

VIRTUAL BRAIN TRAINING

AGENDA FOR VIRTUAL BRAIN TRAINING

1 WHY WE NEED VIRTUAL BRAIN TRAINING

2 BRIEF SCIENTIFIC OVERVIEW

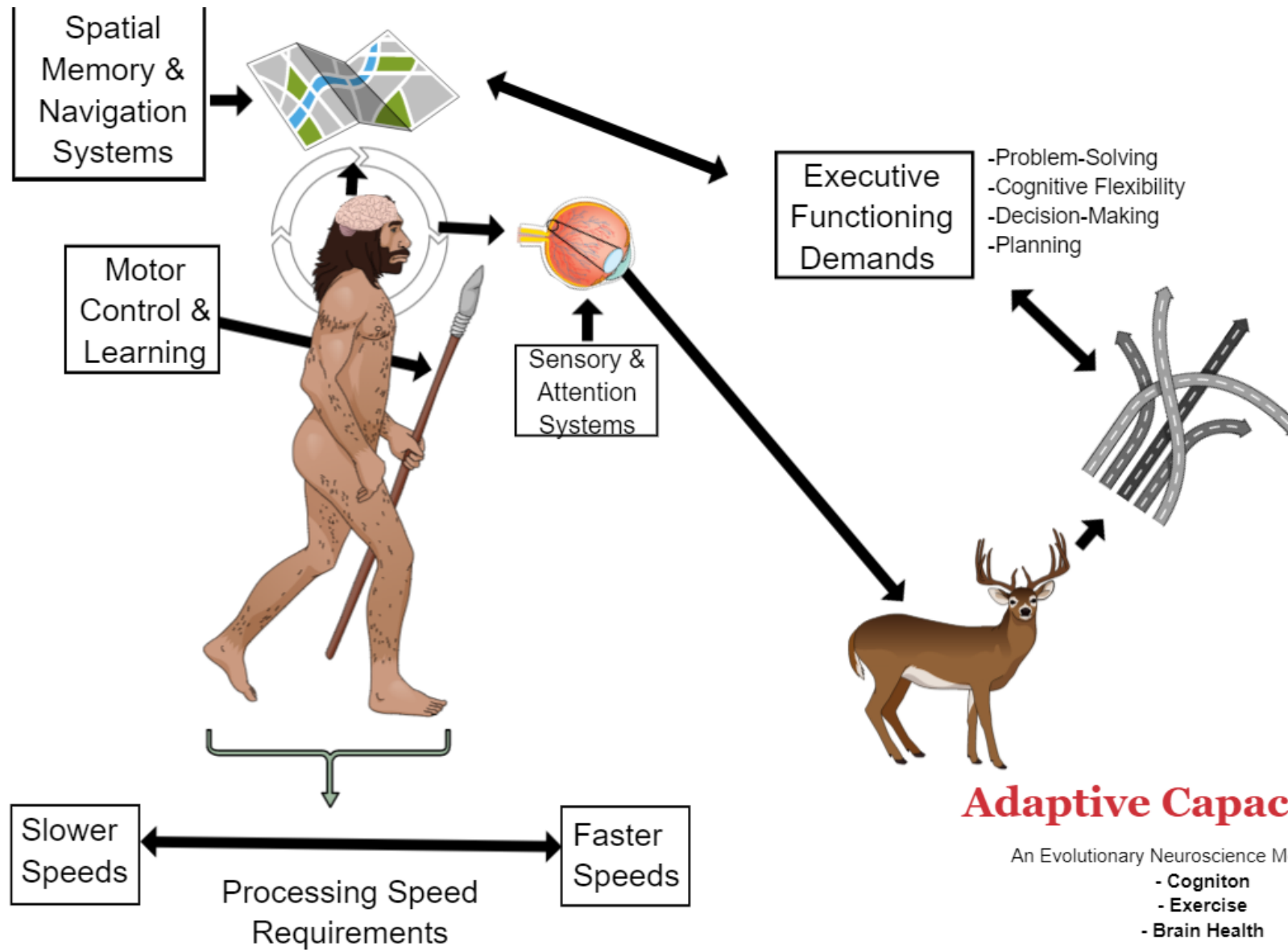
3 COGNITIVE CATEGORIES & MODIFICATIONS

4 COGNITIVE TASK LIBRARY + VIRTUAL MODIFICATIONS

5 TECHNOLOGY-ENABLED SOLUTIONS

THE PROBLEM

- **COVID-19 HAS CHANGED THE WAY THE HEALTH & FITNESS INDUSTRY OPERATES**
- **DIGITAL TRAINING HAS EMERGED AS A PRIMARY MEDIUM, YET COGNITIVE LOAD IS NOT ENOUGH/EXPLICIT**
- **MANY OF THE “AT-RISK” POPULATIONS (OLDER ADULTS, CHRONIC DISEASE) ARE AT A GREATER RISK OF COGNITIVE DECLINE**
- **DIGITAL TRAINING CAN LACK ENGAGEMENT/NOVELTY**
- **COGNITIVE TRAINING VIRTUALLY IS NOT OBVIOUS**



Adaptive Capacity Model

An Evolutionary Neuroscience Model Linking

- Cognition
- Exercise
- Brain Health

Raichlen et al., 2017, Trends in Neuroscience

Open



Closed

Environment is constantly changing

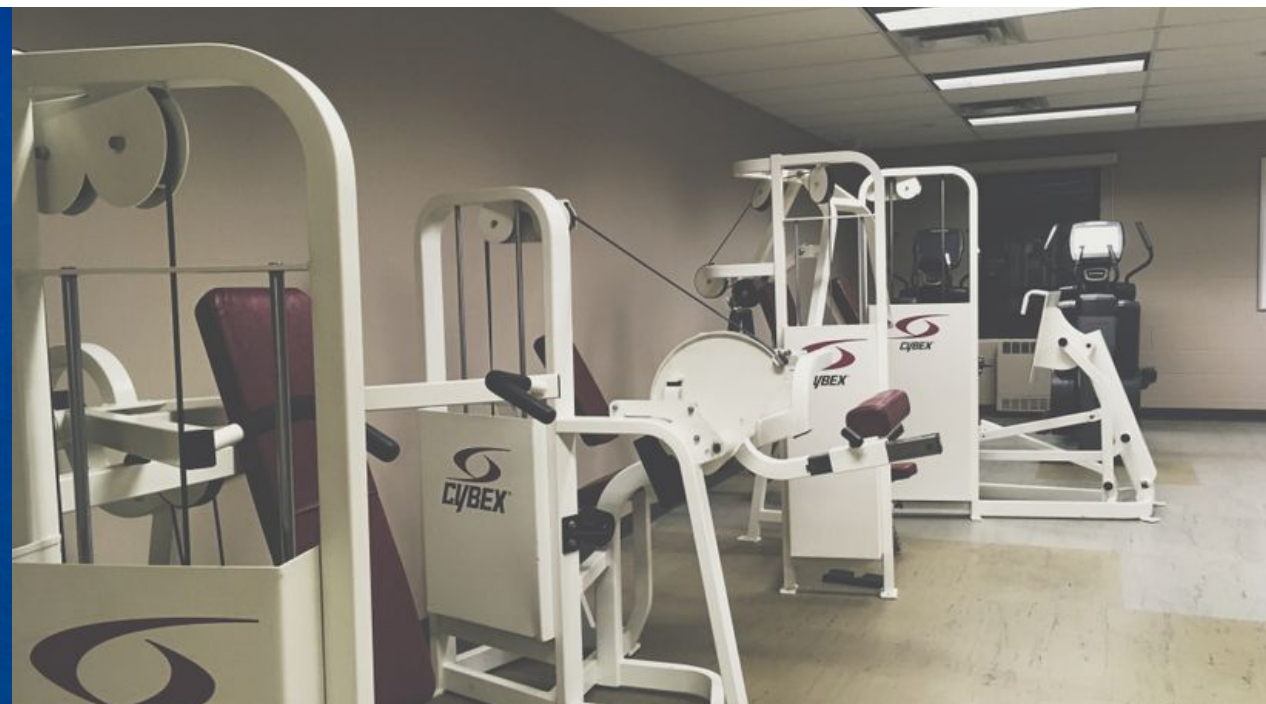
Movements have to be continually adapted

Predominately externally paced

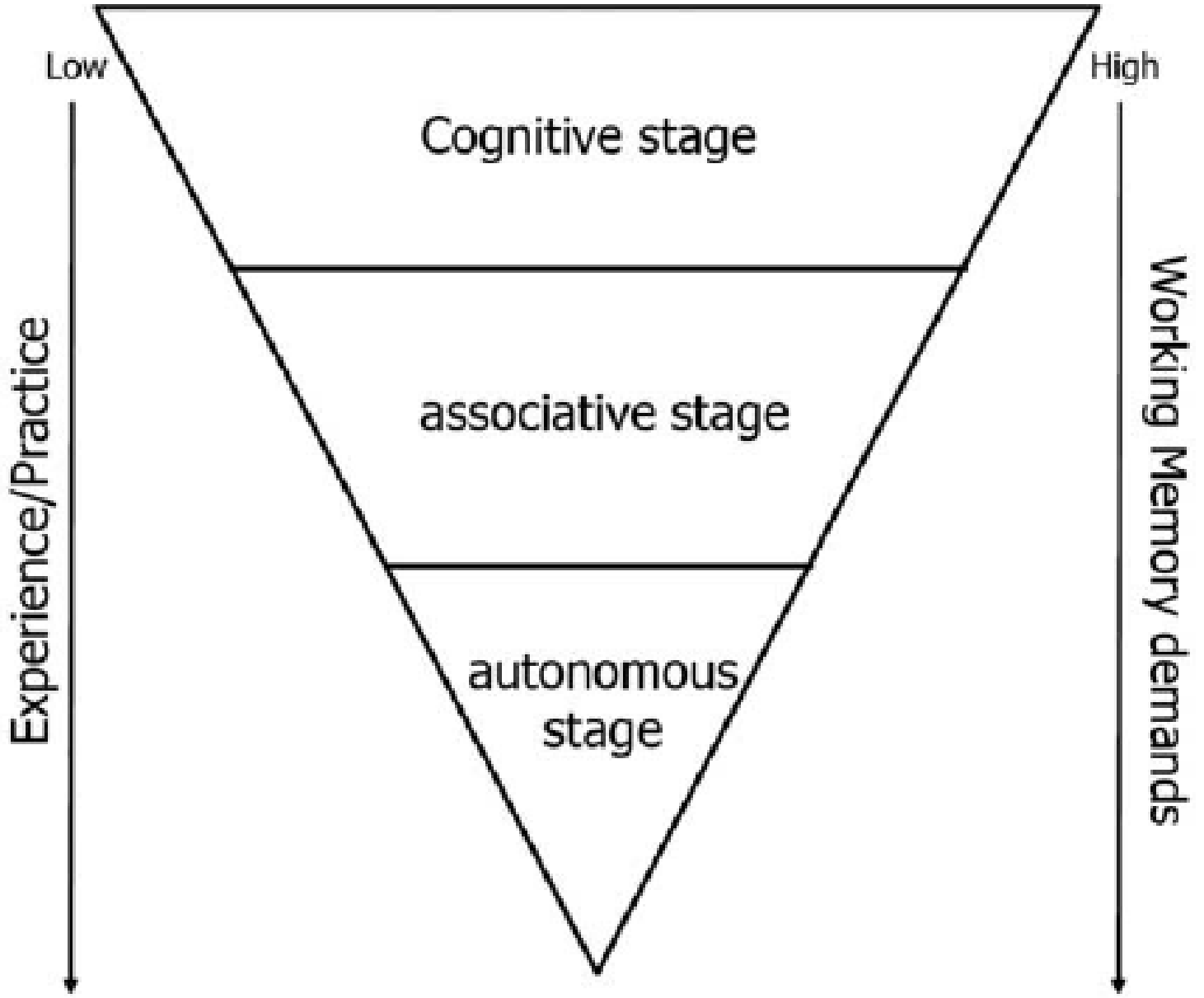
Stable & predictable environment

Movements have a clear beginning & end

Performer knows what to do & when



Controlled processing



Low

High

Cognitive stage

Experience/Practice

associative stage

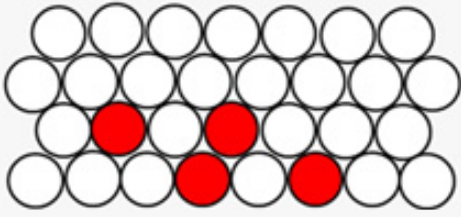
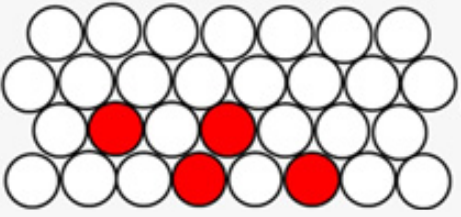
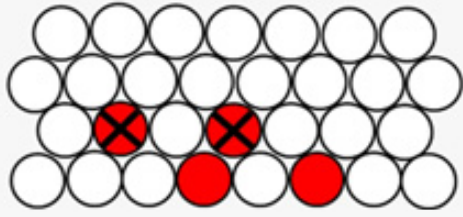
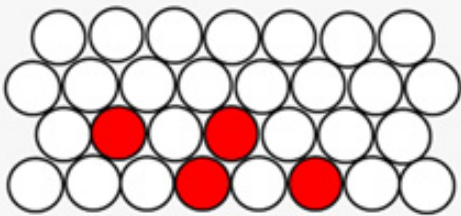
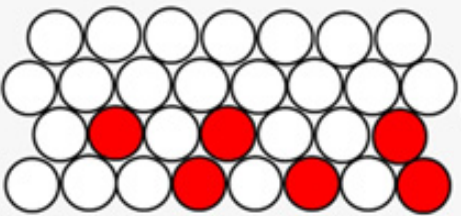
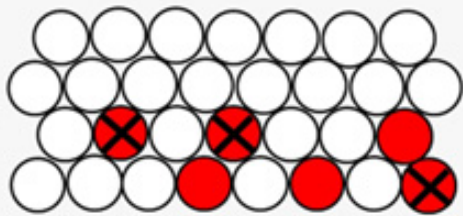
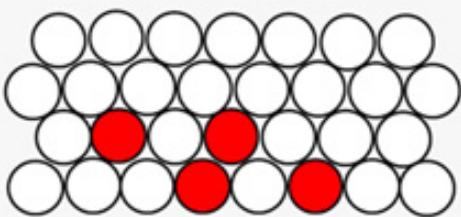
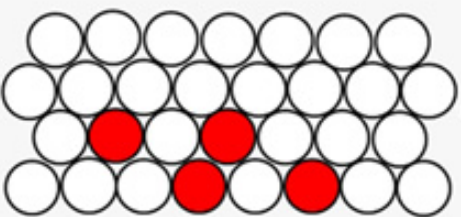
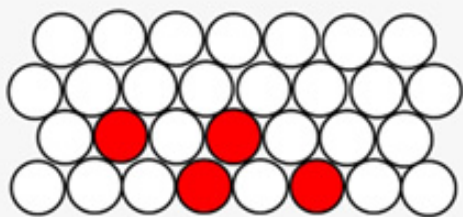
Working Memory demands

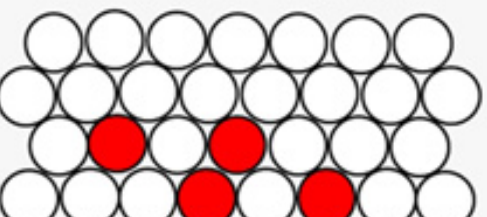
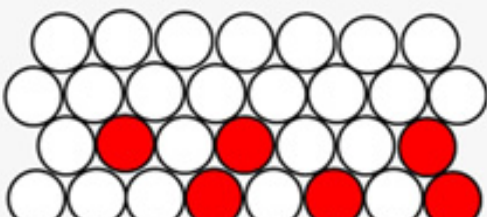
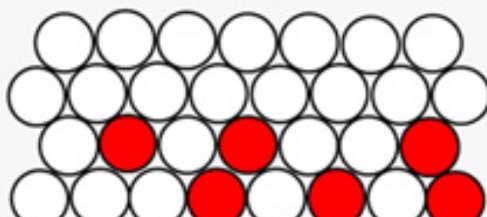
autonomous stage

High

Low

Automatic processing

	Before	During	After
No training			
Physical exercise			
Mental training			

Mental and Physical (MAP) training			
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COGNITIVE-PHYSICAL TASKS

THE 4 PRIMARY COGNITIVE DOMAINS



ATTENTION

Includes attending (visually or auditory) to a stimulus in sustained, selective, switching, or divided capacities



PROCESSING SPEED

Less complex (bottom-up) processing that is based in time to response or reaction. Present in all tasks and measured by time.



EXECUTIVE FUNCTIONING

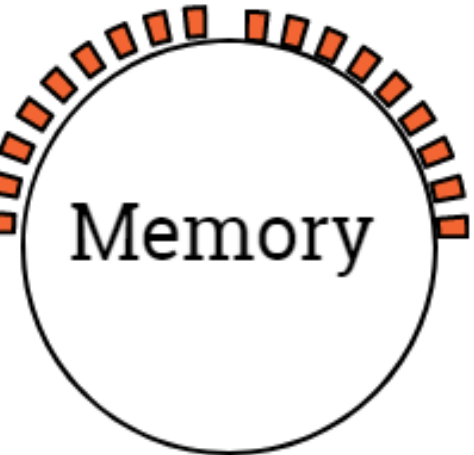
More complex (top-down) cognition. Inhibition, cognitive flexibility, planning, organizing, etc.




MEMORY

The encoding, storage, and/or retrieval of information (verbal, visual, procedural). Working memory - short term - is a part of EF.


The Cognitive Domain "Volume Knobs"




Memory



Attention



Executive
Function



Process.
Speed

NUANCES OF DELIVERING COGNITIVE LOAD

- **TO TRIVIA OR NOT TO TRIVIA?**

Many mainstream dual-tasks focus on trivia (presidents, media, famous people, music, foreign language, etc), but these are based on semantic memory which is not affected by age nor does it transfer to real-life

- **ARE COORDINATIVE TASKS COGNITIVE TASKS?**

Coordinative tasks offer more cognitive load than non-coordinative tasks in most cases, but DO NOT guarantee sufficient or targeted cognitive load

Cerebellum vs. Prefrontal Cortex

- **LANGUAGE TASKS - HOW AND WHY?**

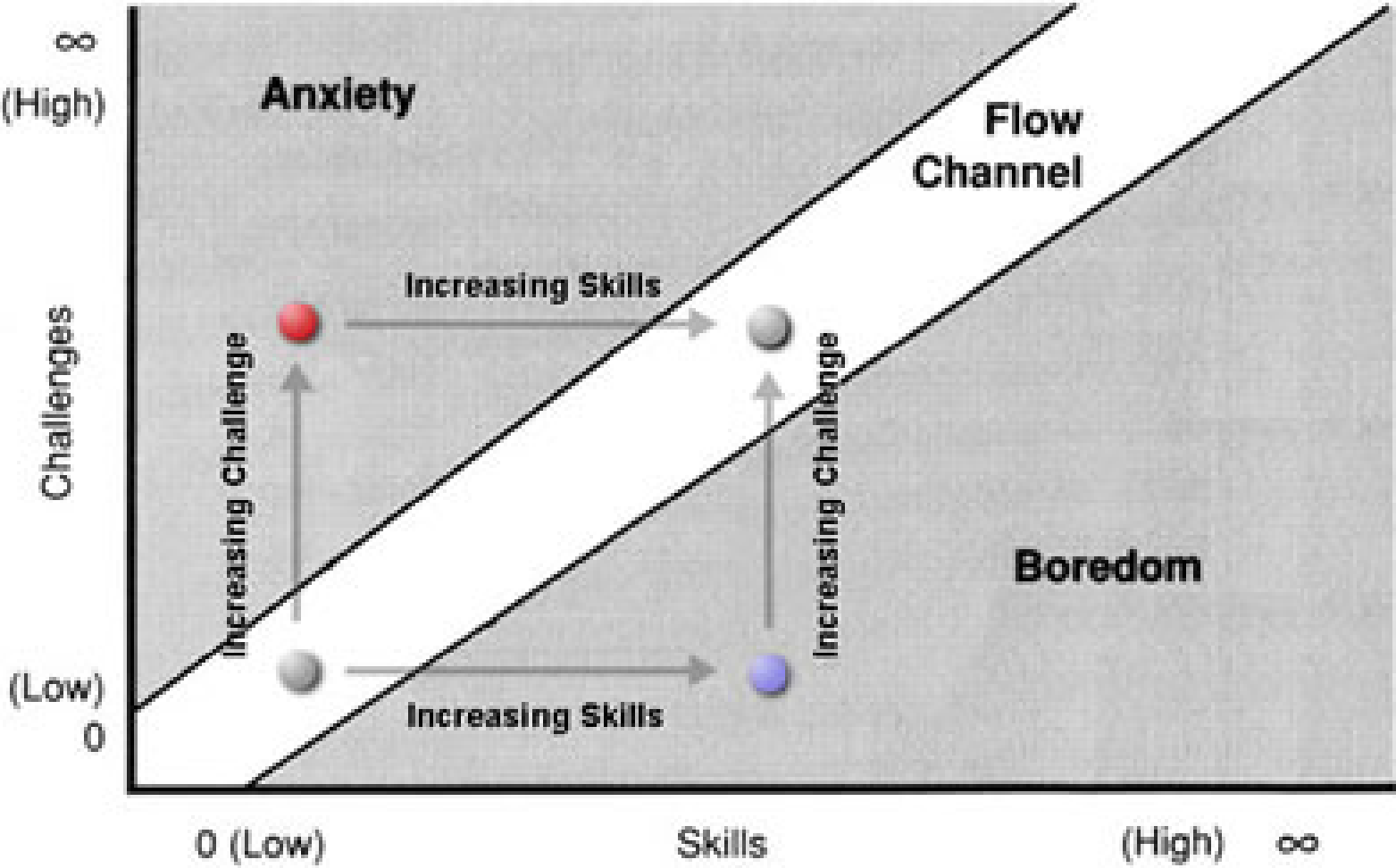
Language is an important part of brain function, and can be affected by types of neurodegeneration (Parkinson's, Dementia, Stroke, TBI), but generally are not bigger issues in the normal aging population

Speech Language Pathology is an entire FIELD - therefore drills cannot be as simple as spelling your name backwards or learning foreign languages

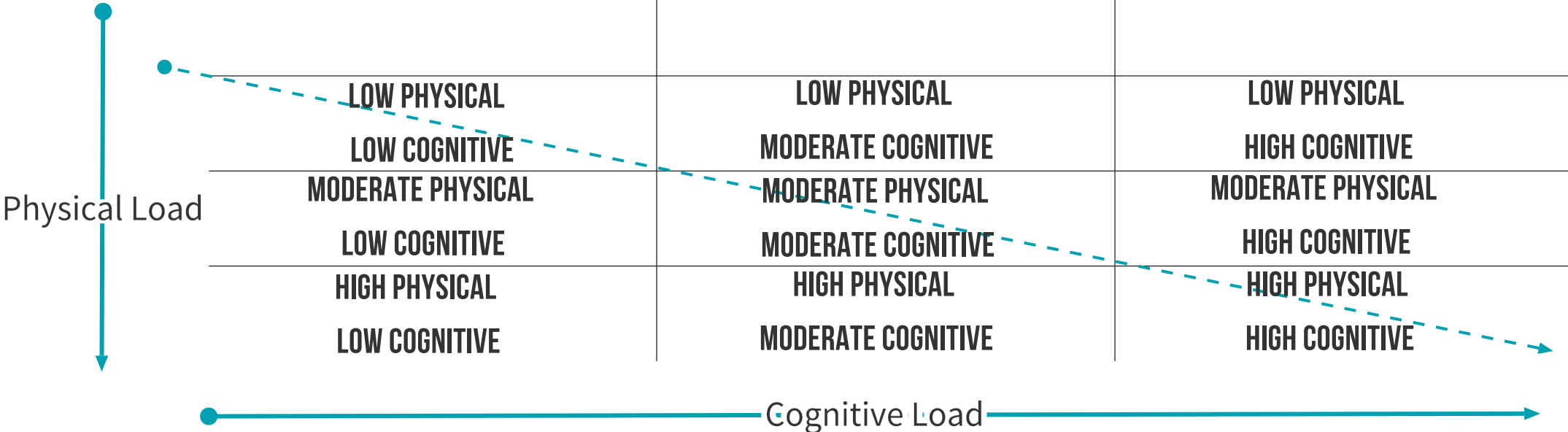
- **FULL SESSION OR PART?**

Cognitive tasks CAN comprise a full-session AND/OR be a component of any exercise session

FLOW STATE



COGNITIVE - PHYSICAL LOADING MATRIX



LEVELING COGNITIVE + PHYSICAL LOAD

Difficulty Levels	Physical Load	Cognitive Loads
1	Low Physical Load	Low Cognitive Load
2	Medium Cognitive Load	Medium Cognitive Load
3	HighPhysical Load	High Cognitive Load



GOAL



LEARNING



SKILL



ACHIEVEMENT

GAMIFICATION CONCEPT

CHALLENGE



REWARD



COMPETITION



USER ENGAGEMENT



REMOTE TRAINING SOLUTIONS

TYPES OF COGNITIVE CUES



VISUAL

Drawings/PPTs
Holding Up Cards/Fingers, etc
Visual Stimuli



AUDITORY

Call-outs (#, Directions, Colors, etc)
Auditory Reactions (cont. mvmnt)
Verbal Generation/Fluency



OBJECT

Dots, Mats, Post-Its
Loaded Implements
Reactive implements (balls, water, pillow)

EXECUTIVE FUNCTIONING DRILL

Video

HOW TO DIGITIZE

- **ASSIGN NUMBERS/COLORS/LETTERS TO MOVEMENT**
- **MOVEMENTS CAN BE ASSOCIATED WITH OBJECTS/IMPLEMENTS**
- **CAN USE AUDITORY (CALL OUT CUE) AND/OR VISUAL (DISPLAY CUE VIA DRAW, APP, OR CARD/FINGERS)**

REACTION TIME DRILL

Video

HOW TO DIGITIZE

- **REPLACE BALL CATCH WITH AN ARM REACH**
- **CAN USE QUADRANTS, TARGETS, OR SPATIAL MAPPING (UL, UR, LL, LR) TO DIRECT MOVEMENT**
- **CREATE CONDITIONAL CONSTRAINTS (LEFT ONLY)**
- **MAP MOVEMENTS TO LOWER AND/OR UPPER BODY**
- **USE AUDITORY CUES INSTEAD OF VISUAL**

BALANCING TASK

Video

HOW TO DIGITIZE

- **USE FLOOR-MAPPED QUADRANTS**
- **USE DOTS, PROCEDOS MAT, POST-ITS
W/LETTERS/NUMBERS/COLORS**
- **USE SPATIAL AUDITORY MAPPING
(N,S,E,W/DIRECTIONS/ASSING NUMBERS)**

ATTENTION DRILL

Video

HOW TO DIGITIZE

- **ASSIGN MOVEMENT THAT BRINGS GAZE OR BODY TEMPORARILY AWAY FROM SCREEN - RETURN TO CUE (DIRECTIONAL, MAPPED, ETC)**
- **ALTERNATE AUDITORY AND VISUAL CUES**

MEMORY DRILL

Video

HOW TO DIGITIZE

- **CREATE CHOREOGRAPHY**
- **USE WORKING MEMORY SPAN VARIATIONS OF ANY PREVIOUS DRILL - FORWARD OR REVERSE**
- **ASK FOR RECALL OF MOVEMENTS, ORDER, OR CUES**
- **UTILIZE SPACED RETRIEVAL THERAPY**

SPACED RETRIEVAL THERAPY

From Tactus Therapy

- **CHOOSE ONE OR MORE FUNCTIONAL TARGETS OR GOALS**

(eg. remembering facts such a name or room number, remembering to perform a certain action, remembering future activities).

- **ASK A QUESTION TO ELICIT THE TARGET RESPONSE**

If the person answers/performs correctly the first time, choose another target for the session. If the answer is unknown or incorrect, tell or show them the right answer and have them repeat it back.

- **ASK AGAIN 15 SECONDS LATER. IF THEY CAN'T RECALL, GIVE THE ANSWER AND HAVE THEM REPEAT IT BACK**

Try again in 15 seconds. If it's still not right, spaced retrieval may not be appropriate.

- **WHEN THE ANSWER IS GIVEN CORRECTLY, DOUBLE THE TIME INTERVAL**

(15 seconds, 30 seconds, 1 minute, 2 minutes, 4 minutes, 8 minutes, etc.) and ask the question again. Repeat this step each time the answer is correctly given.

- **IF THE ANSWER IS INCORRECT, GIVE THE RIGHT ANSWER IMMEDIATELY AND ASK THE QUESTION AGAIN AT THE LAST CORRECT TIME INTERVAL.**

- **IN BETWEEN ASKING THE QUESTIONS, FILL THE INTERVALS WITH OTHER THERAPY ACTIVITIES OR CONVERSATION**

though it's best to choose activities or topics that have little to do with the memory target.



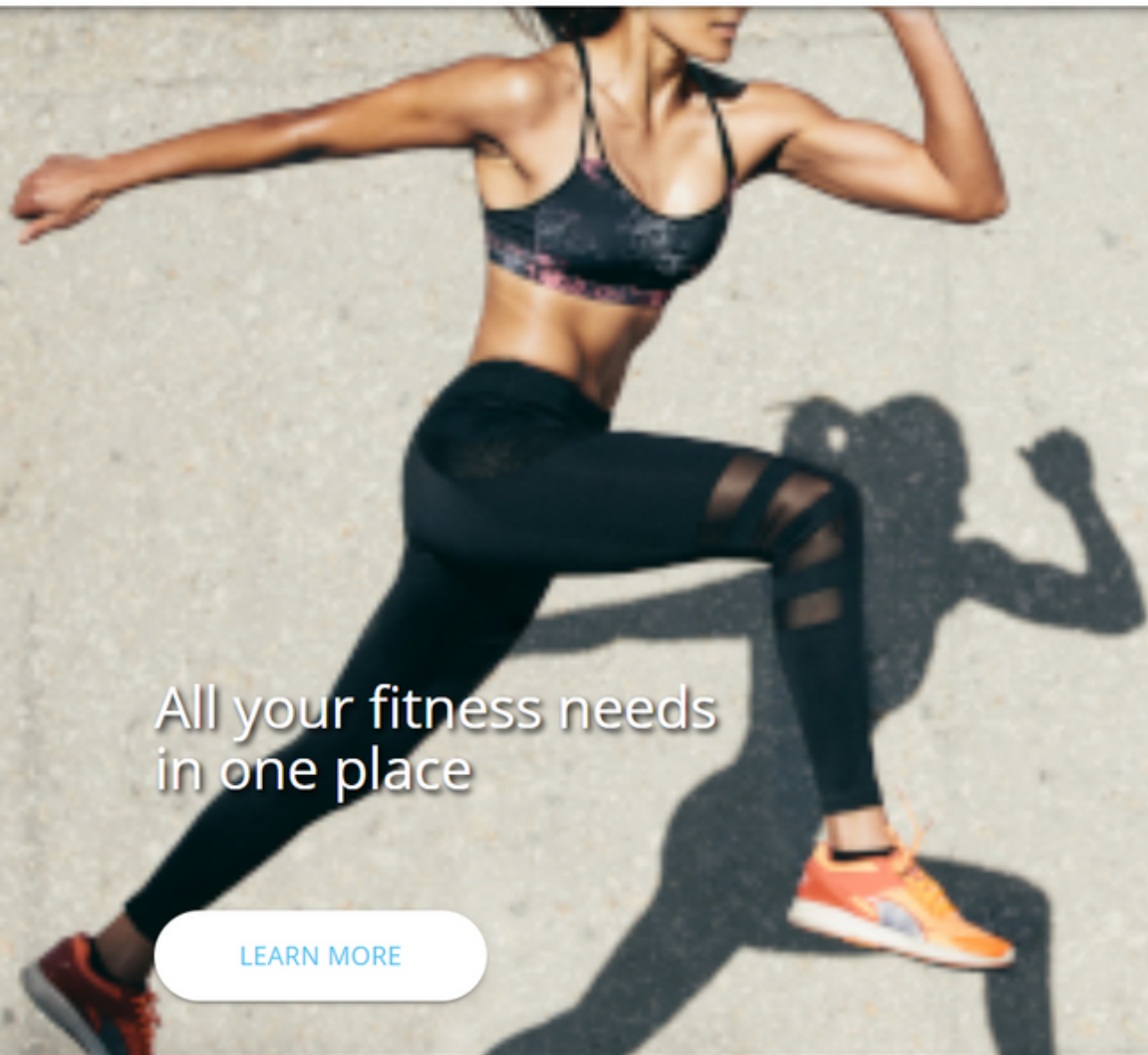
Wellness Providers

Clients

Companies

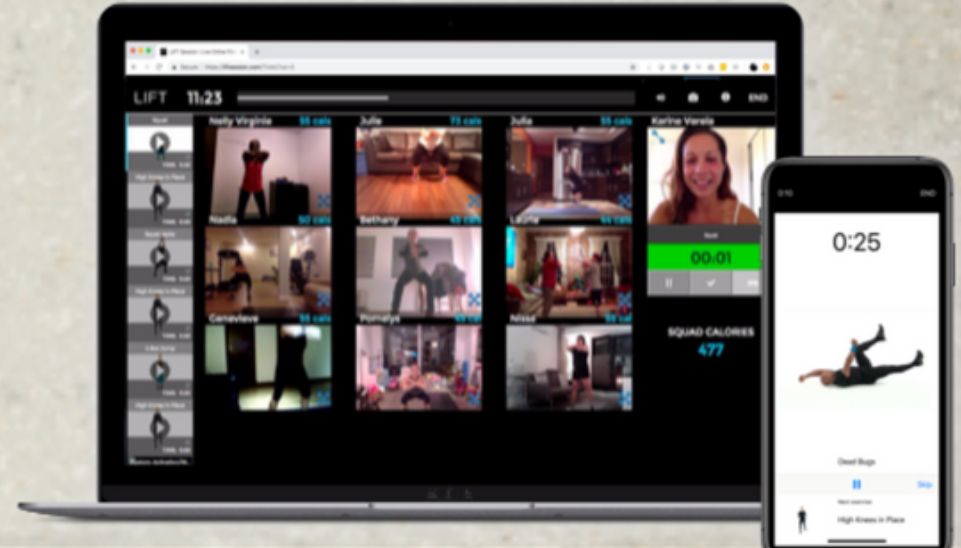
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All your fitness needs
in one place

LEARN MORE



VISUAL REACTION TIME

Video

AUDITORY REACTION

Video

4 - SQUARE REACTION

Video

4 - SQUARE SUBSTITUTION

Video

4 - SQUARE SUBSTITUTION - REVERSE MEMORY

Video

DIRECTIONAL + COMPASS VARIATION

Video

LOADING EXAMPLES

- **BACKPACK**
- **DUMBBELLS**
- **BOOKS**
- **ODD-OBJECTS**
- **ANIMAL**
- **SIGNIFICANT OTHER**

LIFT-SPECIFIC PROGRAM DESIGN

- **80 / 20 PRINCIPLE**
- **PROGRAM & STIMULI PREPARATION**
- **TEMPORAL DEMAND**
- **RANGE OF MOTION**
- **USE A MOUSE**
- **CONSIDER MIRROR REFLECTION**

HOW TO CONVEY THE BRAIN BENEFITS TO YOUR CLIENTS

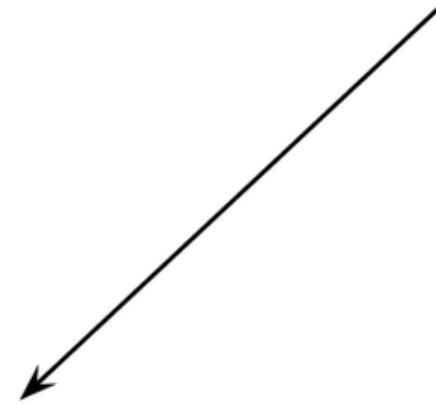
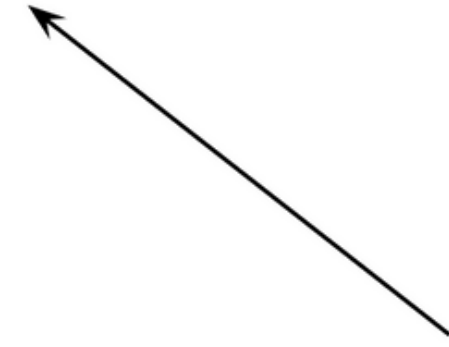
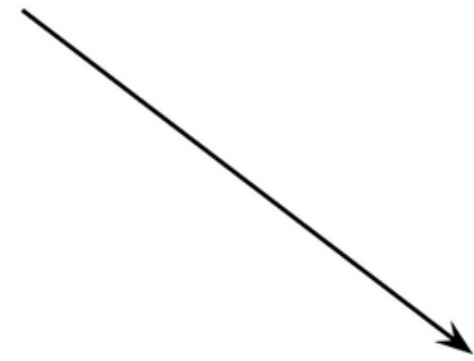
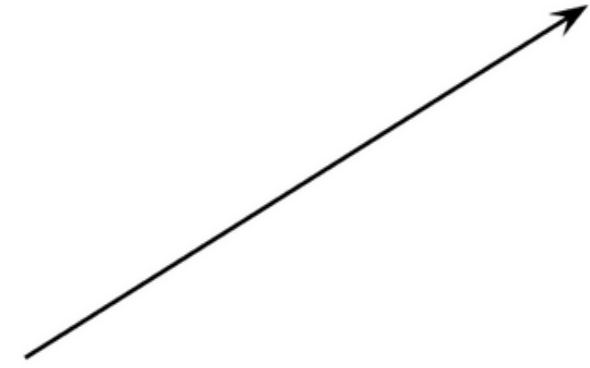
- **ATTENTIONAL FOCUS**
- **COGNITIVE DEMANDS**
- **BRAIN HEALTH OUTCOMES**
- **MIXING IT UP**
- **ENJOYMENT**
- **RELY ON AUTOMATED MOVEMENT**
- **METABOLIC COST**
- **ELECTRO-MECHANICAL DELAY**

HOW AND WHEN DO I USE IT?

- **BRAIN DAY**
- **PROGRAMMING “BLOCK”**
- **VARIABILITY**
- **BRAIN “CIRCUIT”**

ZOOM WHITEBOARD STIMULI

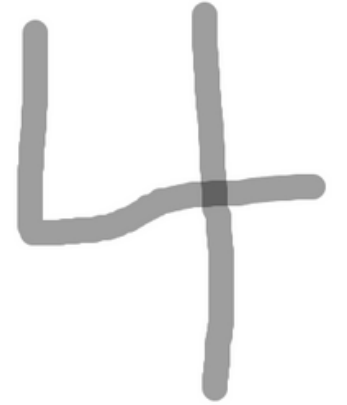
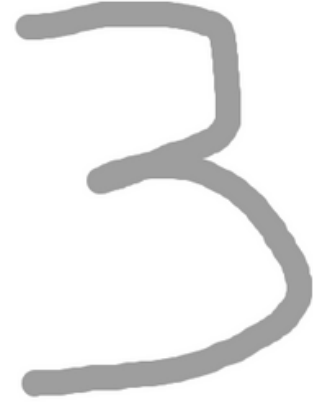
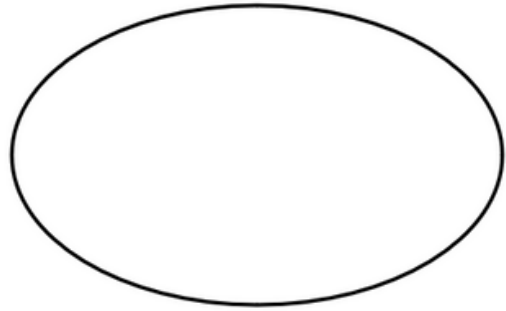
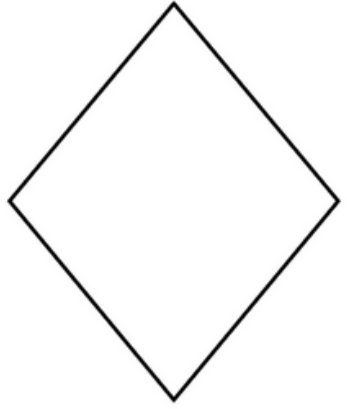
North

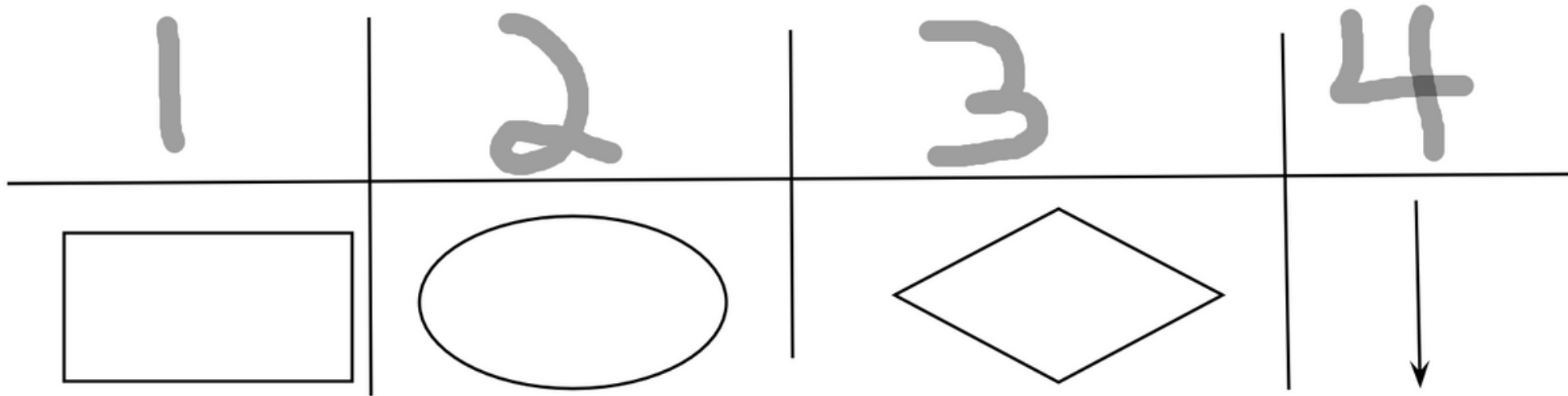


South

West

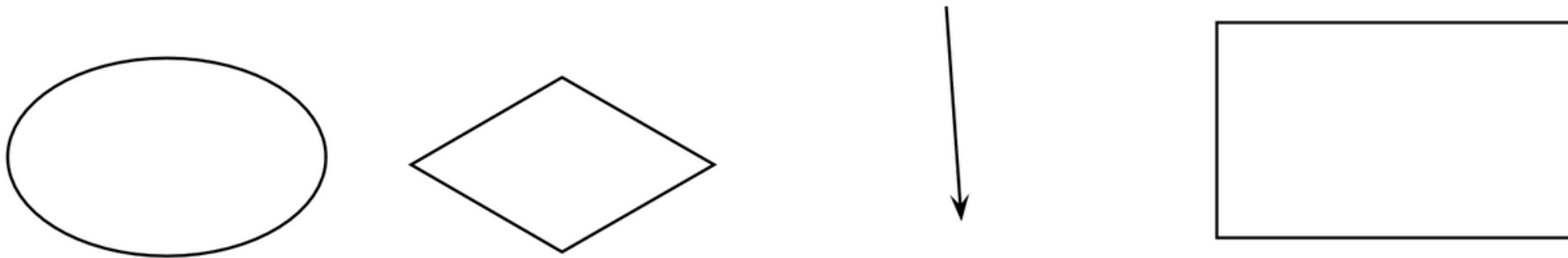
East





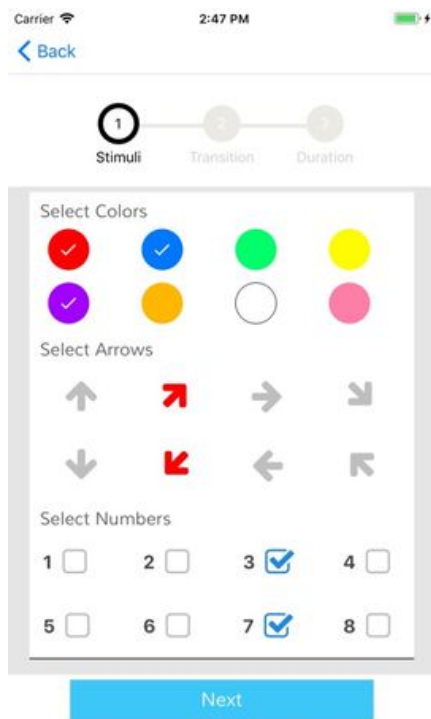
Answer Key

Stimuli

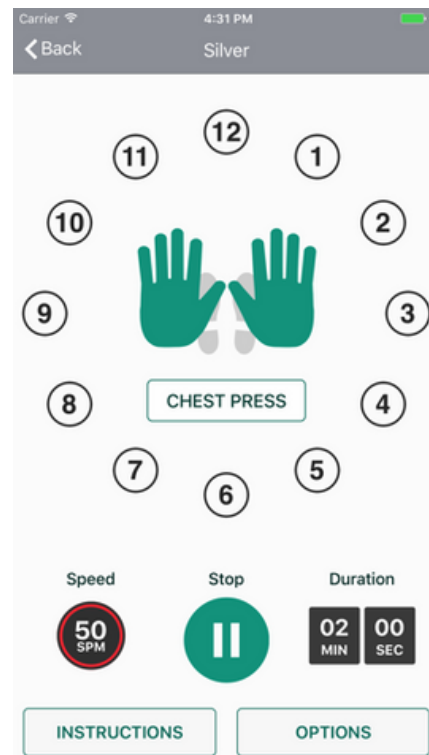


APP-BASED/TECHNOLOGY STIMULI

APPS/TECHNOLOGIES FOR DUAL-TASKING



SWITCHED ON



CLOCK YOURSELF



NYMBL APP

SWITCHED ON - ARROWS

Video

SWITCHED ON - COMPLEX DIRECTIONS

Video

SWITCHED ON - IMPULSE CONTROL

Video

SWITCHED ON - COLOR NAMING

Video

CLOCK YOURSELF

Video

CLOCK YOURSELF - SIMPLE COLORS

Video

CLOCK YOURSELF - SIMPLE NUMBERS

Video

✓ Play prompts in sequence first

Clock Shape

Full Clockface

Clock Shape

✓ Full Clockface

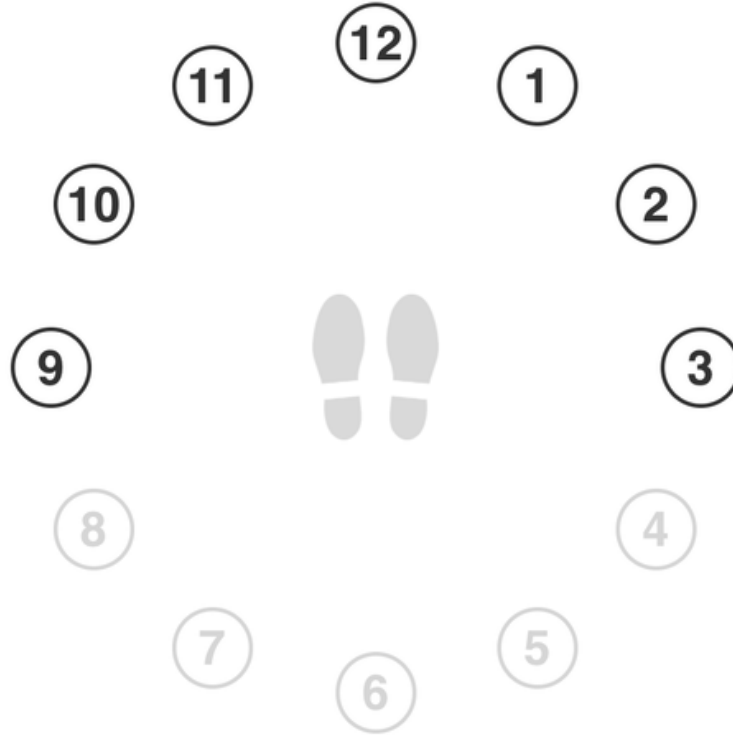
Left Half

Right Half

Top Half

Bottom Half

CANCEL



Speed



Start



Duration



✓ Play prompts in sequence first

Clock Face

Clock Face

Ordinary Numbers

✓ Calendar Months

Minutes

Doubled Numbers

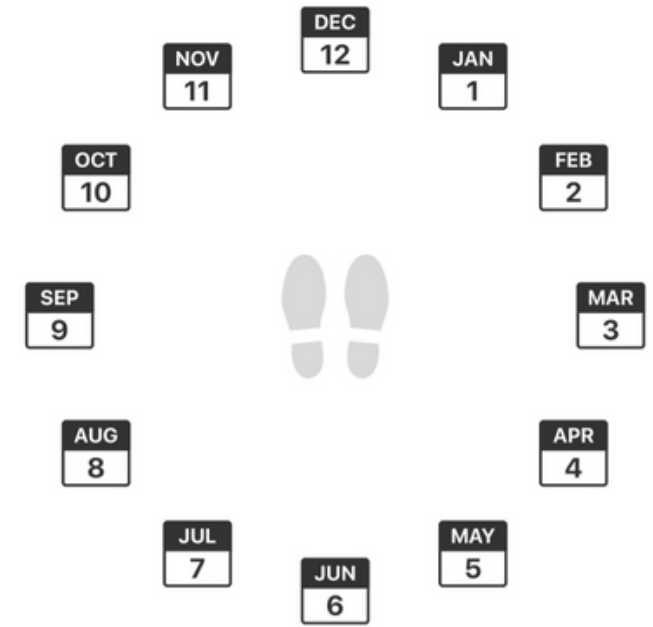
Star Signs

Animals

Periodic Table Elements

Symbols

CANCEL



DR. MIKE STUDER - FSST W/DIGIT SPAN

Video

DAILYDOSEPD

Subscribe to Daily Dose PD workouts for Parkinson's Disease. Custom workouts designed specifically for people with PD using research-backed methods proven to slow the progression of the disease. Gain access to all of our past workouts and join in new workouts posted weekly as well as our livestream events. Try Daily Dose PD for free for 30 days and see if it is the right fit for you!

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Cognitive Training

19 Episodes

This playlist is focused on exercise that include tricky mind games for cognitive training. Research has shown we can train this mind and body with cognitive dual tasking to reduce risk of falls. Each episode will challenge you in ways that are specific to PD. The goal is to be able to move your best

Show more

My list

Share



Cognitive Workouts

Sort by...

19 Episodes



01:10

Introduction to Cognitive Training
Episode 1



05:36

Memory Recall
Episode 2



05:11

Body and Spatial Awareness
Episode 3



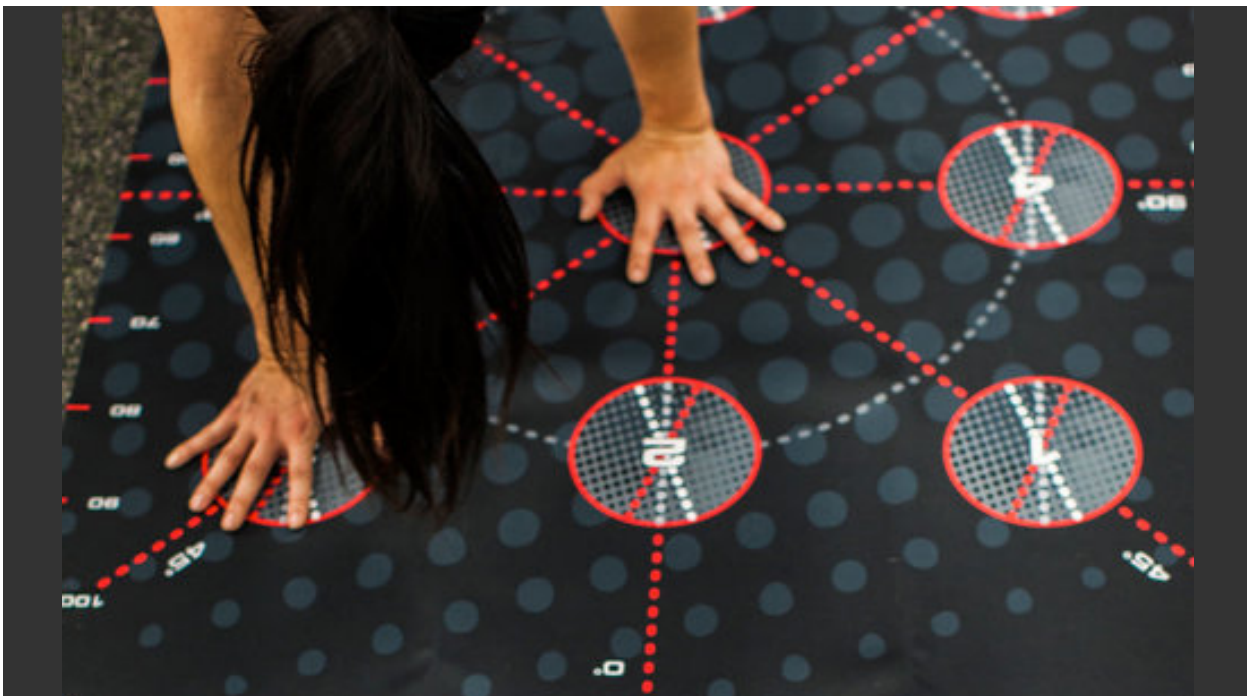
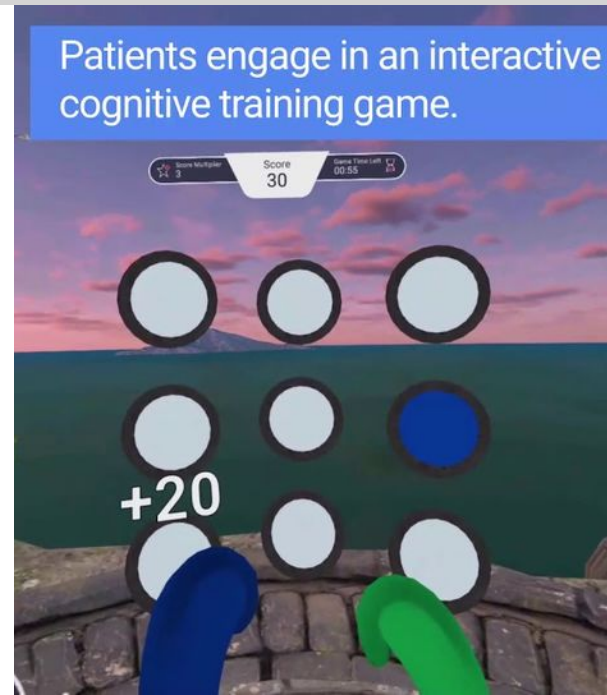
05:45

Set Switching Part 1
Episode 4

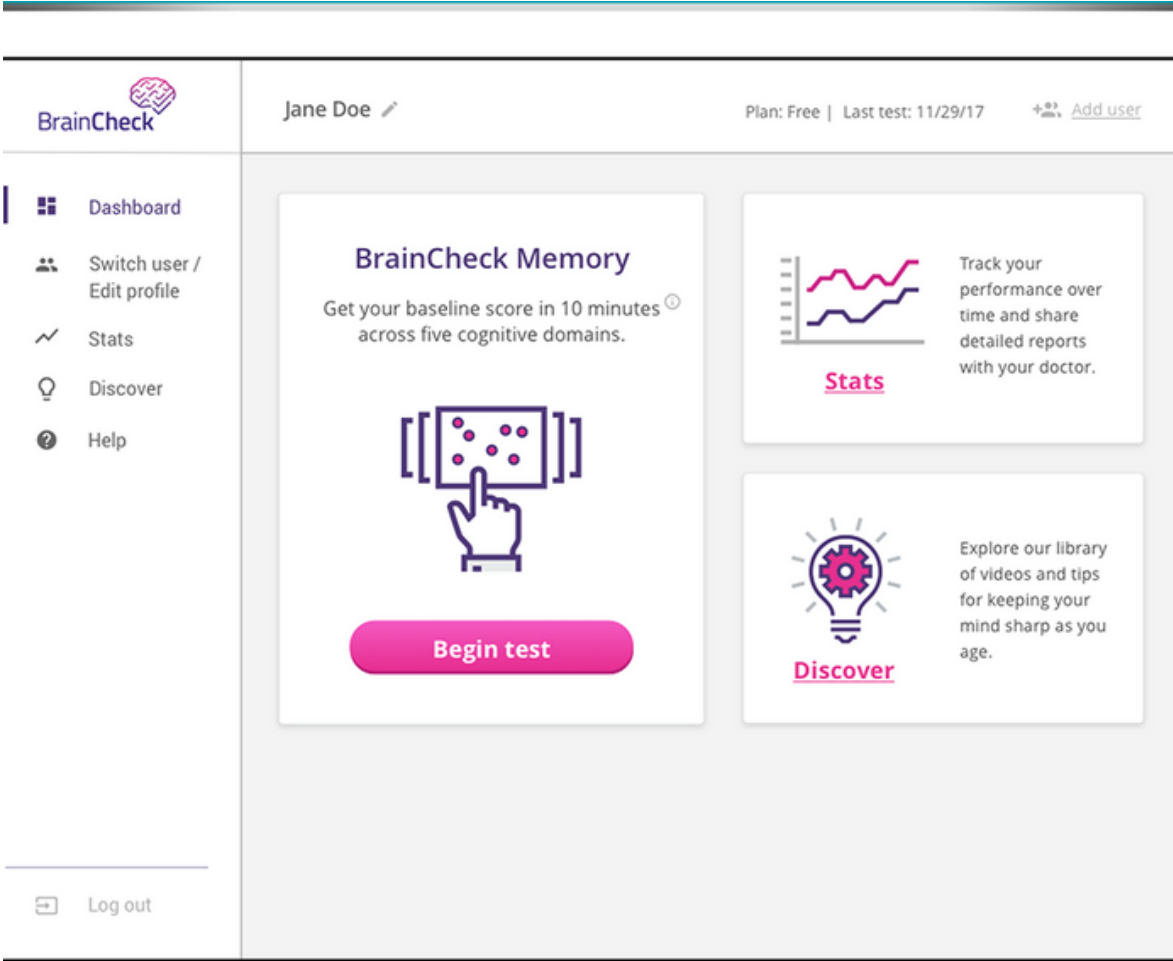
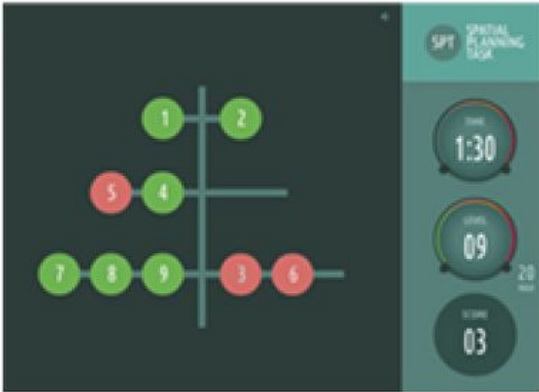
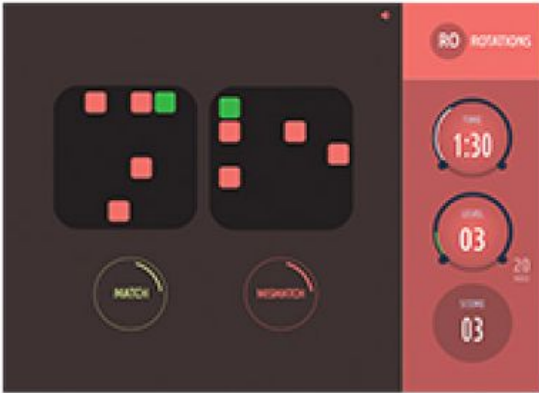
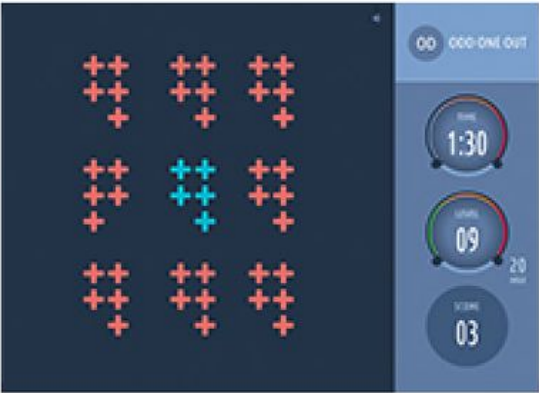


How To Deliver NeuroTracker Telehealth Services

RESOURCE GUIDE



COGNITIVE ASSESSMENT - REMOTELY





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