Whole and Part Practice

KIN 377 Motor Learning - Spring 2024 @ CSUN

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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

Whole or Parts Practice

Complexity vs. Organization

The decision to practice a skill as a whole or in parts can be based on the _____ and _____ characteristics of the skill (Naylor & 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: _____.

How to decide whether to use Whole or Part practice?

- Must _____ 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

Example: Juggling

(Image of juggling)

Decisions to Use Whole or Part Practice

Assessing the levels of _____ and _____ of a skill.

- If the skill is _____ in _____ and _____ in _____, practice the _____ skill.
- If the skill is _____ in _____ and _____ in _____, practice by using the _____ method.

Example: 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 _____ –> one must use _____ because the parts are interconnected; else, either approach is ok.
- If High in _____ –> 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

Example: 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 | Segmentation | Simplification

Fractionization - Intro

- Method
  - 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 _____ limb.
  - Fractionization is supported as an effective strategy for asymmetric skills (Walter & Swinnen, 1994).

Fractionization - Examples

Musical instruments like the _____ or sports skills like the _____.

Segmentation - Intro

Although helpful, part-practice can be a problem when performer needs to put the part back together with the whole skill.

- 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 _____ with the integrative advantages of _____.
- The learner progressively masters the coordination of parts while managing the _____ of the whole skill.

Segmentation - Examples

(Image of breaststroke)

- 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

(Image of juggling with bean bags)

- 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

(Image of skiing with poles)

- 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

(Image related to 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

(Image related to simulators or VR)

- 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

Part Practice in Whole Practice

Problem: When a skill should not be taught using part-practice but some aspects are important to focus.

Solution: Application: Directing attention to a specific part of a skill during its performance.

- 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.

  Momentary intentions - the conscious, voluntary decisions about where to focus attention at a given moment. Kahneman's model proposes that these momentary intentions are a central factor in the allocation of attention

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