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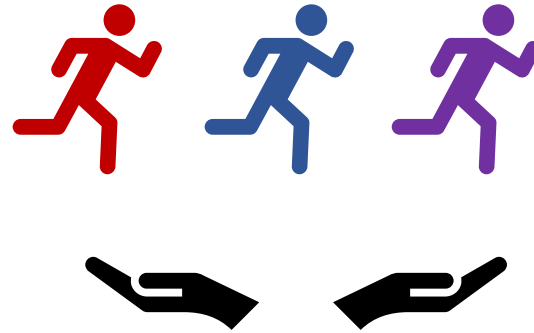
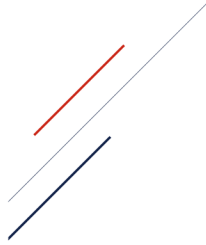
LEEDS BECKETT UNIVERSITY  
CARNEGIE SCHOOL OF SPORT

# Biomechanics of Female Distance Runners – Working with Technical Feedback

Yann Kai Oh, Dr. Brian Hanley, Dr. Andi Drake, Andy Henderson  
Leeds Beckett University



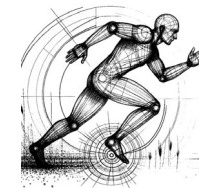
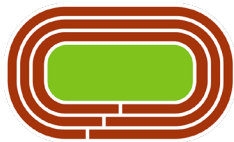
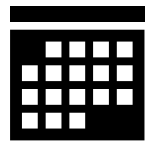
# INTRODUCTION



Coaches



Practitioners



# SETUP



## Middle-distance (n = 11)

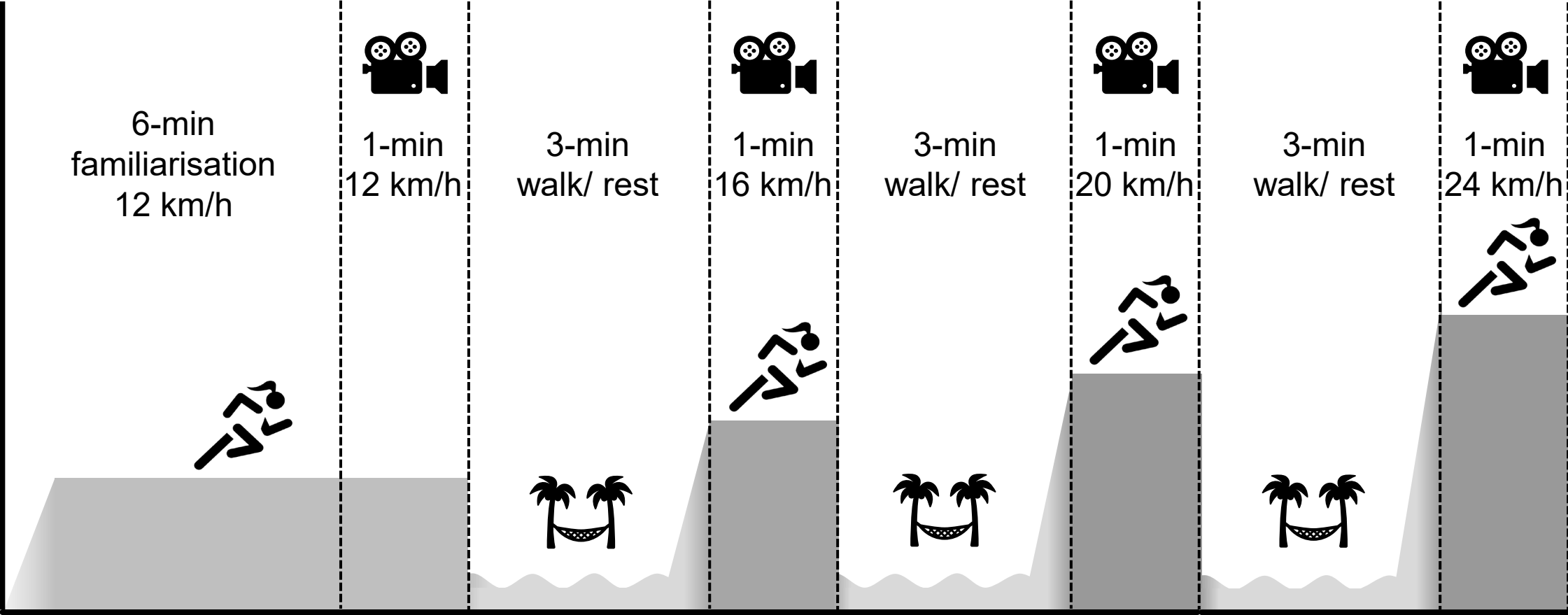
- World Athletics points  $1084 \pm 90$
- 800m: n = 4, 2:05
- 1500m: n = 7, 4:16

## Long-distance (n = 11)

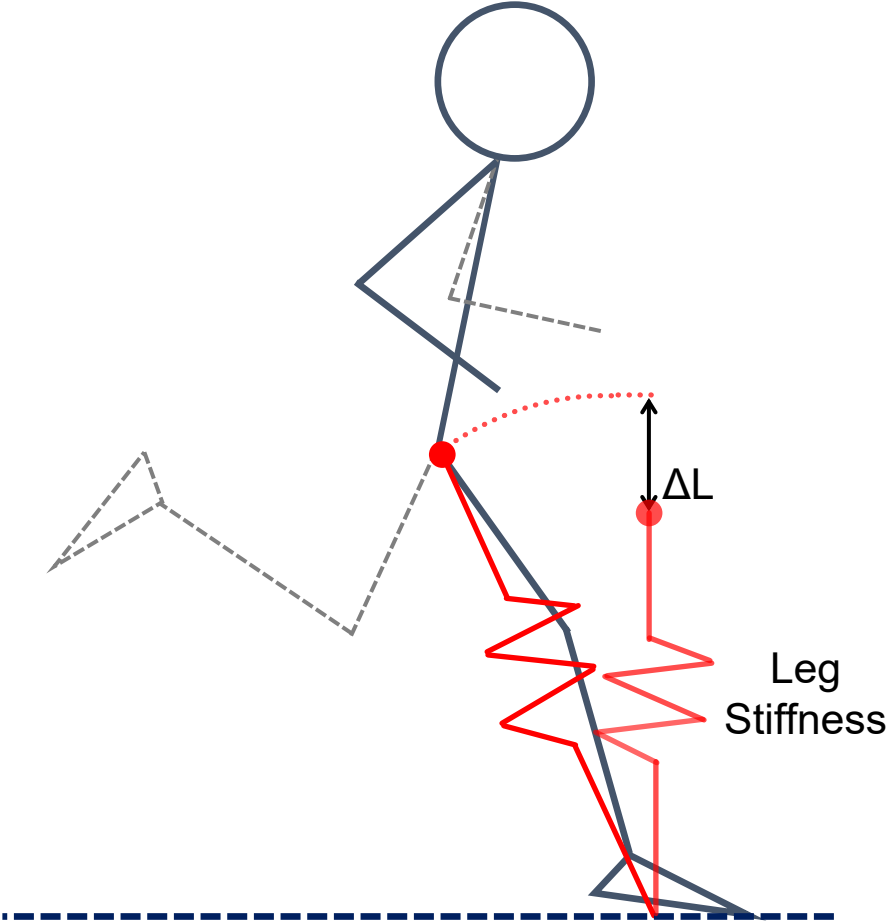
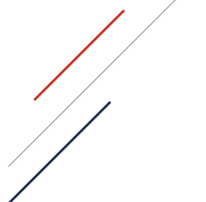
- World Athletics points  $1122 \pm 64$
- 10k: n = 3, 33:08
- Half Marathon: n = 2, 1:11:54
- Marathon: n = 6, 2:28:58



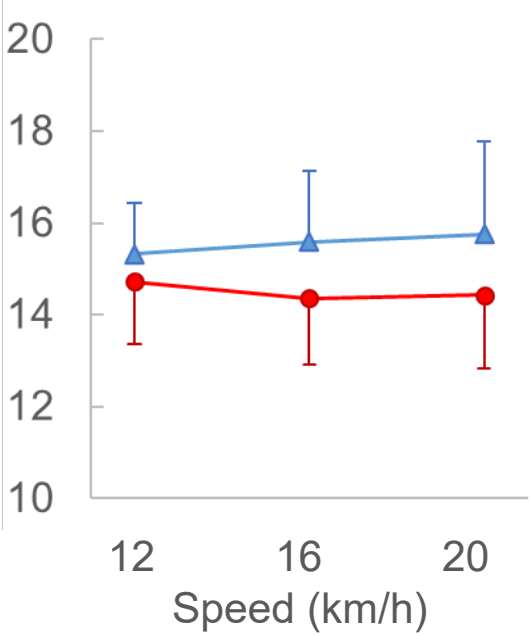
# PROTOCOL



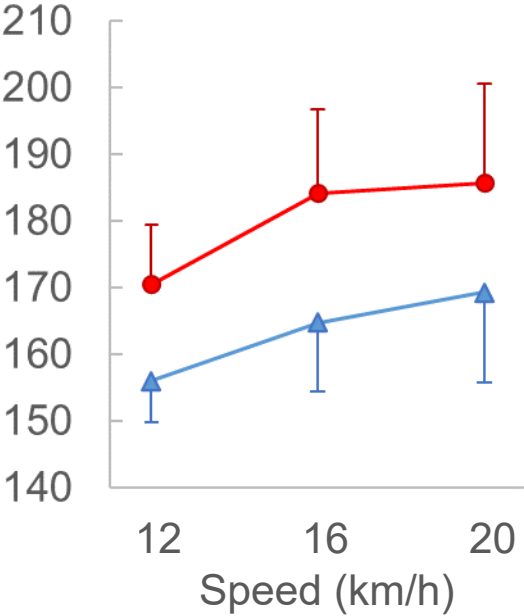
# GLOBAL STIFFNESS



Leg Stiffness (Normalised)



Leg Compression  $\Delta L$  (mm)

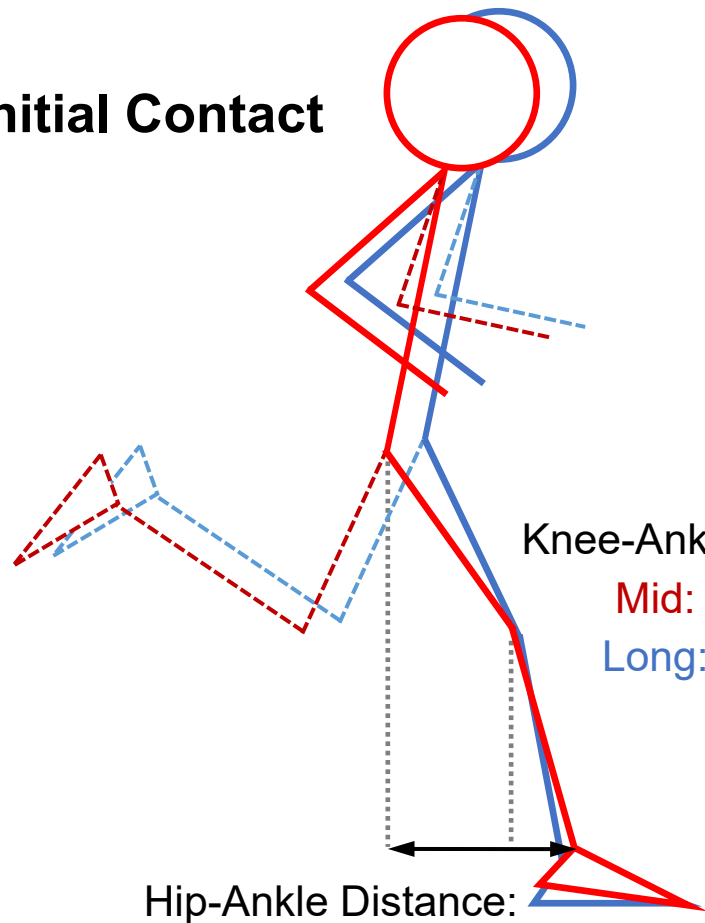


● Middle-distance    ▲ Long-distance



# VISUALISATION

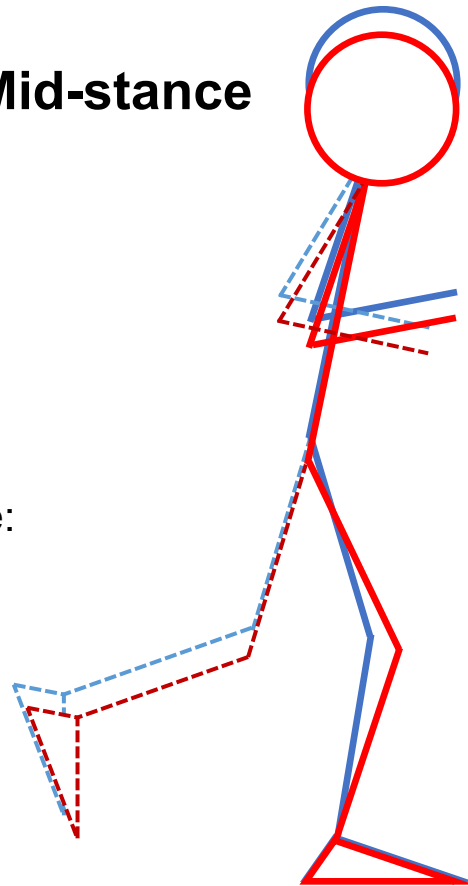
Initial Contact



Knee-Ankle Distance:  
Mid: 0.06 m  
Long: 0.06 m

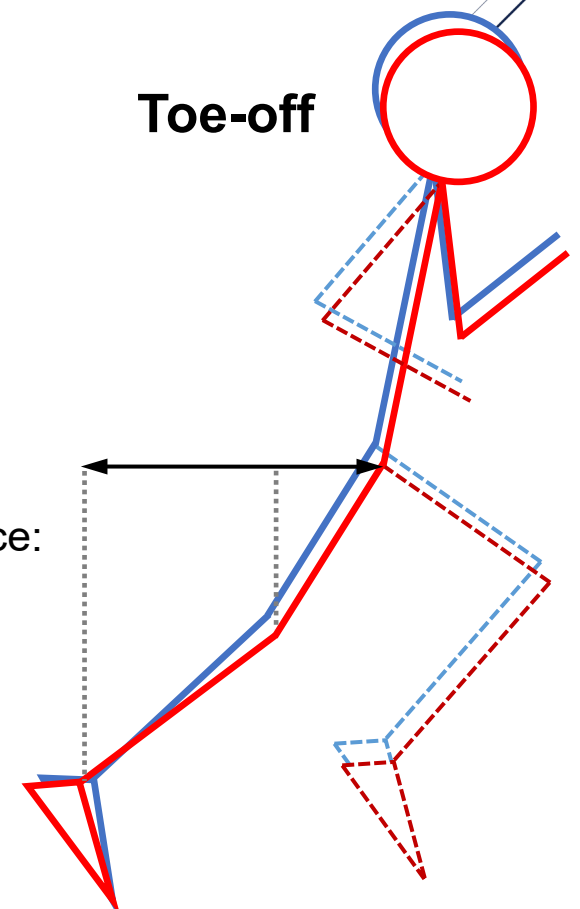
Hip-Ankle Distance:  
Mid: 0.28 m  
Long: 0.26 m

Mid-stance



Leg Compression  $\Delta L$ :  
Mid: 0.19 m  
Long: 0.17 m

Toe-off

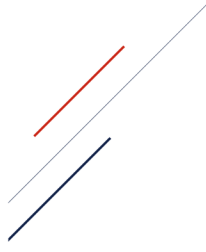


Knee-Ankle Distance:  
Mid: 0.30 m  
Long: 0.28 m





# WHAT DOES IT 'LOOK LIKE' IN PERSON?

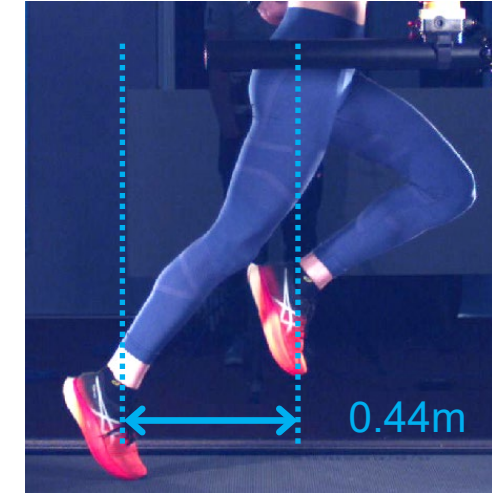
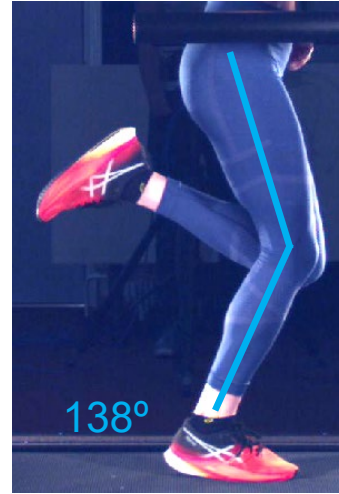
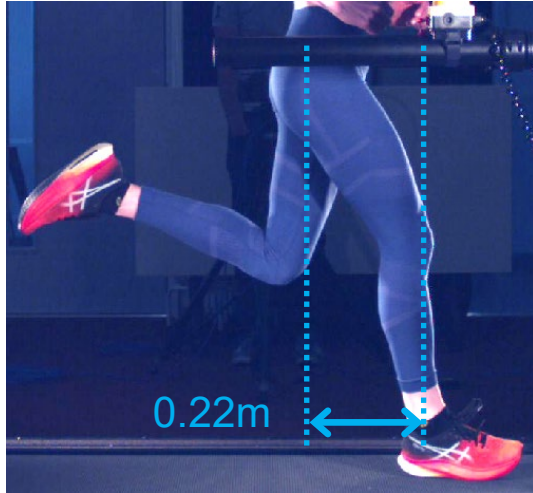


## INITIAL CONTACT

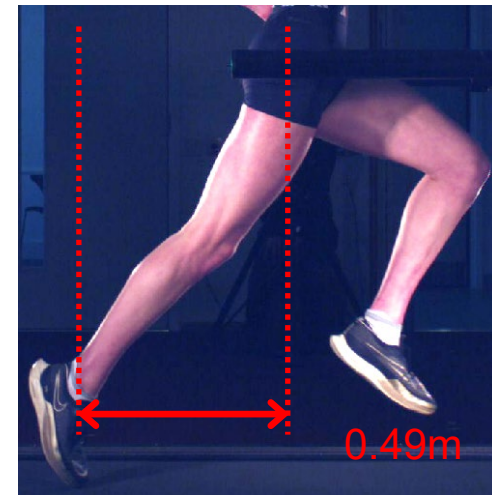
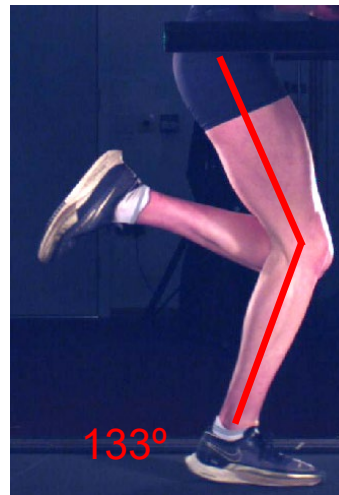
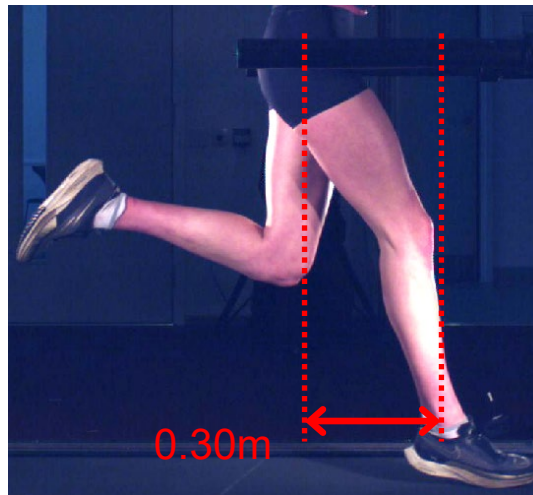
## MID-STANCE

## TOE-OFF

Long-distance



Middle-distance

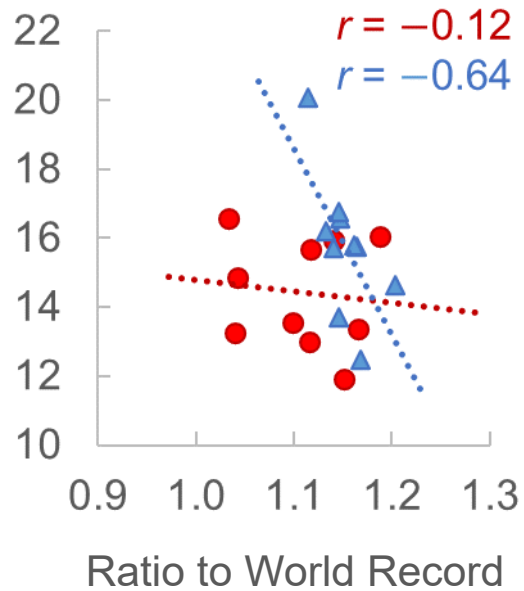




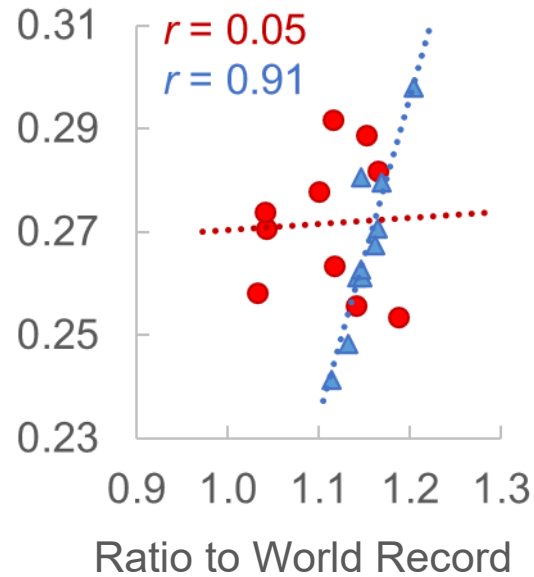
# AT 20 km/h...



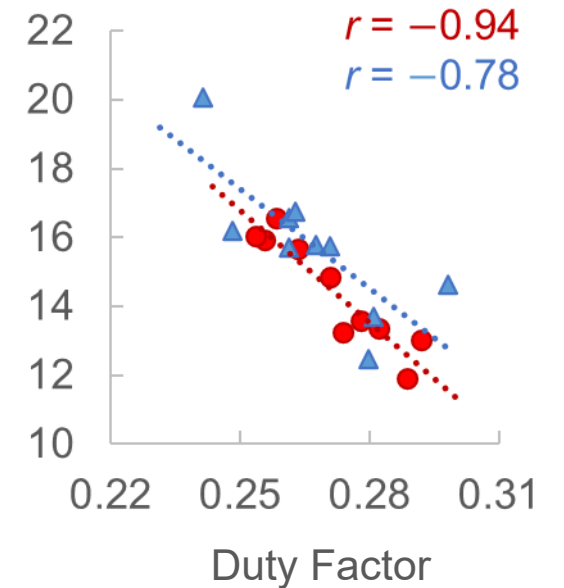
### Leg Stiffness (Normalised)



### Duty Factor



### Leg Stiffness (Normalised)

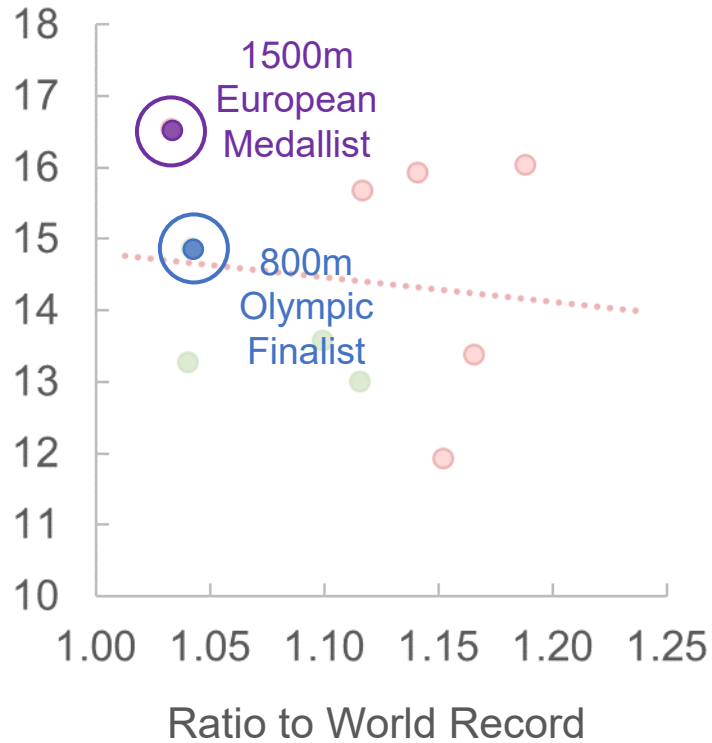


● Middle-distance    ▲ Long-distance

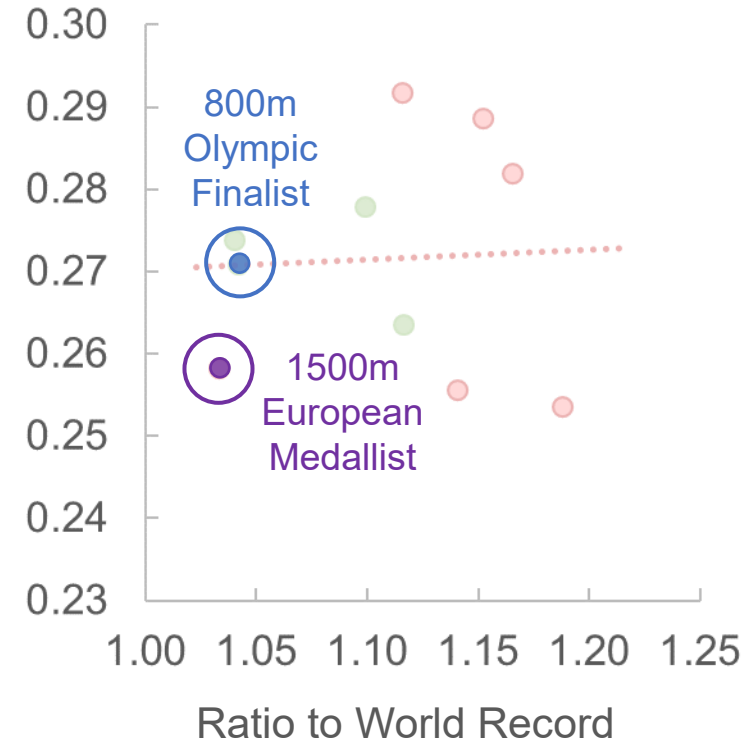


# AT 20 km/h...

## Leg Stiffness (Normalised)



## Duty Factor



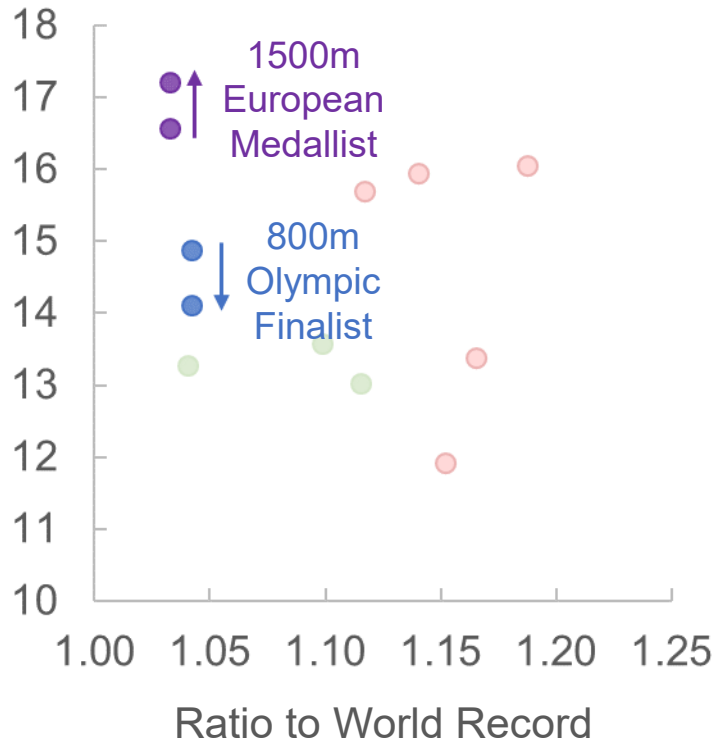
● 800m Specialists

● 1500m Specialists

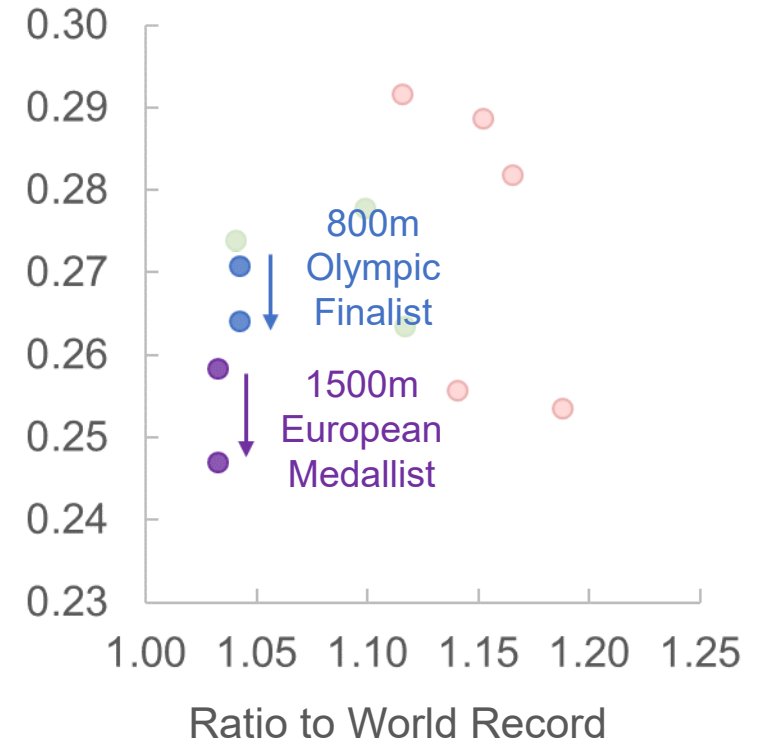


# AT 24 km/h...

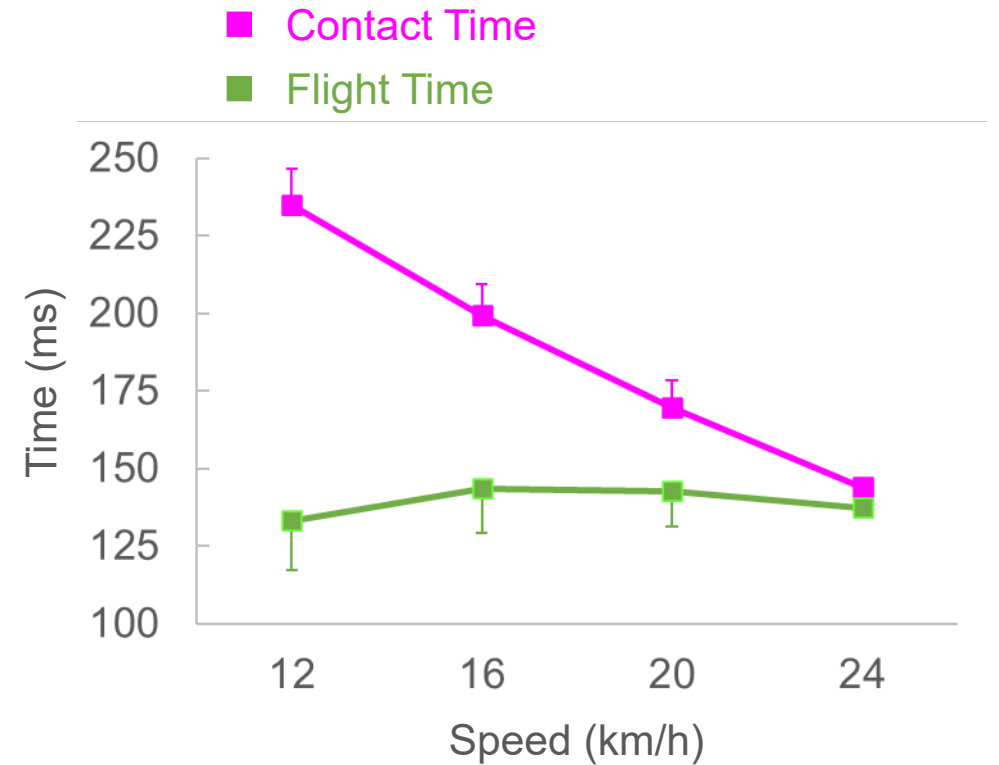
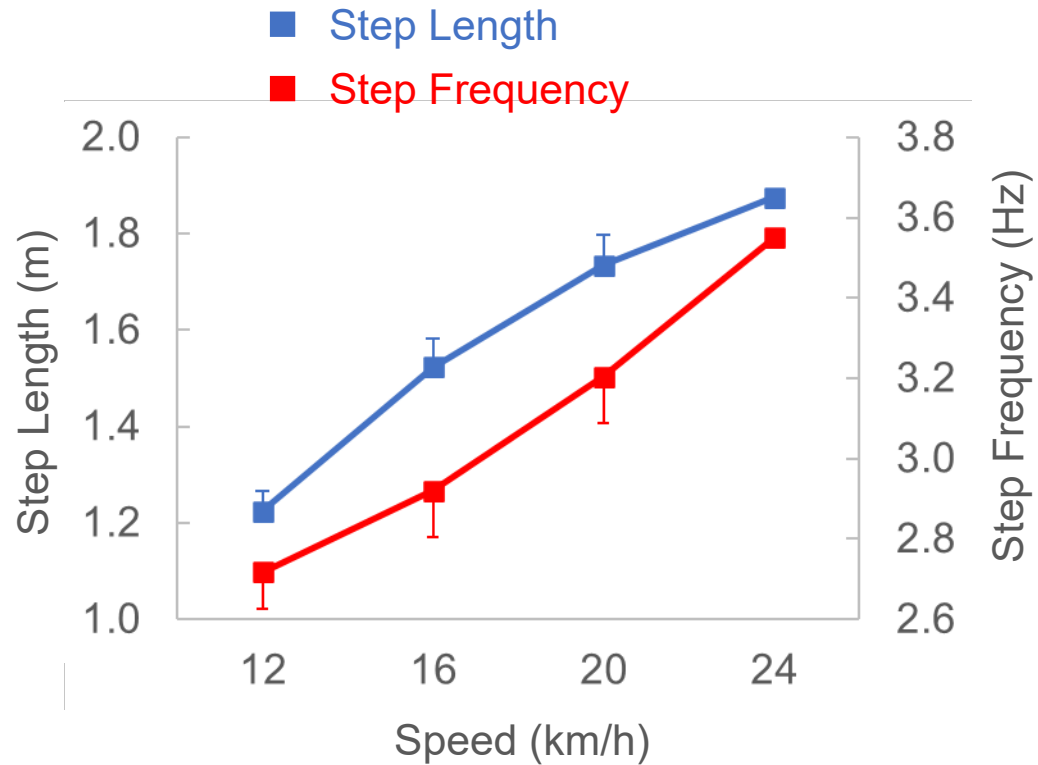
## Leg Stiffness (Normalised)



## Duty Factor

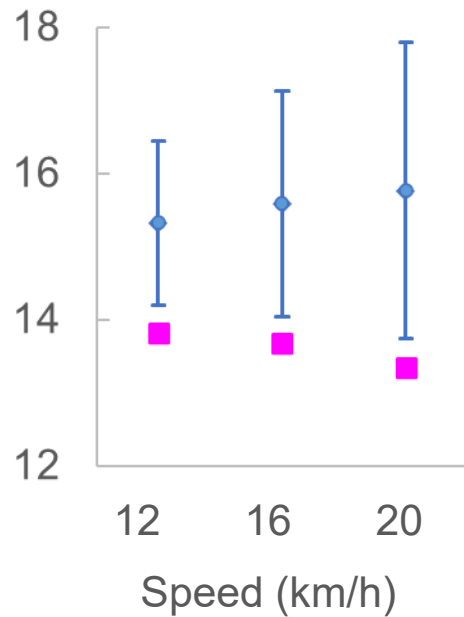


# TO RUN FASTER...

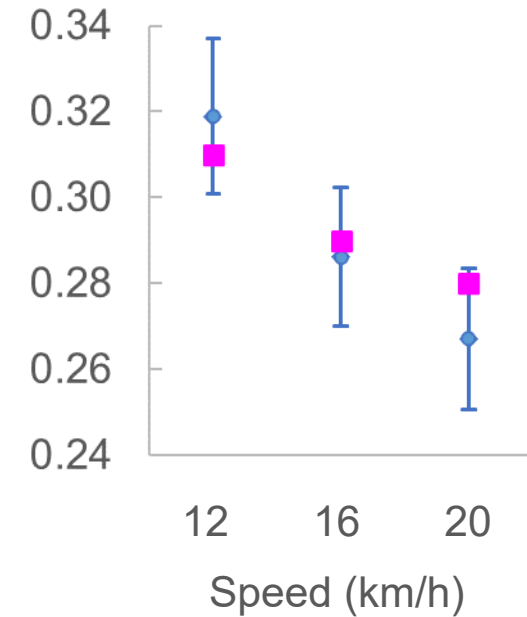


# WORKING WITH TECHNICAL FEEDBACK...

## Leg Stiffness (Normalised)

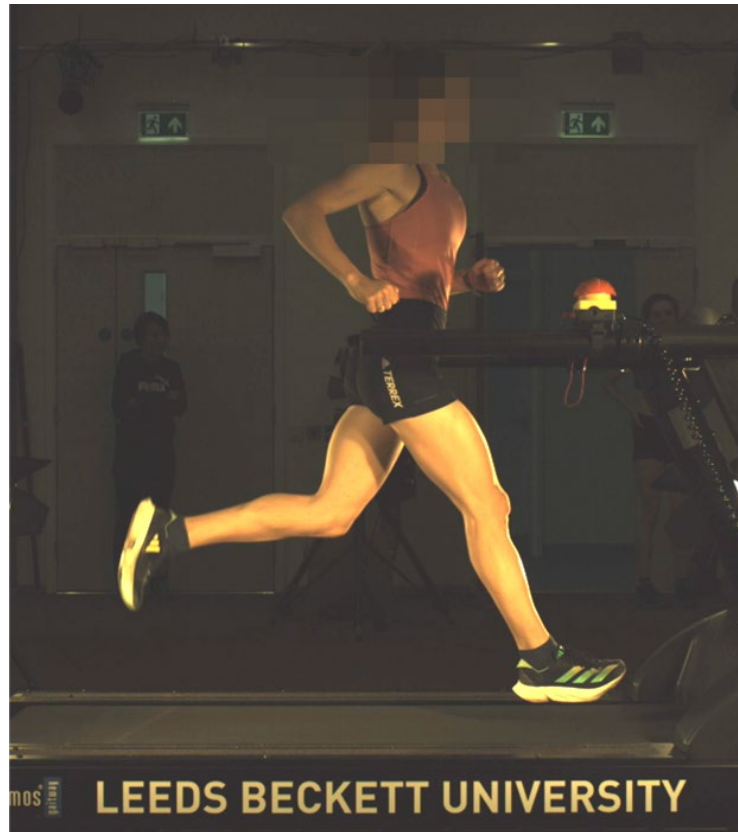
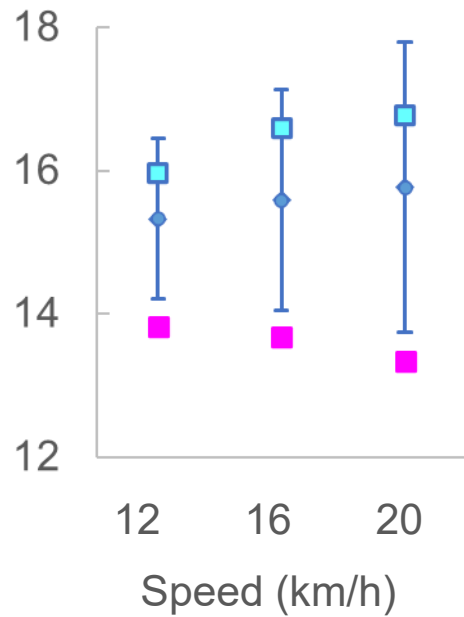


## Duty Factor

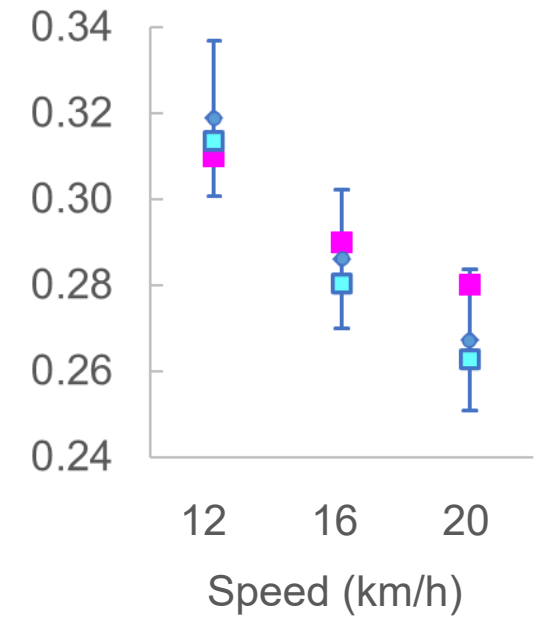


# WORKING WITH TECHNICAL FEEDBACK...

## Leg Stiffness (Normalised)



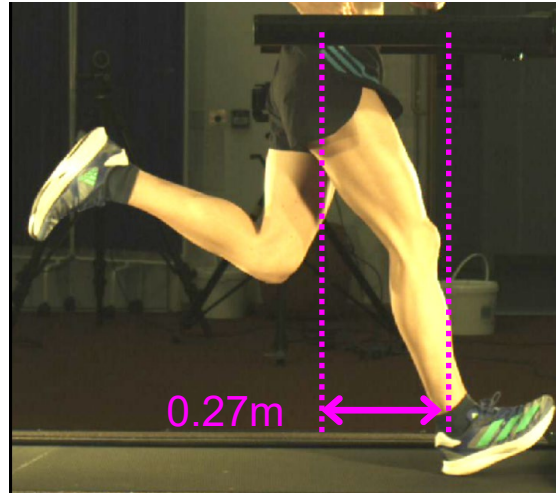
## Duty Factor



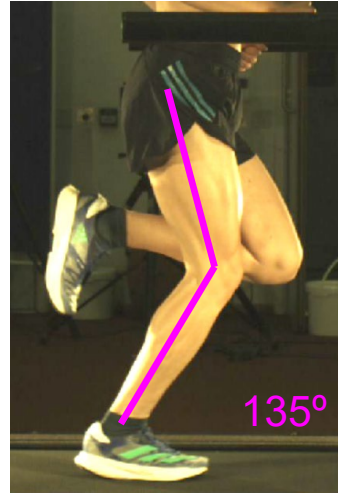


# WORKING WITH TECHNICAL FEEDBACK...

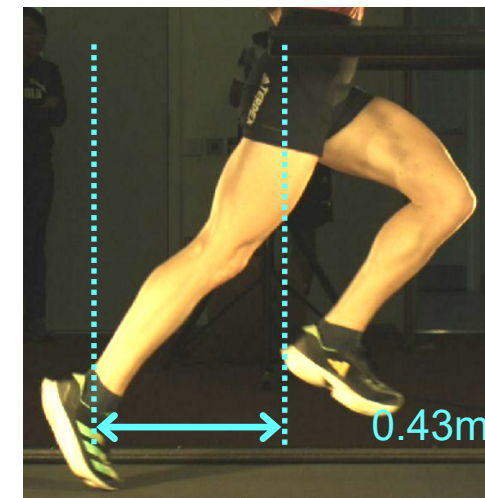
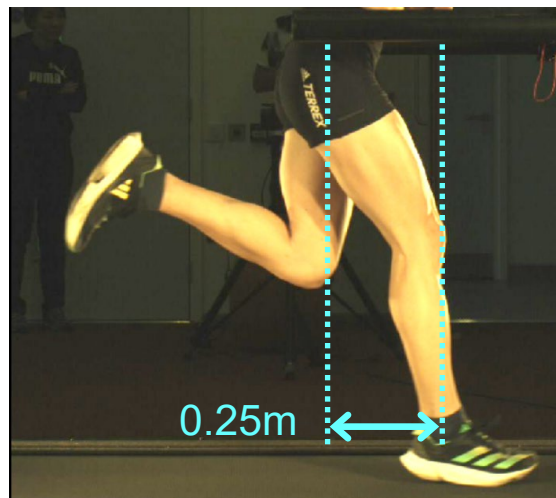
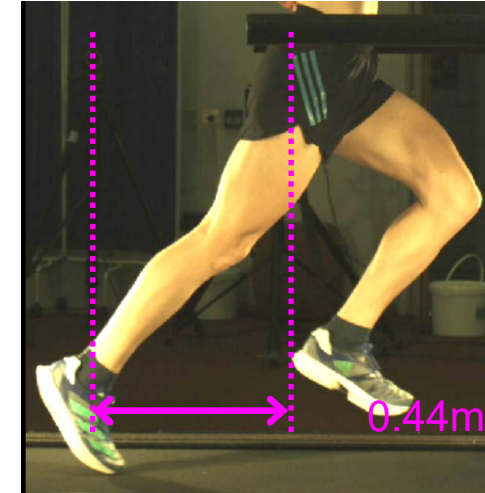
## INITIAL CONTACT

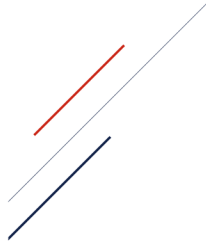


## MID-STANCE



## TOE-OFF





# TIME TO HEAD UPSTAIRS TO THE HUMAN MOVEMENT LAB!

