

High-level attention

- Attention in complex tasks
- Central executive function
- Attention deficits
- Automaticity

Playing a sport

- When you first learn to play basketball you have to attend to too many things
 - You have to watch yourself dribble
 - You have to watch the people around you
 - You have to find the basket
- As your skill grows, certain things require less effort
 - Dribbling gets easier
 - You have a sense of where players on your team will be
 - You can get more sense of the flow of the game
- How do the attentional demands of tasks change with expertise?

Executive attention

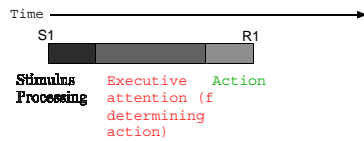
- Our actions are governed by executive attention
 - Determines what actions we select
 - Determines the order of these actions
- There is a limited amount we can do at one time
 - Limited by our sensor and effector systems
 - We have only 2 eyes and 2 arms
 - May have cognitive capacity limits as well

Evidence for executive attention

- Psychological Refractory Period (PRP)
 - A form of dual-task interference
- Two simple tasks
 - With left hand:
 - Press with middle finger if high tone
 - Press with index finger if low tone
 - With right hand
 - Press with middle finger if the letter T
 - Press with index finger if the letter R
 - Always identify tone before letter
- Responses to the second task are slower than if that task was given alone.

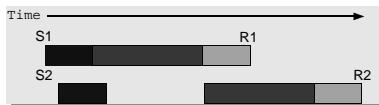
Why?

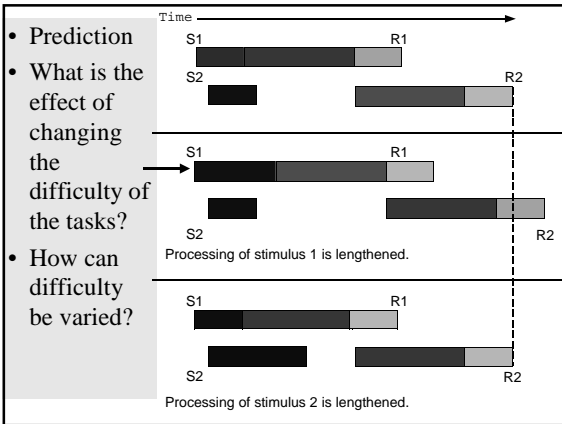
- Pashler argues that central executive attention is involved.

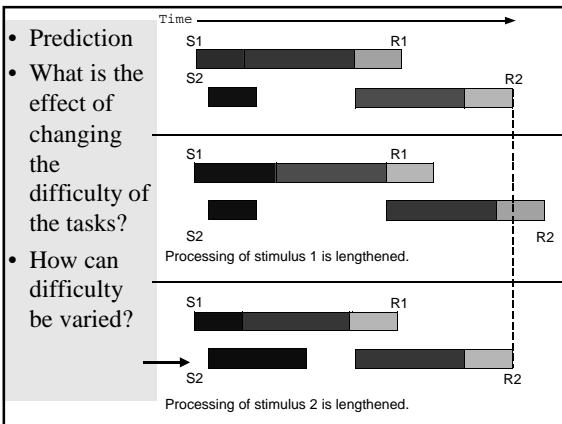


Slowing of second task

- Executive attention decides the order in which tasks are accomplished.
 - Only one action can be planned at a time
 - Other actions must wait







ADHD and Sustained Attention

- Selecting among tasks and perceptual inputs is difficult
 - Attention Deficit/Hyperactivity Disorder
 - A deficit in this ability to select and sustain attention to one set of inputs and actions
- Distractors are a problem in ADHD
 - Milich & Lorch: Sustained attention to a TV program easier with no toys around than with toys
 - Ceci & Tishman
 - Memory test: Normals better than ADHD
 - ADHD kids remembered more of the posters on the wall

Skilled performance

- How do we become skilled in complex tasks?
 - The individual tasks become more automatic
 - We get better at using central executive attention to plan actions
 - A professional basketball player dribbles and shoots automatically
 - This player can plan complex actions in advance
- What does automaticity mean?

Automaticity

- A task is automatic if...
 - It does not require attention to monitor
 - It occurs outside of consciousness
 - It is ballistic
 - Once begun, it runs to completion
- We become automatized to many routines in life.
 - That is part of what makes moving to a new apartment our house stressful.

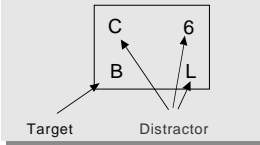
How does this happen?

- How does a task become automatic
- Two key components
 - Practice, practice, practice...
 - Consistent mapping

Example: Visual search

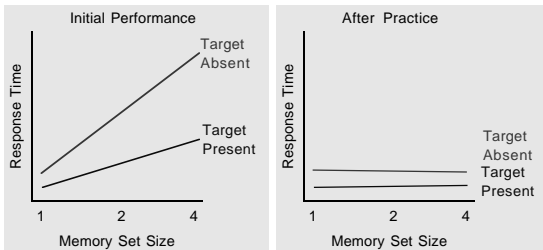
- Search with a memory set

Memory set: T B
(can vary between 1 and 4 items)

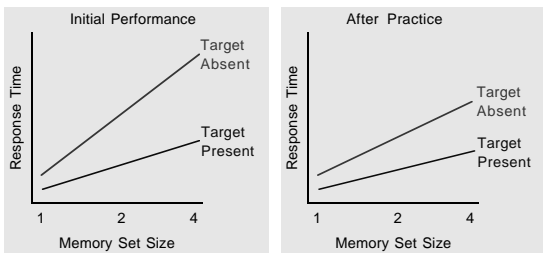


- Memory set can change from trial to trial
- Consistent mapping
 - Targets on one trial are never distractors
- Inconsistent mapping
 - Targets on one trial may be distractors on another

For consistent mappings



For inconsistent mappings



Instance Theory

- Consistency of mapping is required for automaticity
- May reflect importance of memory in automaticity
 - Automatic performance involves retrieving a previous episode from memory and doing the same thing
 - Item from memory might be a fact
 - Learning to do addition automatically
 - Item from memory might be an action
 - It may be strange to think of actions as being a kind of memory
 - After the first exam, we will explore the structure of memory

Summary

- Complex actions require central executive attention
- Components of action may become automatic
- Automaticity requires practice and consistency of mapping
 - Practice does not make perfect, perfect practice makes perfect --*Vince Lombardi*
