

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>