly recorded with tailwind.
- ✓ Mean run time of tailwind group is lower than headwind group and difference is significant at the 5% level.
- ✓ Therefore, we can say that mean run time with tailwind is lower than with headwind.

Fastest Men's 100 Sprint Times Adjusted For Headwind



SO, WHAT'S THE IMPACT?

- ✓ The light blue dots are adjusted for headwind.
- ✓ This illustrates how much of a disadvantage headwind is to posting a record time.
- ✓ The left-most time could have been around 0.25s faster, that's a big deal!

RESULTS AND IMPLICATIONS

AGE

- For the lowest times, there is a relationship between age and speed that indicates an optimal age for peak performance, but we could not confirm this for the entire sample.
- While we would like to conduct further analysis on the dataset, we recommend the IOC consider this narrow age window to post record times and implement the policy change below.

WIND

- Every 1m/s change in wind speed correlates with 0.07s change in time.
- We recommend indoor meets as preferred venue. Headwinds are a significant impediment to new records, which can cost athletes $millions in endorsements and detracts from the sport.

NEXT STEPS

AGE

- Vary age test group range (e.g. 25-30 vs control)
- Look at frequencies of low times across age and time period categories (chi-squared test)
- Analyze times by runner at different ages

WIND

- Analyze times by runner under various wind conditions

OTHER

- Weather on race day