

Archery
Motor

MOTOR Learning Part 2

How to Measure M.L.

9-27-17

think
CORR
Error
Auto
Fluid

3 Stages Fitz
COGNITIVE
ASSOCIATIVE
AUTONOMOUS

Practice Acquisition
Retention
Transfer
(instinctual)

Phoenix
Crypton

- improve
- intuitive (FLOW STATE) → Autonom
- state of mind

"Paulo
Coelho"

- Prac & Repeat
- Bow Posture Strength
- Flight of an Arrow
- Projection of an Intention into space
- Target Trial & Error

He will have another opportunity

Blume's TAXONOMY CHART

Analyze diff

Remembering & Understanding
Rel perm change in performance
Result from PRACTICE

NOT DIRECTLY observable
improve perceptual reading of task (STIM ID)
decision making (RESP SELECT)

MOTOR performance (RESP Program)

Optimal Positive Feedback
3 most INTERESTING
Gymn Figure Sk
Diving
CANVAS

MOVEMENT OUTCOME

step to which a movement
achieves a goal

Dist
Speed
Accuracy
Form

(indirect ways to assess learning)
freethrow percentage

how could you assess learning in
(list of activities)

motor memory

(Esteban Salcedo + George Torres)

EMG electromyography
timing
AMPLITUDE
MAX Contraction
Muscle Activity
other high tech ways to measure
484 Motor

MRI

TMS
transcranial
magnetic
stimulation

9-27-17
WED
484

measure
motor
learning

optimal theory of
motor learning
DIAGRAM

zap area of brain/controls motor cortex

Eye Tracking

- what are you visually paying attention to
Terry Crews
"Danger Zone Video"

How to do a Motor Control Study

Retention (higher levels of RET)

Transfer Skill Perform.

(doing) technique (sport) 1/3

blocks of trials = reps

Practice Perf.

John Kessel

USA Volleyball

sets of reps

PreTest

Practice

Retention

PRAC/ACQUISITION = ST learning within small period of time

RETENTION

relatively permanent change in ability

Retention Interval = between time trials
susceptible to forgetting if interval too long

Transfer: test performance on a related task

Tennis → Badminton

Wonderful World of Oabi Wolf

Schmidt
Lee

INTRO TO MOTOR LEARNING PART 2

HOW TO MEASURE MOTOR LEARNING
-PRACTICE/ACQUISITION
-RETENTION
-TRANSFER

MOTOR LEARNING

- **Motor Learning:** the relatively permanent change in performance
 - Resulting from practice & experience
- ***Not directly observable:**
 - Must infer the neuromotor changes from changes in performance
 - Improved perceptual reading of the task (stimulus identification)
 - Improved decision making (response selection)
 - Improved motor performance (response programming)
 - Changes in neuroplasticity
- ****Describe movement outcomes: the extent to which a given movement achieved the intended goal.**

[HTTPS://WWW.YOUTUBE.COM/WATCH?V=LXIEWDNFZRK](https://www.youtube.com/watch?v=LXIEWDNFZRK)

Through Russ
Not his muscles
But percussion he provides

"Clint Eastwood" by the Gorillaz

STIM ID
Response Selection
Response Programming

percept read
decision making
motor performance
STIM ID
RESP Select
RESP
programming

Assess Learning

Distance
Speed
Accuracy
Form

INDIRECT WAYS TO ASSESS LEARNING

- Distance
- Speed
- Accuracy
- Form



HOW COULD YOU ASSESS LEARNING IN...

- | | |
|--|---|
| <ul style="list-style-type: none"> • Swimming • Soccer – offensive vs. defensive players • Archery • Batting in baseball or softball • Weight Lifting • Golf • Chess • A video game • Playing Piano | <ul style="list-style-type: none"> • Slacklining • Disc golf (frisbee) • Juggling • Skateboarding • Standing or Walking • Fencing • Riding a bike • Dance routine • Tennis • Etc... |
|--|---|

EMG
Eye Tracking
fMRI
TMS

blood oxygenation of brain involved in activity

OTHER, HIGHER TECH WAYS TO MEASURE MOTOR LEARNING

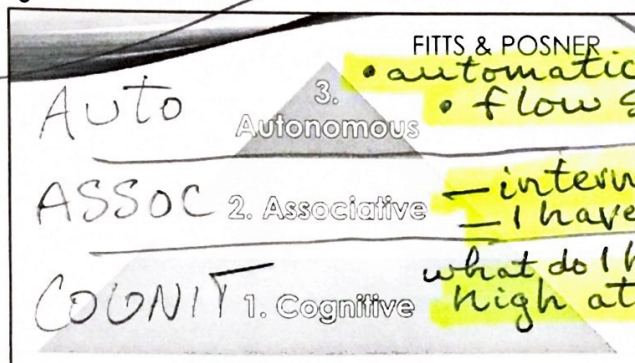
- **Electromyography (EMG)** *MM ACTIV.*
 - Muscle activity
 - <https://www.youtube.com/watch?v=Gki2uFFi2s>
- **fMRI (functional Magnetic Resonance Imaging)**
 - Blood oxygenation to region of the brain involved in an activity
- **TMS (transcranial magnetic stimulation)**
 - Stimulation intensity necessary to elicit muscle contraction
- **Eye Tracking**
 - What are you visually paying attention to?
 - <https://www.youtube.com/watch?v=xgVvIBa0lc>



WEEK 6
cerebellum
trial & error

APPLICATION of STAGES / MODELS

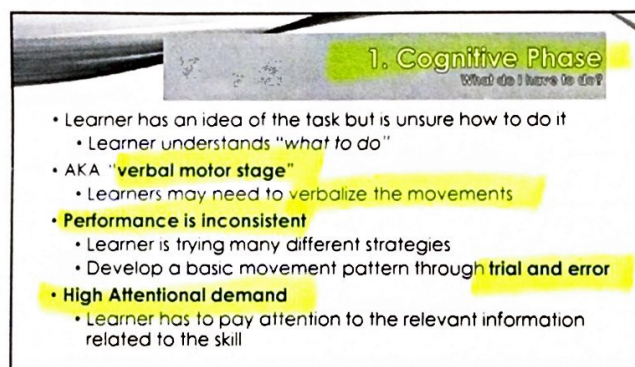
10/9/2017



• automatic • focused on planning & strategy
• flow state

— internal reference of correctness
— I have an idea of what to do

what do I have to do
high attentional demand



COGN Verbal Motor
inconsistent

COGN trial and error

COGN high attentional demand

ASSOC = develop awareness of mistakes

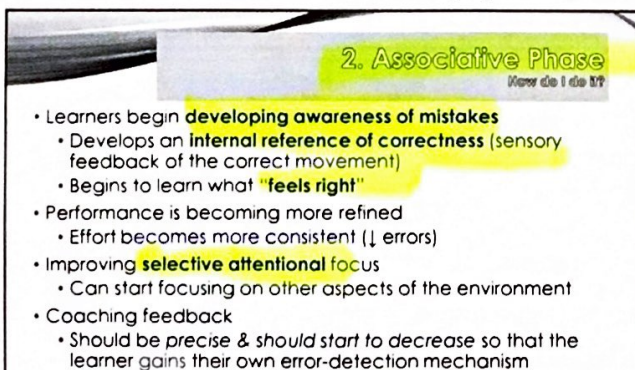
ASSOC = internal reference of correctness

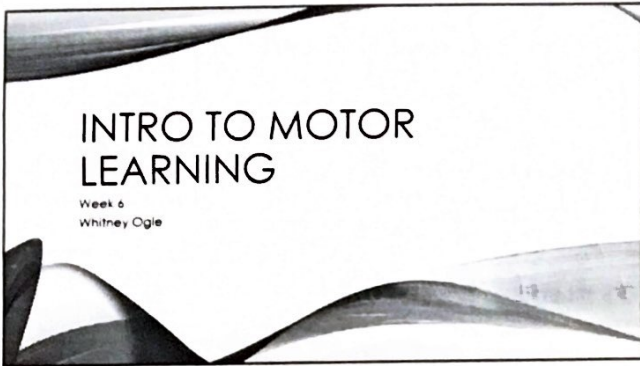
ASSOC =

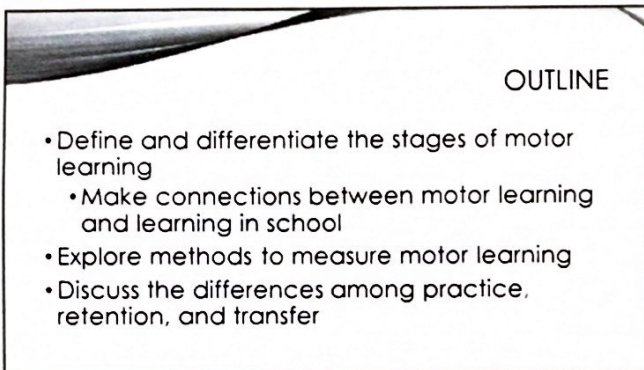
begin to learn what feels right

ASSOC = selective attentional focus

can start focusing on other aspects of the environment

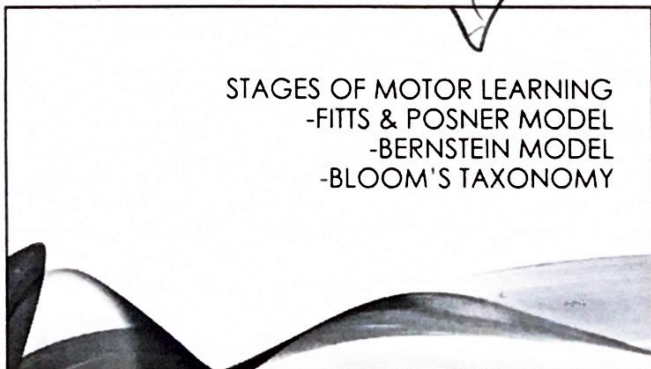






- Define and differentiate the stages of motor learning
 - Make connections between motor learning and learning in school
- Explore methods to measure motor learning
- Discuss the differences among practice, retention, and transfer

Application of the stages

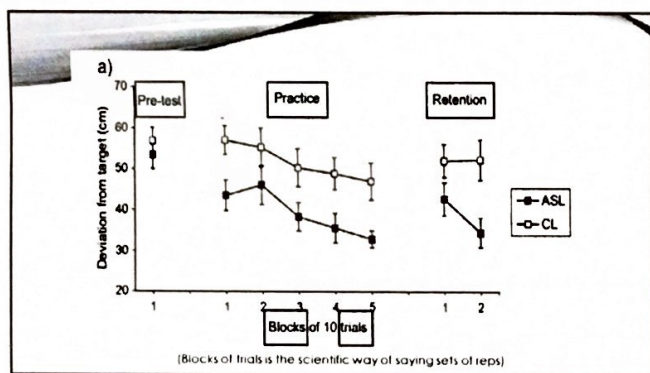


STAGES OF MOTOR LEARNING
- FITTS & POSNER MODEL
- BERNSTEIN MODEL
- BLOOM'S TAXONOMY

HOW TO DO A MOTOR LEARNING STUDY

https://www.youtube.com/watch?v=m_5nWkyRzKM

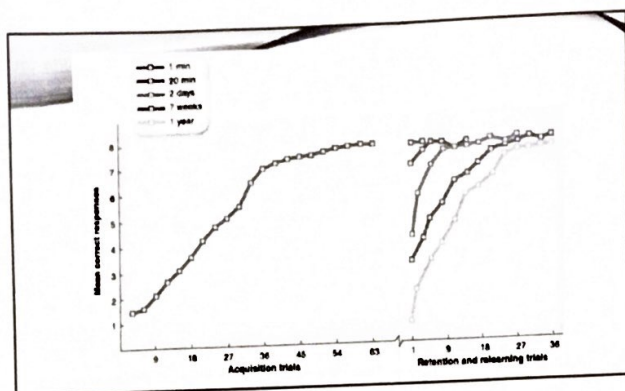
(Watch until ~2 minutes)

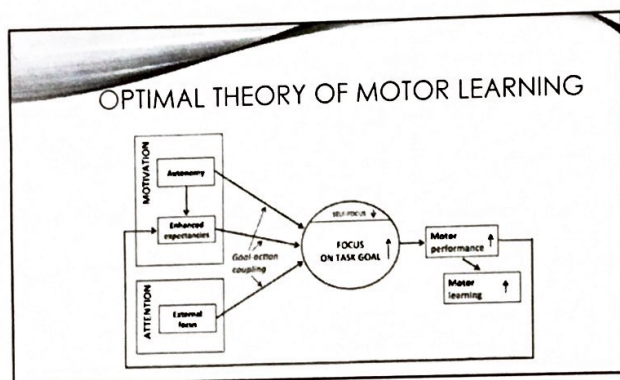


KEY TERMS IN MOTOR LEARNING STUDIES

- **Practice/Acquisition:** short term learning within a relatively small period of time
- **Retention:** relatively permanent change in ability; test performance on same task after some rest
 - **Retention Interval:** the period of time between acquiring the skill and performing the retention trials.
 - Susceptible to forgetting, if the retention interval is too long.
- **Transfer:** test performance on a related task
 - For example: practice tennis serving, transfer test is badminton serving.

transfer = test performance on a related task





BREAKING DOWN THE OPTIMAL (2016) PAPER

- Enhanced Expectancies
 - Positive feedback
 - Social-comparative feedback & Self-Modeling
 - Perceived task difficulty
 - Conceptions of ability
 - Extrinsic rewards
 - Positive affect
- Autonomy
 - Control over practice conditions
 - Instructional language
 - Incidental choices
- External Focus of Attention
 - Movement effectiveness
 - Movement efficiency
 - Movement form

Come prepared with 3 important things from your section for a discussion on Monday
→ Your group will present this topic to the class on Monday
