



## Apraxia – A Body with a Mind of its Own

By Micka Sorani



Our SUPPLEMENTARY MOTOR CORTEX is responsible for planning INTENTIONAL motor actions and our PRIMARY motor cortex is responsible for EXECUTING or carrying out those actions. Individuals with APRAXIA or DYSPRAXIA (a milder form of apraxia) experience difficulty initiating and executing a PURPOSEFUL or intended movement. Both the desire and the ability to move are present, but the person simply cannot execute the intended action. Apraxia affects the ability to plan movements and movement sequences, to initiate, execute, and adjust motor actions and even to stop motor actions.

Spell APRAXIA Spell SEQUENCE Spell SUPPLEMENTARY

The supplementary motor cortex is responsible for planning what type of motor actions? INTENTIONAL

What part of the brain is responsible for executing intentional motor actions?

PRIMARY MOTOR CORTEX

A milder form of apraxia is called \_\_\_\_\_. DYSPRAXIA

Name one of the items mentioned, other than planning movement and movement sequences, that apraxia affects the brains ability to do. INITIATE, EXECUTE, ADJUST, STOP

What's another word for intentional?

Question Type Key

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There are several different types of apraxia, affecting all different parts of the body. They may occur alone or together. One of the most common is BUCCOFACIAL apraxia, sometimes called FACIAL-ORAL, or OROFACIAL apraxia. It is the inability to carry out facial movements on command, such as licking lips, whistling, coughing, or winking. VERBAL apraxia refers to the difficulty someone has initiating and performing the movements needed to make speech. This difficulty arises despite the fact that there is no weakness or impairment in the necessary muscles. Other types of apraxia include LIMB-KINETIC apraxia, which is the inability to initiate or make fine precise movements with your hands, arms or legs.

Spell SPEECH Spell INITIATE Spell MUSCLES

What type of apraxia refers to someone who has difficulty making speech sounds? VERBAL

What type of apraxia refers to someone who has difficulty with initiating or making precise movements with their hands, arms and legs? LIMB KINETIC

What is another name for facial-oral apraxia? BUCCOFACIAL, OROFACIAL

Name one of the movements mentioned that people with buccofacial apraxia are unable to do. LICKING LIPS, WHISTLING, COUGHING, or WINKING

What's another word for initiate?

Try winking or licking your lips.



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OCULAR MOTOR apraxia, which impairs the individual's ability to volitionally, initiate SACCADES (rapid movements of the eye between fixation points) they are unable to move their eyes on command. This challenge can range from small movements made while reading to the much larger movements made while gazing around a space. IDEOMOTOR apraxia impairs the individual's ability to carry out a motor task by command or imitation. An example would be brushing teeth; the individual may have no problem brushing their teeth, but are unable to imitate the action and use the tool correctly. IDEATIONAL apraxia is the inability to independently coordinate activities with multiple, sequential movements, such as dressing, eating, and bathing, even though isolated steps in these sequences can be physically accomplished.

Spell IMITATE Spell PHYSICALLY Spell READING

Apraxia that affects eye movement is called. OCULAR MOTOR

Ocular motor apraxia impairs the individual's ability to initiate \_\_\_\_\_.

SACCADES

What is it called when an individual has trouble initiating a movement in response to a command or imitating a movement? IDEOMOTOR

What type of apraxia affects the ability to coordinate activities with multiple steps. IDEATIONAL

Name one of the examples mentioned that people with ideational apraxia have difficulty completing. DRESSING, EATING, BATHING

What is a synonym for imitate?

Describe a saccade.

Give an example of a task, not mentioned, that someone with ideational apraxia might have difficulty completing.



The fact that these motor tasks are carried out by the apraxic individuals on a pretty consistent basis, may lead to confusion in some people’s minds. They may assume that the apraxic individual has the ability to perform the task but either chooses not to, or fails to understand the instructions. A person with Apraxia has the motor ability to react to SENSORY STIMULI, respond to perceived danger or pleasure, and do things that have been very well PRACTICED. However, they struggle with the ability to MOTOR PLAN; they know what they want to do, but a breakdown happens between the thought and the ACTION. This is because the brain has multiple avenues through which a certain motor movement can be triggered, depending on the context.

Spell BRAIN Spell REACT Spell ABILITY

In apraxia, a breakdown happens between the thought and \_\_\_\_\_. ACTION

Individuals with apraxia have the motor ability to react to sensory \_\_\_\_\_.

STIMULI

They are also able to complete motor actions that have been very well \_\_\_\_\_.

PRACTICED

What is another word that means triggered?

Give me an antonym for pleasure.

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Is there a motor action that you are able to complete in one situation but not in another?

We carry out four main types of motor actions, which use different pathways in the brain. The first is PURPOSEFUL motor, these motor actions happen in response to a thought, an idea or a desire. Apraxia affects the planning and execution of these motor actions. They are initiated in the highest CORTICAL regions of our brains and they are our



longest and slowest NEURONAL PATHWAYS. AUTOMATIC motor actions start out as purposeful and then with practice and repetition they become automatic. Apraxic individuals have the ability to carry out automatic motor actions with no problem, because they have been practiced over and over. An example of this would be learning to walk, or brushing our teeth; these motor actions help our lives run much more efficiently. However, they can also be responsible for some of our bad habits, like continually watching a YouTube video that we hate. Over-learned automatic motor actions are responsible for our MOTOR LOOPS and VERBAL LOOPS.

Spell AUTOMATIC Spell HABITS Spell OVERLEARNED

Which motor actions does apraxia affect? PURPOSEFUL

Which region of the brain is responsible for purposeful motor actions? CORTICAL

Purposeful motor actions have the longest and slowest \_\_\_\_\_.

NEURONAL PATHWAYS

Over-learned, automatic motor actions are responsible for motor and verbal \_\_\_\_\_ . LOOPS

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A purposeful motor action happens in response to a (name one). THOUGHT, IDEA, DESIRE

Name one way a purposeful motor action can become automatic. PRACTICE, REPETITION

What's another word for efficient?

How many types of motor actions are there? 4

Describe a motor action that started out as purposeful and has now become automatic for you.

What is your experience with motor or verbal loops?

IMPULSIVE motor actions are initiated by an EMOTIONAL or a SENSORY stimulus, this is our FIGHT or FLIGHT response. This is why an individual might hit someone or run out of the room when they are feeling anxious. REFLEXIVE motor actions happen in response to a specific sensory stimulus. For example, if you touch something hot, your hand automatically pulls back. Impulsive and reflexive motor actions are meant for our PROTECTION and they happen without us even thinking about them. Impulsive, reflexive and automatic motor actions are not affected by apraxia.

Spell IMPULSIVE Spell ANXIOUS

Impulsive motor actions are triggered by a sensory or \_\_\_\_\_ stimulus.

EMOTIONAL

Impulsive motor actions are triggered by our \_\_\_\_\_ or \_\_\_\_\_ response. FIGHT, FLIGHT

What type of motor action would be triggered by touching a hot stove? REFLEXIVE

Impulsive and reflexive motor actions are for our \_\_\_\_\_. PROTECTION Name an emotion (not mentioned in the passage) that might trigger an impulsive motor action.

Give an example of a situation that might cause an impulsive motor action to occur.

Give an example of something that might cause a reflexive action to occur.

Imitate your body's reaction to touching a hot stove.

Motor Neuron Myelinated Motor Neuron

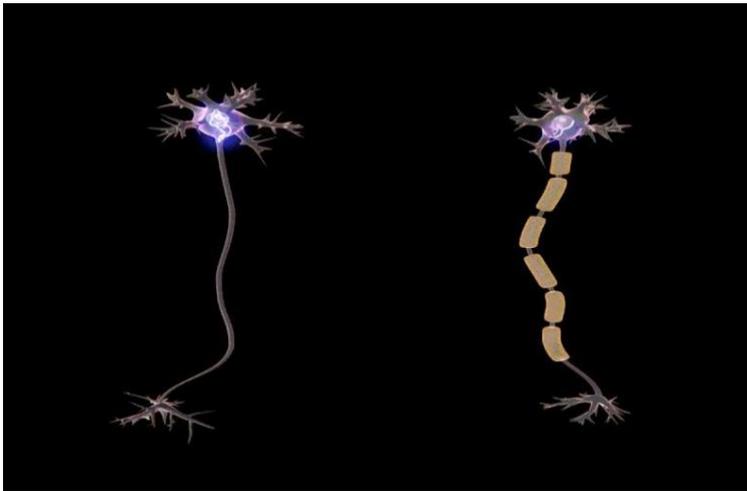
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So what can we do to help our apraxic bodies? The best thing to do is PRACTICE intentional, purposeful movements! Our brains have the amazing ability to reorganize PATHWAYS, create new NEURONAL connections, and even create new NEURONS, this is known as NEURALPLASTICITY. As we practice an intentional motor action, our motor neurons become covered in a fatty coating called MYELIN; this myelin coating causes the messages that travel from our brains to our muscles to move even faster, eventually leading to AUTOMATICITY. Automaticity happens when you practice an action so often that it no longer requires effort.



Spell PATHWAYS Spell PRACTICE Spell NEURON

What is the fatty substance called that coat our neurons? MYELIN

When our brains reorganize pathways, and create new neuronal connections and neurons, this is known as. NEURALPLASTICITY Practicing intentional motor actions leads to \_\_\_\_\_.

AUTOMATICITY What does the myelin coating on the motor neurons do? MAKES THE MESSAGES TRAVEL FASTER, MOVE FASTER

What is an antonym for effort?

Describe a motor action that you would like to become automatic.

Point to the picture of the myelinated motor neuron.

As it turns out, we don't even need to physically perform the actions in order to start forming those new brain CONNECTIONS. VISUALIZING the movements in our minds has almost the same effect on the creation of new neural connections. In one study, research subjects who mentally rehearsed PIANO exercises for two

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hours a day for five days (without even touching a piano), demonstrated almost the same brain changes as the people who physically performed the identical finger movements on a piano for the same length of time. Their brain scans showed that that the group who mentally rehearsed the piano exercises grew nearly the same number of brain circuits as the group who physically engaged in the activity.

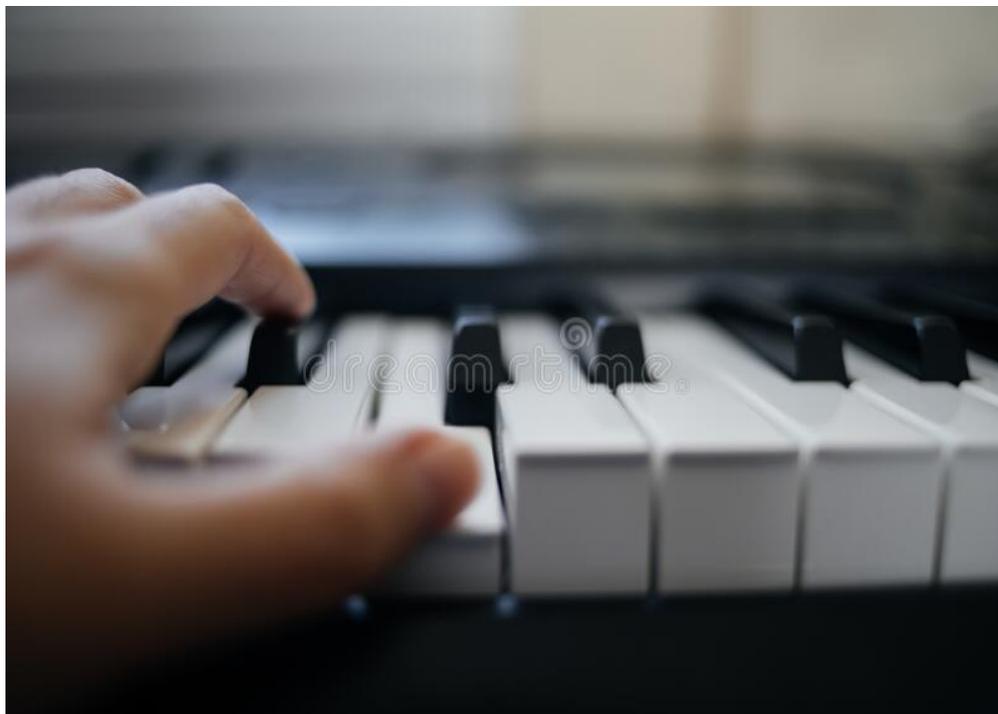
Spell CONNECTIONS Spell STUDY Spell REHEARSED

What instrument did the study involve? PIANO

How were they able to see the growth in the brain circuits at the end of the studies? BRAIN SCANS

Explain what the group, who did not physically touch the piano, did in the study. VISUALIZED, MENTALLY REHEARSED, IMAGINED

Name another type of musical instrument.



How many hours a day did the study participants practice or visualize the finger movements? 2

How many days did the study take? 5

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How many total hours did the study participants spend practicing or visualizing the movements?  $2 \times 5 = 10$

Explain the findings of the study.

Move your fingers as if you're playing a piano.

Whether we physically or mentally acquire a skill, there are 4 ELEMENTS that we all use to change our brains: LEARNING KNOWLEDGE, receiving HANDS-ON INSTRUCTION, PAYING ATTENTION, and REPETITION. Learning knowledge makes new SYNAPTIC connections; INSTRUCTION gets the body involved in order to have a new experience, which further enriches the brain. When we also pay attention and repeat our new skill over and over again, our brains will change.

Spell ACQUIRE Spell ELEMENTS Spell ENRICHES

Learning something new makes new \_\_\_\_\_ connections. SYNAPTIC Which of the 4 elements mentioned involves the body? HANDS ON INSTRUCTION

Other than hands on instruction, name one of the 4 elements mentioned that we can use in order to change our brains. LEARNING KNOWLEDGE, PAYING ATTENTION, REPETITION

What's another word that means attention?

What has your experience been when acquiring a new skill?

Is there a skill or activity that you would like to practice more?

So what does that study mean for us? Each and every time we learn something new our brains form new connections and neurons and make existing neural pathways either stronger or weaker. So, even if you are not able to physically perform a task, at least think about it. Listen to some interesting content, from a PODCAST, an AUDIO BOOK, or maybe a DOCUMENTARY. Visualize yourself completing a new skill that you would like to acquire and you will be creating new neural connections. Our minds are very amazing and powerful tools, which we can use to overcome some of our physical challenges. Visualize what you want, anything is possible.

Spell VISUALIZE Spell LEARN Spell MINDS

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If you are not able to physically perform a task, at least do what? THINK ABOUT IT  
Each time we learn something our existing neural pathways become either stronger or \_\_\_\_\_. WEAKER

Name one of the suggestions mentioned for learning new information.

PODCAST, AUDIO BOOK, DOCUMENTARY

What's another source that you might use for learning new information? What's another word for visualize.

Creative Writing:

Now that we've learned about apraxia, tell me how apraxia affects your body.



Micka Sorani is currently a PIT in the S2C program Cohort R. She lives in the Southern California area, and loves spending time at the beach with her family, hiking with her dogs, and learning as much as she can about apraxia and the different ways we can rewire the brain.

[https://www.ninds.nih.gov/health-information/disorders/apraxia#:~:text=Apraxia%20\(called%20%22dyspraxia%22%20if,physical%20ability%20to%20perform%20them.](https://www.ninds.nih.gov/health-information/disorders/apraxia#:~:text=Apraxia%20(called%20%22dyspraxia%22%20if,physical%20ability%20to%20perform%20them.)

<https://pathwaystofamilywellness.org/Inspirational/evolve-your-brain-the-science-of-changing-your-mind-part-3.html>

<https://rarediseases.org/rare-diseases/apraxia/#:~:text=Apraxia%20is%20a%20neurological%20disorder,simply%20cannot%20execute%20the%20act.>

[www.i-asc.org](http://www.i-asc.org)

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<https://www.sciencedirect.com/topics/neuroscience/apraxia>

<https://www.webmd.com/brain/apraxia-symptoms-causes-tests-treatments>

<https://pubmed.ncbi.nlm.nih.gov/17507030/#:~:text=Abstract,to%20verbal%20command%20or%20imitation.>

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