World Human Powered Speed Challenge - Nevada, USA

On the expanse of State Route 305, near Battle Mountain, Nevada, a global gathering of cyclists embarks on an incredible mission: shattering the limits of human-powered land speed of 89.59 MPH. Amidst the panoramic beauty of SR 305, these cyclists embrace the challenge.

At 4,619 feet (1,408 meters) above sea level, this road provides a platform for speed. Riders muster their strength for each attempt, timed meticulously over 200 meters. From 2001 to 2019, 250 competitors across 10 nations have brought 217 bikes to Battle Mountain. Through 1674 attempts, they have etched 7502 miles into the unforgiving asphalt, a testament to their unwavering resolve.

The Riders

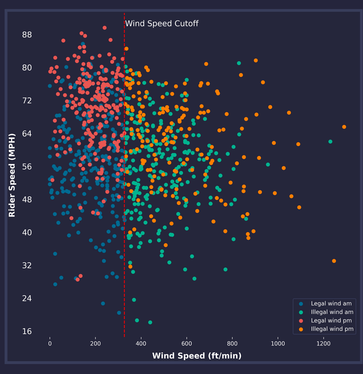
One bike stands alone at the top, **Vortex**, created by the University of Toronto, has raced an incredible 94 times. Even more impressive is that **Bluenose**, the second highest, was also created by them

Toronto have a long history at the competition, and alumnus **Todd Reichert** holds the world record at **88.59 MPH**, as well as having raced 47 times, the second highest.

While the Canadian teams have a historically strong showing at the WHPSC, teams from the Netherlands, the UK, and Italy have started to make more appearances in the last decade. There are even riders from Japan and Australia competing for the record!

250 unique riders

10 unique countries



The Race

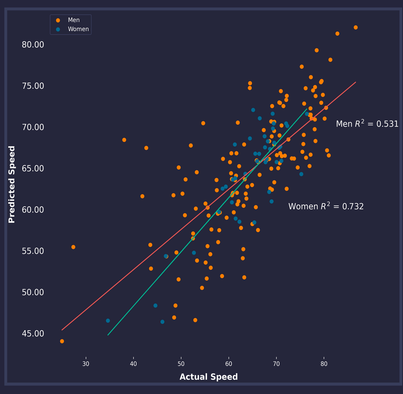
Wiih the effort they expend, asking the rider to turn around and go again is not an option, so the wind must be below the cutoff value of 322 ft/min, be it a headwind, tailwind, or crosswind.

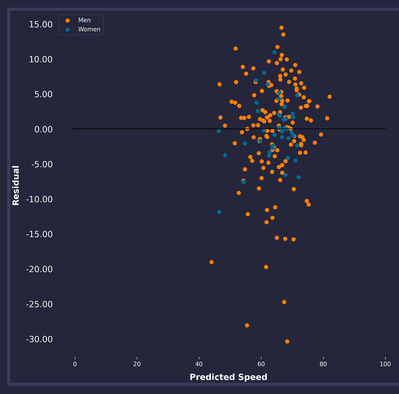
The two most frequented categories are the Men's and Women's Single Rider 200m Flying Start events, jointly constituting a substantial **81%** of all entries spanning the last two decades. In a stark contrast, a mere **2.9%** of the entries correspond to arm-powered vehicles.

Because of the unpredictable nature of the desert weather, the riders don't know what the conditions will be like 5 miles down the road, so only **54%** of the 200m flying start riders have a legal wind speed through the trap.

54% of runs are wind legal

The Model



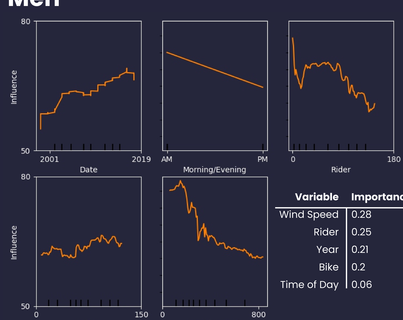


Two Random Forest Regression models were constructed to gain insights into the intricate interplay of numerous variables within the process, shaping their impact on the riders' top speeds. One model was built for the Women's 200m flying start, while the other for the Men's category.

The model is more accurate in predicting the Women's results (R^2 **0.73**), whereas the Men's results are more uncertain (R^2 **0.53**). This variance could be attributed to the significant imbalance in the volume of runs, with men contributing to a staggering **381%** more data points. This broader dataset encompasses a wider spectrum of skills, while the fewer data points for women tend to congregate towards the upper levels.

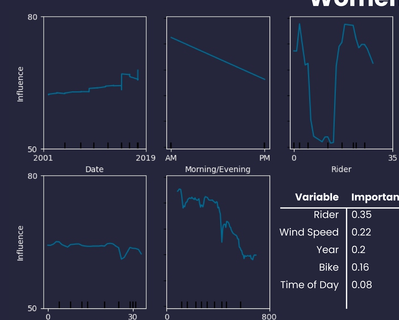
Displayed below are the partial dependence plots, showing the individual influence of each variable on the anticipated rider speed. In the men's performances, wind speed emerges as the paramount factor, while for women, the rider's choice exerts a substantially more pronounced impact. Remarkably, neither of the models shows substantial susceptibility to the time of day factor, effectively putting to rest the ongoing debate regarding the optimal timing for races—whether it be the evening or the morning.

Men



Variable	Importance
Wind Speed	0.28
Rider	0.25
Year	0.21
Bike	0.2
Time of Day	0.06

Women



Variable	Importance
Rider	0.35
Wind Speed	0.22
Year	0.2
Bike	0.16
Time of Day	0.08

Data gathered from http://ihpva.org/whpsc/