

# Whole and Part Practice

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## Credits

This presentation is based on the book by Magill & Anderson (2020).

## Learning Objectives

- Define the terms \_\_\_\_\_ and \_\_\_\_\_ as they relate to the relationships among the parts or components of a complex motor skill.
- Describe ways to apply the part-practice methods of \_\_\_\_\_ and \_\_\_\_\_ to the practice of motor skills.
- Describe several ways to apply \_\_\_\_\_ methods to the practice of motor skills.

## Definitions

- **Whole practice**
  - A practice strategy that involves practicing a skill \_\_\_\_\_ (i.e., as a whole)
- **Part practice**
  - A practice strategy that involves practicing \_\_\_\_\_ of a skill before practicing the whole skill

## Practice a Skill as a Whole or in Parts

The decision to practice a skill as a whole or in parts can be based on the \_\_\_\_\_ and \_\_\_\_\_ characteristics of the skill. Hypothesis by Naylor and Briggs, 1963.

- **Complexity:** \_\_\_\_\_ of parts or components and the degree of \_\_\_\_\_ that characterize a skill.
  - More complex tasks have \_\_\_\_\_ component parts and place more demands on \_\_\_\_\_.
  - Note: “Complexity” is distinct from “\_\_\_\_\_.”
- **Organization:** The \_\_\_\_\_ among the component parts of the skill.
  - Skill has a high level of organization when its component parts are \_\_\_\_\_ and \_\_\_\_\_ interdependent.
    - \* Example: \_\_\_\_\_.
  - Low level of organization: When the component parts are \_\_\_\_\_ independent.
    - \* Example: \_\_\_\_\_.

## Decisions to Use Whole or Part Practice

Assessing the levels of \_\_\_\_\_ and \_\_\_\_\_ of a skill.

- If the skill is \_\_\_\_\_ in \_\_\_\_\_ and \_\_\_\_\_ in \_\_\_\_\_, practice the whole skill.
- If the skill is \_\_\_\_\_ in \_\_\_\_\_ and \_\_\_\_\_ in \_\_\_\_\_, practice by using the part method.

See a closer look: The simplification method for learning three-ball juggling in the next slide.

## How to decide whether to use Whole or Part practice?

- One needs to \_\_\_\_\_ the skill
- According to Naylor and Briggs (1963), focus on:
  - \_\_\_\_\_
  - the extent to which the spatial-temporal characteristics are \_\_\_\_\_
  - decide which levels of \_\_\_\_\_ and \_\_\_\_\_ best represent the skill

## Organization vs. Complexity approach: beam routine in gymnastics

	Low Organization	High Organization
Low Complexity		_____
High Complexity	_____	

Organization: The \_\_\_\_\_ among the component parts of the skill.

Complexity: \_\_\_\_\_ of parts or components and the degree of \_\_\_\_\_ that characterize a skill.

Rule of thumb

- If High in Organization → one must use \_\_\_\_\_ because the parts are interconnected; else, either approach is ok.
- If High in Complexity → one must use \_\_\_\_\_ because the parts are interconnected; else, either approach is ok.
- How would you practice a *balance beam routine* in gymnastics?
- Is the **Organization** High or Low
- Is the **Complexity** High or Low

- Answer: \_\_\_\_\_ and \_\_\_\_\_ -> \_\_\_\_\_ is the most effective

### Organization vs. Complexity approach: Baseball pitching

	Low Organization	High Organization
Low Complexity	_____	_____
High Complexity	_____	_____

Organization: The \_\_\_\_\_ among the component parts of the skill.

Complexity: \_\_\_\_\_ of parts or components and the degree of \_\_\_\_\_ that characterize a skill.

Rule of thumb

- If High in Organization -> one must use \_\_\_\_\_ because the parts are interconnected; else, either approach is ok.
- If High in Complexity -> one must use \_\_\_\_\_ because the parts are interconnected; else, either approach is ok.
- How would you practice *baseball pitching*?
- Is the **Organization** High or Low
- Is the **Complexity** High or Low
- Answer: \_\_\_\_\_ and \_\_\_\_\_ -> \_\_\_\_\_ is the most effective

### Part practice: Fractionization

- Definition: Fractionization is a part-practice strategy for skills requiring \_\_\_\_\_ (AC).
  - What is AC?
    - \* Tasks that demand \_\_\_\_\_ movements from each limb (arm or hand) simultaneously.
- Does it matter which limb to practice first?
  - The \_\_\_\_\_ of individual limb movements determines the order of practice.
    - \* Sherwood (1994) suggests starting with the more \_\_\_\_\_ limb.
- Controversy in Research

- Mixed evidence on the efficacy of whole versus part-practice approaches.
- Fractionization is supported as an effective strategy for asymmetric skills (Walter & Swinnen, 1994).

## Examples

Musical instruments like the \_\_\_\_\_ or sports skills like the \_\_\_\_\_.

## Segmentation - Intro

- Method
  - Start with practicing the \_\_\_\_\_, then progressively integrate additional parts, culminating in the whole skill.
  - The progression should ideally move from \_\_\_\_\_ to \_\_\_\_\_, optimizing learning outcomes.
- Overcoming Integration Challenges
  - Problem: Difficulty arises when trying to \_\_\_\_\_ separate parts of a skill learned in isolation.
  - Solution: \_\_\_\_\_ part practice reinforces the connection between parts as the learner advances.

## Segmentation - Advantages

- Allows \_\_\_\_\_ on individual parts, easing the cognitive load.
- Mitigates difficulties in \_\_\_\_\_ learned parts into a whole skill.
- Ideal for skills involving \_\_\_\_\_ of movements.
- Facilitates \_\_\_\_\_ and \_\_\_\_\_ coordination as parts are integrated.
- Combines the attentional benefits of part practice with the \_\_\_\_\_ advantages of whole practice.
- The learner progressively masters the coordination of parts while managing the \_\_\_\_\_ of the whole skill.

## Segmentation - Examples

- The breaststroke
  - It can be divided into \_\_\_\_\_ and \_\_\_\_\_.
  - Each part is learned separately before integrating them, focusing on \_\_\_\_\_ timing.

- Empirical Support for Segmentation
  - Watters (1992): Demonstrated benefits for \_\_\_\_\_ on a keyboard.
  - Ash and Holding (1990): Showed advantages for learning a \_\_\_\_\_.

## **Simplification - Intro**

- Definition: Simplification involves \_\_\_\_\_ a skill or its components to make it easier to perform.
- Aimed at helping learners grasp \_\_\_\_\_ skills by reducing difficulty.
- Strategies: Several methods can be used, each tailored to \_\_\_\_\_ types of skills.

### **1. Reducing Object Difficulty**

- Technique: Use \_\_\_\_\_ objects to reduce task complexity.
- Example: Learning to juggle with \_\_\_\_\_ instead of balls to slow the movement.
- Research Support: Early practice with simpler objects aids in grasping the \_\_\_\_\_ (Hautala, 1988).

### **2. Reducing Attention Demands**

- Strategy: Minimize the \_\_\_\_\_ by reducing the complexity of the task.
- Example: Using \_\_\_\_\_ while learning to slalom improves focus on movement coordination (Wulf et al., 1998; Wulf & Toole, 1999).
- Application: Body-weight support systems in gait rehabilitation reduce the cognitive load of \_\_\_\_\_ (Miller, Quinn, & Seddon, 2002).

### **3. Reducing Speed**

- Purpose: \_\_\_\_\_ practice to emphasize the timing and spatial aspects of a skill.
- Benefit: Establishes essential \_\_\_\_\_ patterns that can be transferred to normal speeds.
- Evidence: Effective for learning both \_\_\_\_\_ and \_\_\_\_\_ (Walter & Swinnen, 1992).

#### 4. Adding Auditory Cues

- Method: Incorporate \_\_\_\_\_ signals to guide the performance of skills.
- Success: Assists in improving gait in \_\_\_\_\_ patients (Thaut et al., 1996).
- Broader Application: Auditory cues aid various \_\_\_\_\_ and enhance motor rehabilitation (Rochester et al., 2009; White et al., 2009; Malcolm, Massie, & Thaut, 2009).

#### 5. Sequencing Skill Progressions

- Approach: Gradually \_\_\_\_\_ the complexity of tasks in a sequenced manner.
- Example: Baseball players progressing from hitting off a \_\_\_\_\_ to hitting a pitched ball.
- Research: Shows benefits for learning \_\_\_\_\_ and increased \_\_\_\_\_ (Hebert, Landin, & Solmon, 2000; Stevens et al., 2012).

#### 6. Simulators and Virtual Reality

- Advantages: Allows practice without \_\_\_\_\_ consequences and offers control over specific conditions.
- Examples: Diverse applications across \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ training.
- Effectiveness: Generally supported by research when similar to the \_\_\_\_\_ environment (Fisher et al., 2002; Howells et al., 2008).

### Other Approaches

#### An Attention Approach to Part Practice in Whole Practice

- Premise: It's possible to focus on \_\_\_\_\_ of a skill during whole practice to improve specific aspects.
- Advantage: Merges the benefits of both \_\_\_\_\_ and \_\_\_\_\_ practice strategies for skill development.

#### Theoretical Support for the Attention Approach

- Attention Theory: Kahneman's model highlights '\_\_\_\_\_ ' as a key to allocating attention.
- Application: Directing attention to a \_\_\_\_\_ part of a skill during its performance.

## Empirical Evidence of Attention-Directing Strategy

- Study: Gopher, Weil, and Siegel (1989) on learning the \_\_\_\_\_.
- Findings: Directing attention to specific \_\_\_\_\_ of the game improved mastery.

## Implementation of Attention-Directing Strategy

- Instructions focused on specific skill components, e.g., \_\_\_\_\_ the spaceship or \_\_\_\_\_ mines.
- The dual-strategy group (controlling spaceship first, then handling mines) \_\_\_\_\_ other groups.

## Teaching Implications

- Before deciding whether to practice a skill as a whole or by parts, \_\_\_\_\_ the skill to identify its component parts.
- After analyzing a skill and identifying its parts, determine the degree to which the performance of any one part \_\_\_\_\_ on the performance of the preceding part. When parts are characterized with this relationship, the parts should be practiced \_\_\_\_\_ rather than as separate parts.
- It is important not to assume that because parts can be \_\_\_\_\_, they should be practiced separately; the performance dependence on preceding and following parts should always \_\_\_\_\_ the decision concerning which parts to practice separately and which parts to practice together.
- When the parts of a skill follow a specific \_\_\_\_\_ of movements, the preferred way to engage in part practice is the \_\_\_\_\_ part method, in which parts are practiced in sequence and become increasingly larger until the whole skill can be practiced in its entirety.
- When practicing the parts of a skill is not advisable or possible, consider ways to \_\_\_\_\_ the whole skill before engaging people in performing the skill as it would be performed in its real-world context.
- When the technology is available, \_\_\_\_\_ and \_\_\_\_\_ provide excellent initial means of engaging people in practicing a skill before having them practice it as it would be performed in its real-world context.
- Directing attention to a part of a skill while performing the whole skill can be an effective way to \_\_\_\_\_ errors for parts of a skill that should not be practiced as separate parts.



## References

Magill, R. A., & Anderson, D. (2020). *Motor learning and control: concepts and applications*. McGraw-Hill Education. <https://www.bkstr.com/csunorthridgestore/product/motor-learning-and-control--concepts-and-applications-147614-1>