



# MONITORING, ANALYTICS AND THE ATHLETE: A PRACTICAL APPROACH

REG GRANT, RSCC\*E, CAT(C)

STRENGTH AND CONDITIONING COACH

# DISCLOSURE

- **No conflicts**

The background is a solid blue color. It features several faint, white, circular patterns and arrows. In the top left, there is a small circle with a dashed line and an arrow pointing clockwise. In the top right, there is a large, complex circular pattern with multiple concentric circles, some solid and some dashed, and an arrow pointing clockwise. In the bottom left, there is a small circle with a dashed line and an arrow pointing clockwise. In the bottom right, there is a small circle with a dashed line and an arrow pointing clockwise.

# 20 YEARS

INTO  
20 MIN

The background is a solid blue color. It features several abstract geometric elements: a large circle with a dashed line and an arrow pointing clockwise in the top left; a large circle with a dashed line and an arrow pointing counter-clockwise in the bottom left; a large circle with a dashed line and an arrow pointing clockwise in the bottom right; and a large circle with a dashed line and an arrow pointing counter-clockwise in the top right. The text "THANK YOU" is centered in the middle of the image.

THANK YOU

The background is a solid blue color. It features several abstract geometric elements: a large, faint, light-blue circular scale with degree markings (0, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the upper right quadrant; a smaller, faint, light-blue circular scale with degree markings (0, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the lower right quadrant; and a small, faint, light-blue circular scale with degree markings (0, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the upper left quadrant. The word "PEOPLE" is centered in the middle of the image.

PEOPLE


The background is a solid blue color. It features several abstract geometric elements: a large, faint, light-blue circular scale with degree markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the upper right quadrant; a smaller, faint, light-blue circular scale with degree markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the lower right quadrant; and a small, faint, light-blue circular scale with degree markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the upper left quadrant. The word "CULTURE" is centered in the middle of the image.

CULTURE

The background is a solid blue color. It features several faint, light-blue geometric patterns. In the top-left corner, there is a small circle with a dashed line and an arrow pointing clockwise. In the top-right corner, there is a large, complex circular diagram with multiple concentric circles, radial lines, and numerical labels (100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) around the perimeter. In the bottom-left corner, there is a partial view of a circle with a dashed line and an arrow pointing clockwise. In the bottom-right corner, there is a circular diagram with concentric circles and a dashed line with an arrow pointing clockwise.

DO YOU THINK ABOUT OTHERS

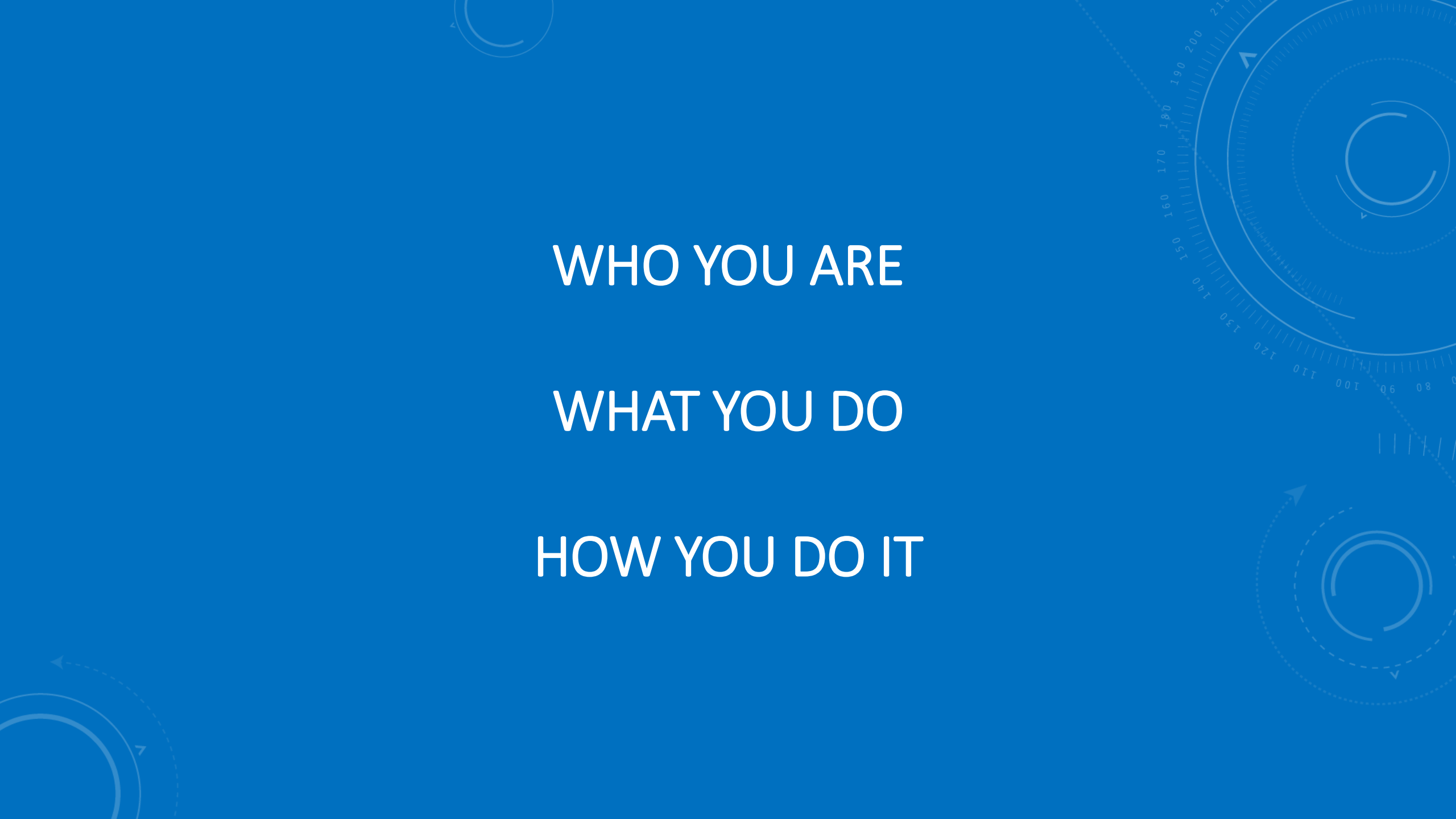
DO YOU THINK ABOUT YOURSELF

The background is a solid blue color. Overlaid on this are several faint, light blue circular patterns. Some are solid circles, while others are dashed. There are also some curved lines and small numbers (like 150, 160, 180, 190, 210, 220, 230, 240, 250, 260) scattered around, suggesting a technical or scientific theme.

*PROGRESS IS IMPOSSIBLE WITHOUT  
CHANGE, AND THOSE WHO CANNOT  
CHANGE THEIR MINDS CANNOT  
CHANGE ANYTHING*

GEORGE BERNARD SHAW

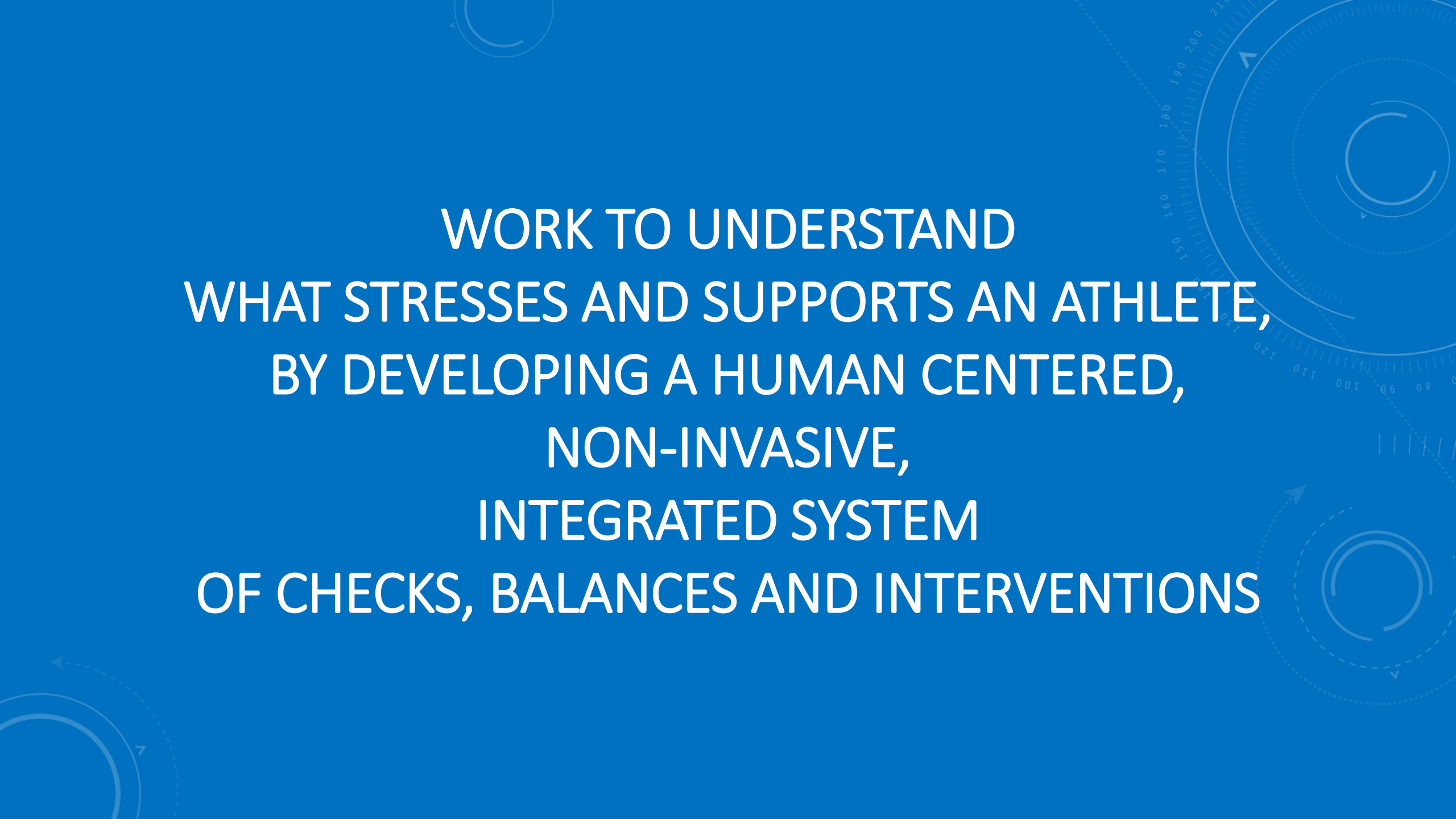


The background is a solid blue color. It features several decorative elements: a large circular arc with tick marks and numbers (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) in the top right; a smaller circular arc with tick marks and numbers (10, 20, 30, 40, 50, 60, 70, 80, 90) in the bottom right; and a dashed circular arc with an arrow in the bottom left. The text is centered and consists of three lines.

WHO YOU ARE

WHAT YOU DO

HOW YOU DO IT



WORK TO UNDERSTAND  
WHAT STRESSES AND SUPPORTS AN ATHLETE,  
BY DEVELOPING A HUMAN CENTERED,  
NON-INVASIVE,  
INTEGRATED SYSTEM  
OF CHECKS, BALANCES AND INTERVENTIONS

The background is a solid blue color. It features several abstract geometric elements: a large, faint, light-blue circular scale with numerical markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the upper right quadrant; a smaller, faint, light-blue circular scale with numerical markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the lower right quadrant; and a faint, light-blue circular scale with numerical markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the lower left quadrant. The text is centered and reads:

# ATHLETE APPLICATION OPPORTUNITIES



WE ALL WANT TO MAKE BIG CHANGE

WHO'S LIFE WILL YOU CHANGE









# CONNECTED NETWORK



# APPLICATION

The background is a solid blue color. It features several abstract geometric elements: a large, faint, light-blue circular scale with degree markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the upper right quadrant; a smaller, faint, light-blue circular scale with degree markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the lower right quadrant; and a small, faint, light-blue circular scale with degree markings (90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210) and arrows, located in the upper left quadrant. There are also several dashed lines and arrows forming circular paths around these scales.













# WHERE DO WE START

UNDERSTAND OUR ATHLETES AND THEIR NEEDS



HIGH INTENSITY

EXPLOSIVE  
MOVEMENT









GIVE





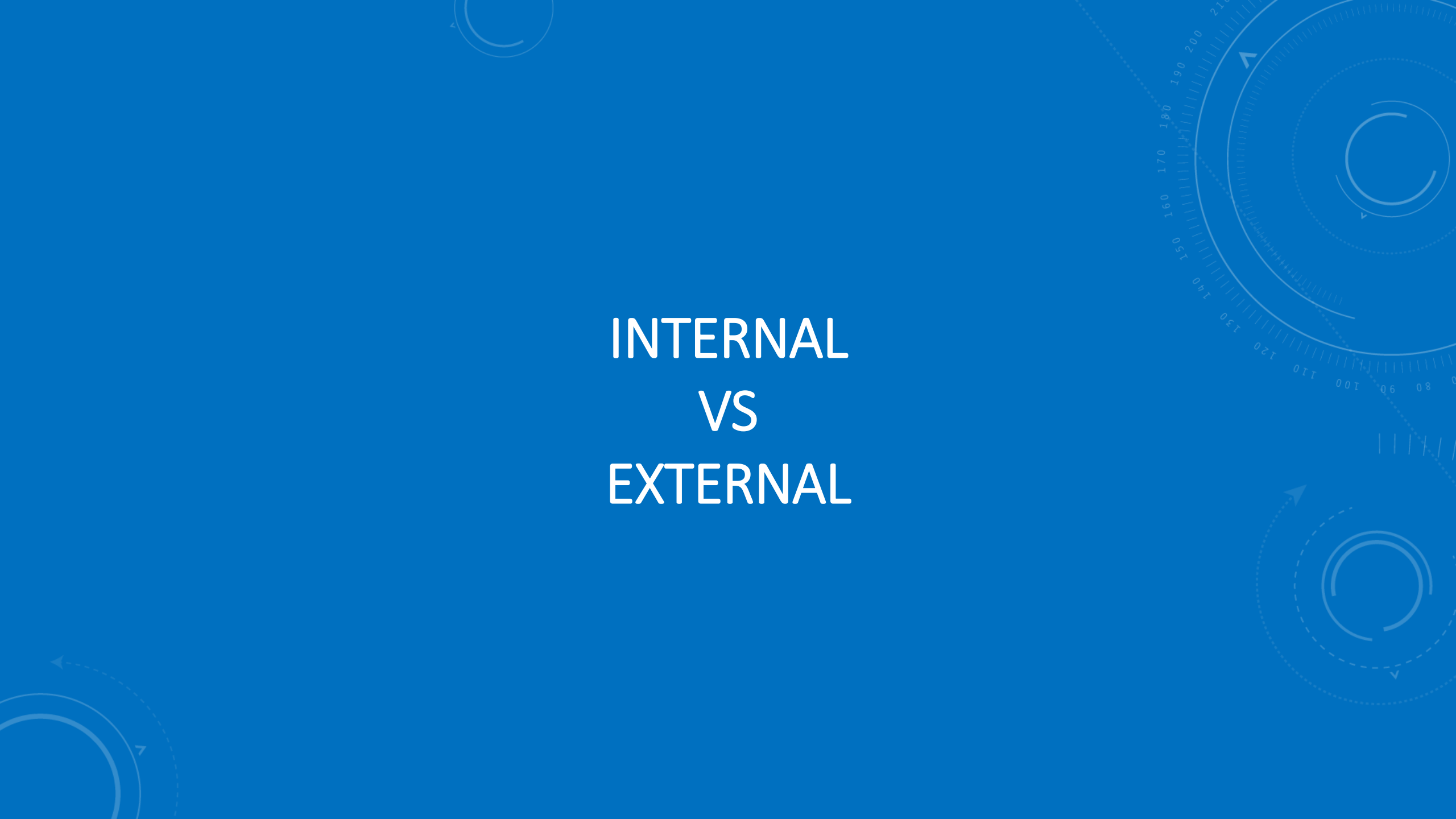
RECEIVE







# INTERNAL VS EXTERNAL

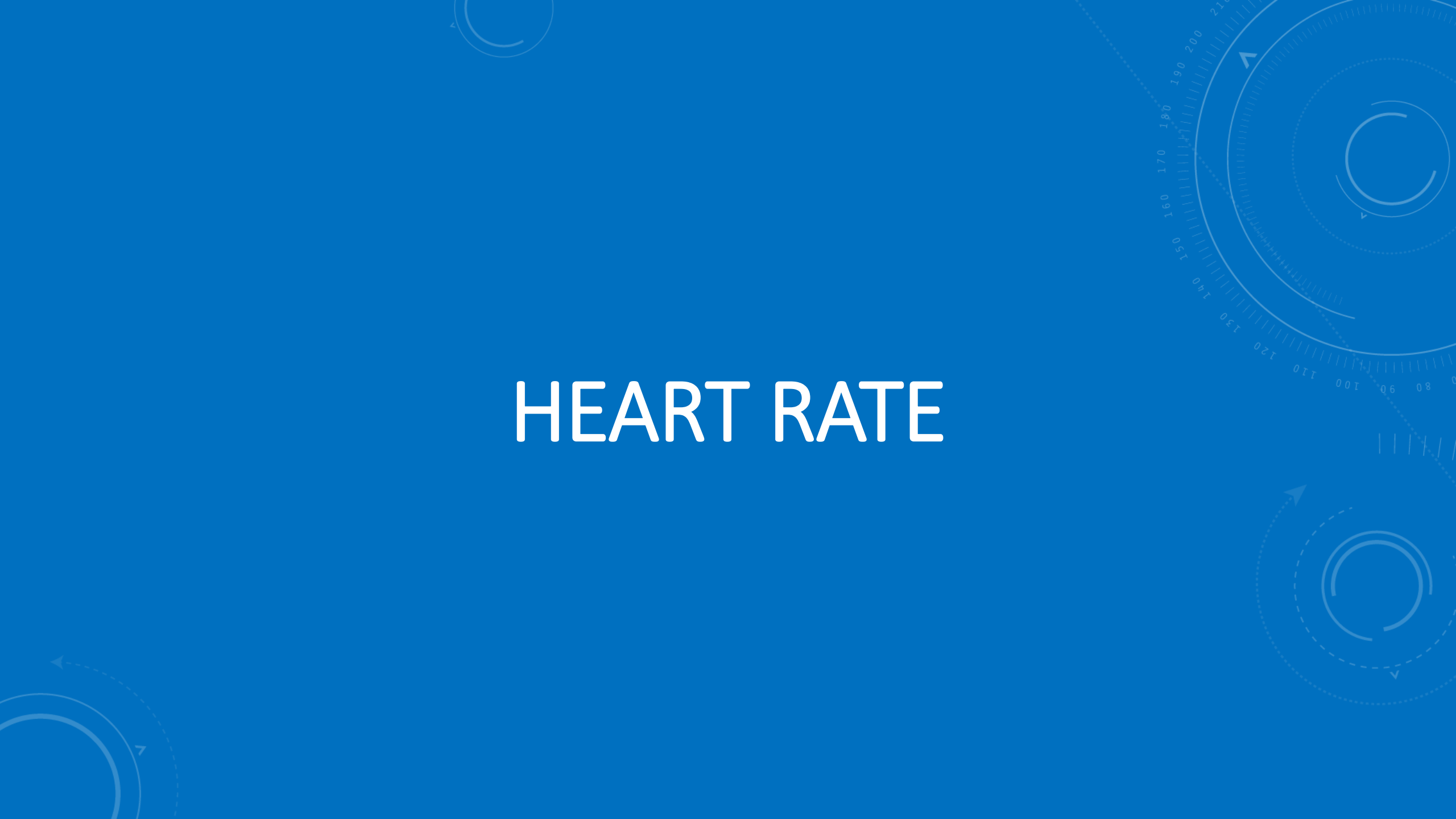


The background is a solid blue color with faint, light blue circular patterns and numbers. The numbers are arranged in a circular fashion, with some numbers like 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, and 260 visible. There are also dashed lines and arrows indicating a circular flow or rotation.

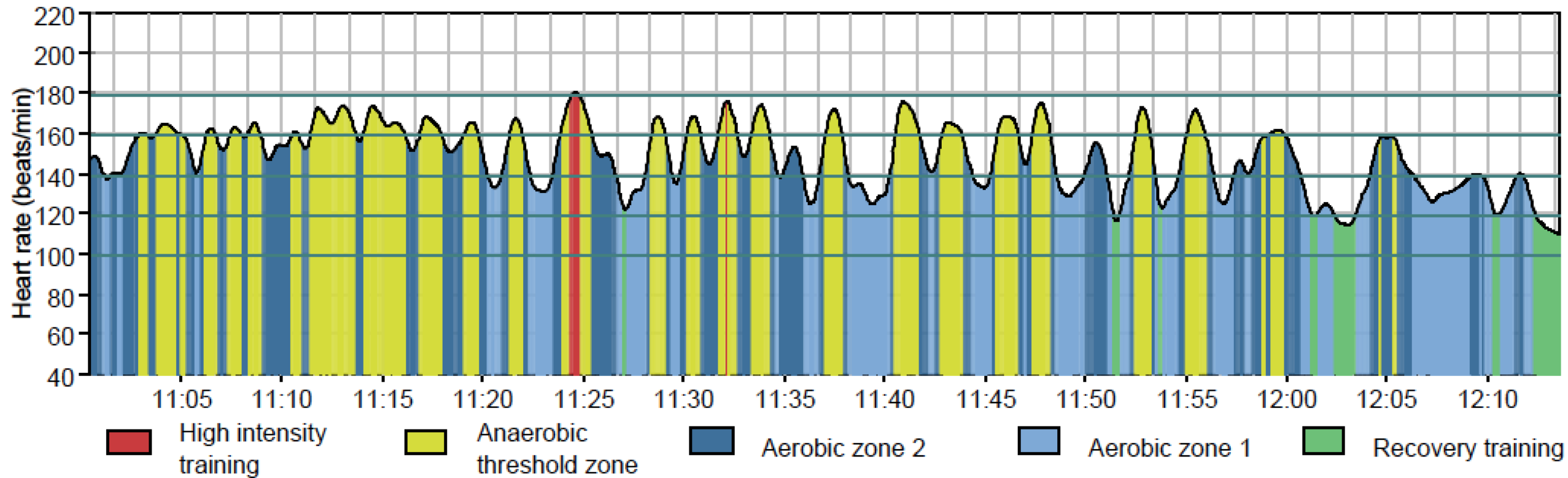
*NOT EVERYTHING THAT CAN BE  
COUNTED COUNTS,  
NOT EVERYTHING THAT COUNTS CAN  
BE COUNTED.*

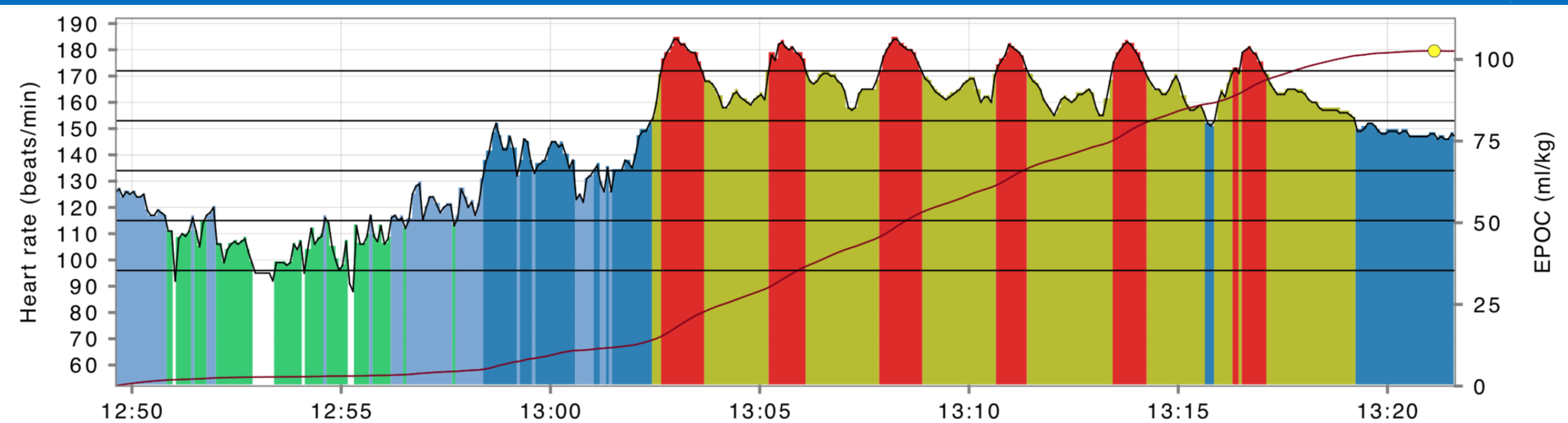
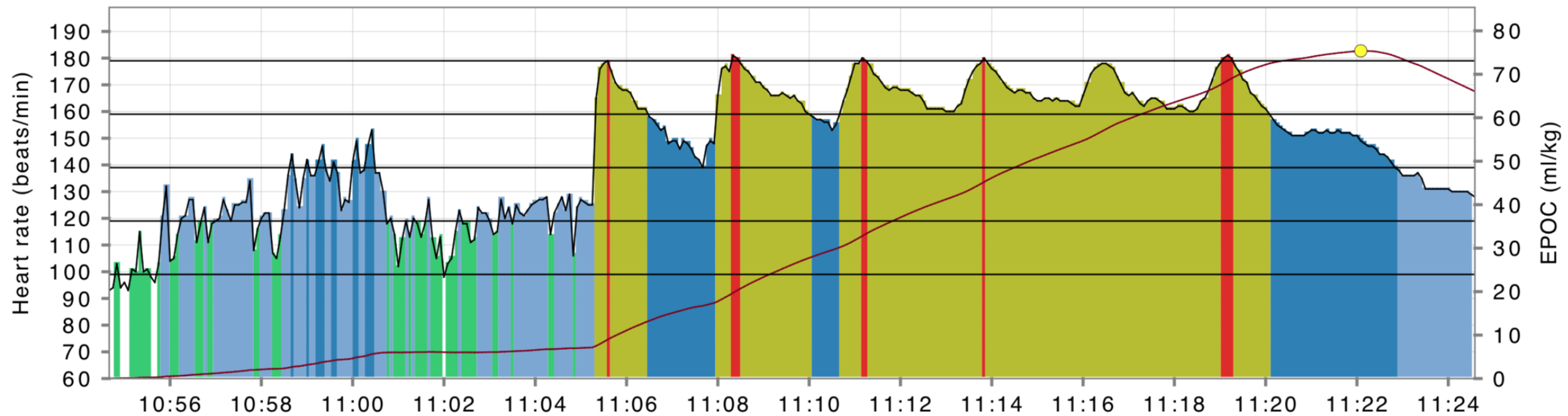
ALBERT EINSTEIN

# HEART RATE

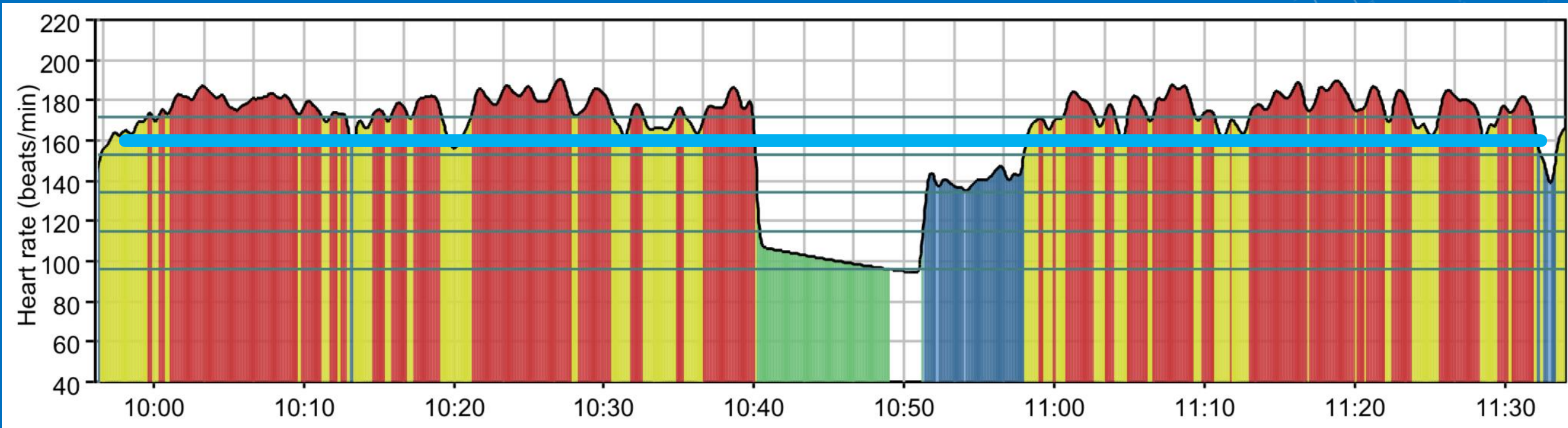


# CLEAN DATA



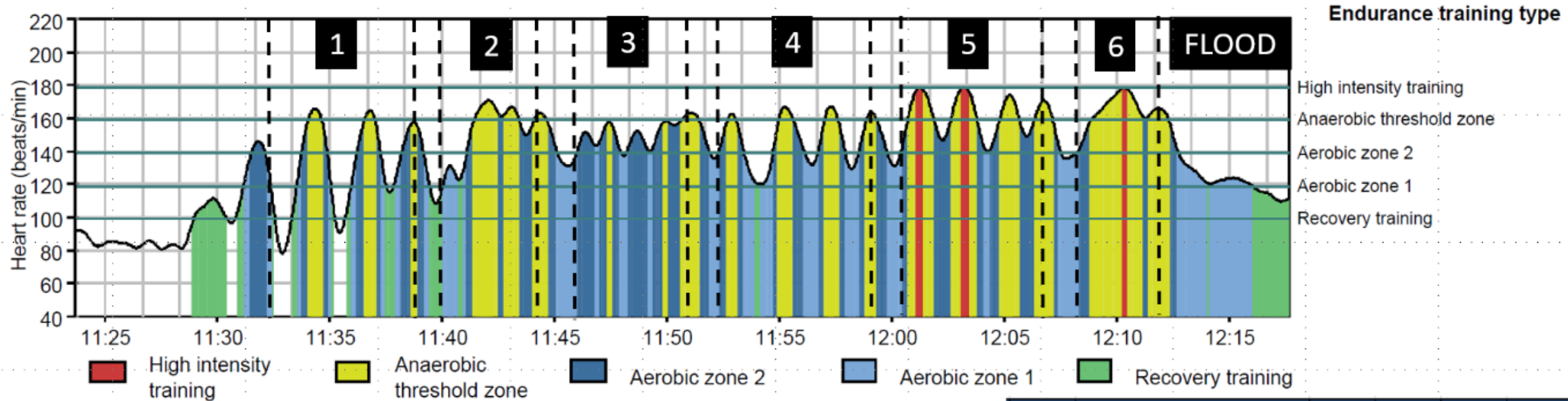


# HOW HARD DO YOU WORK?

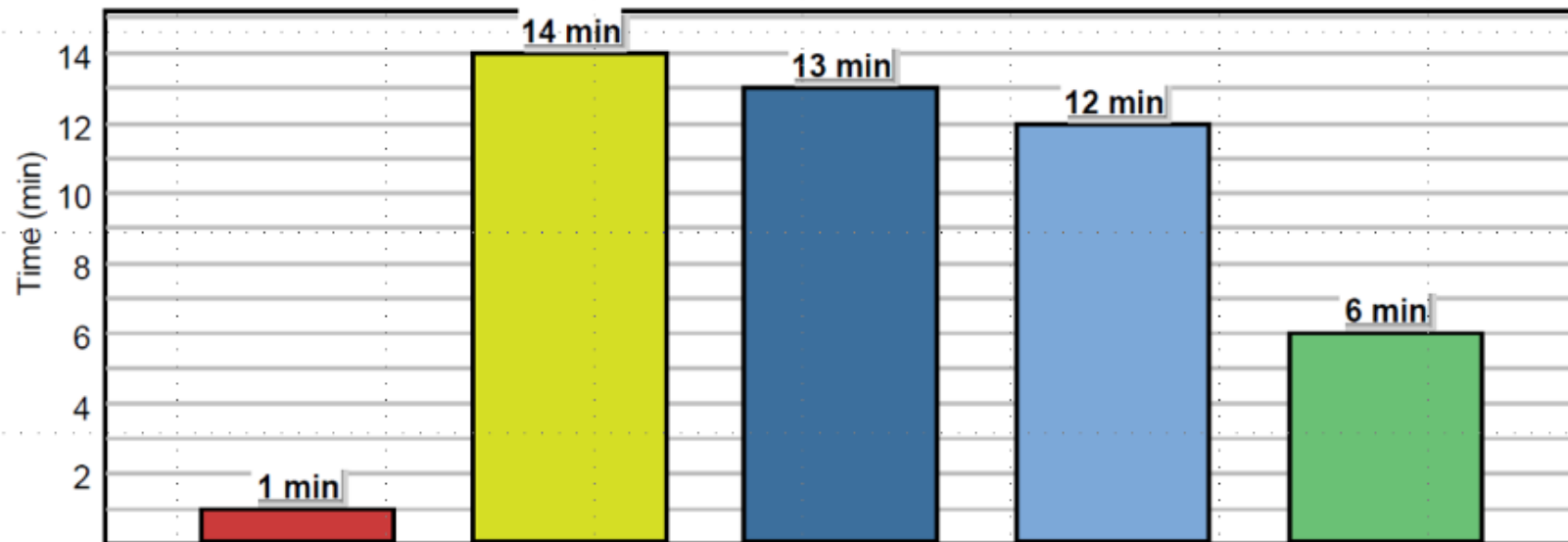




# UNDERSTANDING DRILLS

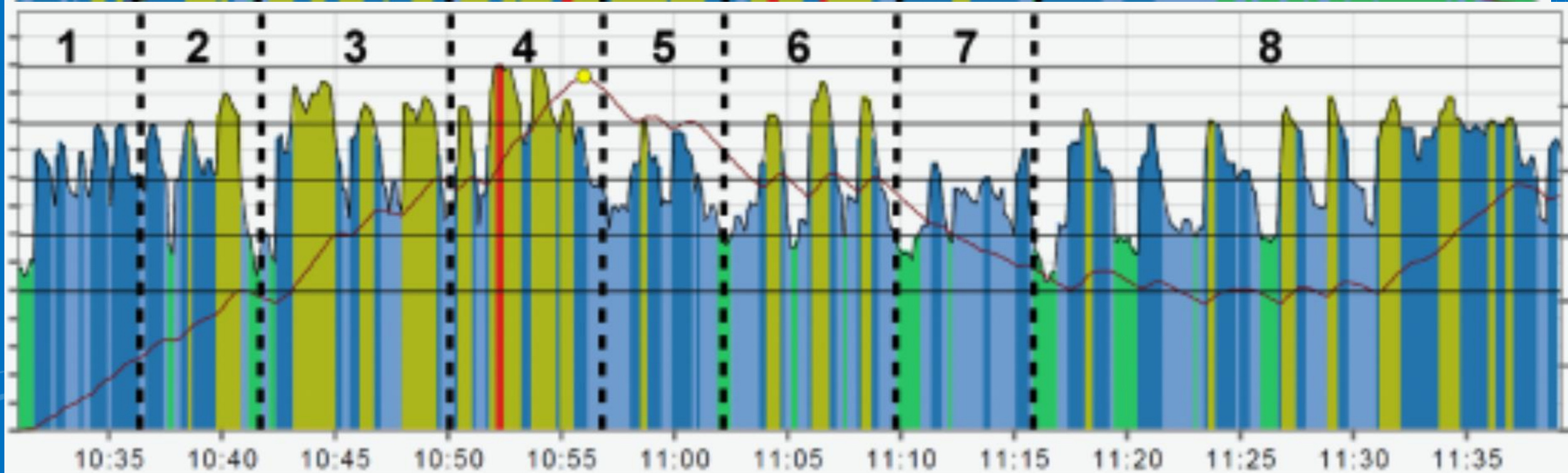
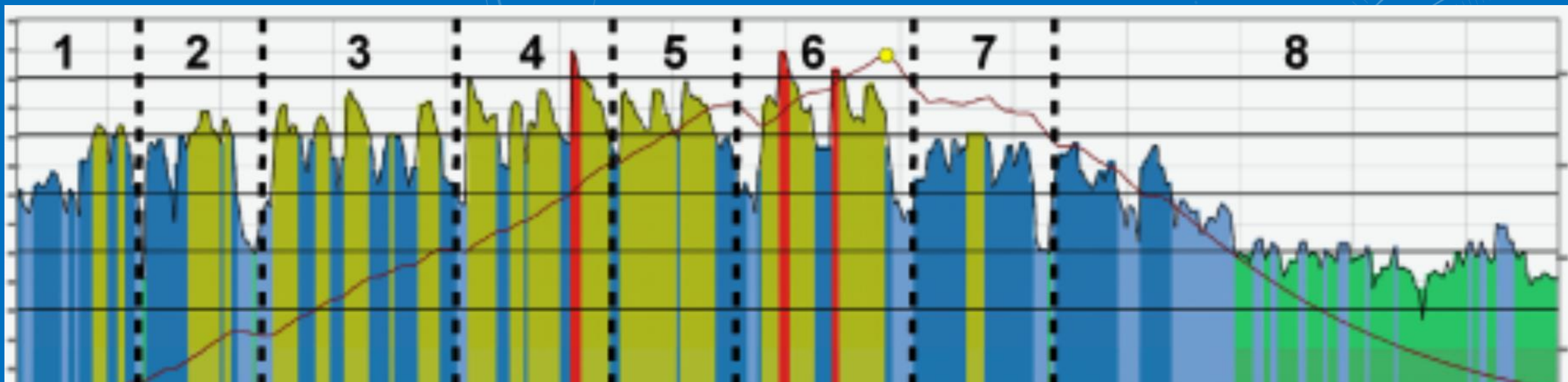


Classification of the measurement to different endurance



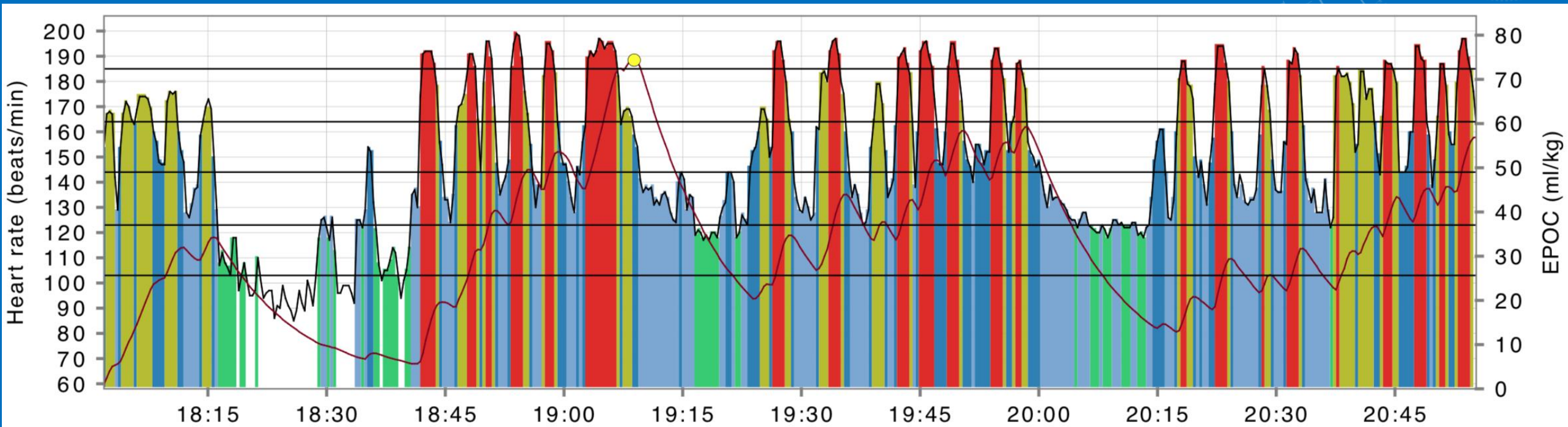
Drill #	Drill Name	Drill Start Time	Drill End Time	Drill Time	Off Time
1		11:30	11:39	09:45	00:49
2		11:40	11:43	03:18	01:14
3		11:45	11:50	05:36	01:16
4		11:51	11:59	07:47	00:25
5		12:00	12:07	07:14	00:41
6		12:08	12:12	04:14	00:00
7		12:12	12:30	18:00	00:00
8		12:30	12:36	05:56	01:09
9		12:37	12:41	03:46	01:31
10		12:42	12:48	06:10	00:55
		12:49	12:56	06:59	00:00







# GAME



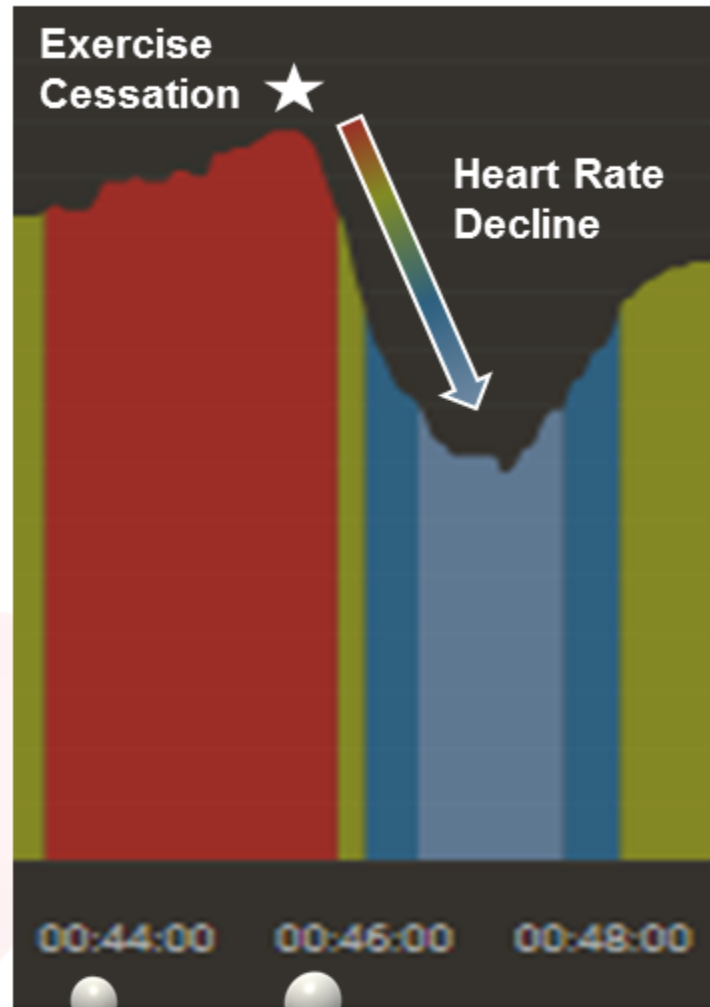
# What You Need to Know About Heart Rate Recovery

## Definition

Heart-rate recovery (HRR) can be defined as the rate at which heart rate declines after the cessation of physical exercise.

## What It Tells Us

Heart-rate recovery (HRR) can be used as an indicator for cardiovascular fitness and the presence of fatigue.



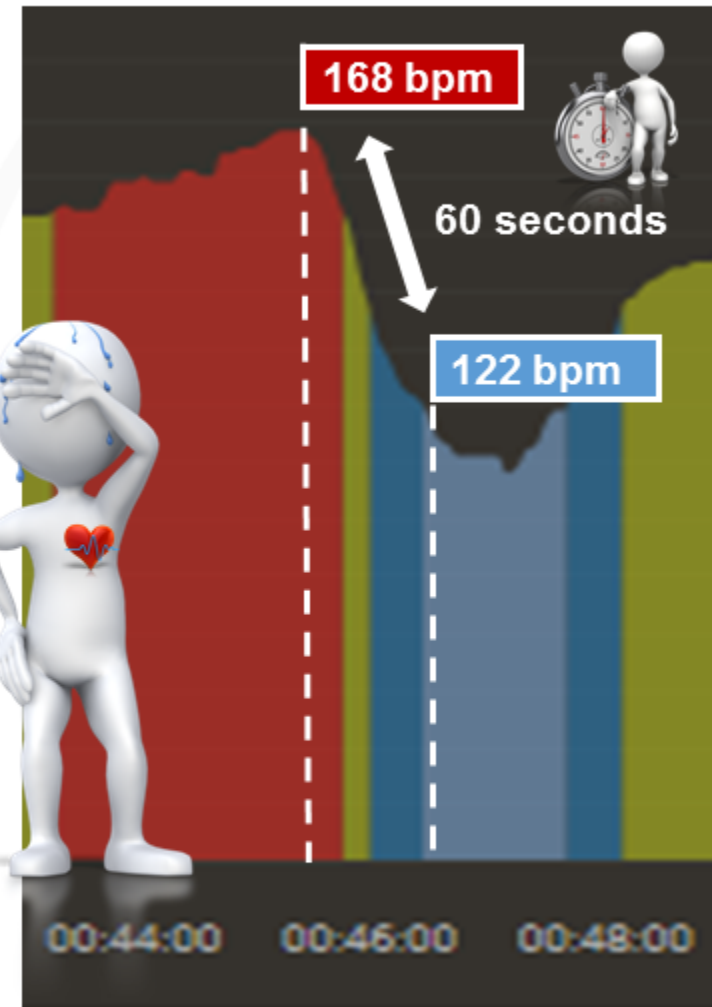
## Calculation & Time Frame

1

Subtract the heart rate (HR) value obtained after the chosen time frame (i.e. 30 or 60 seconds) from the final heart rate value observed during the exercise.

2

Assessment of HRR over short durations, such as 30 and 60 seconds ( $HRR_{30}$  and  $HRR_{60}$ ), are frequently used in the literature and are the most practical, particularly in the elite sport setting.



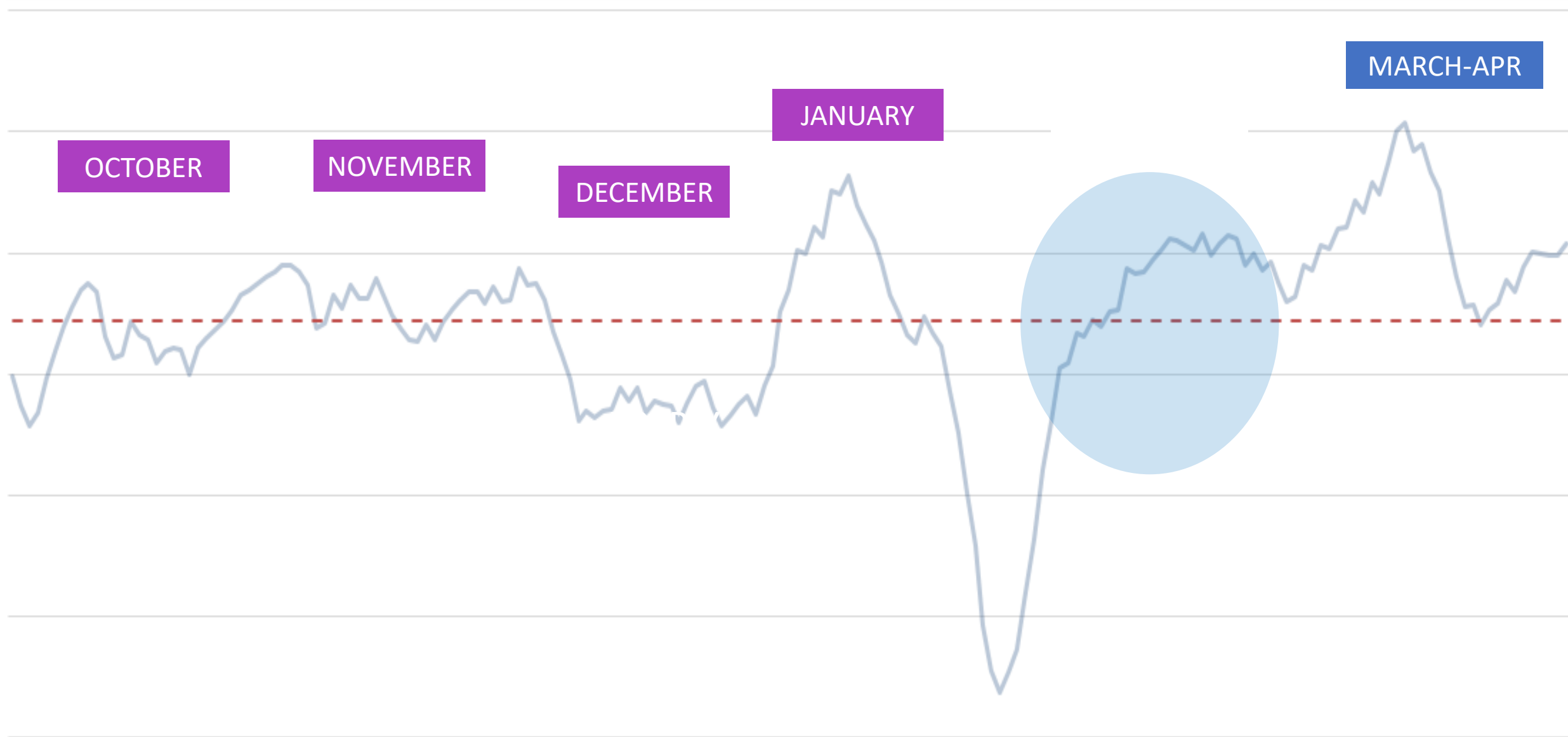
3

$$HRR_{60} = 168 \text{ bpm} - 122 \text{ bpm}$$
$$HRR_{60} = 46 \text{ bpm}$$

STRESS / LOAD

The background is a solid blue color. It features several faint, white, abstract circular patterns. In the top right corner, there is a large, semi-circular gauge or dial with numerical markings from 80 to 210. In the bottom right corner, there is a smaller circular pattern with concentric circles and arrows. In the bottom left corner, there is another circular pattern with concentric circles and arrows. The text "STRESS / LOAD" is centered in the middle of the image in a white, sans-serif font.





# A Deeper Look at In-game Actions of NHL Players

## Difference Between Heart Rate Response And Player Movement During An Elite Ice Hockey Shift

### TYPICAL SHIFT VIA HEART RATE



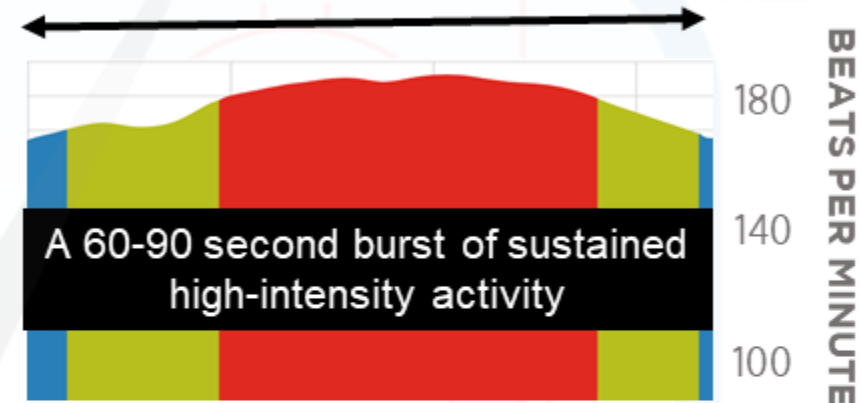
Heart rate response and movement demands of elite ice hockey competition differ. A combination of both may be important for training monitoring in ice hockey athletes.

### TYPICAL SHIFT VIA SPEED

4-10 High-intensity Bursts (>17 km/h) ✓  
15-26 meters covered per burst  
1.5-3.0 seconds in duration per burst

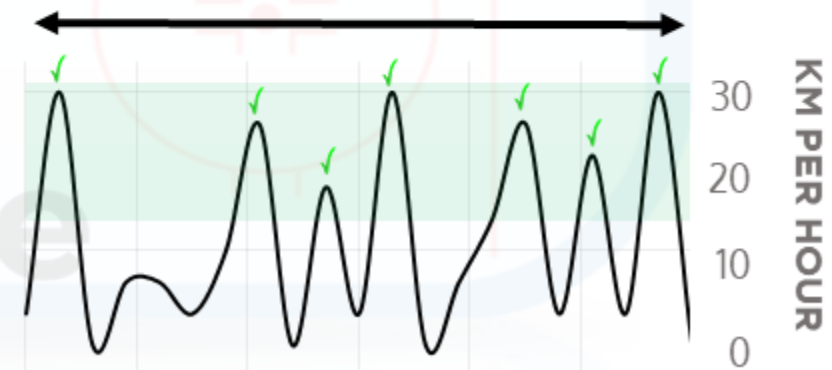
### HEART RATE

~60 seconds



### SPEED

~60 seconds



en



Volkswagen



Volkswagen



Volkswagen



Volkswagen



Volkswagen

# Volkswagen

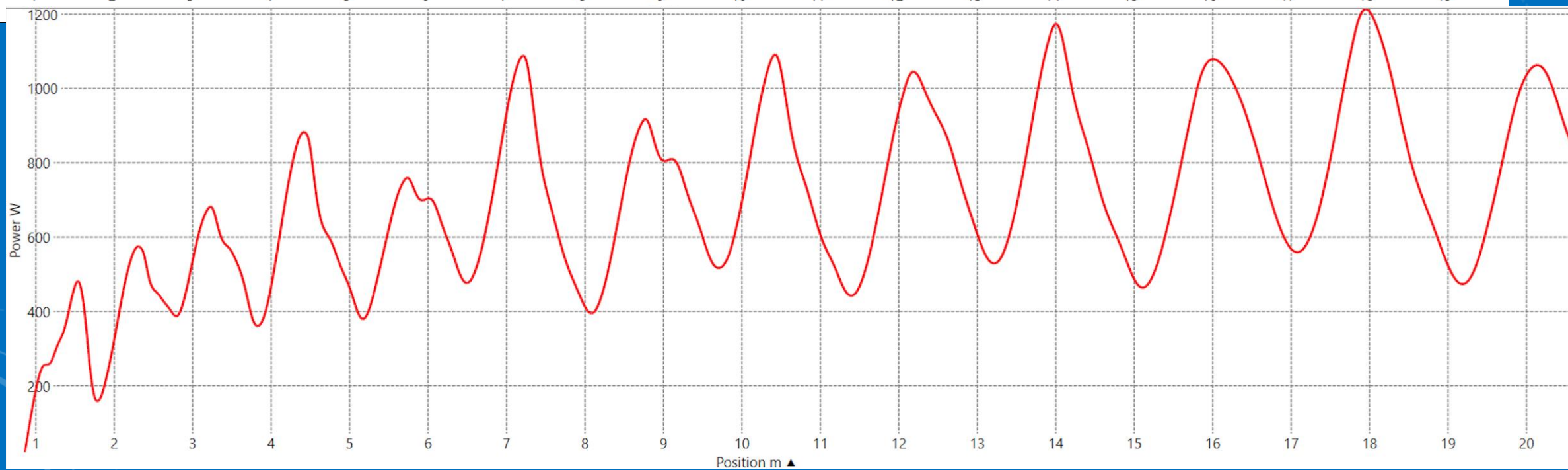
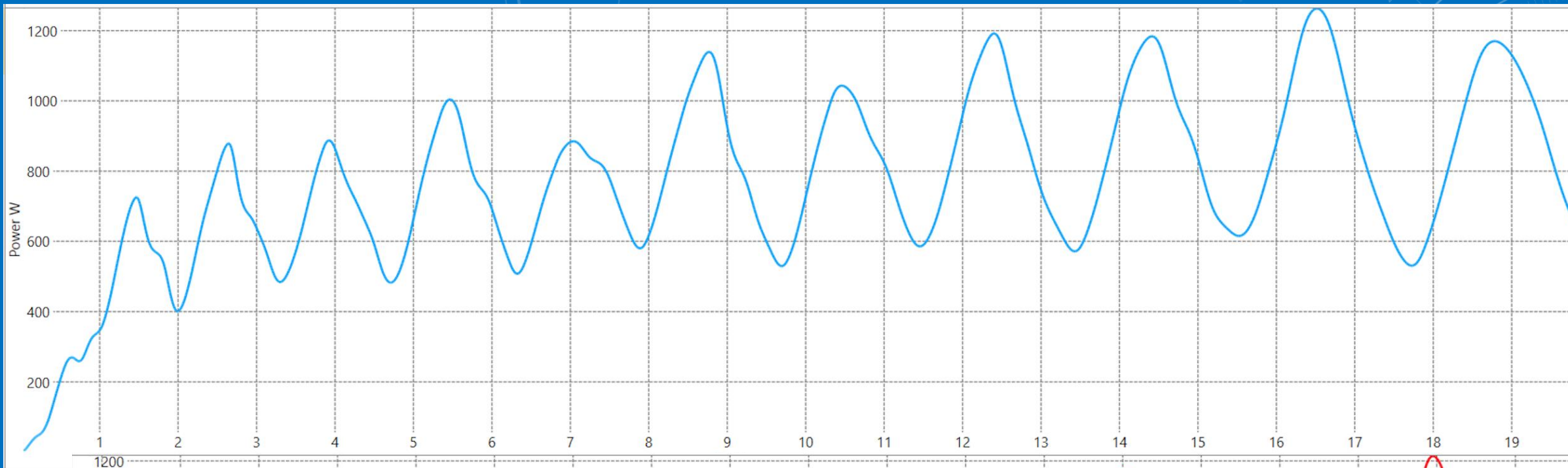
[covestro]

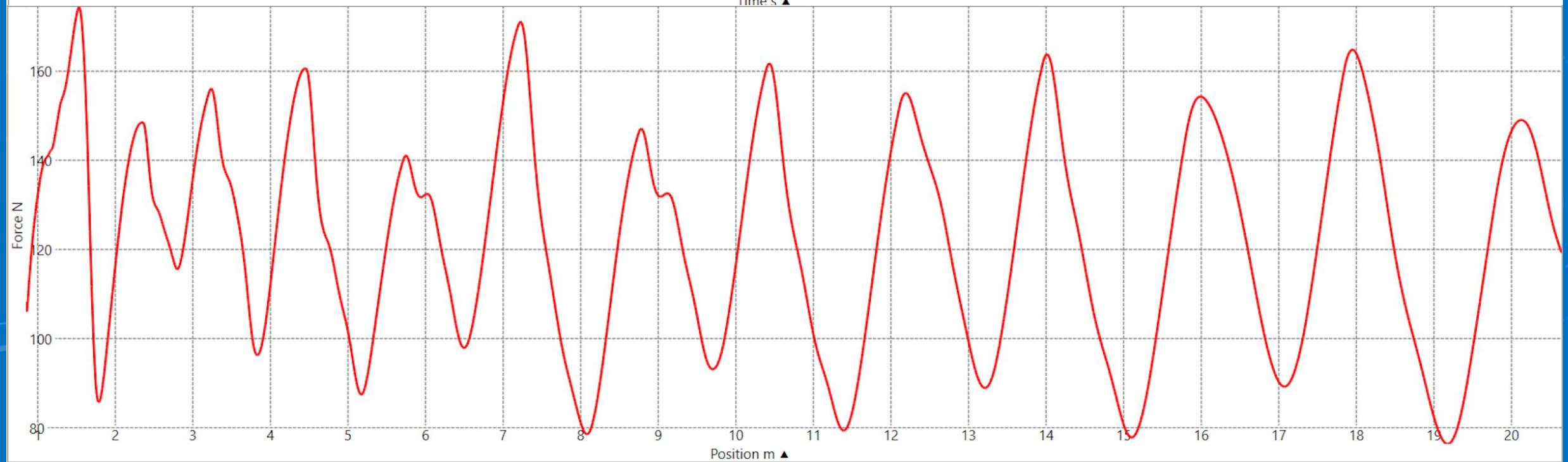
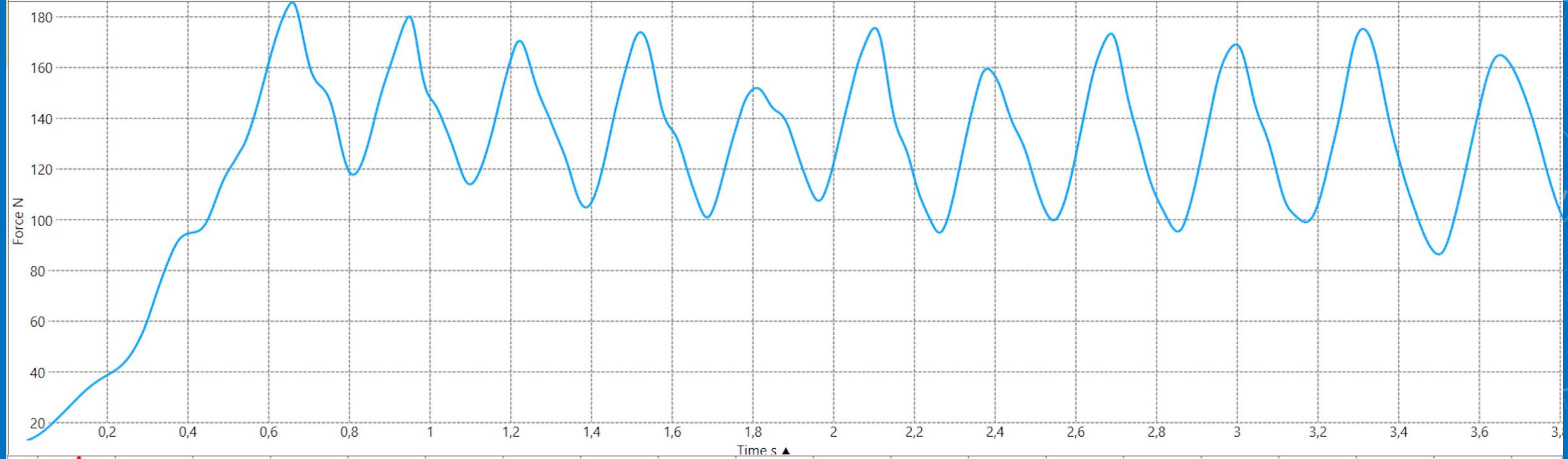
[covestro]

[c





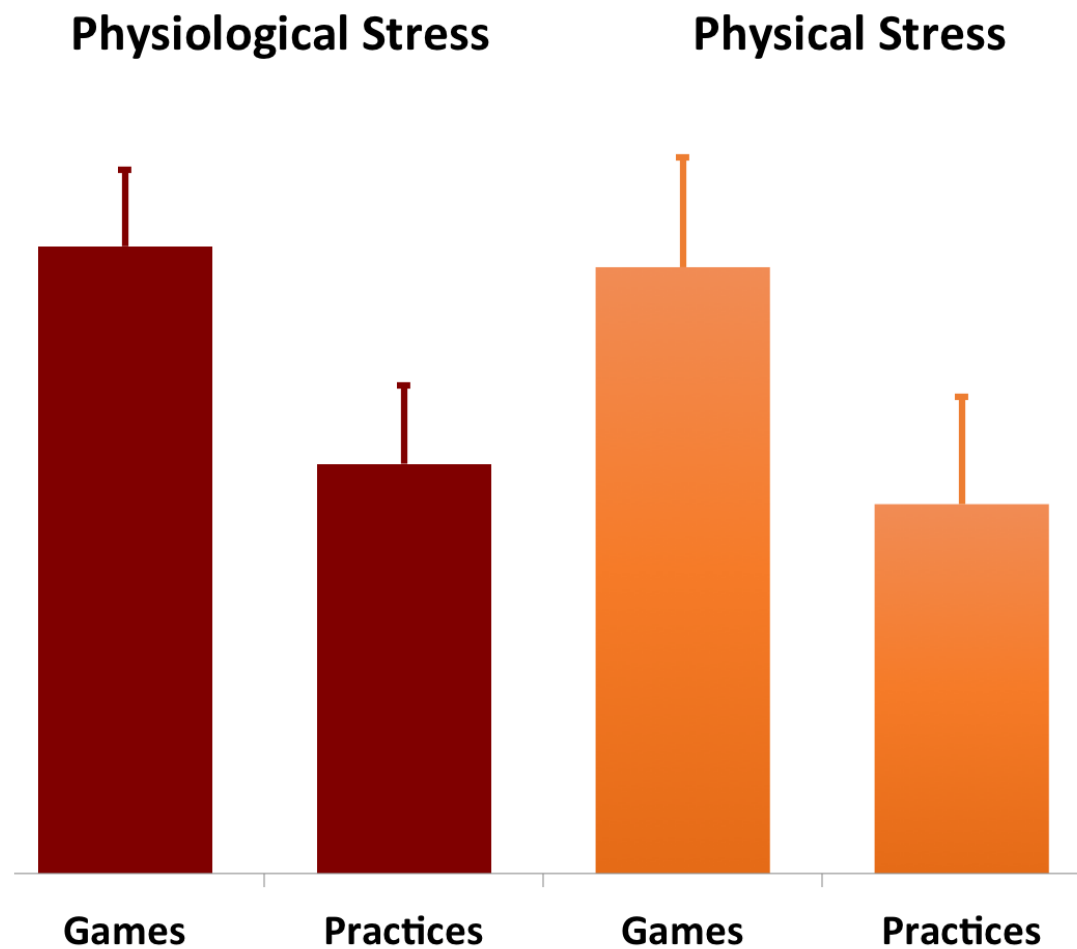




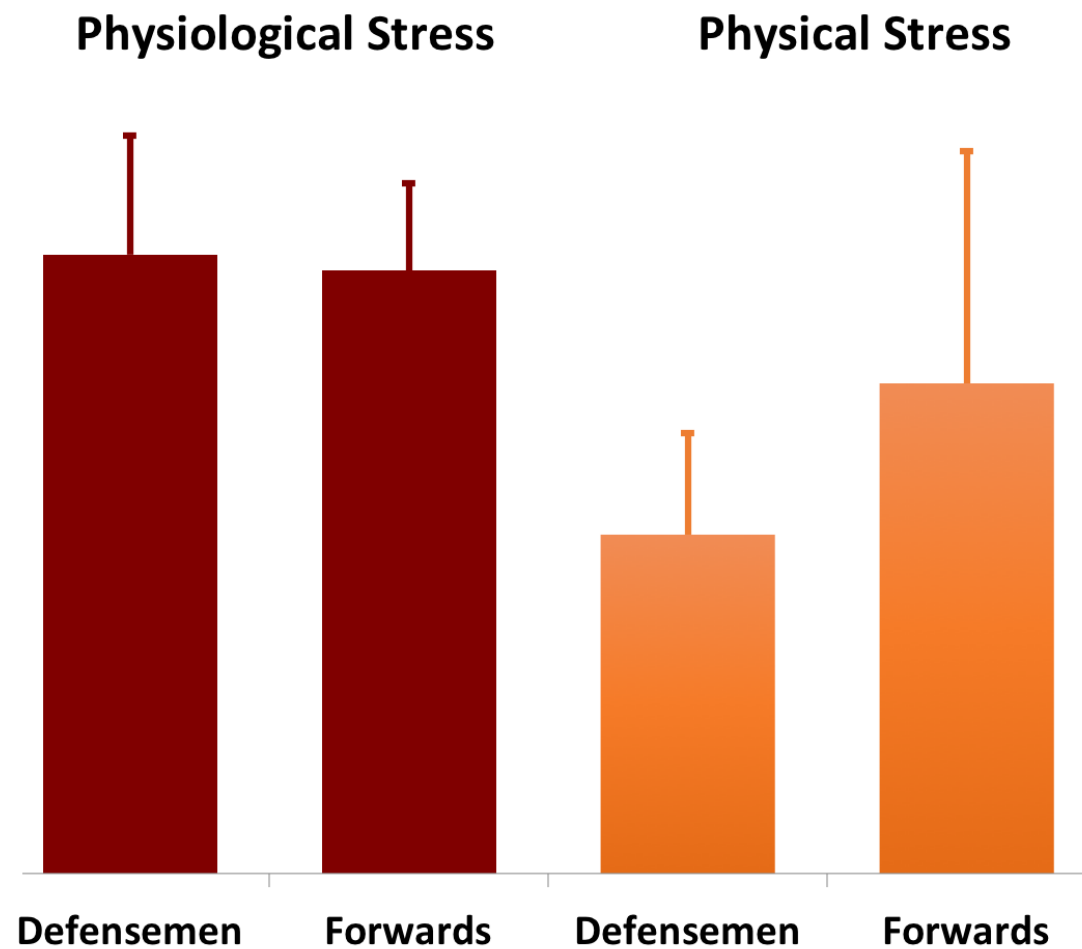
# ACCELEROMETRY



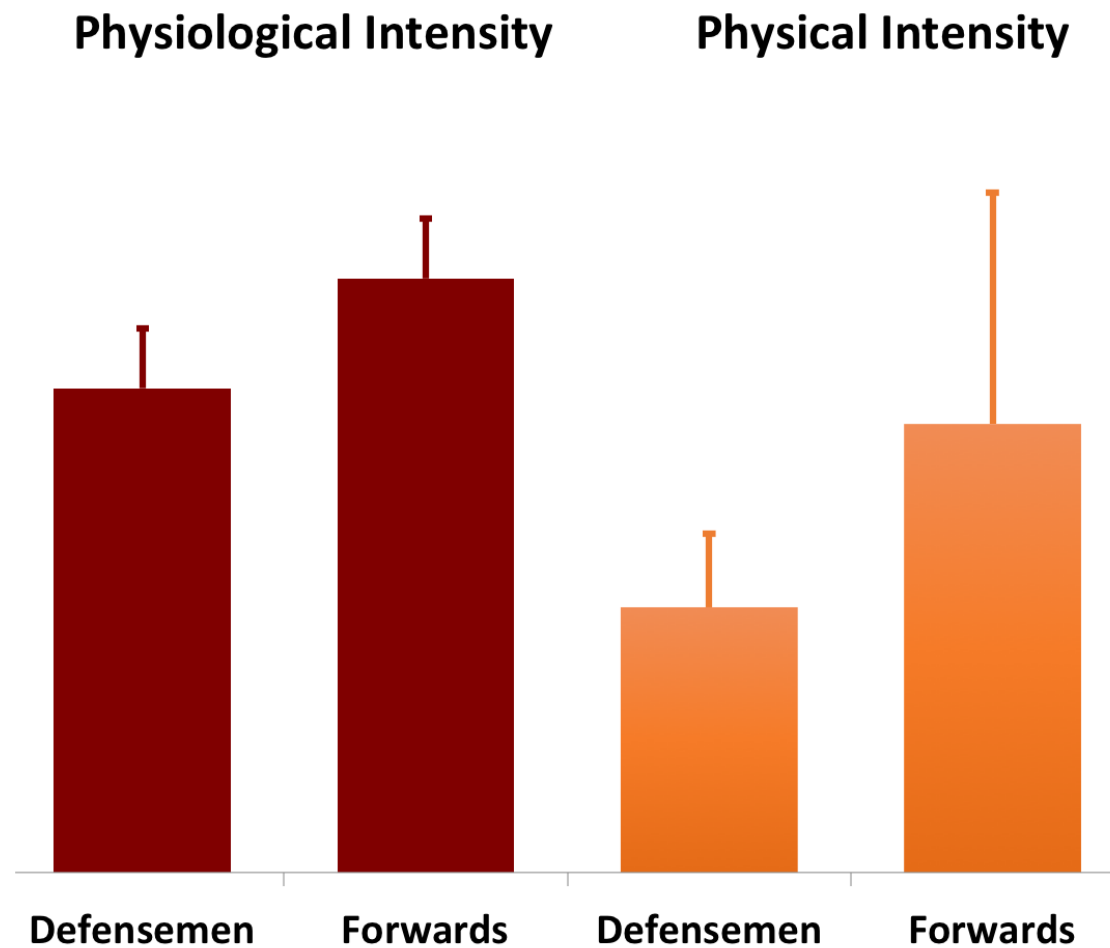
# GAMES VS PRACTICES



# STRESS



# INTENSITY



The background is a solid blue color. It features several faint, light blue geometric patterns. In the top right corner, there is a large, complex circular diagram with multiple concentric circles and radial lines, resembling a technical drawing or a clock face. In the bottom left corner, there is a smaller circular diagram with concentric circles and dashed lines. In the bottom right corner, there is another circular diagram with concentric circles and dashed lines, similar to the one in the bottom left. The word "OPPORTUNITIES" is centered in the middle of the image in a large, white, sans-serif font.

# OPPORTUNITIES



# HEART RATE VARIABILITY

The background is a solid blue color. It features several decorative elements: a large circular scale on the right side with numerical markings from 80 to 210 and concentric circles; a smaller circular scale in the top left corner; and a dashed circular arrow in the bottom left corner.

# Heart Rate Variability (HRV) In Sport: What It Is And How It Works

## What Heart Rate Variability (HRV) Measures

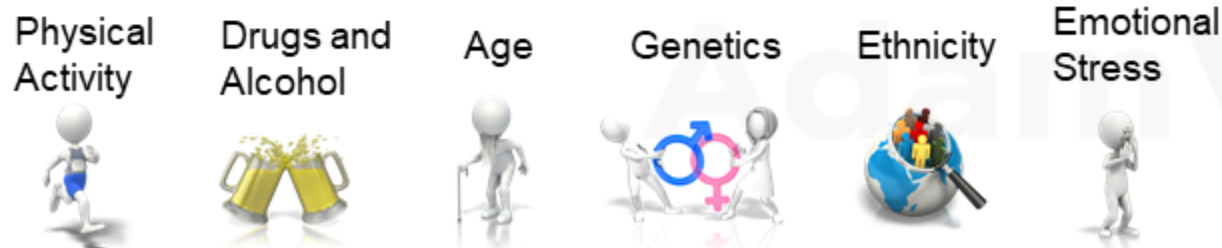
Heart Rate Variability (HRV) is the measure of **variance in time intervals between successive heartbeats** (i.e. cardiac cycles; R-R intervals)



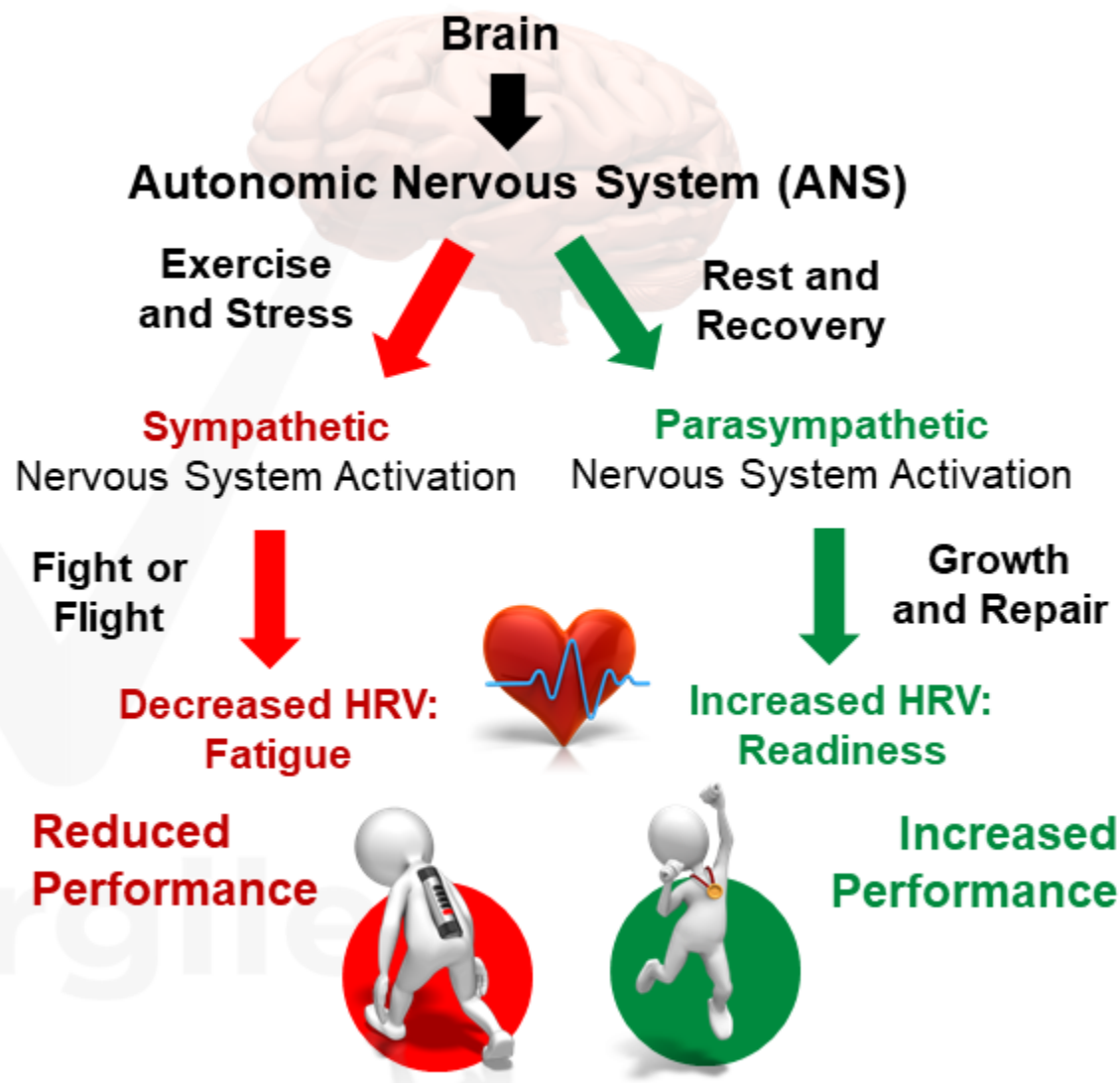
## Use Of HRV To Monitor Athlete Training Stress

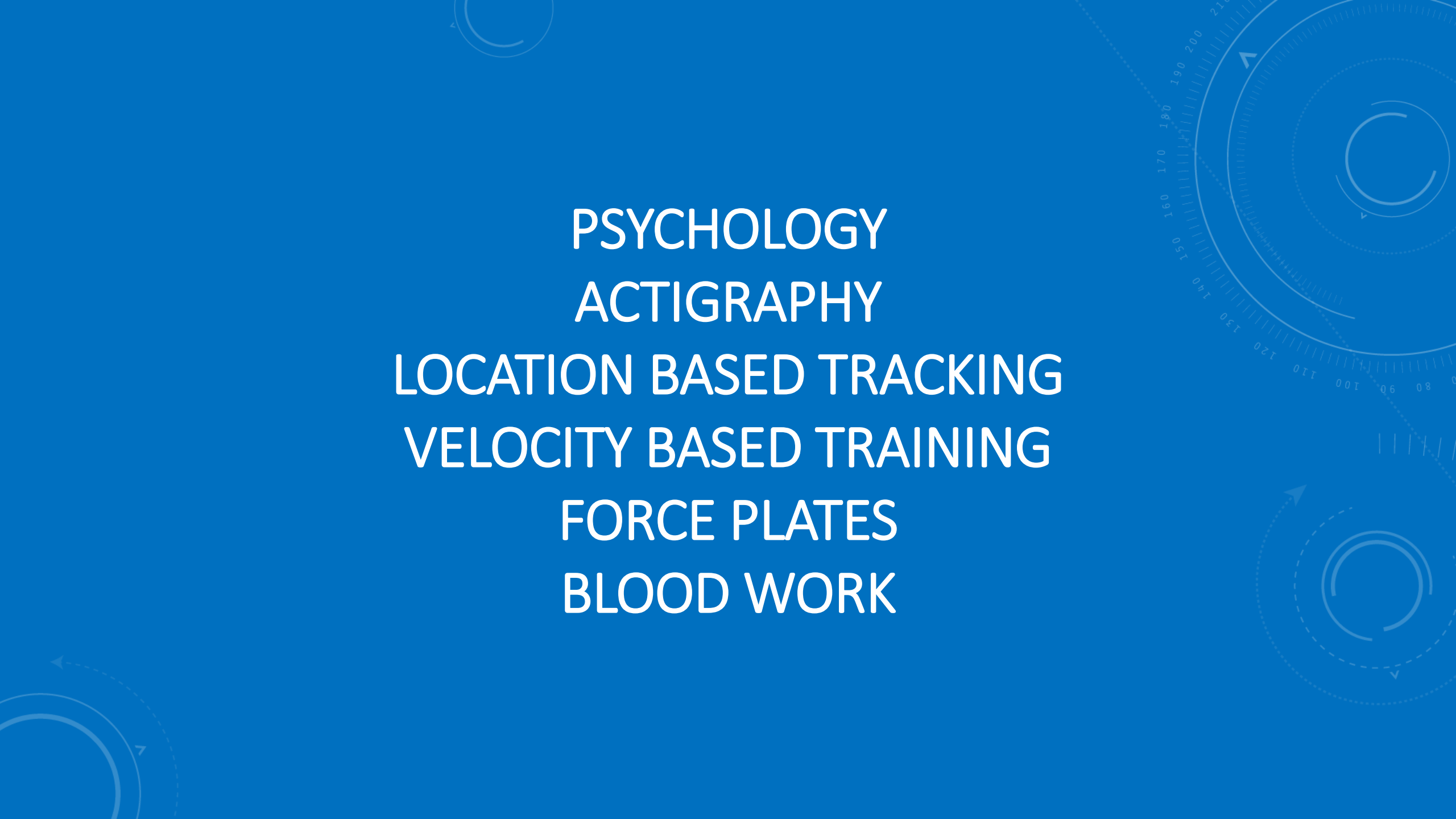
Heart Rate Variability (HRV) is a **valid and reliable predictor of Autonomic Nervous System (ANS) function**, which controls the sympathetic-parasympathetic balance of the body. This balance is altered in response to training stress; HRV could, potentially, be used to better understand the training adaptation and maladaptation in response to training stress

## A Few Factors that Impact HRV Response Include



## How Heart Rate Variability (HRV) Works





PSYCHOLOGY  
ACTIGRAPHY  
LOCATION BASED TRACKING  
VELOCITY BASED TRAINING  
FORCE PLATES  
BLOOD WORK

# BRAIN SPEED

HOW DO YOU PROCESS? – WHAT SLOWS YOU DOWN?





# TRUE AGILITY – DECISION BASED







SYSTEM



*DON'T QUIT  
WORK HARDER  
NEVER BE INTIMIDATED*

**BILL COWHER**





Thank you



**PERFORMANCE**  
R E D E F I N E D

Thank you



Thank you