Attention

KIN 377 Motor Learning - Spring 2024 @ CSUN

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Credits

This presentation was based on Chapter 09 - Attention from Magill & Anderson (2020).

Learning Objectives

- Define the term _____ as it relates to the performance of motor skills - Discuss the concept of _____ _____ and identify the similarities and differences between _____ and _____ central-resource theories of attention capacity. - Describe _____'s model of attention as it relates to a motor skill performance situation - Describe the differences between _____ and _____ theories of attention capacity - Discuss _____ techniques that researchers use to assess the attention demands of performing a motor skill. - Explain the types of _____ _____ a person can employ when performing a motor skill. - Define _____ _____ _____ and describe how it relates to attention capacity limits and motor skill performance. - Discuss how skilled performers use _____ and _____ motor skills in visual search.

Think, pair, and share activity

- Think about a motor skill that you perform that requires you to do more than one thing at the same time ~ _____ seconds - Now, describe this motor skill to your partner. As you do so, talk about how you can simultaneously perform these multiple activities by identifying what you think about, what you do not think about, and what you visually focus on as you perform these activities - ~ _____

The concentration test

Defining Attention

- Attention refers to several characteristics associated with _____, _____, and _____ activities that establish limits to our performance of motor skills. - According to scientists, attention limits influence performance when we do more than _____ simultaneously.

Agenda

1. Attention and Multiple-task Performance
2. Attention Theories
3. Dual-task procedures for assessing attention demands
4. Focusing attention
5. Attention and Automaticity
6. Visual search and motor skill performance
7. Training visual search strategies
8. Points for the practitioner

1. Attention and simultaneous performance of multiple activities

Attention and Multitasking

When we simultaneously perform multiple tasks (for example, driving a car, listening to a CD, and talking with a passenger), we sometimes:

- Experience no difficulties in performing all the tasks, but - Cannot do all the tasks as _____ as we would like

WHY?

The answer relates to attention as a _____-limiting factor.

2. Attention Theories

Filter theories (known as bottleneck theories). - Difficulty doing multiple tasks at one time because of the inability to _____ process multiple stimuli. - The human brain is like a computer: _____ > _____ > _____ - Bottleneck: Along the way, the system _____ out info NOT selected for further processing

Popular for many years, but… - Research > Information-processing functions could be carried out _____ - How to explain attention limits? - Is the result of the limited availability of _____ (similar to financial resources)?

Theories emphasizing attentional resource limits

- We can perform _____ simultaneously, as long as the resource capacity limits are not exceeded.
- What if these limits are exceeded?
- We experience difficulty performing one or more of these tasks (remember the tap/rub activity?)

The question about the number of sources - View 1 > there is _____ from which all attentional resources are allocated - View 2 > there are _____ sources for resources

Central-resource capacity theories of attention.

- Attention-capacity theories propose one _____ of attentional resources for which all activities requiring attention compete.
- Financial analogy > one source from which all activities must be _____

Kahneman's Attention Theory

- Kahneman's attention theory: An example of a _____ resource theory. - A single source of mental resources from which we derive cognitive effort is presented as a "_____" of resources that has a _____ capacity. - Available attention can vary depending on certain conditions: - The _____, the _____, and _____ characteristics

Three rules that people use to allocate attention resources when performing multiple tasks.

1. _____ to ensure completion of at least one task
2. Enduring dispositions: Involuntary attention to at least two types of characteristics of events.
    - Event is _____ for the situation in which it occurs.
    - _____ of the event to us personally.
3. Momentary intentions.
    - People allocate attention according to their specific _____.
    - Can be _____ or directed by an _____

Multiple Resource Theories

- Alternative to _____ theories. - Propose that we have _____ for attention. - Each source has a _____ capacity

Wickens > Resources for processing info are available from 3 sources: 1. _____ (vision, limbs, and speech) 2. _____ (perception, memory encoding, response output)
3. _____ (verbal codes, spatial codes)

Success in performing two or more tasks simultaneously depends on whether those tasks demand our attention from a _____ or from _____ resources.

3. Dual-task procedures for assessing attention demands

Dual-task procedure determines _____ and _____ of the simultaneous performance of two different tasks. - Primary task is the _____. - Secondary task performance is the basis to make inferences about the _____ of the primary task.

4. Focusing Attention

Attentional focus is the directing of attention to specific aspects of our _____ or _____ environment.

Width of focus

- Focus on environmental and mental activities can be _____ or _____

Direction of focus

- Focus can be _____ (cues in the environment) or _____ (internal thoughts, plans, problem-solving activities)

Attention switching

- The changing of _____ _____.

images/soccer-pass.mp4

To pass a soccer ball, one needs to...

Focusing Attention on Movements versus Movement Effects

Does _____ or _____ direction of attentional focus matter?

Action effect hypothesis (Prinz, 1997) explains:

- Proposed benefit of _____ focus during performance
- Focus attention on _____ (i.e., "effects") of movements rather than on the _____ themselves

Why: constrained action hypothesis - Performer consciously attempts to _____ performance - Reverses to earlier, less _____ form of movement control

5. Attention and Automaticity

Is attention linked to _____?

Automaticity = Performance of a skill (or its parts) with _____ on attention capacity. - Relates to evaluation of the _____ in the component of Kahneman's model of attention. - Some problems require _____, and effortful mental activities are influenced by _____ and _____. - _____ brain areas are active when tasks are automatized - Example: _____ (2005) fMRI based research.

Examples

images/dribble-exp.mp4

images/dribble-novice.mp4

6. Visual Selective Attention (VSA)

Definition of VSA

- The term refers to _____ and _____ performance-related information in the performance environment.

Visual search

- _____ relevant information in the environment, enabling a person to determine how to _____ and _____ a skill in a specific situation.

Eye movements and visual selective attention

- Device can track the _____ while people observe a scene.
- What a person is visually attending to is inferred from the "_____" (locus of central vision).

What is the relationship between eye movements and visual attention? - Does what a person _____ (point of gaze) indicate where _____ _____ is directed?

Selective Attention and Point of Gaze

- Directing visual attention to an environmental feature without _____ at it is possible.
- Remember, eye-movement recordings track _____ and not _____ vision.

Rethink the moto: 'Keep your eyes on the _____ at all times.'

How We Select Visual Cues

Visual search and intended actions - The performer looks for specific cues in the performance environment, enabling them to achieve a specific _____. - Example: _____ and _____ (2002) demonstrated that the focus of initial eye movements differed when participants were told to point to or grasp an object.

Feature integration theory

- Initial visual search is based on specific features, such as _____ or _____.
- Selection of features of interest occurs when a person focuses the _____ on the master map of all features.

Visual Search and Motor Skill Performance

Visual search helps gather info that influences three aspects of the action control process: 1. Action _____ 2. _____ of the selected action
3. _____ of action initiation

Note that these three preparation processes are influenced by visual search in _____ motor skills and _____ motor skills.

Relearning how to pick up a coffee mug (closed skill) - Ask a patient to assess the content of the mug before movement initiation: - Full, hot, etc. - Shape of the handle

Passing a soccer ball after receiving it from goalkeeper (open skill) - Ball speed - Pressure

Tennis serve example

7. Training Visual Search Strategies

Do we need to train it?

- Visual search success is based on _____ in specific performance situations.
- These strategies are often acquired without _____ training and without the person's _____ awareness of the strategies they use.

Some specific cases it may help. See the Quiet Eye in the next slide.

The Quiet Eye

- Refers to the amount of time devoted to the _____ just before movement initiation. - It is directed to a _____ or _____ in the performance context. - It is a _____ of the performer's gaze. - Its onset occurs just before the _____ common to all performers of the skill. - Its duration is _____ for elite performers.

https://youtu.be/vhf8DMYNgi8

Points to the Practitioners

1. The capability to do multiple activities simultaneously when performing a motor skill can be _____-_____. This means that a person may succeed more in some situations than others. Note these differences and use them to design further instruction and practice.

2. People will be more likely to be _____ while preparing to perform, or performing, a motor skill when events occur in the performance environment that is not usually present in this environment.
3. Skilled individuals will be more likely to perform at their best when their _____ or _____ levels are optimal for performing the skill in the situation they will experience.
4. People will perform motor skills better when they focus their _____ (i.e., what they "think about") on the _____ of the movement rather than on their own movements.
5. You can enhance a person's visual selective attention in performance situations by providing many opportunities to perform a skill in various situations in which the most _____ remain the same in each situation.
6. Train people to focus on the most relevant cue in the performance environment and then maintain _____ with that cue just before initiating movement – this relates to 'quiet eye'.

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