McMaster University

SCIENCE

Department of Kinesiology

Motor skills: Fundamentals

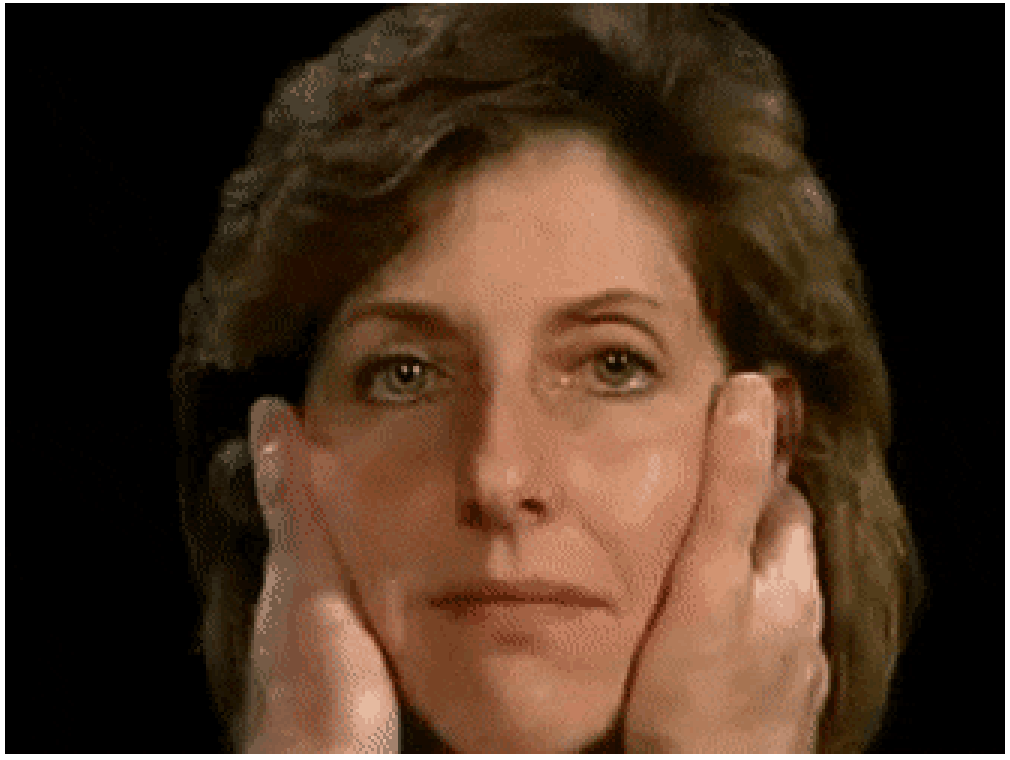
KINESIOL 1E03 - Motor control and learning

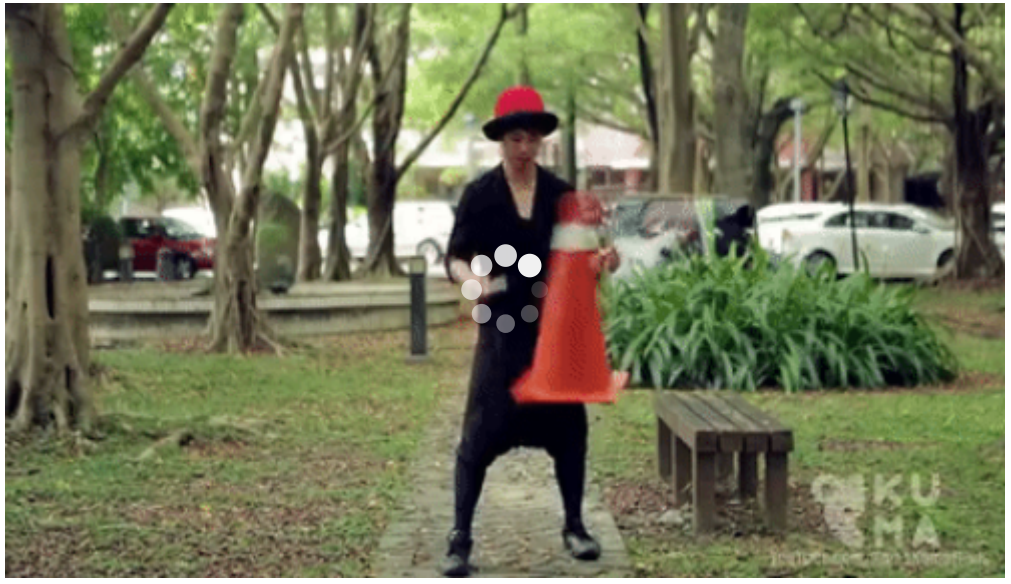
Laura St. Germain

Fall 2022 Week 0

Lecture 1

How would you describe these two situations?





Left: https://thumbs.gfycat.com/AdoredCarefulCopperbutterfly-size_restricted.gif; Right: https://thumbs.gfycat.com/CheapHardBullfrog-size_restricted.gif

Learning objectives

1. Define and distinguish the terms **skills/actions**, **abilities**, **movements**, and **reflexes**, and give examples of each.

2. Identify and describe **three influences** on how we perform a motor skill.

3. Define and distinguish **four characteristics** of motor skills.

Take-home message:

There are some foundational terms and concepts in the study of motor behaviour that often get used incorrectly in both everyday life and professional sports.

We can categorize skills into one of three domains

COGNITIVE SKILLS: Depend on an individual's **knowledge and mental abilities**

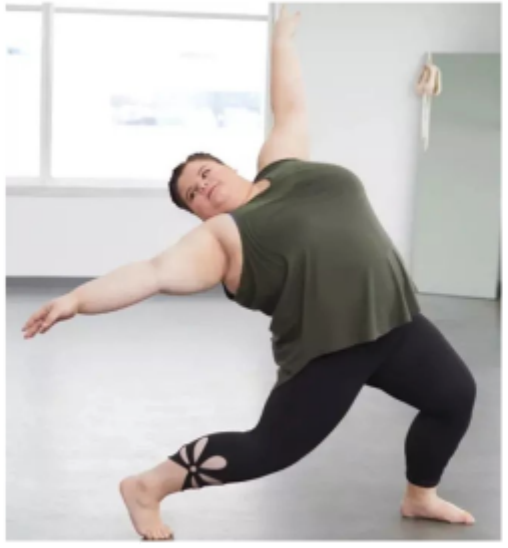
PERCEPTUAL SKILLS: Depend on an individual's ability to **recognize and discriminate** among various sources of perceivable stimuli

MOTOR SKILLS: Depend on an individual's **quality of movement**

Cognition and perception exist fundamentally to subserve action and are intrinsically linked to the motor system and to the acquisition of skill behaviours

Motor **skills are...**

Defined as activities or tasks that require **voluntary control** over movement of the joints and body segments to **achieve a goal**

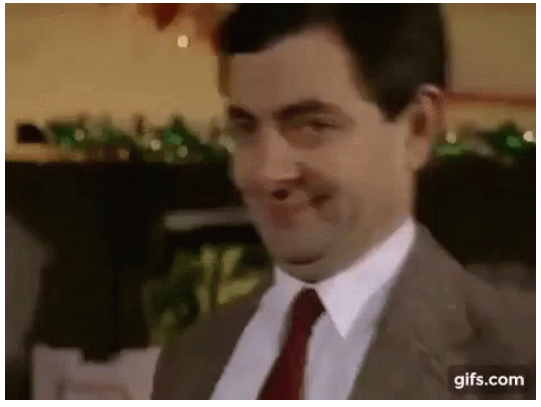


Motor skills are...

- goal-directed and performed voluntarily
- require movements of joints and body segments via muscular contractions
- need to be learned (or relearned)

Motor skills vs reflexes

Wink



Blink

*Winks and blinks are similar **movements** but have very different neuromotor processes*

Motor **skills are...**

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Motor skills vs abilities

Relatively stable and enduring traits typically regarded as having been either **genetically inherited** or developed during **growth and maturation**

- Abilities are **not** easily modifiable by practice or experience
- Abilities **underlie** motor skills
- E.g., reaction time, hand-eye coordination, dexterity

Motor **skills are...**

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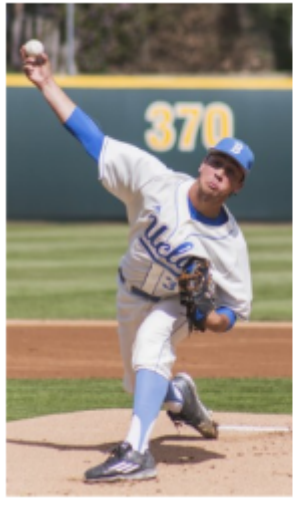
Motor skills vs movements

Component parts of a skill that are **observable and measurable**




Why is it important to distinguish between motor skills and movements?

- Humans learn **motor skills** (i.e., actions), we do not learn movements
- As we learn skills, the movements that make them up become **adaptable** to move successfully in our environment
- Movements and motor skills are **assessed/evaluated/measured** differently[1]
  - **motor skills** are typically evaluated in terms of **outcome**
  - **movements** are typically evaluated in terms of how they are **produced**

[1]Will see this in the *Measuring motor performance* lectures

The relationships between motor skills and movements

- **Many-to-one** relationship
  - There are a variety of movements that can accomplish the same action goal
- **One-to-many** relationship
  - One movement pattern could be used to achieve many different action goals

Characteristics of skilled performance

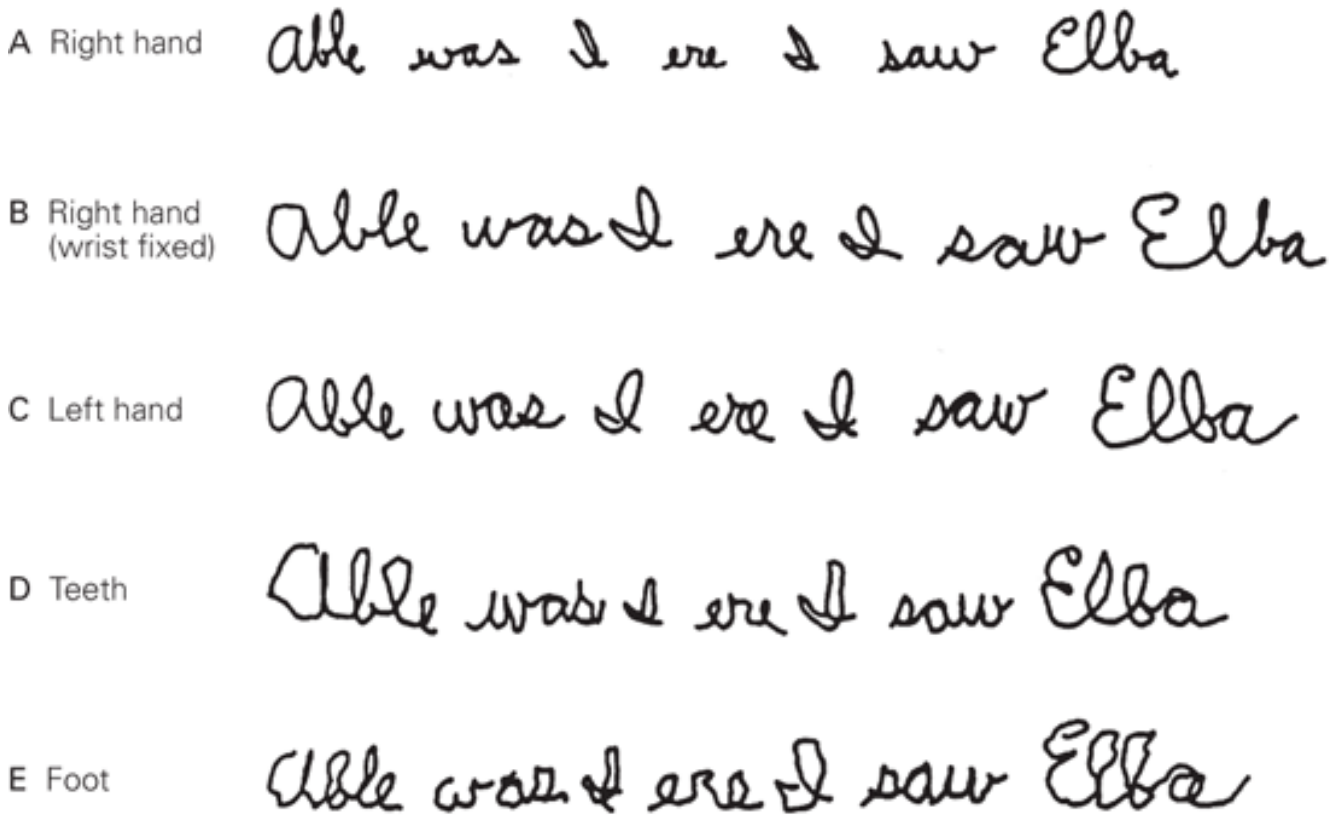
"*the ability to bring about some end result with maximum certainty and minimum outlay of energy, or of time and energy*"[2]

- **Maximum certainty of goal attainment**
  - repeatedly being successful
- **Minimum energy expenditure**
  - decrease physical and mental exertion required
- **Minimum movement time**
  - performance quality remains high with reduced time required to execute it
- **Maximum adaptability**
  - ability to achieve task goals under a variety of settings

[2]Guthrie 1952

Four characteristics of motor skills

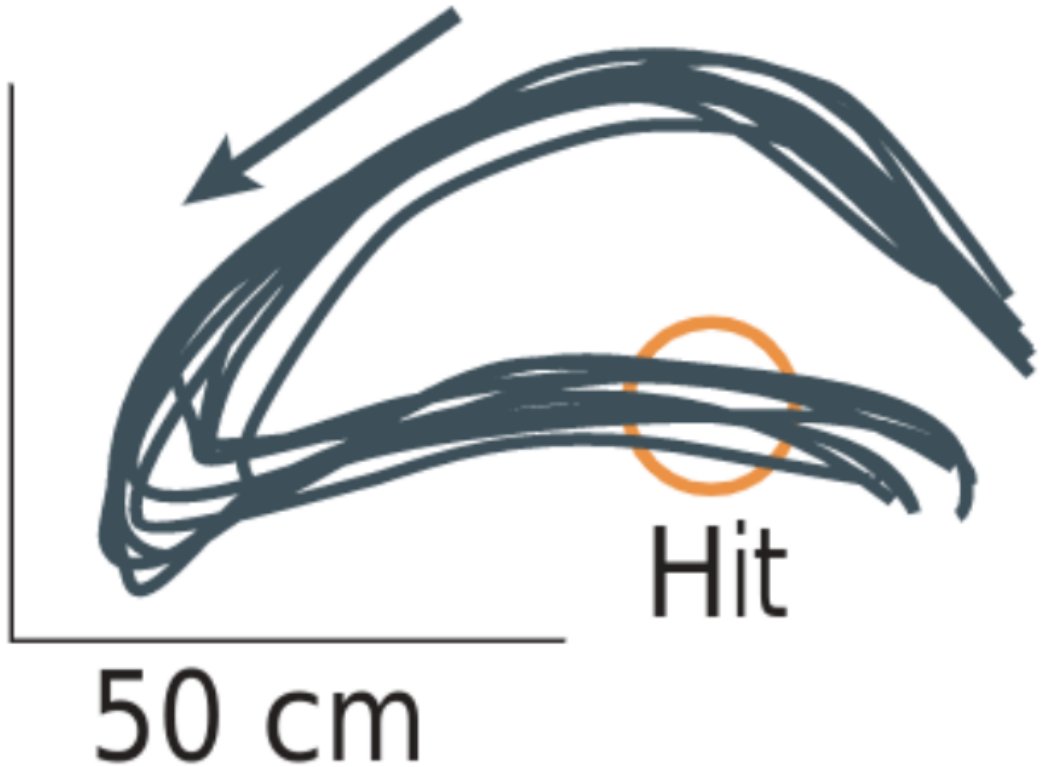
Motor equivalence



Source: https://neurology.mhmedical.com/data/books/1049/kan_ch33_f001.png

Four characteristics of motor skills

Motor variability



Scott 2004 (https://doi.org/10.1038/nrn1427); Todorov & Jordon 2002 (https://doi.org/10.1038/nn963)

Four characteristics of motor skills

Motor consistency

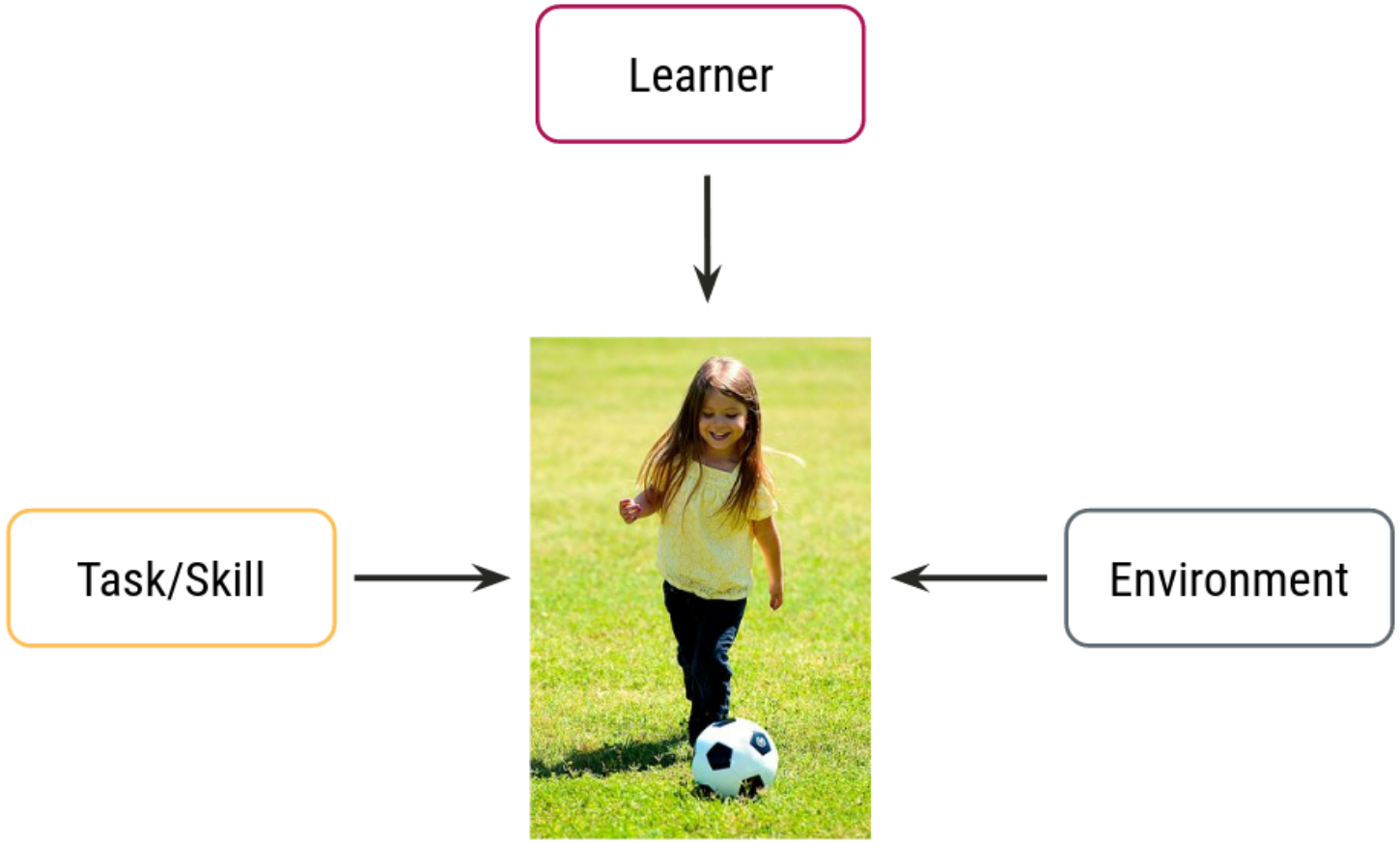
Source: https://i.kym-cdn.com/photos/images/original/001/268/638/be0.gif

Four characteristics of motor skills

Motor modifiability

Source: https://wp.usatodaysports.com/wp-content/uploads/sites/90/2013/08/tiger.gif

The performance of any motor skill is influenced by the individual, the task, and the environment



Learner

- Previous skill learning
- Psychological characteristics
- Bodily constraints on movement and fitness level
- Age and developmental readiness

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Task/Skill

- Performed alone or with others
- Speed of performance and perceptual demands
- Use of equipment
- Rules constraining action

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Environment

- Practice versus performance location
- Stable or variable conditions
- Presence of observers and other perceptual elements
- Constraints on movement possibilities

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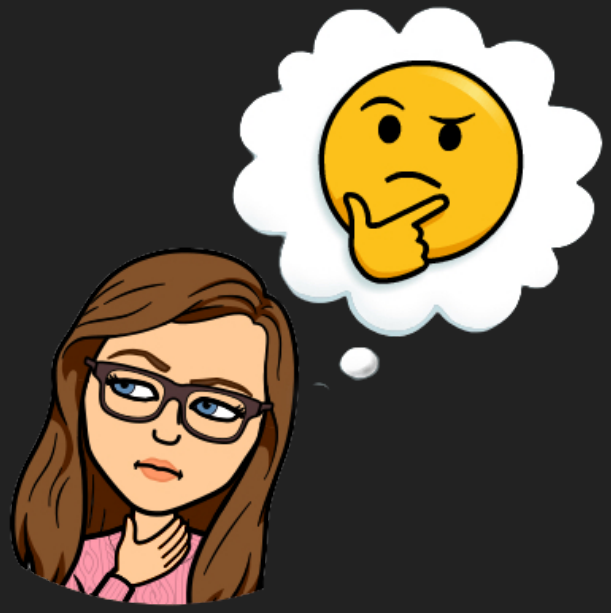
What questions do you have?



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