Observational learning
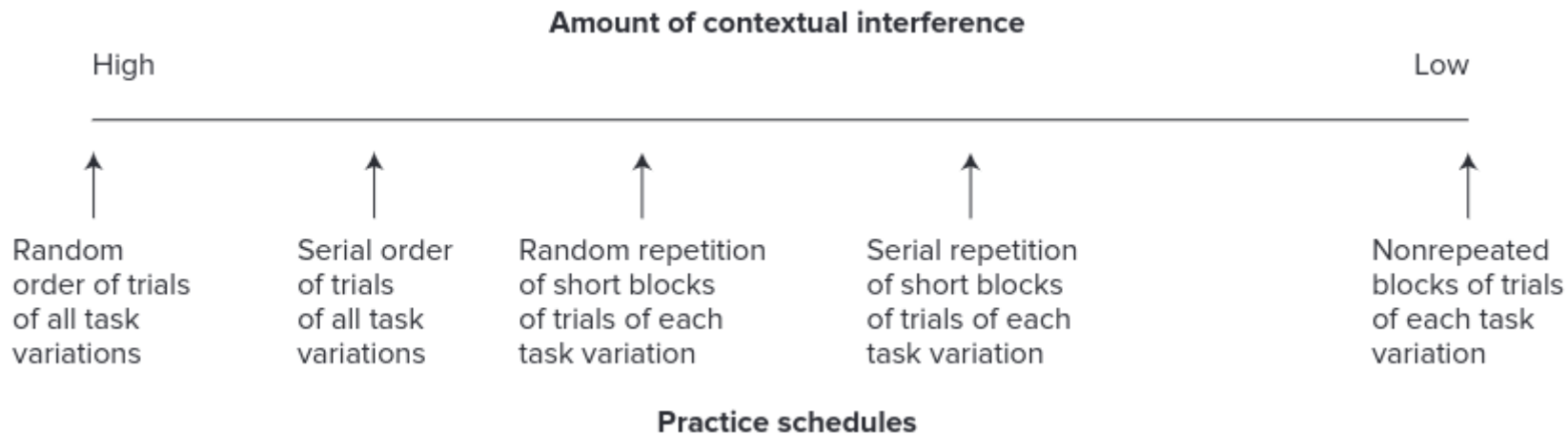
KINESIOL 1E03 - Motor control and learning

Laura St. Germain
Fall 2022 Week 10
Lecture 19

Review from last lecture

Practice can be organized to promote different amounts of contextual interference

CONTEXTUAL INTERFERENCE[1]: refers to the **interference** that results from performing various tasks or skills with the **context** of practice

Amount of contextual interference

High — Low

Random order of trials of all task variations | Serial order of trials of all task variations | Random repetition of short blocks of trials of each task variation | Serial repetition of short blocks of trials of each task variation | Nonrepeated blocks of trials of each task variation

Practice schedules

CONTEXTUAL INTERFERENCE EFFECT: when a **high amount** of contextual interference results in **better** retention and/or transfer performance than a low amount of interference

[1]This term was introduced by Battig 1979 when he first demonstrated the contextual interference effect; Fig: Magill & Anderson 2017

Why is random more effective than blocked?

ELABORATION HYPOTHESIS

Interleaving tasks gives the learner opportunities to engage in **inter- & intra-task processing** (i.e., compare and contrast) in **working memory**, which **facilitates** the development of more **distinct or elaborative** motor memories

FORGETTING-RECONSTRUCTION HYPOTHESIS

Interleaving tasks forces the learner to **"forget" or dump** a given **action plan** from **working memory** to plan and execute successive trials. The learner must then **(re)construct an action plan** on each trial.

Lee & Magill 1983 (https://doi.org/10.1037/0278-7393.9.4.730); Shea & Morgan 1979 (https://doi.org/10.1037/0278-7393.5.2.179); Shea & Zimny 1983 (https://doi.org/10.1016/S0166-4115(08)61998-6)

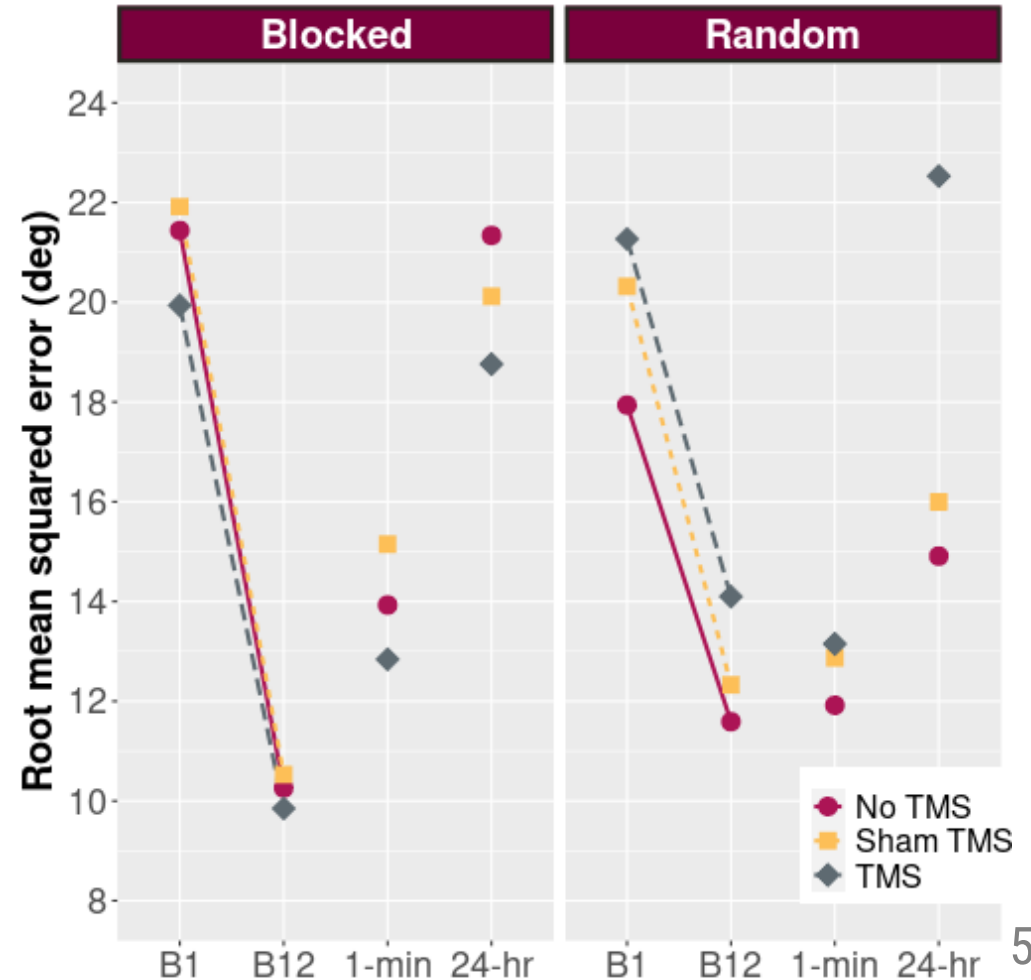# Testing between explanations: TMS

Task: Waveform matching

Groups:

- **Random** groups
  1. No-TMS
  2. Sham-TMS
  3. TMS
- **Blocked** groups
  1. No-TMS
  2. Sham-TMS
  3. TMS

TMS protocol: **Suprathreshold** TMS during the **intertrial interval** to modulate **elaborative** and/or **forgetting-reconstruction** processes

Lin et al. 2008 (https://doi.org/10.3200/JMBR.40.6.578-586)

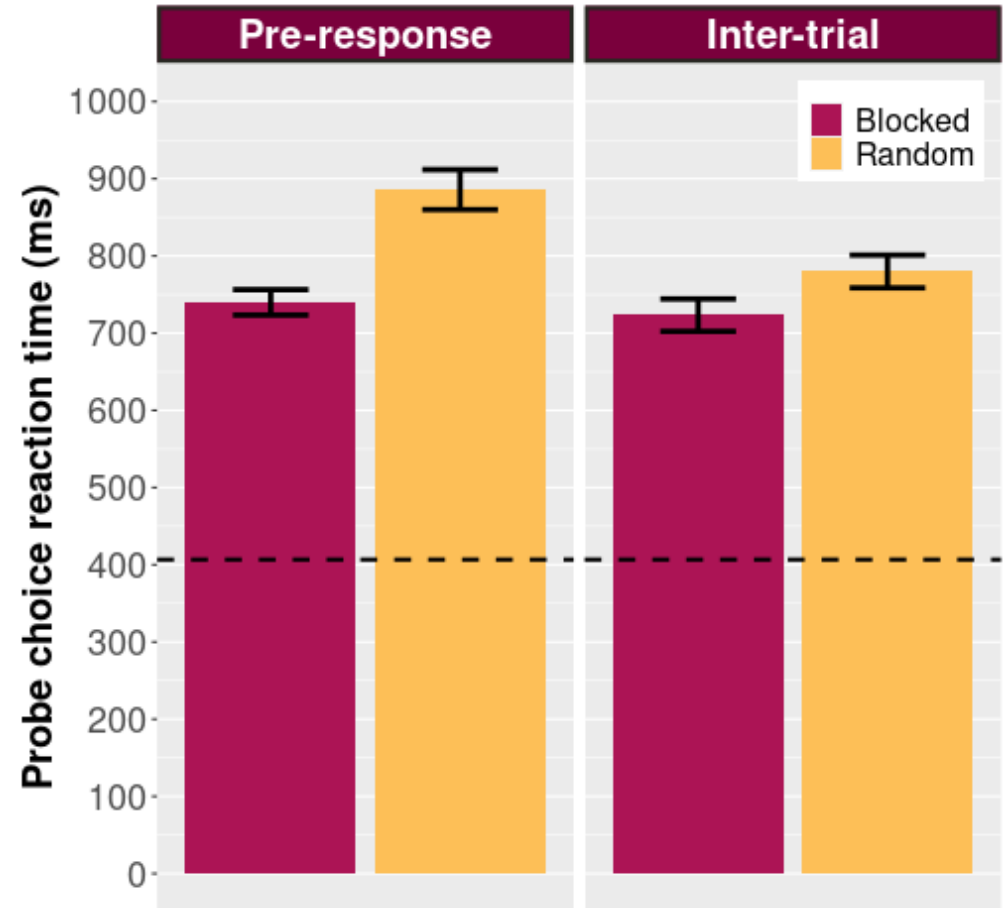# Testing between explanations: Probe reaction time

Task: Sequence learning (3 patterns)

Probe task: 2-Choice reaction time task (**low** versus **high** tone)

Probe protocol: **Randomly** presented on **some** trials (12 trials for each tone)

Groups:

- **Random** groups
    1. Pre-response interval
    2. Inter-trial interval
- **Blocked** groups
    1. Pre-response interval
    2. Inter-trial interval

Approximate data from Li & Wright 2000 (https://doi.org/10.1080/713755890) through plot digitization

Any questions?

Learning objectives

1. Identify various **characteristics** of possible model demonstrations.

2. Describe **strengths** and **weaknesses** of different models.

3. Describe how to select **appropriate ways** to **implement** observational learning.

> **Take-home message:**
>
> **Observing a model is an effective way to promote motor learning, but the effectiveness of an observation intervention will depend on moderator variables, context and function, and characteristics of the model.**

Observational learning

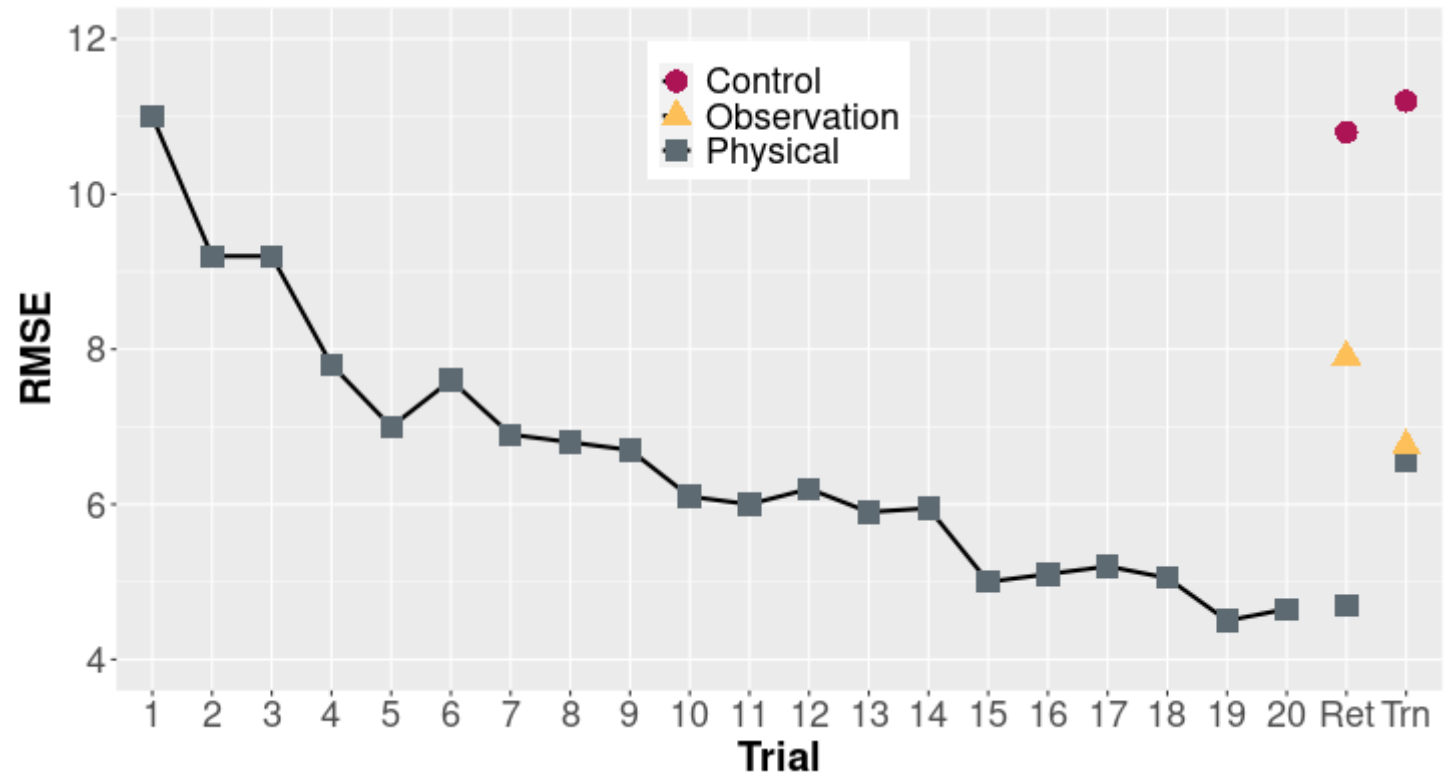**Definition:** The use of demonstration(s) to convey information about how to perform a skill.

Another definition: The process by which a learner brings their actions to approximate those of a model.

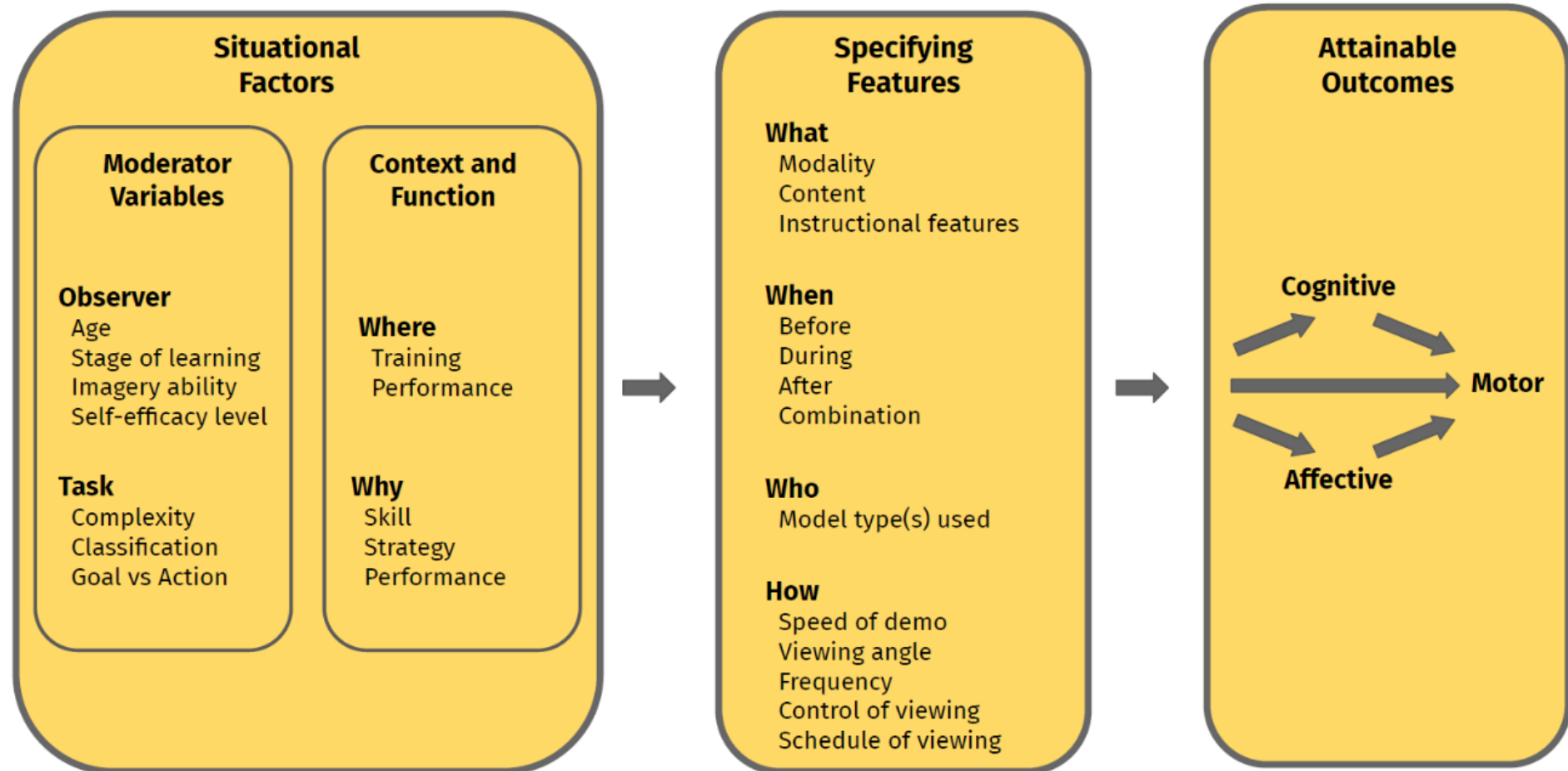# Observational practice offers learning benefits, but to a lesser extent than physical practice

Task: Keyboard tracking task

Groups:

- Physical practice
- Observational practice
- Control

An applied model for the use of observation

Situational Factors

Moderator Variables

Observer
- Age
- Stage of learning
- Imagery ability
- Self-efficacy level

Task
- Complexity
- Classification
- Goal vs Action

Context and Function

Where
- Training
- Performance

Why
- Skill
- Strategy
- Performance

Specifying Features

What
- Modality
- Content
- Instructional features

When
- Before
- During
- After
- Combination

Who
- Model type(s) used

How
- Speed of demo
- Viewing angle
- Frequency
- Control of viewing
- Schedule of viewing

Attainable Outcomes

- Cognitive
- Affective
- Motor

Adapted from Ste-Marie, Lelievre, & St. Germain 2020 (https://doi.org/10.1080/02701367.2019.1693489)

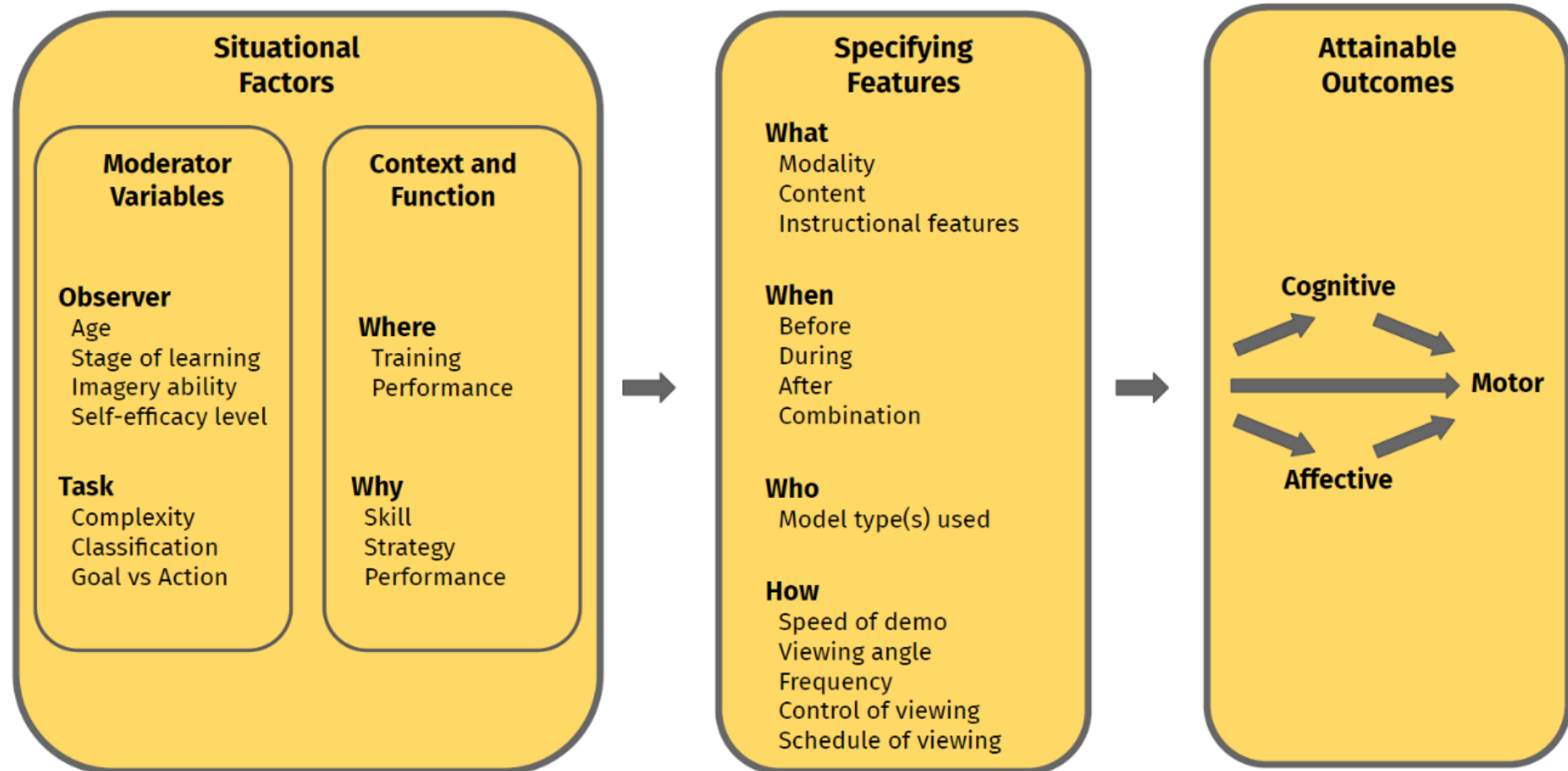# Moderator variables impact observation intervention outcomes

Task

- Complexity
- Classification
- Goal vs action

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Where: Models are beneficial in a variety of settings
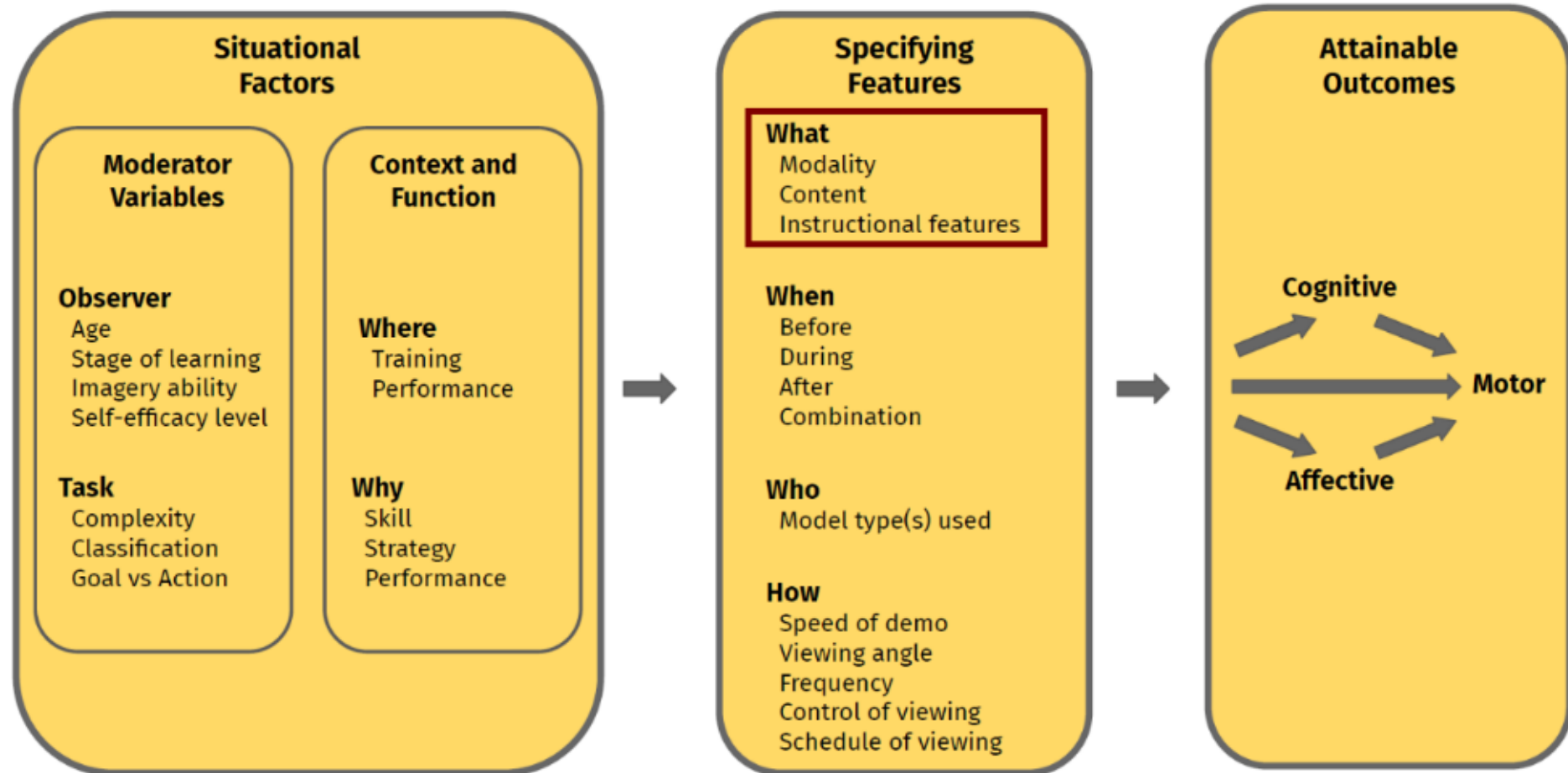
Training

Performance

Why do we observe?

Skill: Improve skill performance and learning

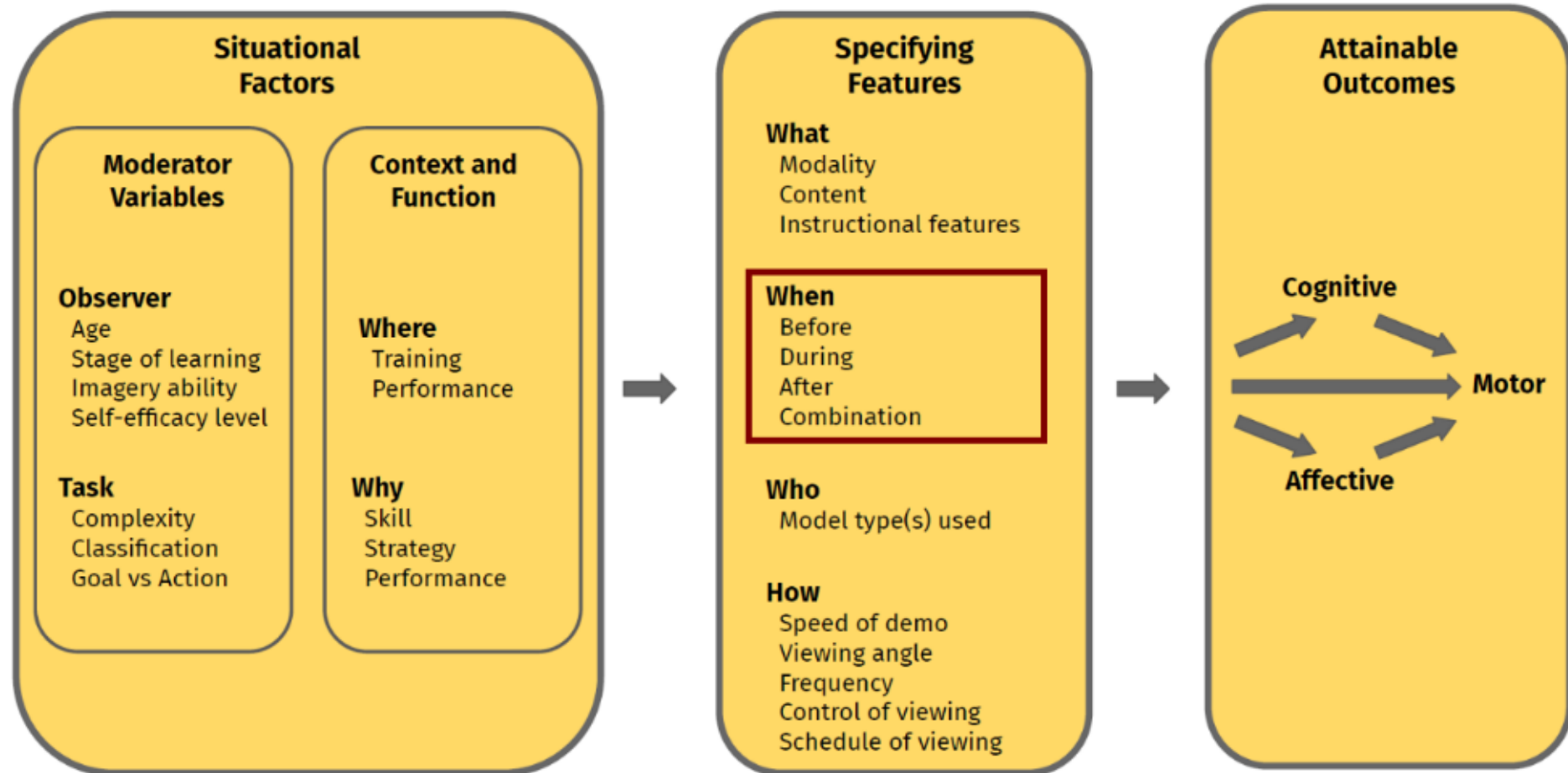**Strategy:** Develop and execute sport strategy

Performance: Reach optimal levels of mental arousal

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An applied model for the use of observation

Who **should we observe?**

Who: Types of models

Unskilled/Novice: Will make errors during the skill

- Aids in **error detection**

Skilled/Expert: Performs the skill with no errors
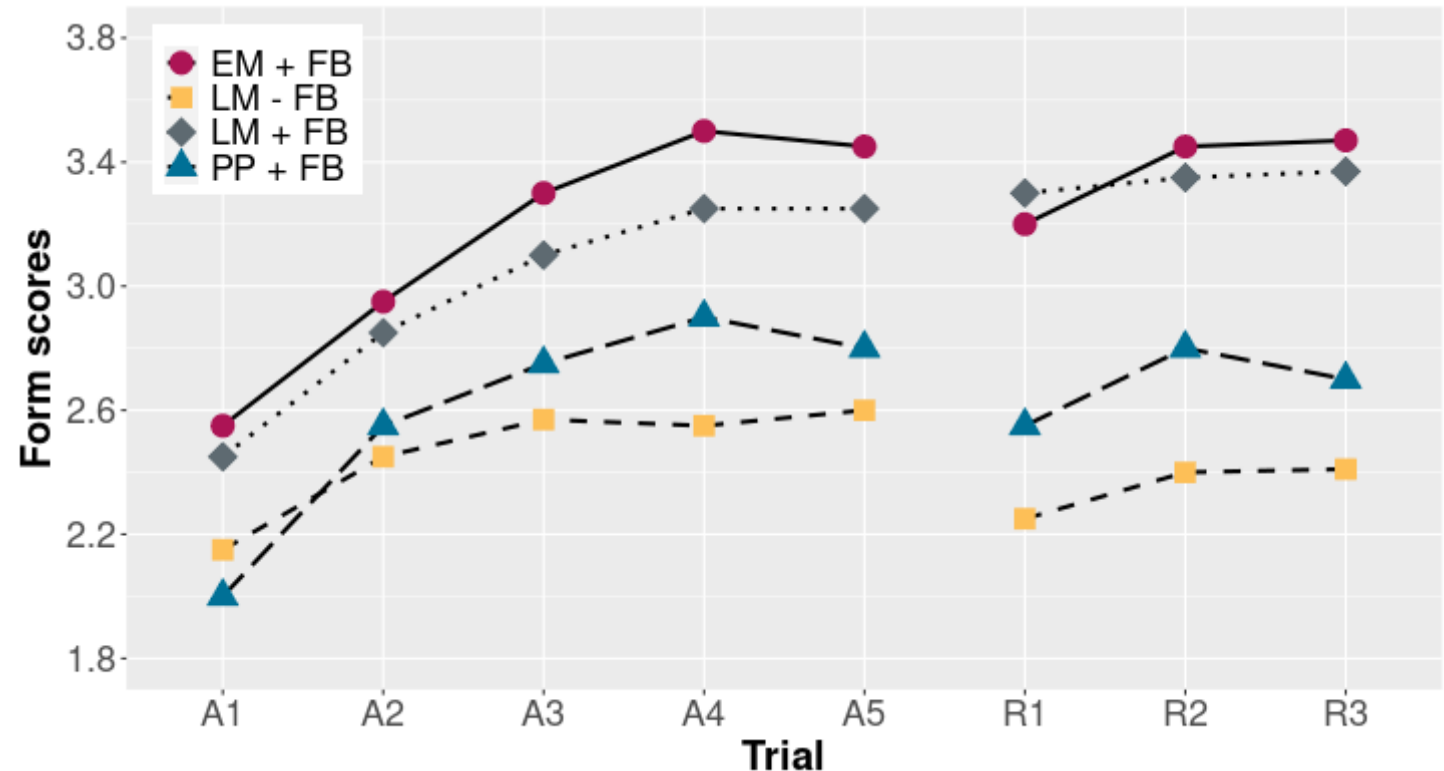
- Aids in **error correction**

Learning: Will begin at an unskilled level and progress throughout practice towards a skilled level

Expert and learning models are effective; feedback about the learning model must be provided

Task: Free squat

Groups:

- Expert model with feedback
- Learning model **with no** feedback
- Learning model **with** feedback
- Physical performance with feedback

Approximate data adapted from McCullagh & Meyer 1997 (https://doi.org/10.1080/02701367.1997.10608866)

Who: Observing yourself

Self-observation: Watching video replay of yourself

Positive self-review: Taking video recordings of yourself and watching the best trials

Feedforward modeling: Editing a video of yourself to show you completing a skill at a level higher than you are currently able to perform

Who: **Combining model types**

- Often called a **mixed-model**
- Combining **skilled** and **unskilled**: Allows for direct comparisons, which may enhance a learner's **error detection and correction** mechanism
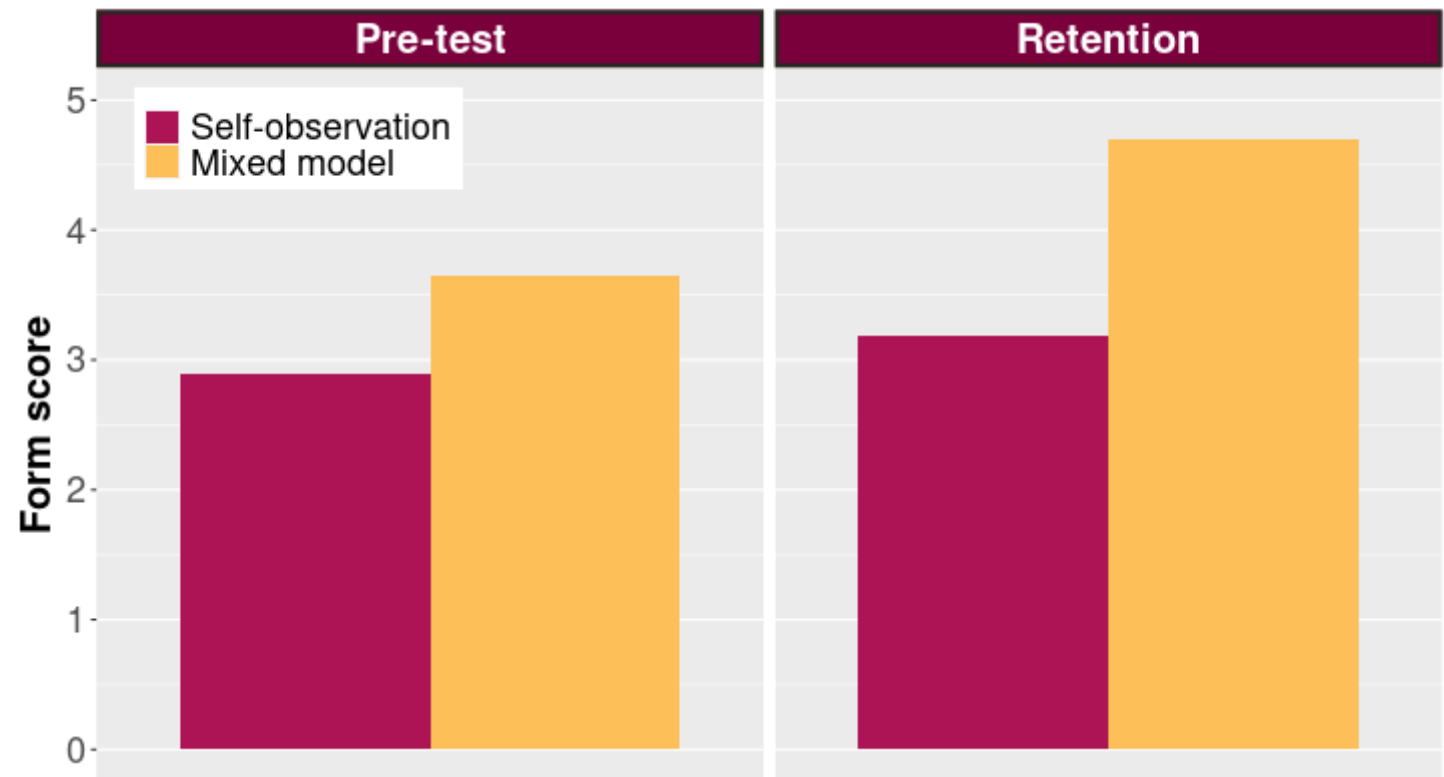
Combining self-observation with an expert model enhances learning

Task: Gymnastics skills

Conditions:

- **Self-observation:** watch themselves
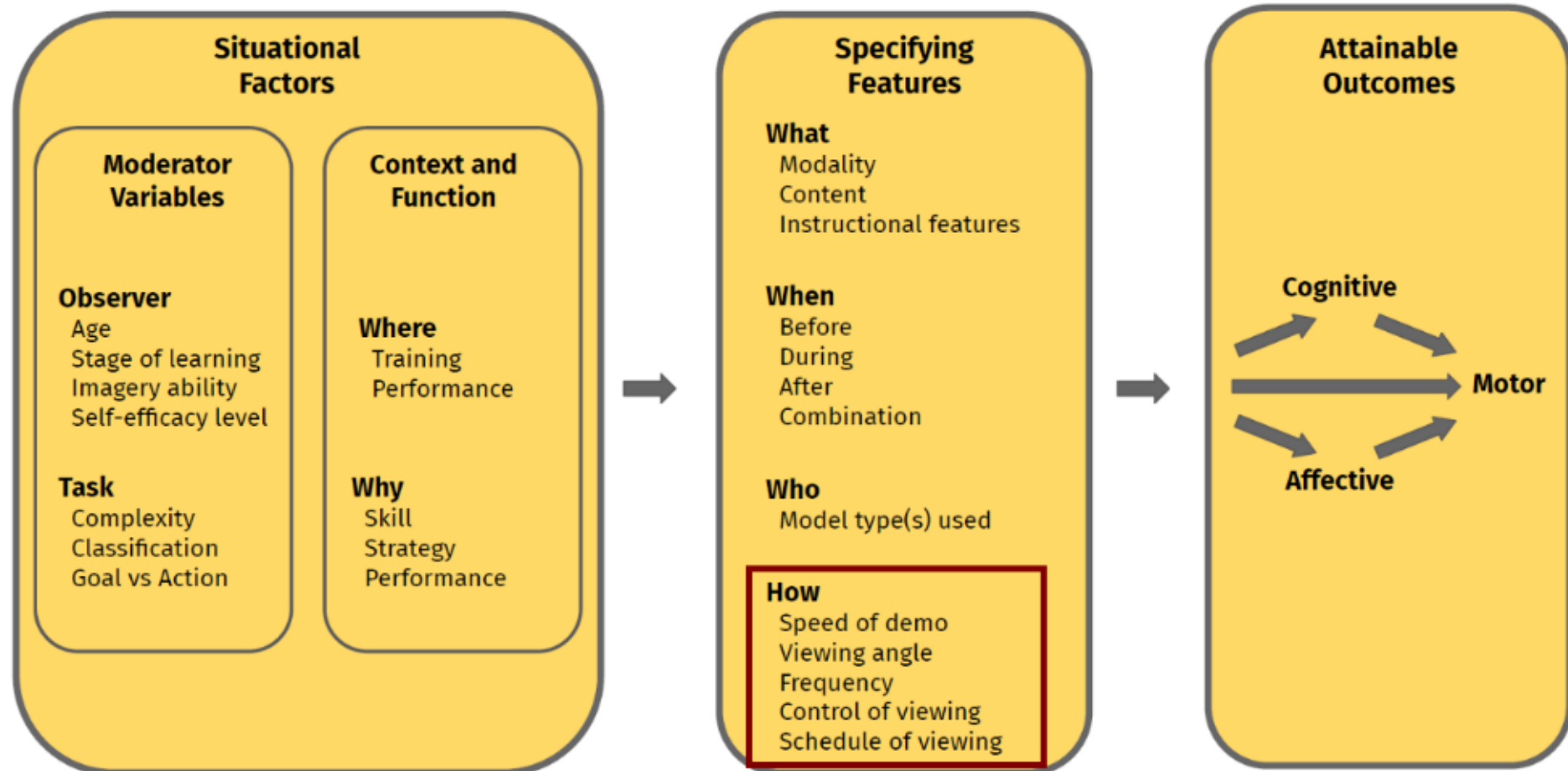- **Mixed-model:** watch themselves and an expert model

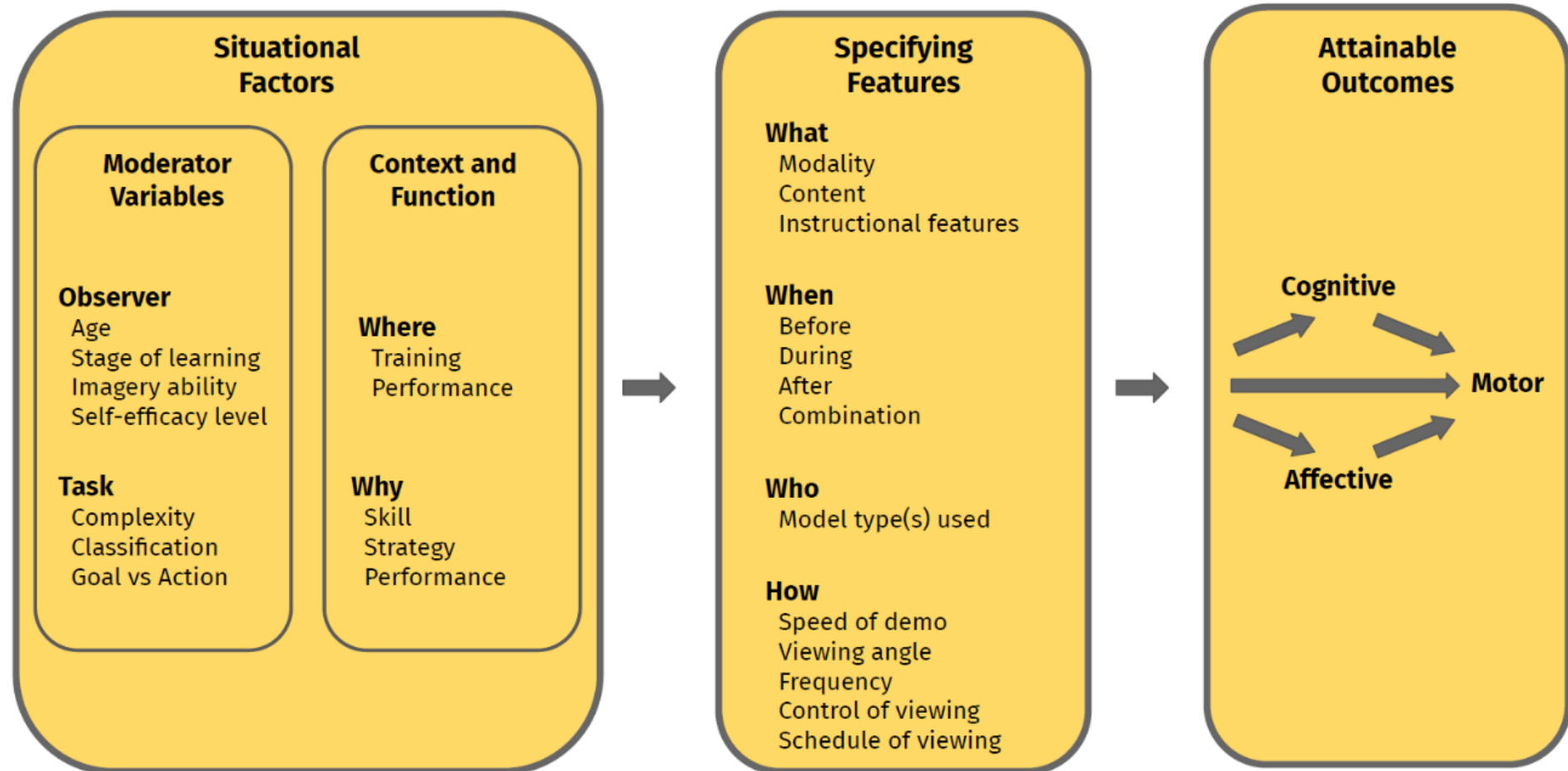# Who: **Choosing a model type**

- Observational learning is an effective way to improve motor learning

- There is no clear gold standard of who to observe

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What questions do you have?
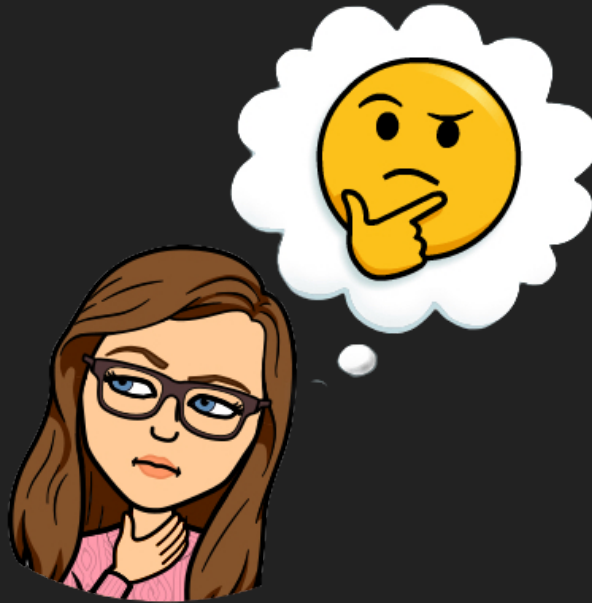
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