

Appraising functional anatomy - Physical Education (2019)

ACHPER Queensland

August 17 , 2018


Acknowledgement of Country

I acknowledge the
Traditional Owners
of the lands on
which we gather.

I pay my respects
to their Elders,
past, present and
emerging.

Before we
begin...

What do you
most want to
learn about
functional
anatomy today?

- 
1. Use a sticky note to record your thoughts
 2. Post on the wall



Source: Banks Rowing Club archives, 1968)

Introductions: about me

*Believe me, my young friend, there
is nothing — absolutely nothing —
half so much worth doing as simply
messaging about in boats*

**Kenneth Grahame - Wind in the
Willows**

Introductions - about you

Teaching:

0-5 yrs?

6-10
yrs?

11-15
yrs?

16-20
yrs?

>21 yrs?

Preferred Band:

7-10
HPE?

11-12
Health?

11-12
PE?

Professional learning:

AC-HPE

Health
(2019)

PE (2019)



Learning goals

- Identify critical functional anatomy concepts in physical activity.
- Determine strategies to integrate functional anatomy into learning experiences.
- Investigate processes to identify functional anatomy concepts in physical activity.

Success criteria

You will know you are successful if you can:

- use the syllabus subject matter to develop learning experiences using functional anatomy concepts
- recognise the role of functional anatomy concepts in developing a deeper understanding of how movement occurs in physical activity
- devise strategies to identify functional anatomy concepts in physical activity

Effective questions
promote inquiry

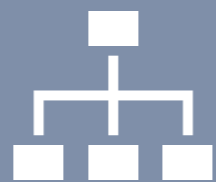
Effective questions promote inquiry:



key to teaching for understanding



understanding is developed by students, through a process of comparing previous experiences with what they know, feel and are experiencing



fostering engagement through questioning is essential in developing understanding.

Functional anatomy - purpose

Providing students and teachers with a common language to describe movement

Enhance depth of understanding about movement

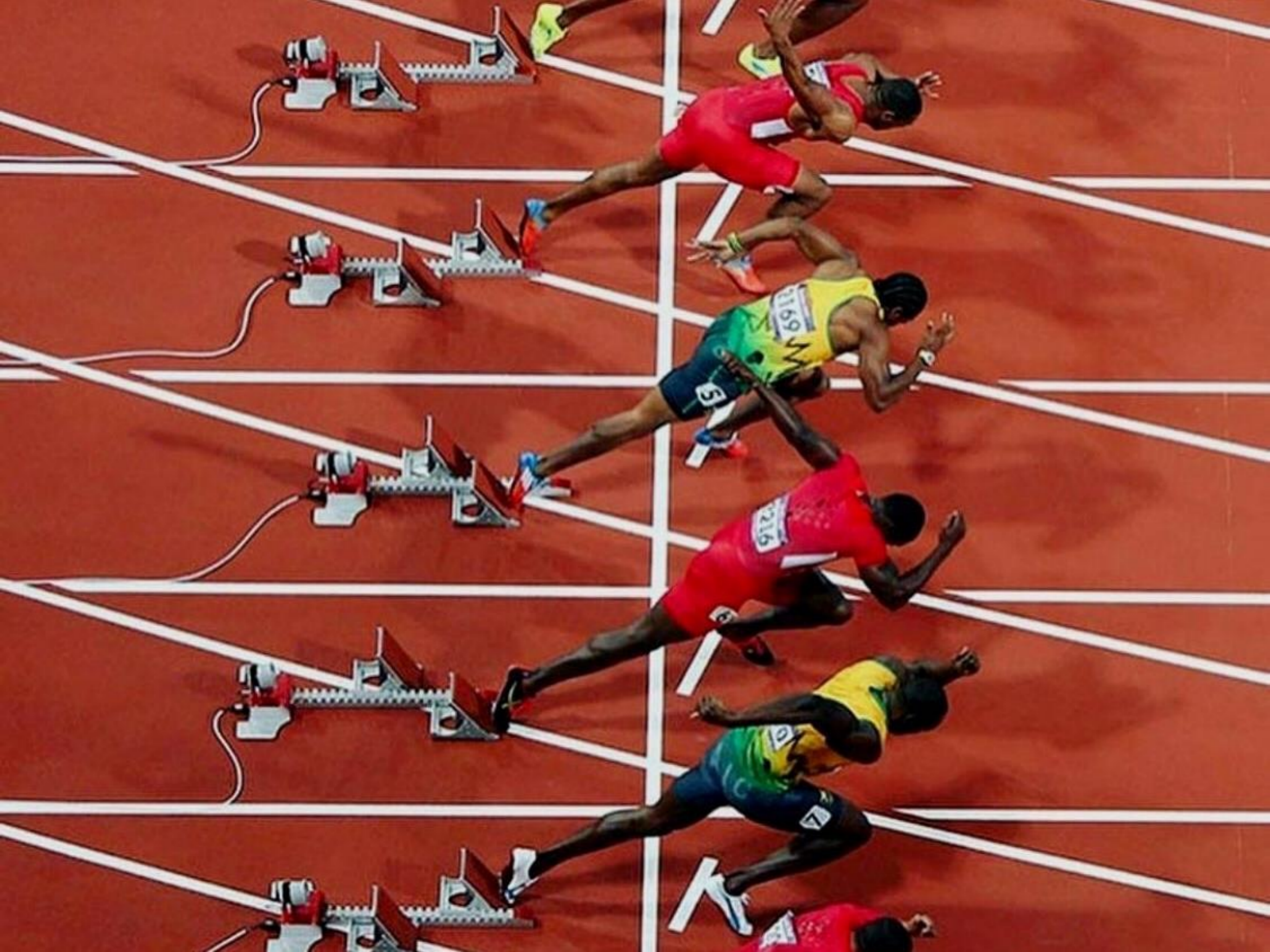
Functional anatomy concepts

Engage and understand

See, think and wonder

<http://www.visiblethinkingpz.org>

Harvard University



Subject matter - Topic 2

Engage and understand

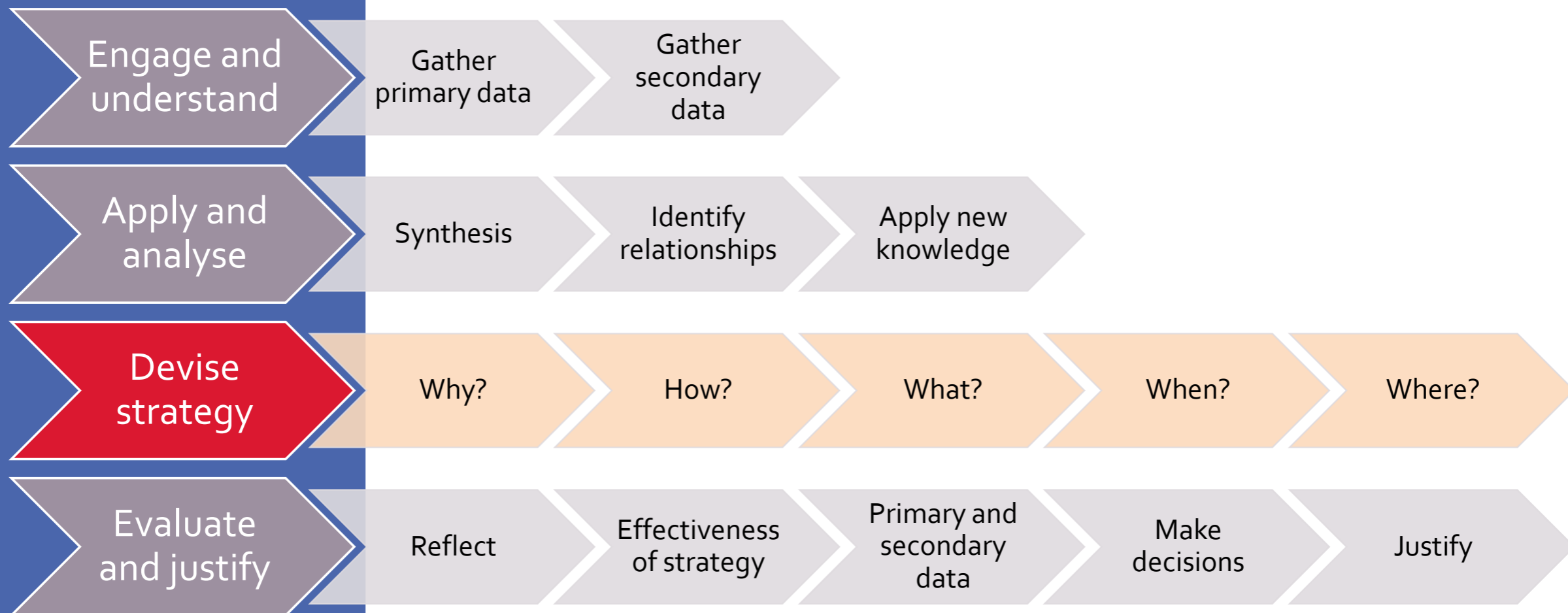
- **identify** and **explore** the critical anatomical and joint movements in the selected physical activity, e.g. flexion, extension, abduction, adduction, pronation, supination, rotation, circumduction, dorsiflexion, plantar flexion, eversion and inversion
- **identify** and **explore** the two types of isotonic muscle contractions: concentric and eccentric, in the selected physical activity
- **recognise** and **explain** that reciprocal inhibition describes the process of muscles on one side of a joint relaxing to accommodate muscle contraction on the other side of the joint in order to produce movement. Reciprocal inhibition involves the use of agonist and antagonist muscles
- **gather** primary data about the influence of biomechanical and functional anatomy concepts and principles on personal performance of specialised movement sequences and movement strategies in authentic performance environments
- **use** secondary data to analyse how biomechanical and functional anatomy concepts and principles can influence performance in the selected physical activity.

Subject matter - Topic 2

Apply and analyse

- **analyse** and **synthesise** primary data and secondary data about the influence of biomechanical and functional anatomy concepts and principles on specialised movement sequences and movement strategies in the selected physical activity
- **devise** personal biomechanical strategies to optimise performance in the selected physical activity that considers:
 - the relevant biomechanical and functional anatomy requirements of the specialised movement sequences and movement strategies
 - individual's biomechanical strengths and limitations

(QCAA, 2018)



Find your partner

Critical anatomical and joint movements

Movement term	Description
Flexion	Bending to decrease the angle between two bones
Extension	Increasing the angle between two bones
Abduction	Movement of the bone away from the midline
Adduction	Movement of the bone toward the midline
Pronation	Movement of the bones of the forearm to place the palm of the hand facing downwards
Supination	Movement of the bones of the forearm to place the palm of the hand facing upwards
Rotation	Movement of a bone around a central axis
Circumduction	Movement of a bone to describe a circle as it moves around
Dorsiflexion	Movement of bones to raise the toes and foot to the anterior face of the lower leg
Plantar flexion	Movement of bones to point the toes
Eversion	Movement of bones so that the sole of the foot moves outward at the ankle
Inversion	Movement of bones so that the sole of the foot moves inward at the ankle

Apply and analyse

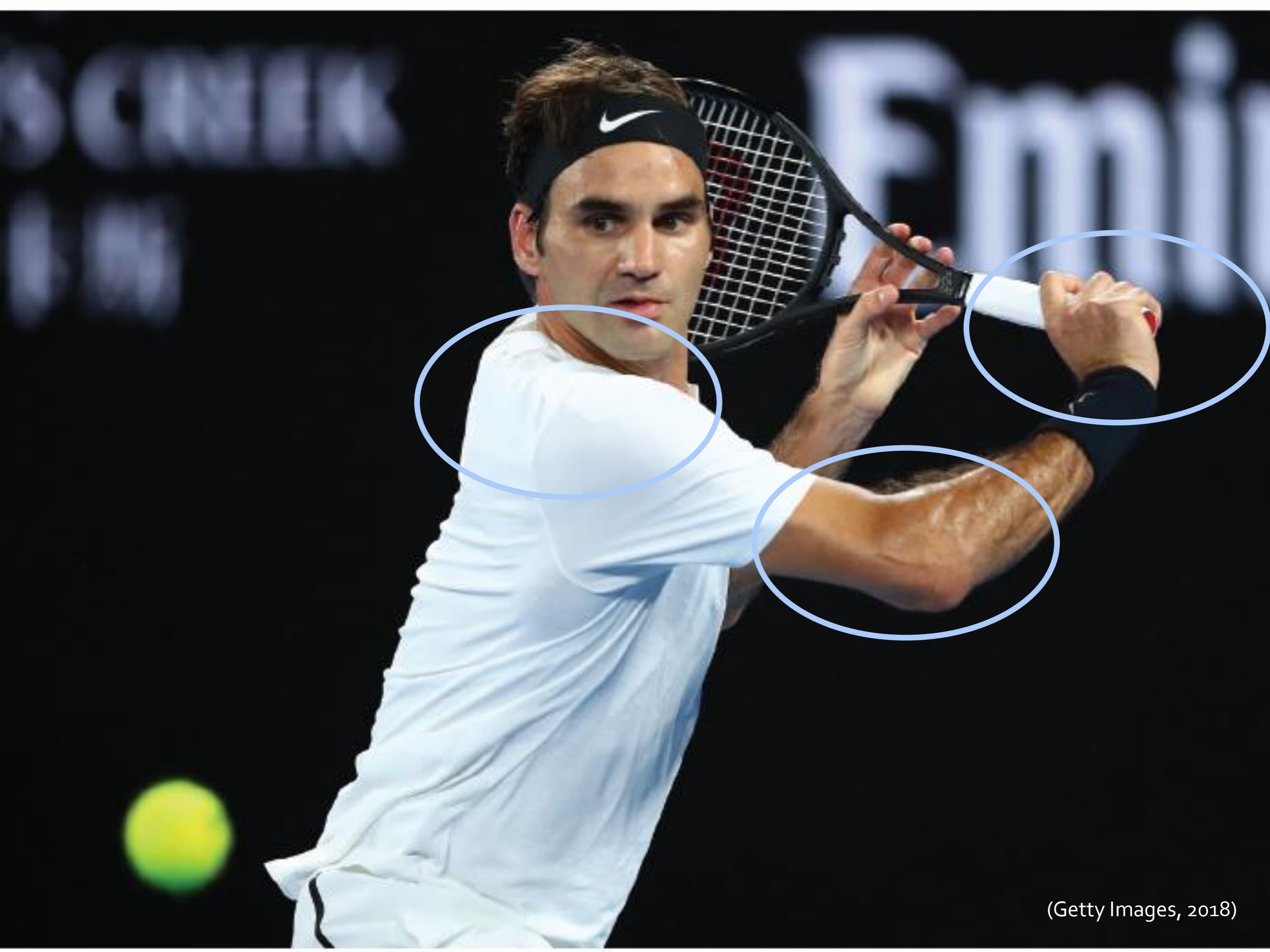
Which joint movements occur in this physical activity?

Critical
anatomical
and joint
movements

Apply and
analyse

e.g. Tennis backhand

- 1) List the joints involved in the action
- 2) List the movements that occur at each joint
- 3) List the sequence of events involved in the movement shown



Engage and understand

identify and **explore** the two types of isotonic muscle contractions: concentric and eccentric, in the selected physical activity

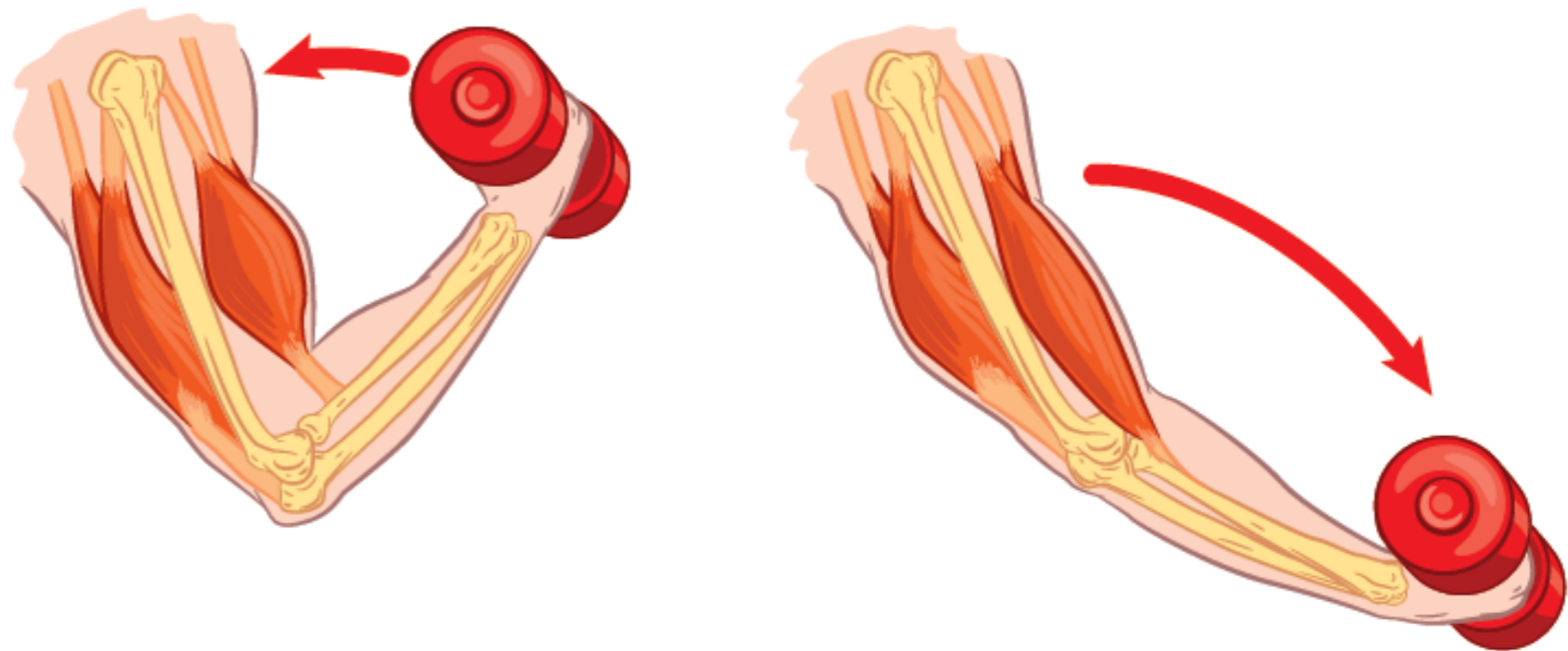
Inquiry question

How do muscles and joints enable us to move?

Isotonic muscle contraction

- **Concentric contraction:**
a muscle contracting under load and shortening to produce tension
- **Eccentric contraction:**
a muscle contracting under load and lengthening to produce tension

Figure 5.10
Concentric
and eccentric
muscle
contractions
develop
tension and
force.

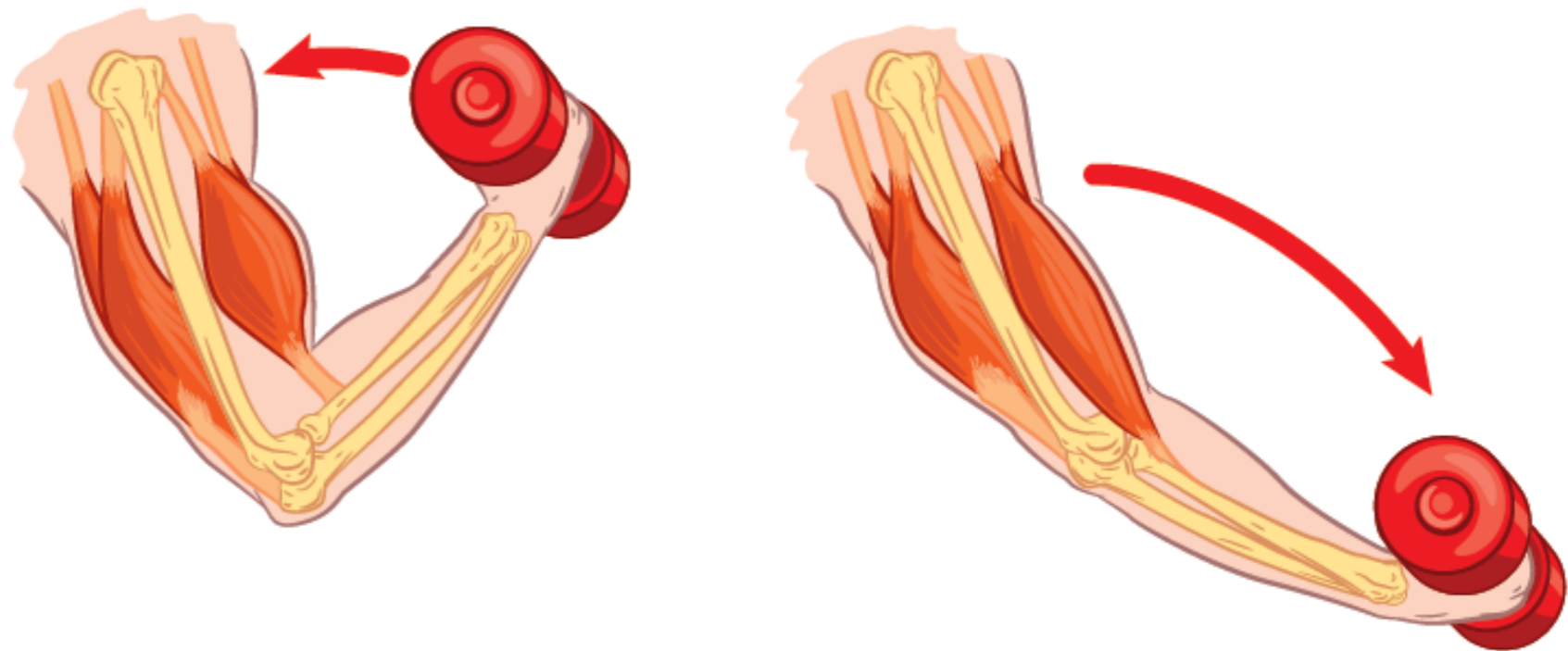


Apply and analyse

Over to you...

Work with a partner to **investigate** concentric and eccentric muscle contraction

Figure 5.10
Concentric
and eccentric
muscle
contractions
develop
tension and
force.



Apply and analyse

Engage and understand

recognise and **explain** that reciprocal inhibition describes the process of muscles on one side of a joint relaxing to accommodate muscle contraction on the other side of the joint in order to produce movement.

Inquiry question

What processes enable muscles to contract and relax to assist movement ?

Reciprocal inhibition

A process in which muscles located on one side of a joint relax to accommodate muscle contraction on the other side

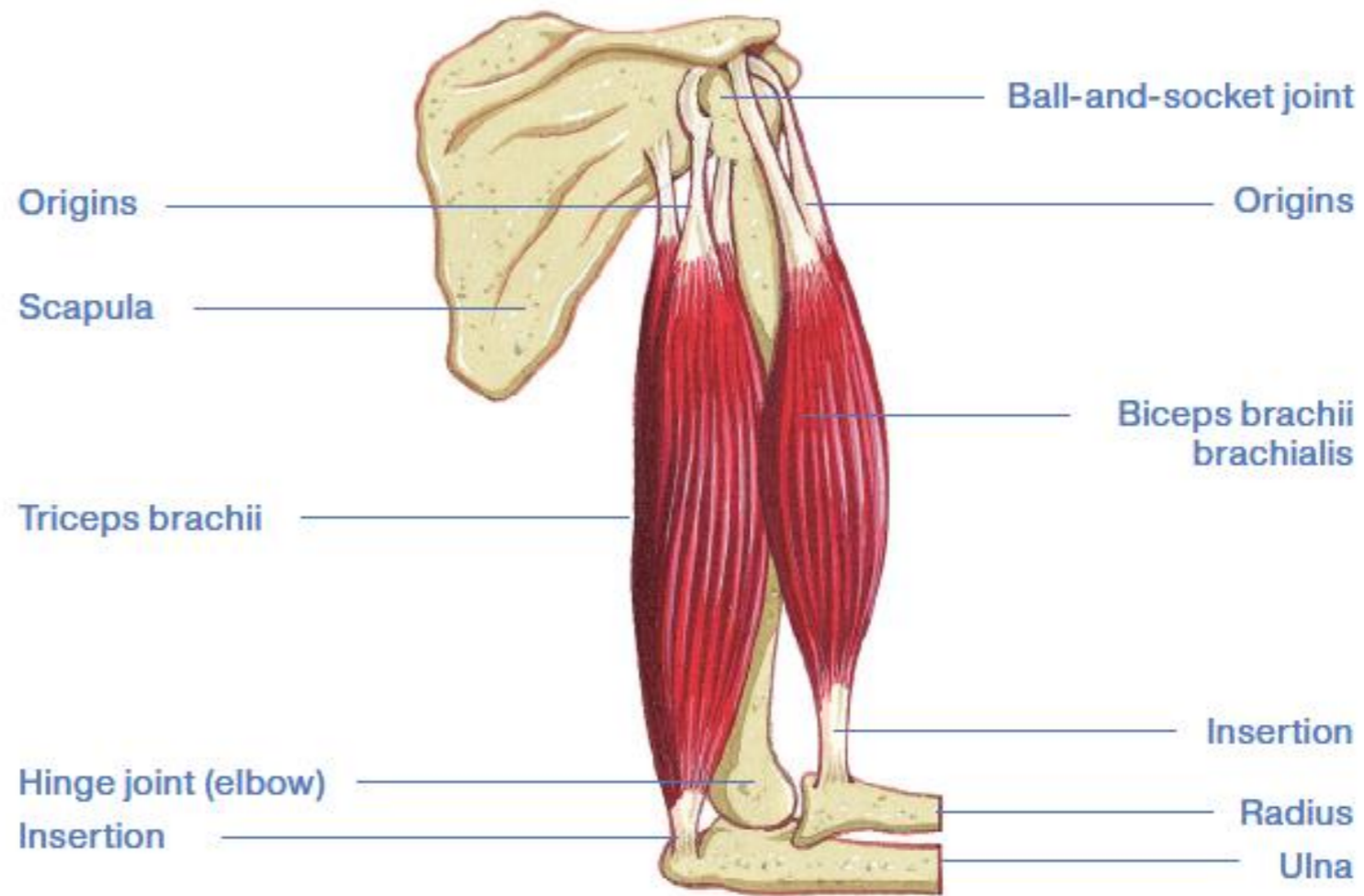
- **Agonist:**

the prime mover, providing major force to lead a muscle action

- **Antagonist:**

muscles that work in opposition to the agonist to reverse a movement

Figure 5.8
Muscle
relationships
working across
the elbow joint



Reciprocal inhibition

Over to you...

Work with a partner to **investigate** reciprocal inhibition

Apply and analyse

Visible Thinking strategy: What makes you say that?

Reciprocal inhibition

What's going on?

What do you see that makes you say that?

Engage and understand

gather primary data about the influence of biomechanical and functional anatomy concepts and principles on personal performance of specialised movement sequences and movement strategies in authentic performance environments

Movement analysis

Gathering data

Movement analysis

- Using sub-routines or phases of movement

Sub-routines



Batting in Softball – sub-routines

- Grip and hand position
- Stance
- Stride step
- Hip rotation and pivot
- Swing
- Contact
- Follow through

(adapted from Garman, J., 2001, Softball skills and drills,
Human Kinetics, Champaign, Ill)



Qualitative movement analysis

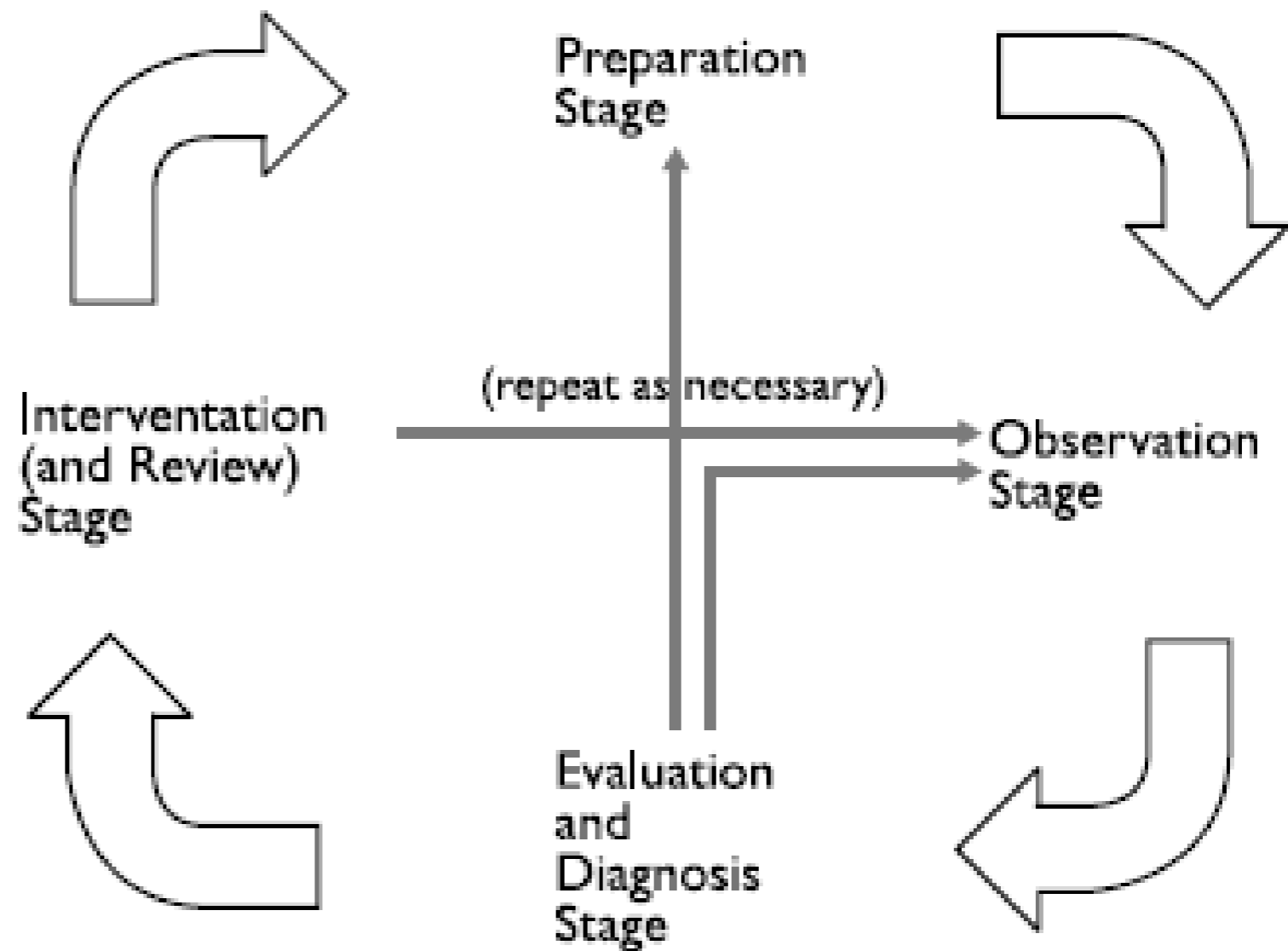
- Four stages of qualitative analysis:

1) Preparation

2) Observation

3) Evaluation and diagnosis

4) Intervention and review



(Source: adapted from Bartlett, 2014)

Preparation

- What do you want to observe?
- Gather relevant information about the movement (secondary data)
- Establish critical features of the movement (secondary data)
- Develop an observation strategy

Observation

- Decide the best position to place your capture device
- Choose the number of trials to observe
- Select the focus of the observation
e.g. particular phases of the movement
- Implement the observation strategy
- Gather primary data from digital capture of the movement

Evaluation and diagnosis

- Evaluate strengths and limitations of performance
- Consider sequence and sub-routines
- Devise a strategy to enhance performance
- Consider:
 - variability of movement
 - movement errors
 - critical features

Intervention

- Provide feedback to performer
- Emphasis on cues
- Address practice strategies
- Link with motor learning strategies?

Functional anatomy and physical activity

Visible Thinking: 3 -2- 1 Bridge

Three thoughts or ideas

Two questions you have

One analogy or comparison

Movement analysis apps and software

- Kinovea (open source software – FREE)
- Dartfish
- Swinger
- Coach's Eye
- Hudl
- Burst Mode



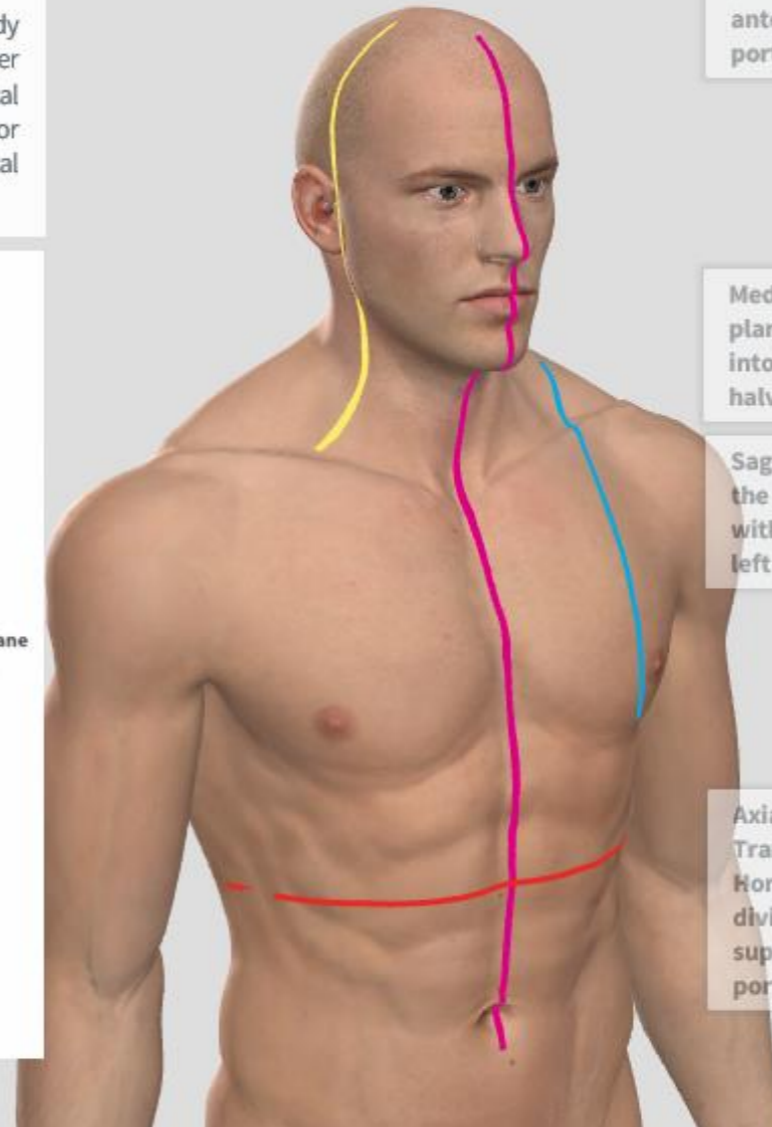
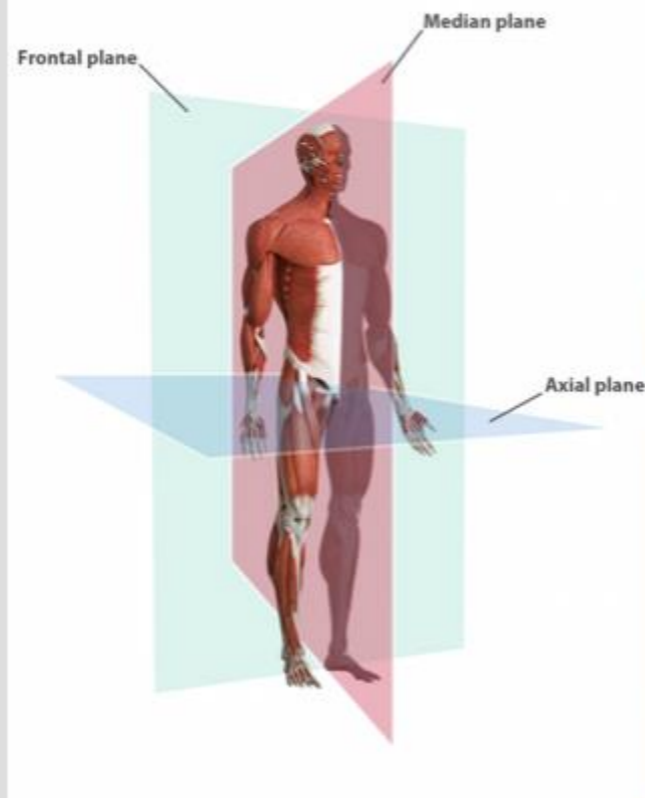
Stromotion –
Dartfish

Other resources



Anatomical position

There are 3 primary or "cardinal" planes of the body which are used as points of reference, or as cuts to better visualize internal structures. The cuts may be physical through the actual tissue as performed surgically or during a dissection, or diagnostic as used with medical imaging like CT or MRI scans.



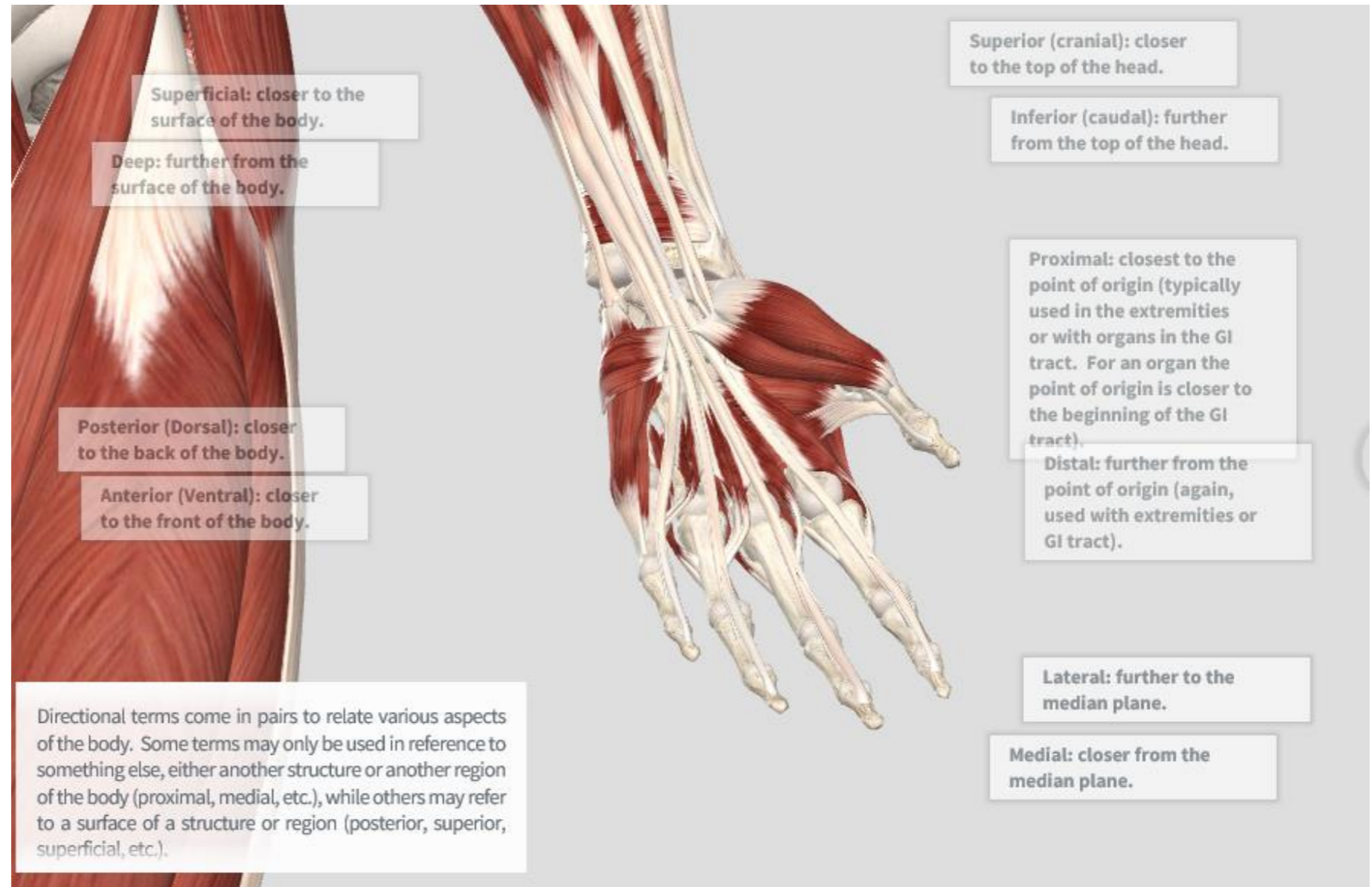
Frontal (Coronal) plane: divides the body into anterior and posterior portions.

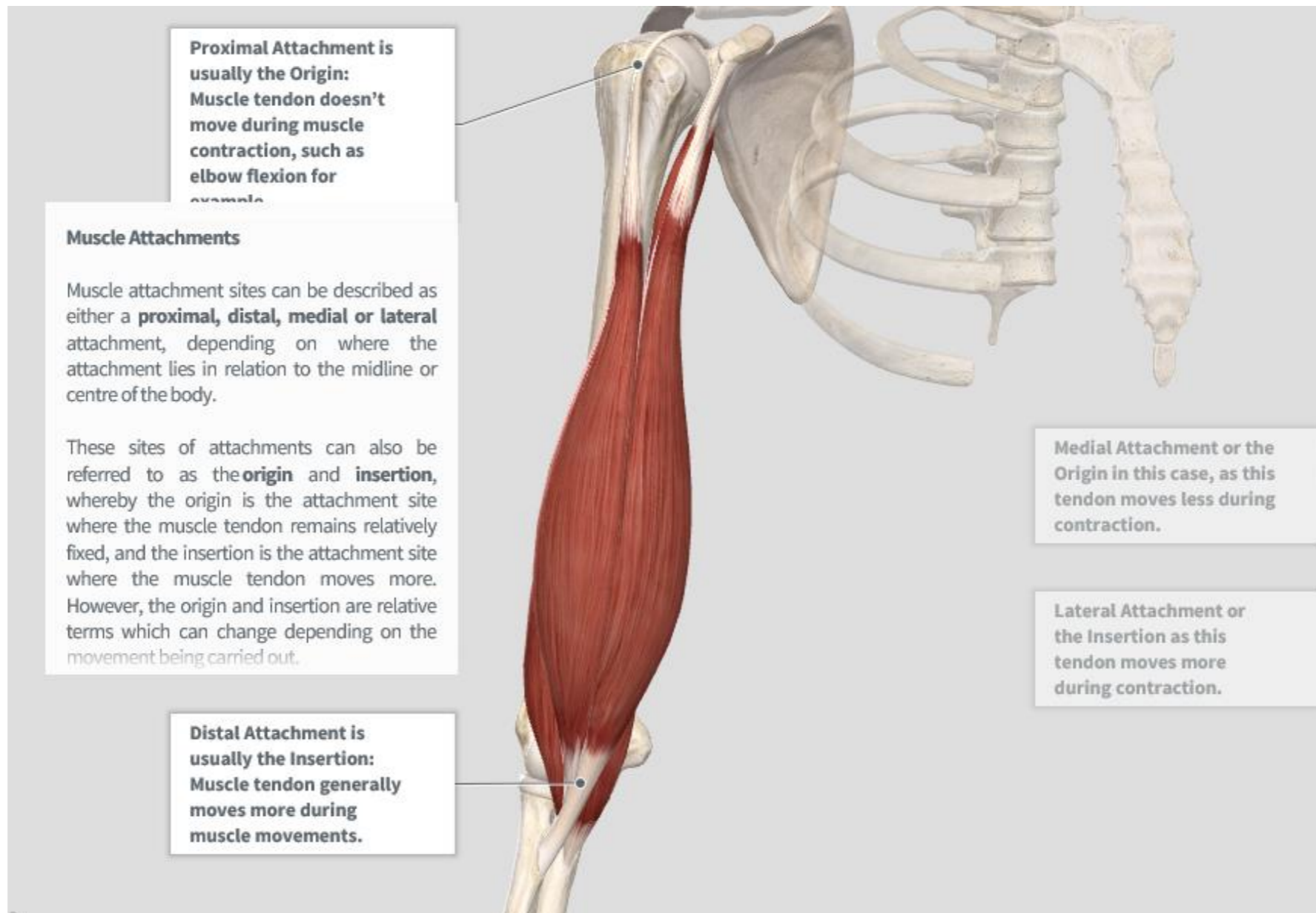
Median (Mid-Sagittal) plane: divides the body into equal right and left halves.

Sagittal plane: parallel to the median plane, but with unequal right and left halves.

Axial (Transverse, Transaxial, or Horizontal) plane: divides the body into superior and inferior portions.

Directional terms

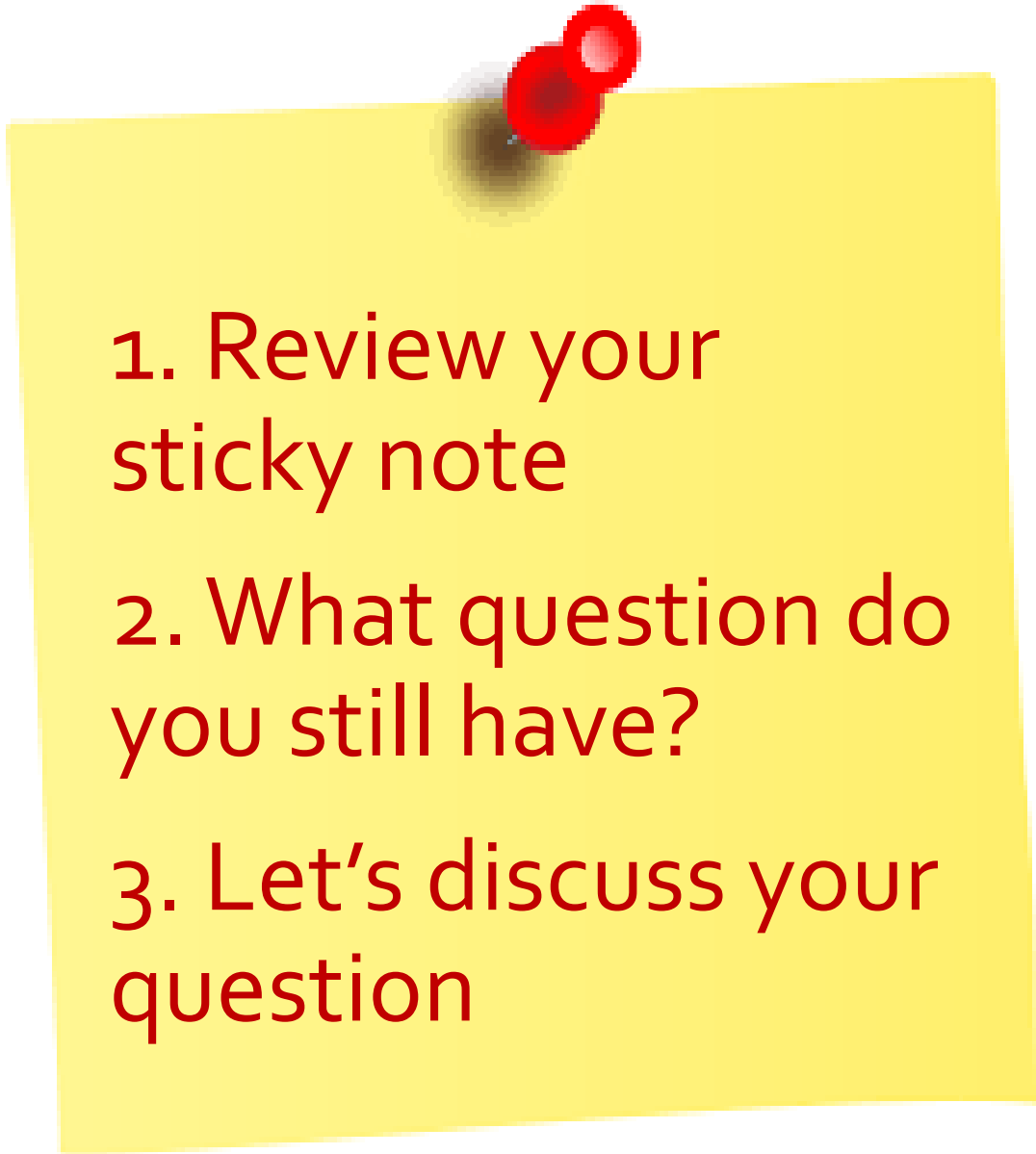




Origin and insertion

At the start of
the session...

What do you
most want to
learn about
functional
anatomy today?

- 
1. Review your sticky note
 2. What question do you still have?
 3. Let's discuss your question

Thank you.

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