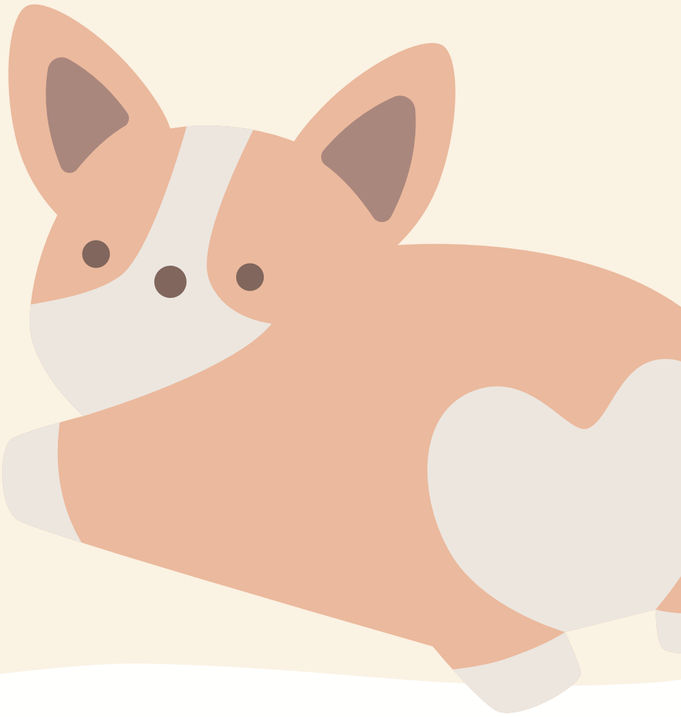
Data science competition

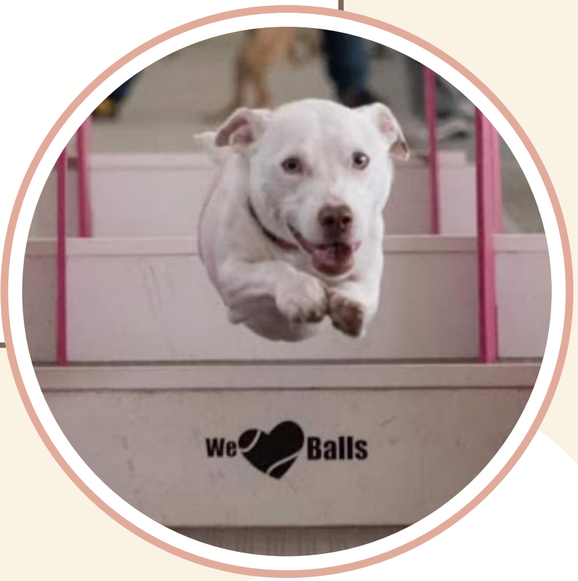
Flyball



Tamás Berki

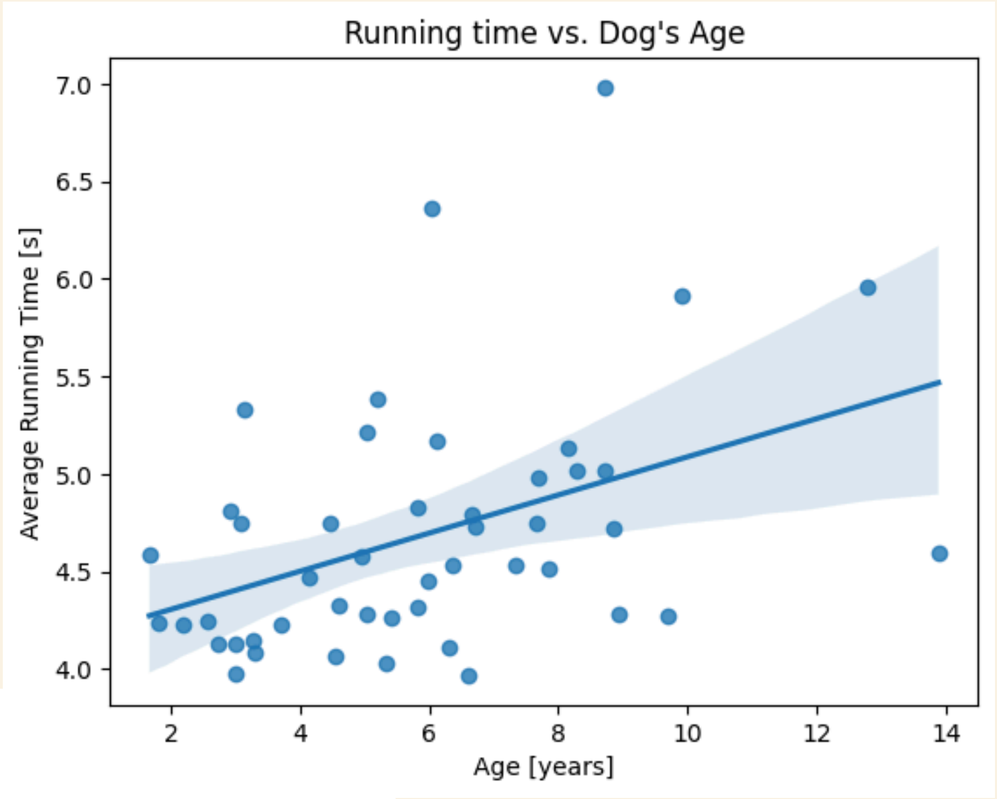
Optimizing Performance for Wild Runners

This analysis dives into your team's performance data to identify key areas for improvement and provide data-driven recommendations to help you achieve podium finishes!

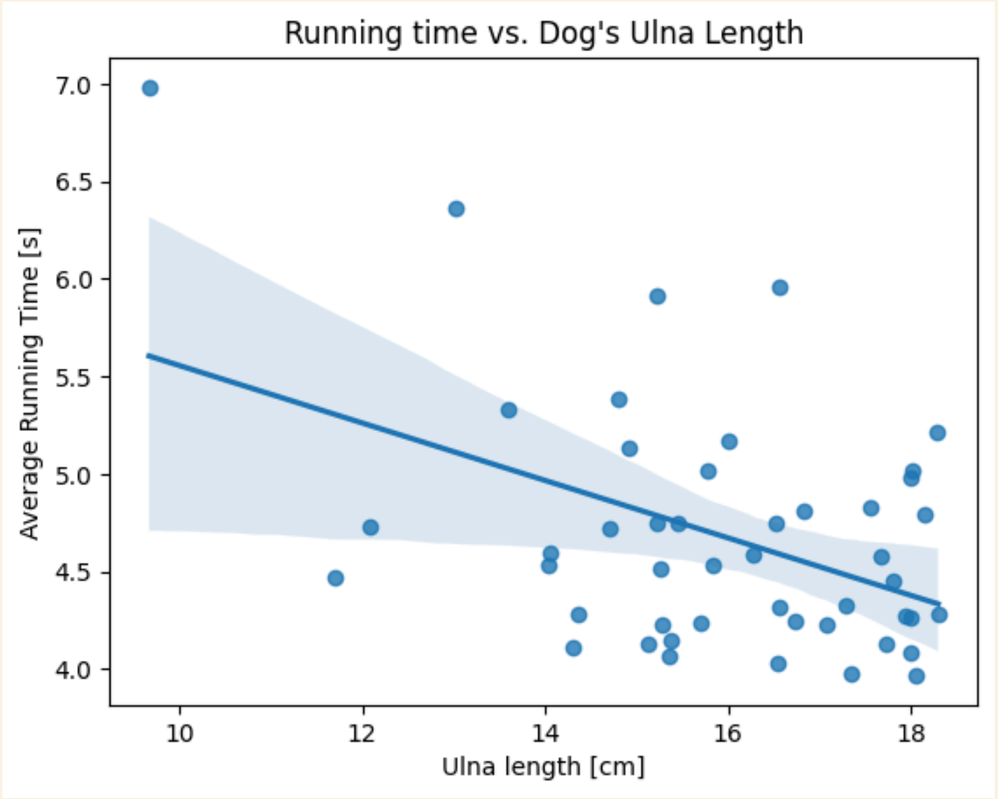


Basic Analysis 1

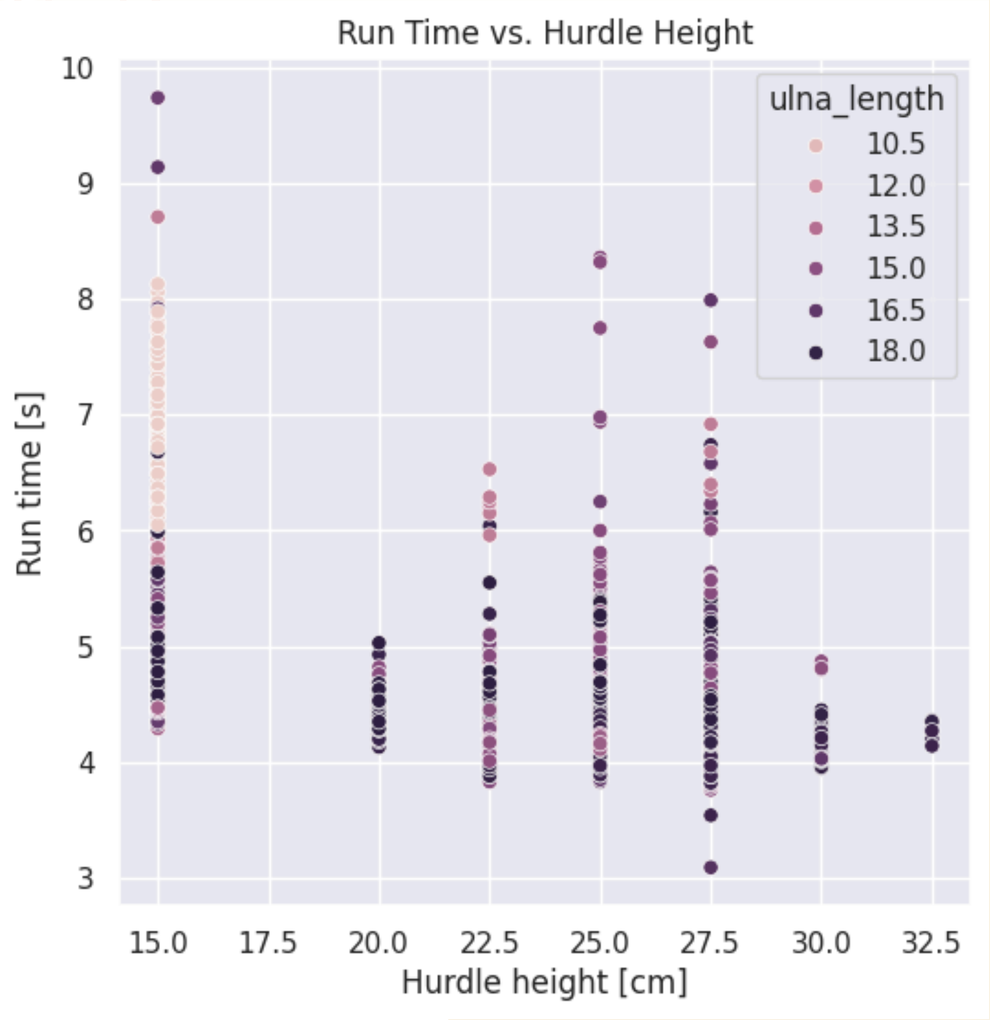
Younger dogs run faster (0.1 sec/year)



Larger dogs run faster (−0.16 sec/cm)



Basic Analysis 2

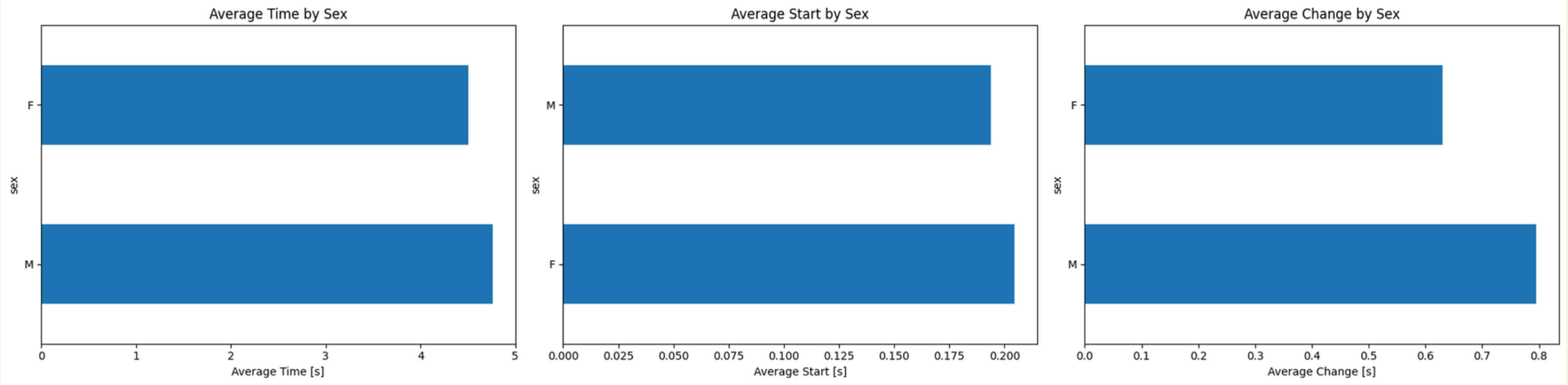


Mixing different sized dogs in the same team is a bad idea

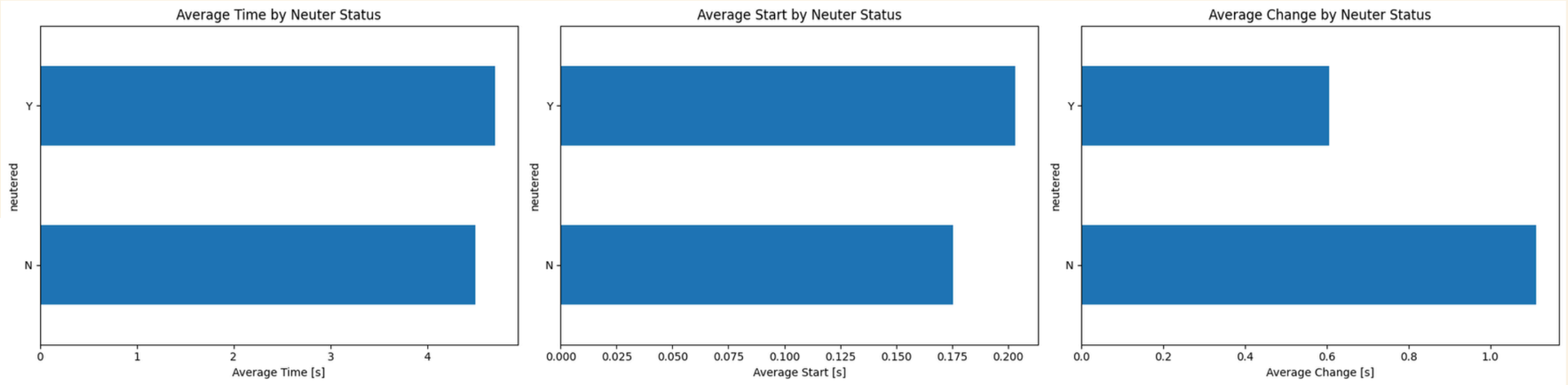
- Smaller dogs run slower, they should run in another division
- Even large dogs run faster if the hurdle is higher
- Slope -0.11 sec/cm

Basic Analysis 3

Female dogs are better in exchange

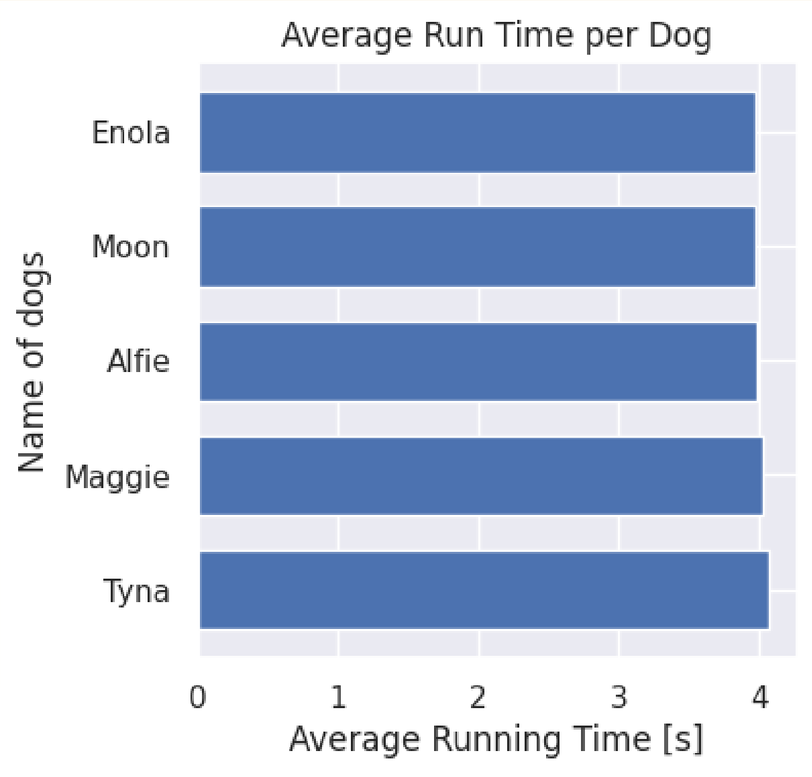


Neutered dogs are better in exchange

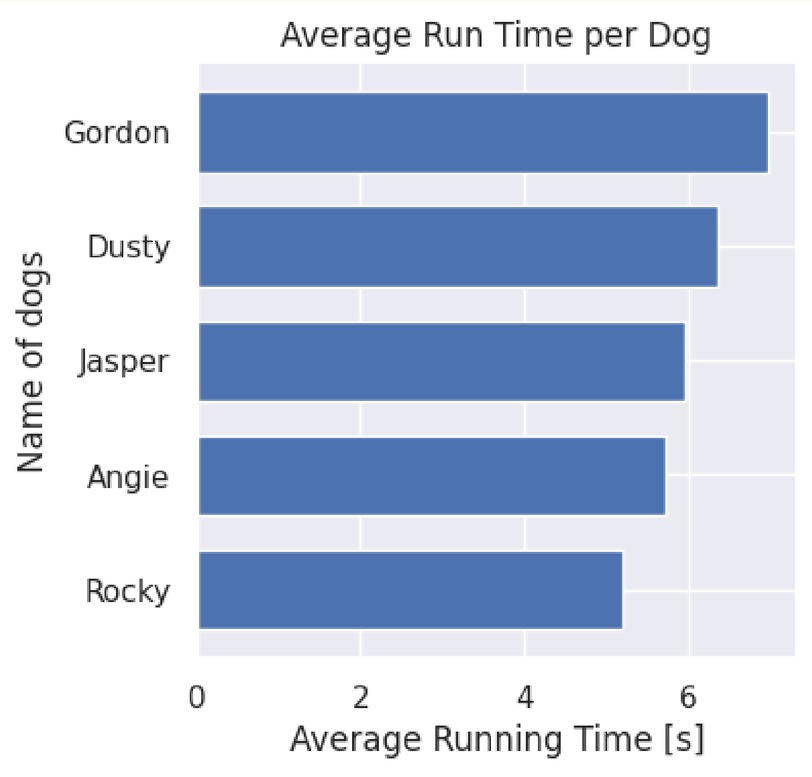


Dog Performance 1

Fastest dogs



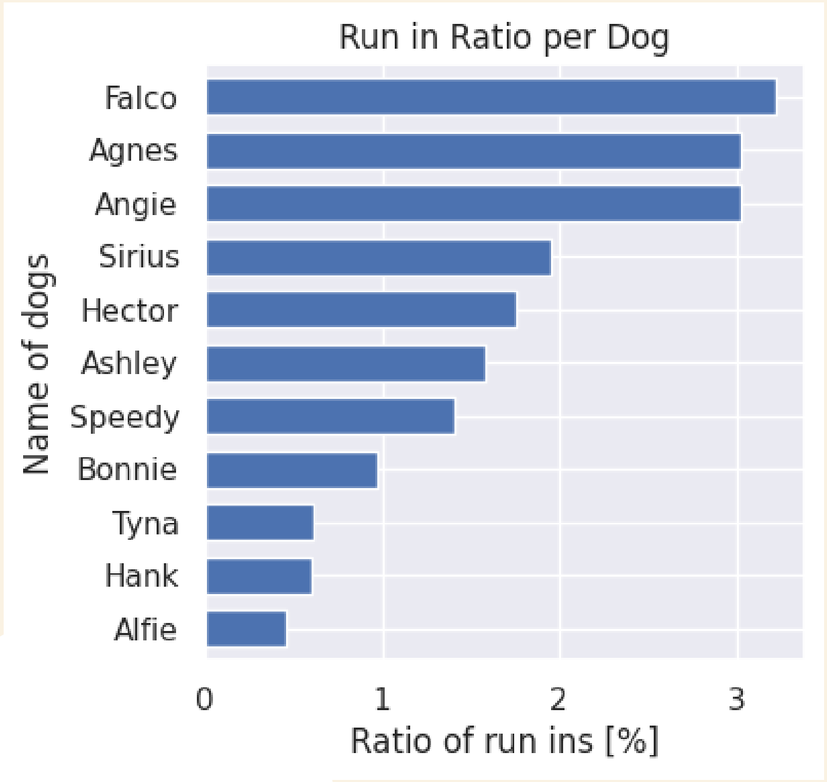
Slowest dogs



Dog Performance 2

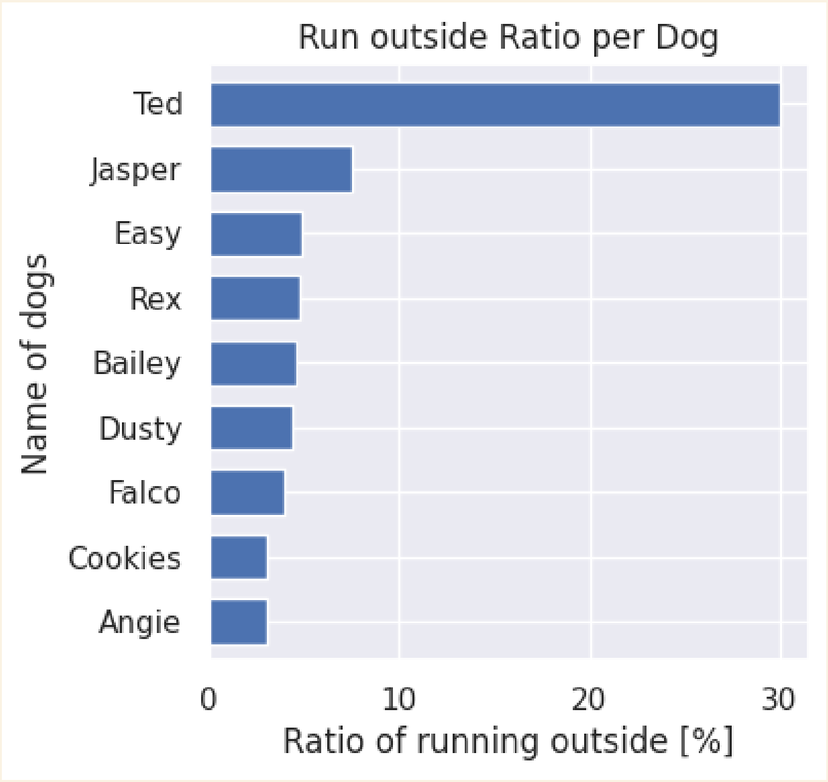
Run-in is a rare mistake

just a few dogs do that more than twice out of 100 runs



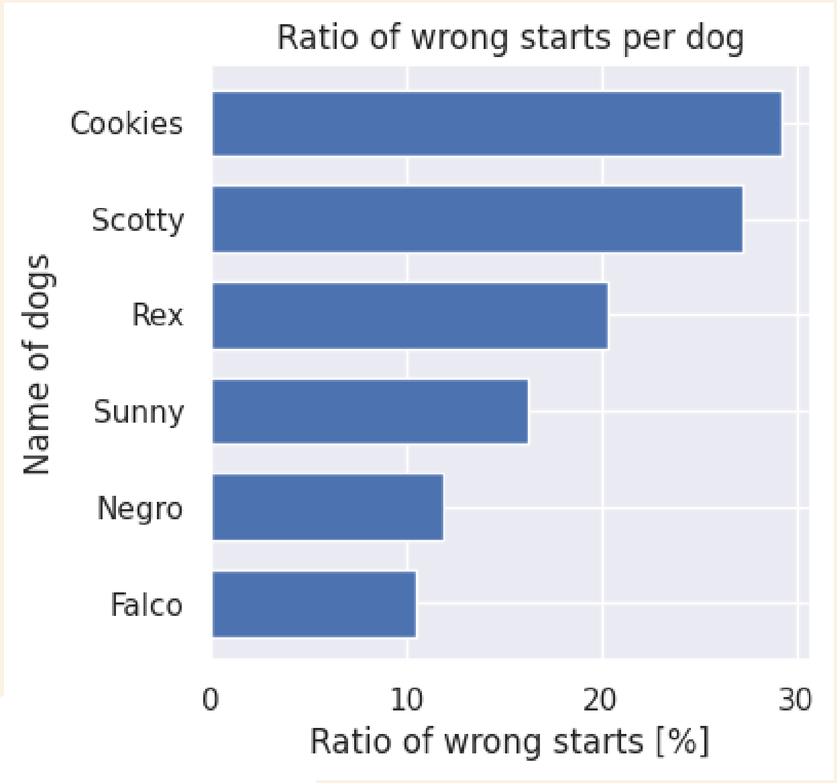
Run outside is more frequent

Ted definitely needs some training about it

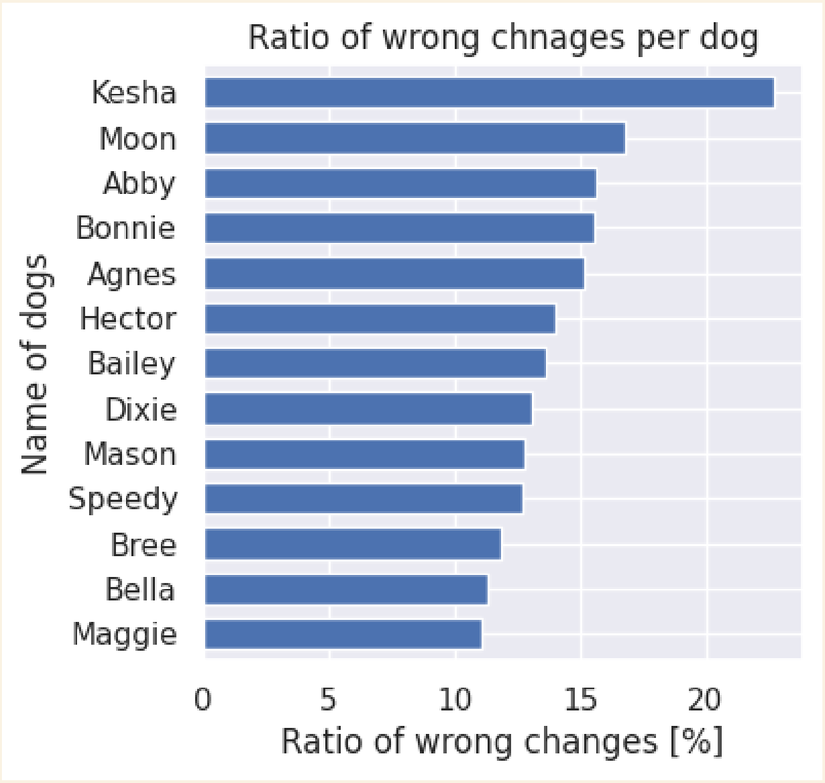


Dog Performance 3

Dogs with high wrong start ratio

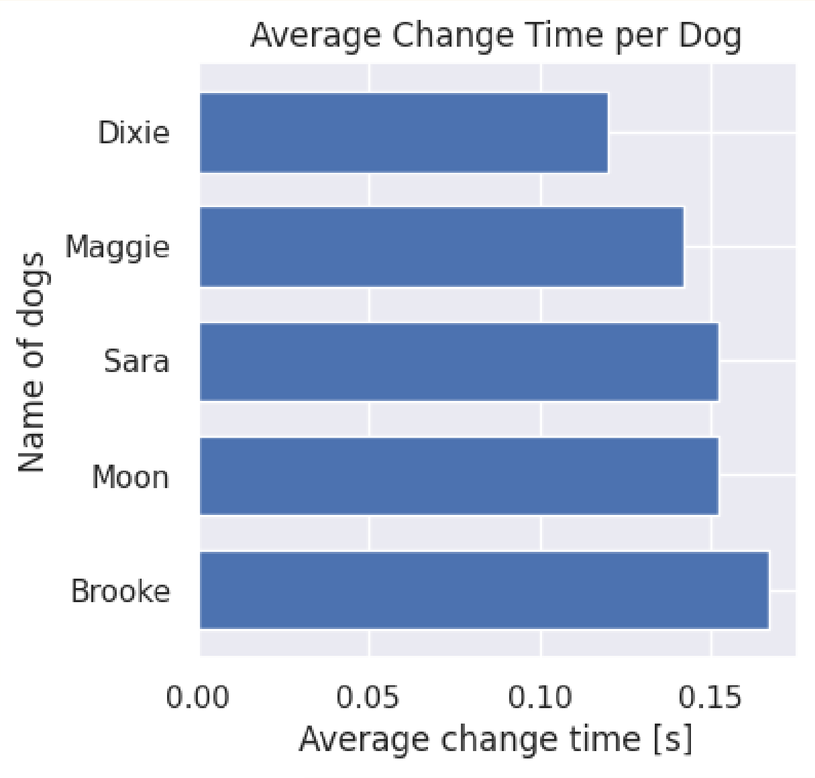


Dogs with high wrong exchange ratio

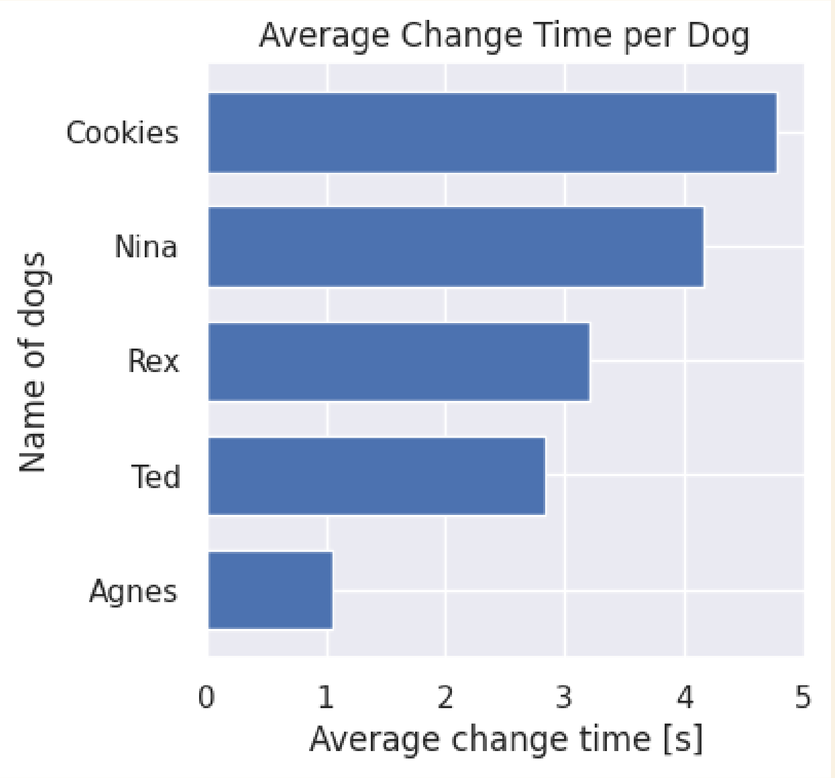


Dog Performance 4

Best exchangers

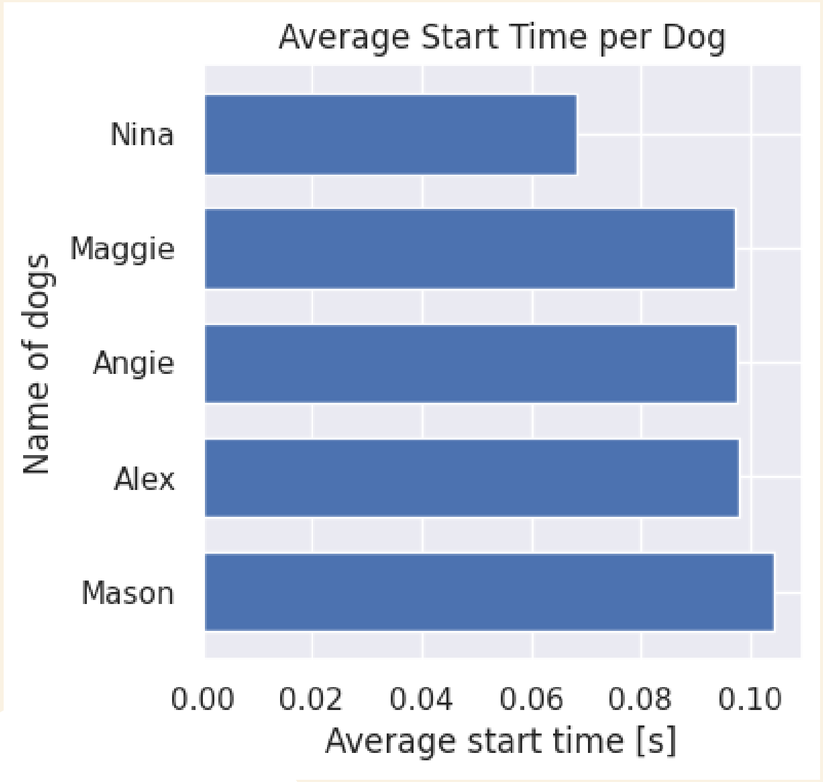


Worst exchangers

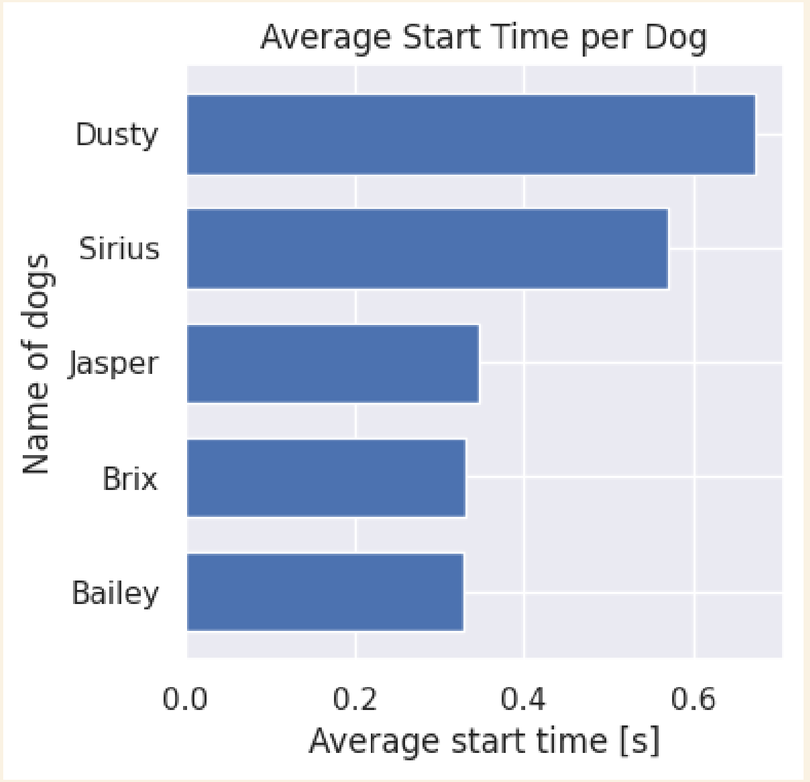


Dog Performance 5

Best starters



Worst starters



Course Color

There is no significant difference in the running performance on red and blue courses

Average run time:

Red: 4.39 s

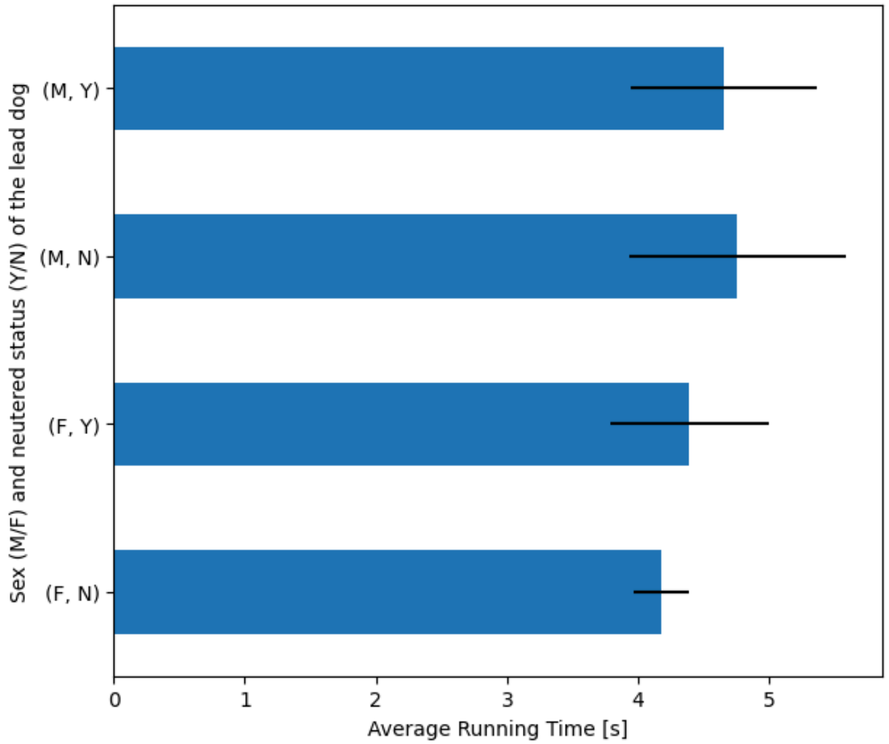
Blue: 4.40 s

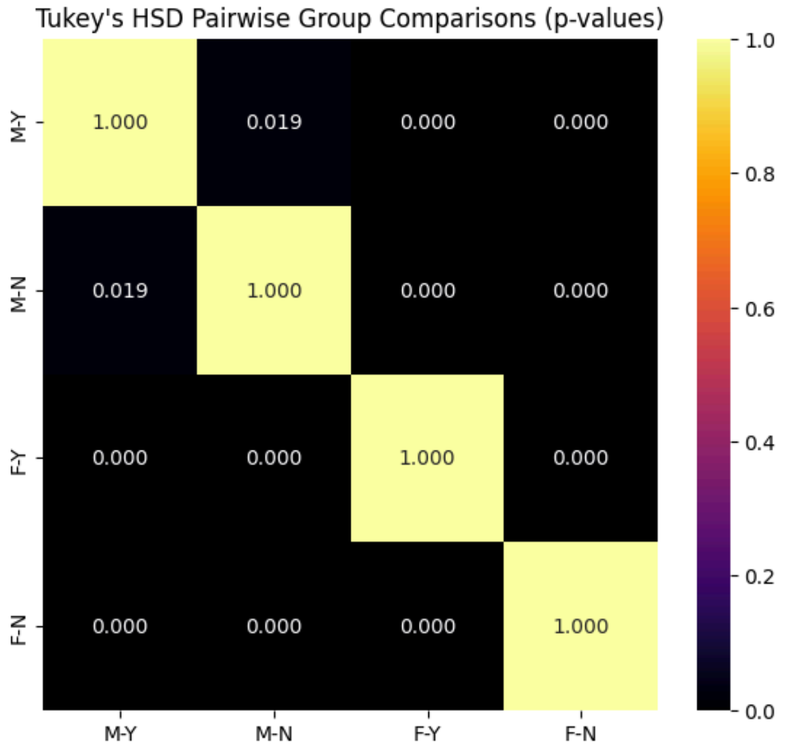
P-value from T-test:

0.33 – we failed to reject the null-hypothesis that there is no significant difference between the two groups

Note: Start and exchange times were not analyzed

Running performance vs. lead dog sex and neuter status
all dogs included





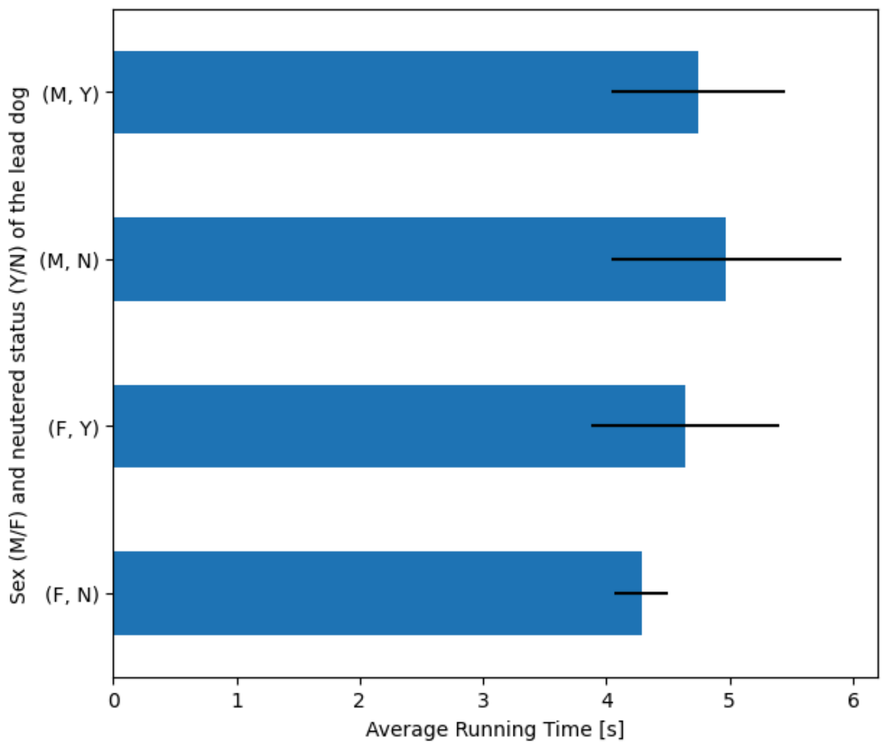
ANOVA (Analysis of Variance):
The overall ANOVA p-value of 8E-43 indicates that some of the groups are significantly different from others.

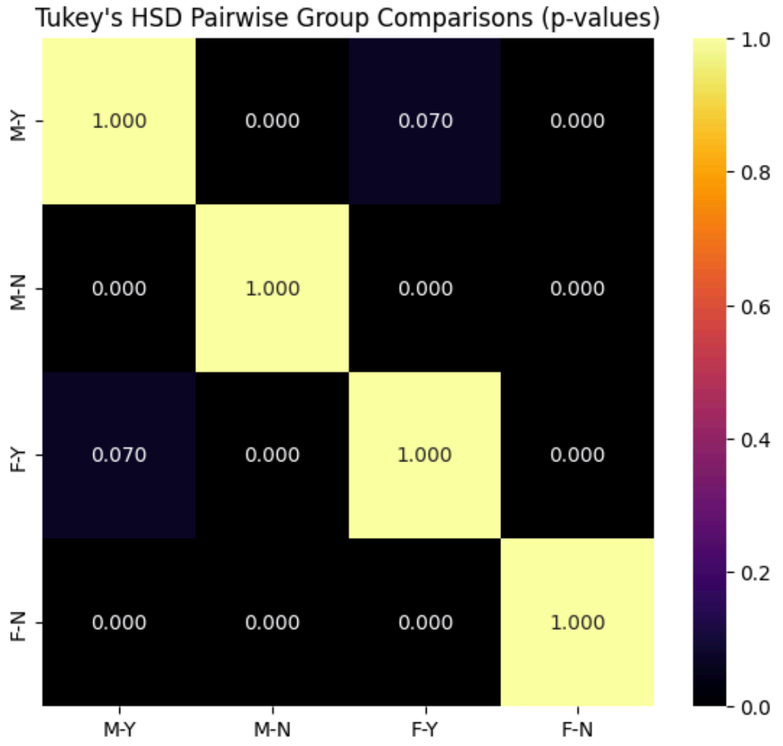
Tukey's HSD (Honestly Significant Difference)
The p-values for all pairs are below 0.05, indicating that all groups differ significantly from each other.

Conclusion:
Dogs that exchange with a female dog, especially one that is not neutered, run significantly faster than otherwise.

Further question:
Is this true for both males and females?

Running performance vs. lead dog sex and neuter status males

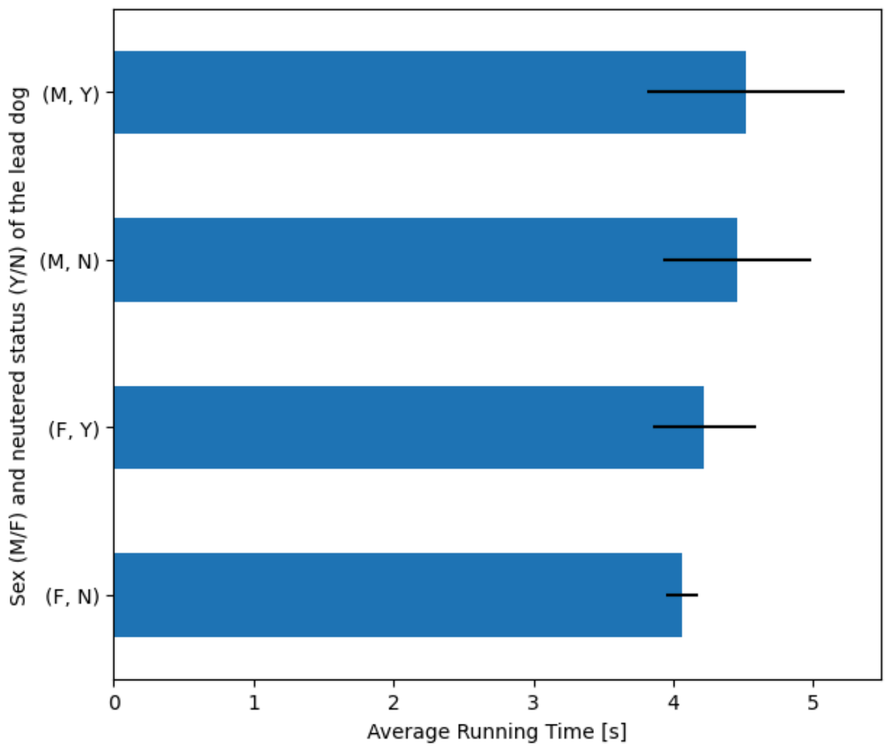


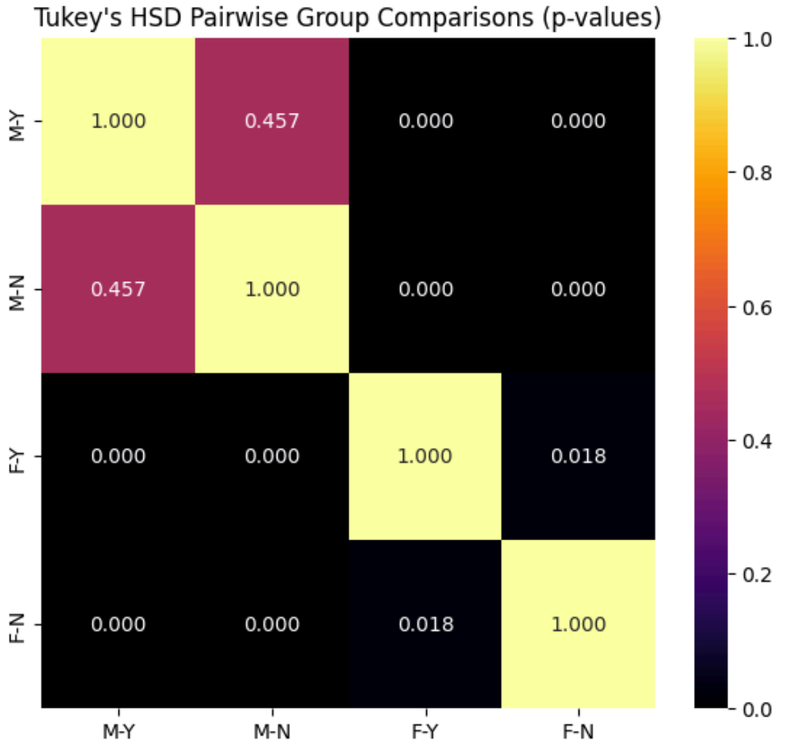


Best performance is still against non-neutered female dogs

There is no significant difference if the exchange partner is a neutered male or a neutered female

Running performance vs. lead dog sex and neuter status females

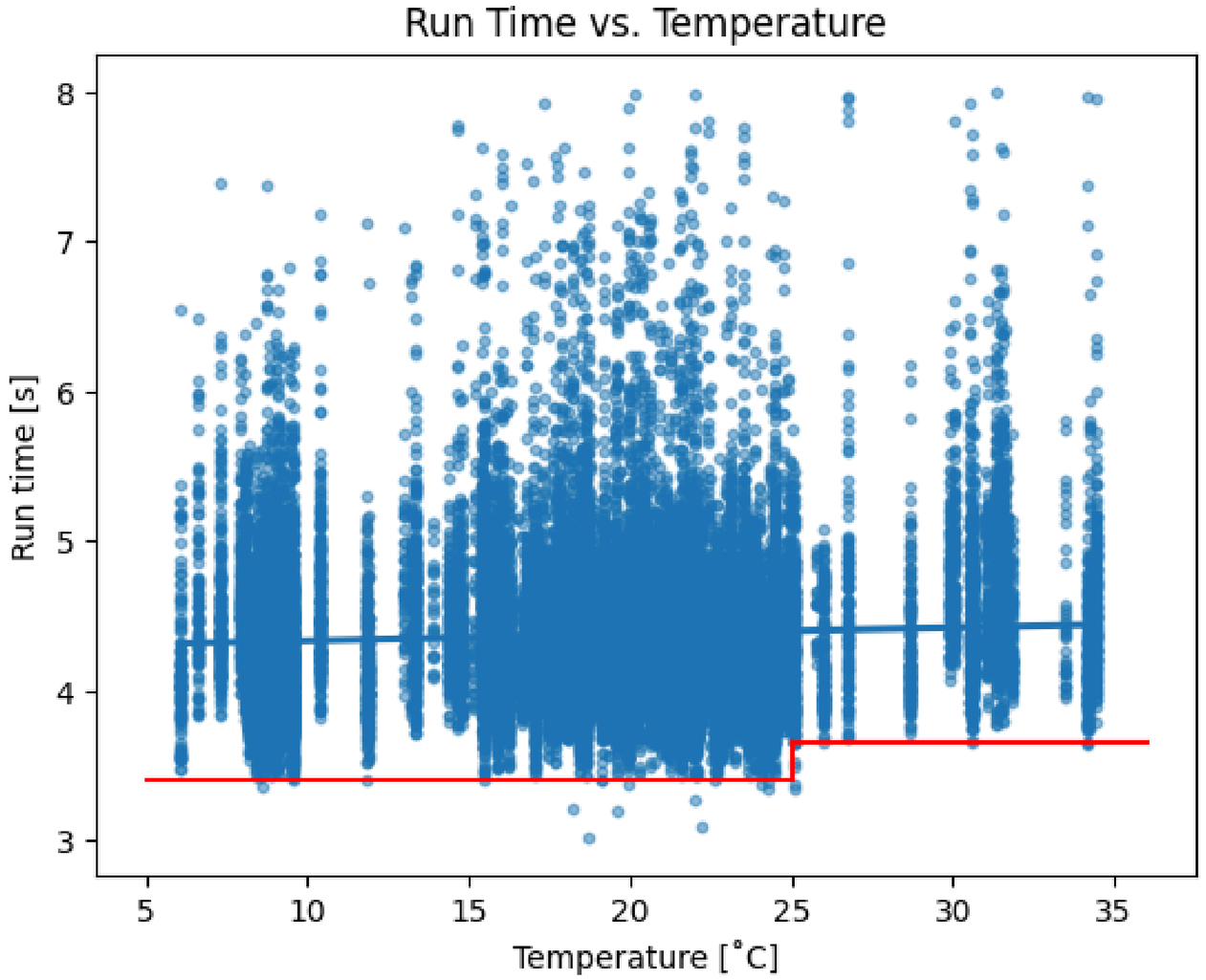




Best performance is still against non-neutered female dogs

There is no significant difference if the exchange partner is a neutered male or a non-neutered male

Temperature



Running time vs. temperature

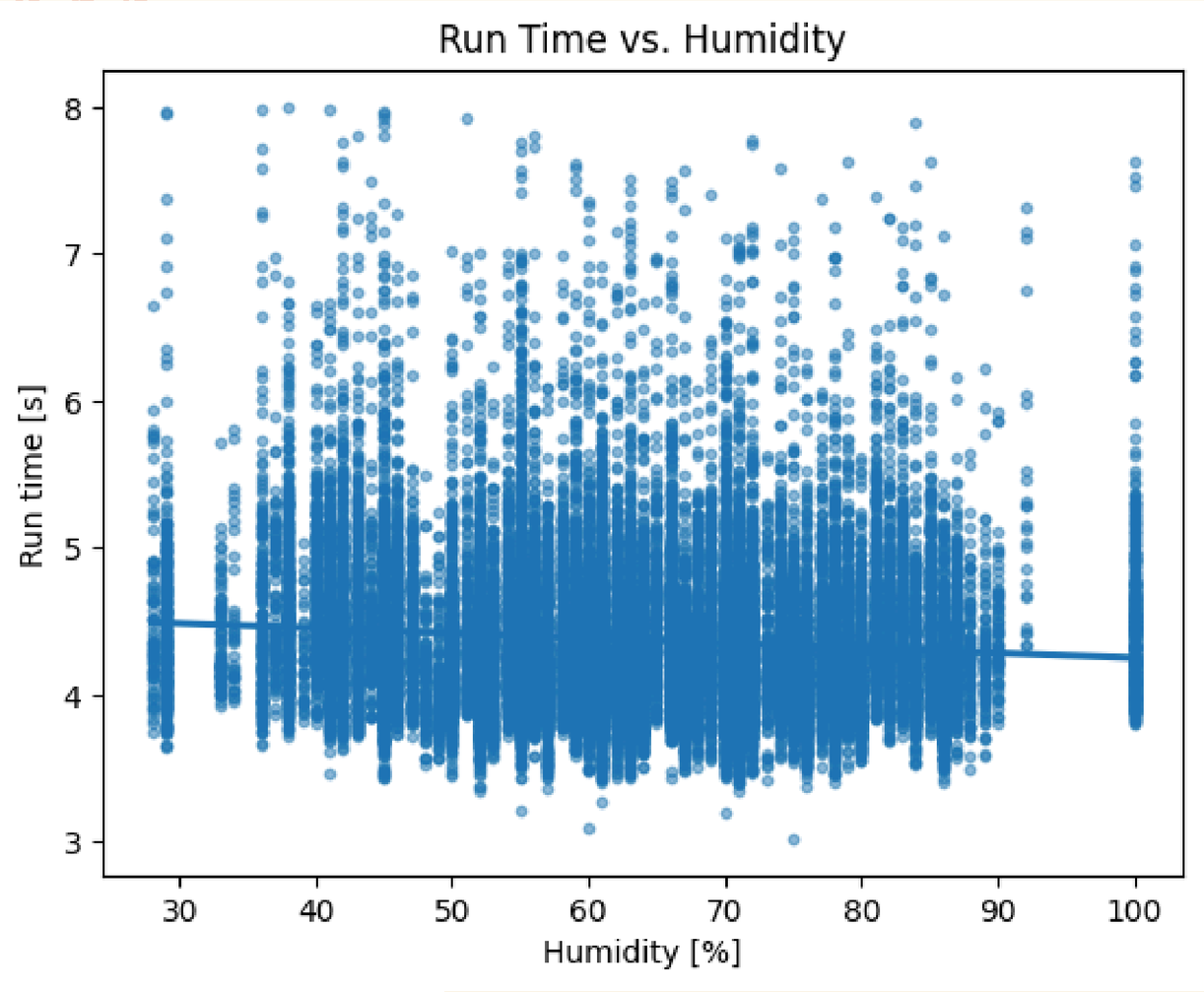
The low p-value indicates a significant correlation between temperature and running time. However, even though the correlation is significant, the slope is very low. A 1 °C increase in temperature corresponds to only a 0.004 second increase in running time.

Dog performance may improve by approximately 0.1 seconds on a cold day (< 10°C) compared to a hot day (> 30°C).

Visually examining the data suggests a stepwise performance degradation above 25°C. The run time of the best performing dogs abruptly changes from around 3.4 seconds to around 3.65 seconds. It's important to note, however, that lower performing days or events also occur at lower temperatures. Additionally, there are very few slow runs (> 6.5 seconds) on cold days (< 10°C) compared to many slower runs on warm days.

Overall, it seems reasonable to conclude that dog performance increases with lower temperatures.

Humidity

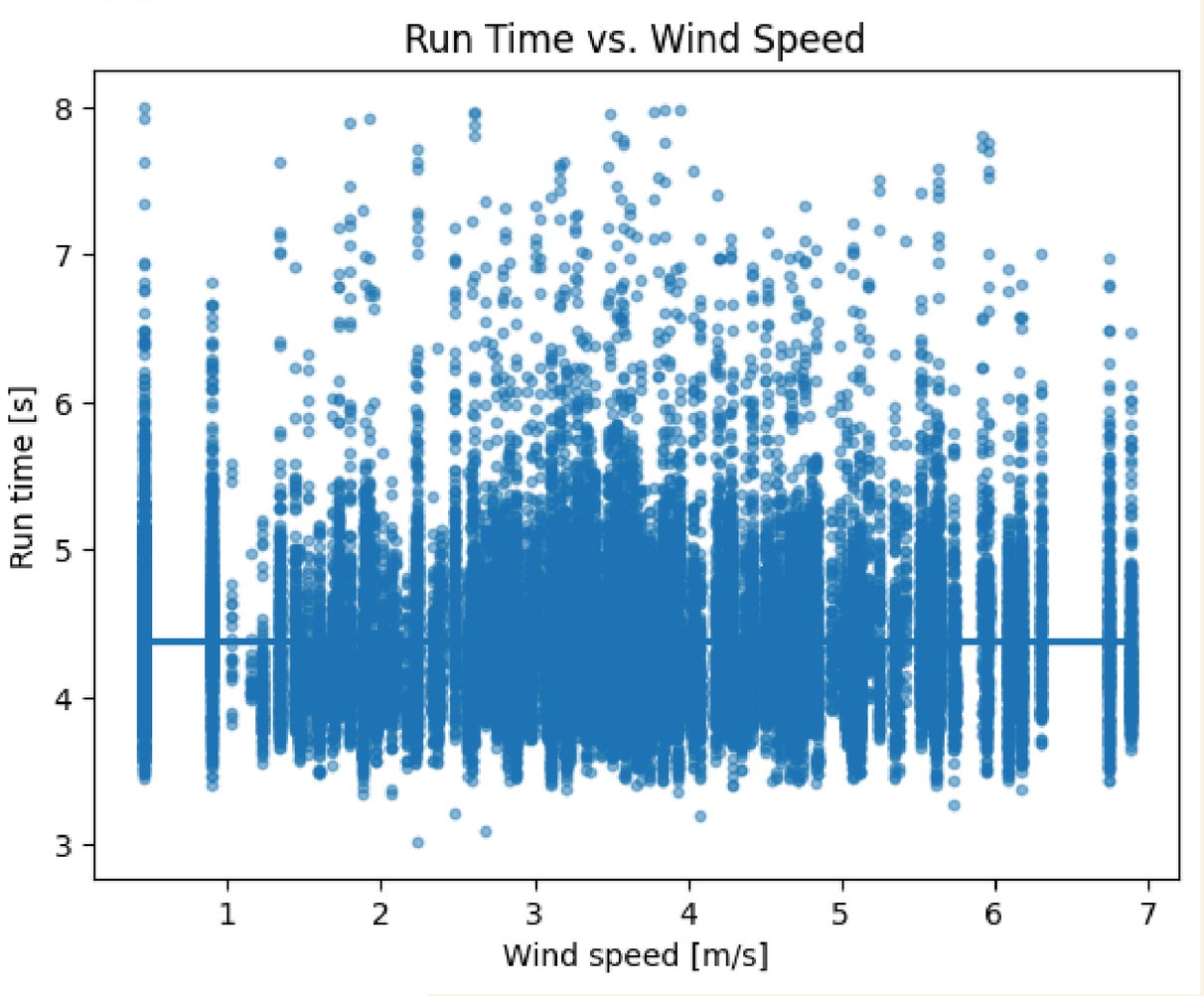


Running time vs. humidity

The low p-value indicates a significant correlation between humidity and running time. A 1% increase in humidity leads to dogs running slightly faster, by approximately 0.003 seconds. Comparing a very dry day (humidity around 30%) with a wet, likely rainy day (humidity 90–100%), the difference in average running time could be more than 0.2 seconds.

However, correlation does not equal causation. It's possible, that other factors associated with high humidity, such as lower temperatures or rain, are the actual reason improving dog performance.

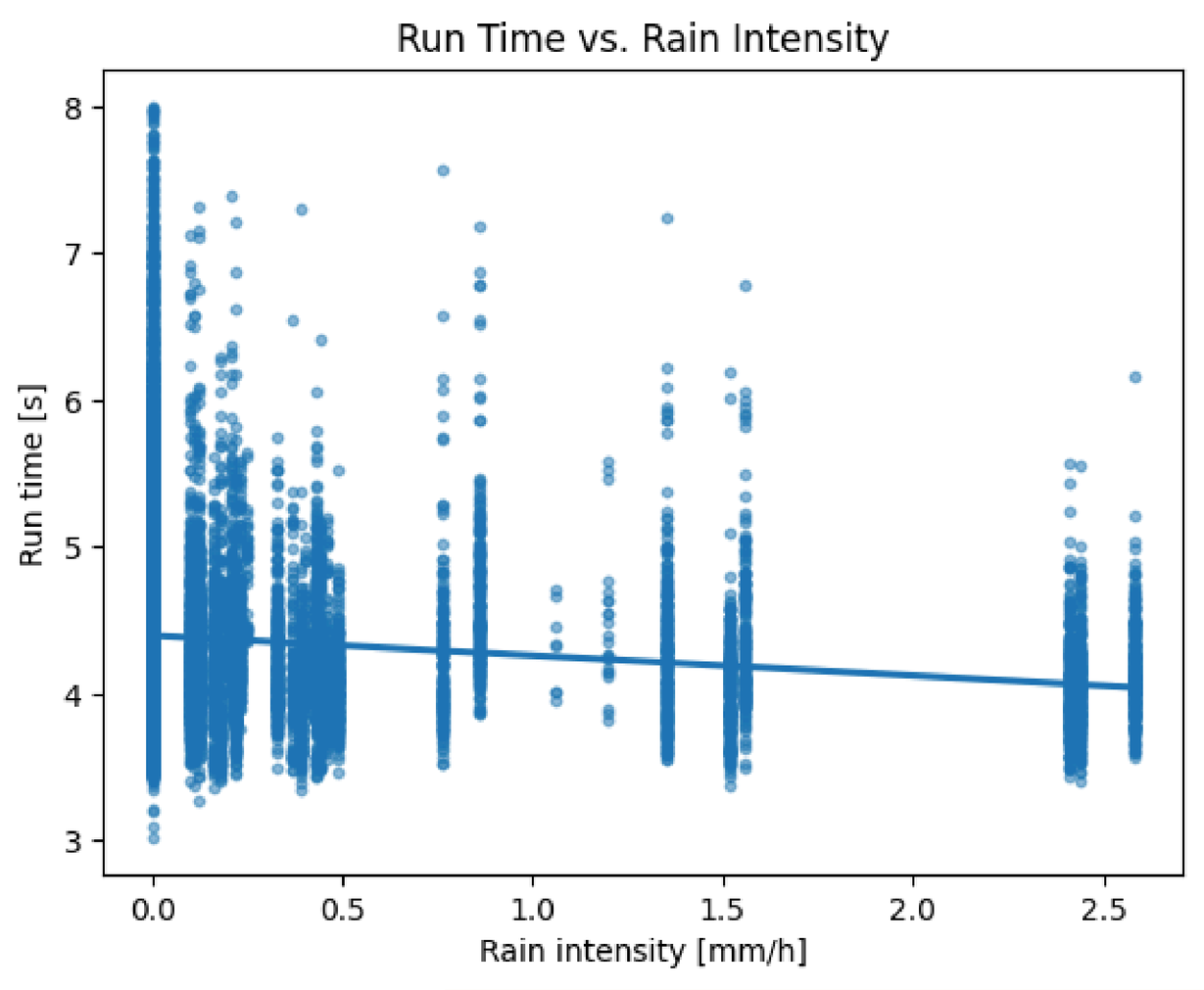
Wind speed



Running time vs. wind speed

The high p-value of 0.94 indicates that there is no significant correlation between wind speed and run time.

Rain Intensity



Running time vs. rain intensity

The low p-value indicates that there is a significant correlation between rain intensity and running time. It appears that dogs run faster on a rainy day with a 1 mm/h increase in rain intensity corresponding to a decrease in running time of about 0.14 seconds.

Visually examining the data suggests rain may not affect peak performance. However, it seems to eliminate slow performances. There are many runs exceeding 5.5–6 seconds on dry days, but these longer runs become much rarer during rain.

Note that the real reason for slower runs on a dry day may be heat instead of the lack of rain.

Conclusion

Flyball competition data were analyzed for

- Individual dog performance
- Team composition
- Course color
- Sex and neuter status of exchange partner
- Influence of weather

Recommendations

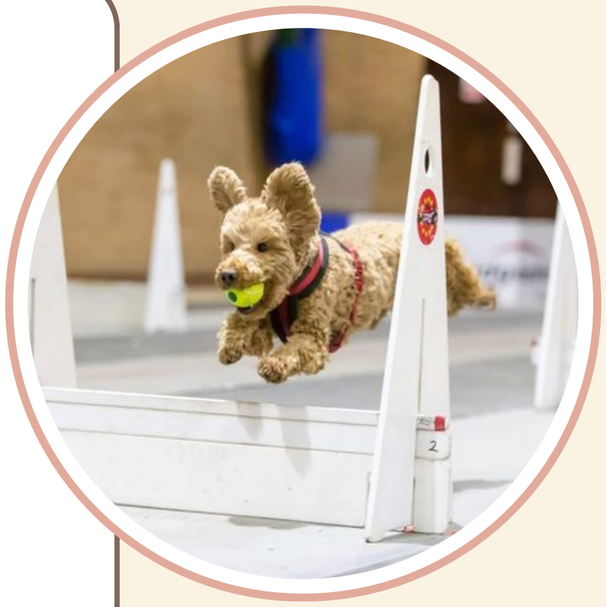
Do not mix different sized dogs in the same team

- Even large dogs run slower when the hurdles are lower

Use large young dogs whenever possible

Use more female dogs

- Female dogs are better in change
- Running performance is improved when exchanging with a female, especially with an unneutered female



Thank You For Attention

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