

Muscle Memory and Mental Imagery

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Abstract

How can we walk and chew gum at the same time? How can a tennis player learn and improve his serve? How can a musician play the piano and sing at the same time? The actor needs to understand how the process of learning works for his body and brain. There is a best way to learn a text and an easy way to learn a choreography, all you need is to understand how our muscles are linked to the brain and what muscle memory is. Distributed attention does not exist, at least as we think it is. Our brain cannot focus on two actions at the same time. It will make one action a priority and the other will become secondary. All the secondary actions that we perform are controlled by our body memory system. That is why we can have only one action that is new to us. If we are trying to do something new and demanding, we lose our focus on other things. We need to start easy and simple and then build up speed until the movement becomes a reflex does not need our attention. The body will move by its own and we can add a new movement on our routine. After we learn a new move how can we improve it without practicing it? We can use our imagination to improve our throwing posture and precision. If we visualize our movement like a slow-motion film, we can correct and improve it just by thinking about it. For an Actor it is a powerful tool that he can use to get closer to his characters.

Keywords: mental imagery, muscle memory, reflex, choreography, motion, learning new skills, motion improvement.

How to cite: Deliu, I. (2022) Muscle Memory and Mental Imagery. *Doctoral Horizons* 1(4), 30-37.

Introduction

“Your odds of success improve when you are forced to direct your energy and attention to fewer tasks.” – Warren Buffet (as cited in Malesko, 2012)

Our brain can't focus on two or more tasks at once. It has “an ability more or less developed to change the focus very fast between different points or things” (Stan, 1968). Our body and brain are in a constant learning process. Our muscles can learn to do things that we are constantly doing letting the brain focus on other things. So, to be able to walk and talk on the phone at the same time, the process of walking must be a reflex gesture so that the brain can concentrate on the conversation. The best example of how our body works is the way we manage to learn to play any musical instrument. If we take for example the process of learning to play guitar, most of the time, the first step is to learn how to stroke with our right hand (if we are right-handed) to a beat. And we repeat that motion over and over until we can do it without concentrating on the motion—the hand will stroke on its own. The second step is to learn some chords with our left hand, without doing anything else. At this point even our right hand will be still. After we can change between two or three different chords with our left hand, we can add the stroke that we repeated before. At this point we are changing focus between our hands, but we mostly pay attention at our left hand because our right hand can keep stroking without much trouble due to our ability to gain muscle memory. Now our brain will work as a conductor and will only adjust the timing of the movements not the motions of the hands. After a lot more repetition we can change the focus to our voice if we want to sing along and not think or focus once on the hands. I cannot find an exact number, or time frame to tell you how many times you need to repeat a motion to become pure reflex, but it is estimated at around 50.000 times for an all-new movement. It seems a lot, and it really is, but we rarely learn totally new moves. Most of the times we learn a motion that is based on another motion that we already master, and that number is reduced a lot. Every new motion that we want to learn will be based on a similar motion that we already know until the brain and the nervous system will create new paths. “Muscle memory is the result of permanent changes in the brain, nerves, and muscles.” (Smith, 2017)

For an actor it is the most important piece of information on how to learn a new skill, how to master it and how he can reproduce it many times in different situations. With any choreography if we start slowly, from the smallest movement and build up the motions and the speed, we can code our body to do what we want without thinking at what we are doing. This is the last step that an actor needs to be

able to focus on how he feels and to explore his emotions. When you put them all together you will have a routine in your choreography with small chances of injury. You will have the perfect same motions and new emotions each time. You will be focused on acting and not on other stuff, because our brain cannot be focused on two or more places at once.

To understand more of how our body and brain works, we can think of the process of riding a bike. If you learned as a kid to ride and then you do not ride anymore for 20 years and then try again after all these years, you will not fall as you did the first time when you tried. This is how your muscles will not let you down. Once a path created in our nervous system it is very hard to erase it completely. A path will fade away slowly, you will lose speed and precision, but will not disappear without a trace. At this point, if you need to teach a kid how to ride a bike, you will not be able to explain to him how to do it even if you know perfectly how to ride it and have all the information on that subject. The only way he will learn is if he gets on the bike and feels it. This is because the only way to teach a muscle to do anything is by actually doing it. "Perfection will come through practice. It cannot come by merely reading instructions..." (Hill, 2007) Muscle memory is a connection between the brain and the muscles that is developed through repetition. The more you do it, the more your body can unconsciously do it. To put it in a different perspective, we can imagine our body like an island. The brain and the hand are located far from each other on the same island. The nervous system is responsible to carry the packages of information from the brain to the hand. At first the island is virgin, but the more information we send, the more obvious a path will appear. On each pass, the travel time is more and more reduced. The more packs we send through a route, the more likely it is to become a road or a highway, therefore the information will arrive faster and complete at the muscle. This is how our body works to learn and be able to do things faster and more precisely, again, through repetition. Every new move, it is somehow based on an already known motion that is closer to the move that we want to learn. That means that the body is using the highways that are already built to obtain the faster route. The problem for us is when we want to correct a motion that was learnt with a bad technique, because we will need to bypass the old route that is already in use. It is much harder to convince the nervous system that a new path will work better than the old faster one. "It is really hard to *reprogram* and unlearn the *permanent changes*" (Smith, 2017). If you want to learn a new skill by yourself, it is easier if you have no idea how to do it at all and consult a video or a book on that subject. Be careful to learn the proper technique from the

start and be your own teacher from the start. If you watch yourself closely and start at low speeds and separate the motions, you will have a good form. After that you can build progressions. If you already have a bad technique and form, it is almost impossible to correct and change paths by yourself. "Only an experienced instructor can tell you how well you are performing a given technique and help you separate unconscious bad habits from good muscle memory." (Lane, 2003)

Muscle memory as an acting tool

The muscles, the same as the brain, have short and long memory. The short-term memory is called acquisition and it can fade completely and quickly. The long-term memory is consolidation, and it is a different mechanism in the brain. "Complex motor tasks require several training sessions interspersed with periods of rest and sleep. For these tasks, acquisition and consolidation are interlocked, forming a complex sequence of events" (Smith, 2017).

The brain has different areas for learning new skills and mastering already known skills. You can use one area of the brain for a limited time before it will be overloaded, and you will lose focus. That is why we cannot learn new skill in a day or a single session. The brain needs to rest between sessions, to transform the acquisition into consolidation. When you are learning, you see and feel your progress, and after a while, you will lose focus and performance will decline, you will have diminished returns. You can think of the learning process as building a cement wall: if you pour too much at once, it will fall. You need to put little by little and let each layer dry before pouring the next one. After resting, you will lose some skill and you will not be as good when you quitted before, but you will get there quick and beyond. Expect the learning progression to be irregular and inconsistent but with positive results. Do not forget to rest between sessions. Sleep is needed for consolidation to take place and paths to be created, sleep improves performance. The same process is applied for an actor when learning a text. The best way is to divide it into chunks and feed the brain little by little until he switches to consolidation and learns it all. You can also be better at learning, the same way you learn other things. If you repeat the process, you will be able to learn faster and include bigger chunks of information.

We can learn a new move only by doing it, but we can train to move better without actually doing it. The process is called mental imagery. This tool will be the most used tool than an actor can have. It is how the pro players in every sport train a big portion of time. To put it in words, if we think of a specific motion of the body,

we are always using our imagination and we visualize the movement. If we concentrate and repeat the thought several times, we can train to be able to do it better just by improving the technique in what we "see". There are many studies done in proving this theory. One involved gathering three groups of basketball players with the same percentage of success at free throws. Group A did not train at all, group B trained for one hour everyday by practicing free throws at the court and group C trained for 1 hour everyday just imagining doing free throws and concentrate on how it feels and looked from the inside of the body. The study lasted for two weeks and the improvements for group B and C were the same as for group A. This was a big proof that the imaginative training was as important and beneficial as the conventional method.

Another study was done on two groups of tennis players regarding the serve shot. First group had to watch a video tape of a professional player with a perfect rated shot, server nine times. First two were played at normal speed, the next two at half speed, a frame by frame one with an audio of a coach that pointed out the most important parts of the motion, then another two at half speed and another at full speed. After watching the video, they closed their eyes and saw themselves serving with the same technique that they learned from the video. After this five-minute exercise they went to court and did each 30 servers. They had increased their serve speed by an average of 8 km/h each. The second group trained at the bench press to build muscles and trained at the court to improve their serve the conventional way. At the end they gained a speed increase by 4 km/h. "Bottom line: The mental training group increased their serve speed even more than the group that focused on strength training and serve practice..." (Smith, 2017).

Before I play a match, I try to carefully rehearse in my mind what is likely to happen and how I will react in certain situations. I visualize myself playing typical points based on my opponent's style of play. I see myself hitting crisp, deep shots from the baseline and coming to the net if I get a weak return. This helps me mentally prepare for a match, and I feel like I've already played the match before I even walk on the court. Chris Evert (as cited in Moran, 1996)

As a stuntman I use the same technique with the same results. I visualize a fall that I have to do in every way possible with all the scenarios that I can think of and, like I am already watching the shot frame by frame, I slowly correct mistakes and take decisions to improve my stunt. I also project what can go wrong or

different from the environment and act accordingly. This helps me program my brain to react in a specific way if something does happen. This is the best and more efficient way to be prepared in case of everything. Otherwise, if I let anything by chance or let the surviving instinct to react, it can react in a harmful way or like most of the times, too slow. If I already have the scenario in my brain, if it happens, it will be accessed and played as it was recorded when I visualized that specific scenario.

Conclusions

Our brain is smarter than we think. We just need to figure out the most efficient way that works for each of us to program it. If we can truly develop our imagery skills and emphasize on technical elements of the correct motion, we can train our brain to pack and send the clearest information that our muscles need to react. If we have the infrastructure ready for the information, we have the perfect combo to learn and perform in a perfect way. This is the safest and fastest way to learn any skill regardless if it is about a coordination exercise, precision throw or show of strength.

The actor has only two tools that he can work with: his body and his voice. Without them he cannot exist as an actor or as a performer. The tool that he uses the most, that the spectator relates the most with, is the body, the actors body. "The centrality of the body brought into focus those places where the body naturally has a central role." (Ruffini, 2014) The more an actor can control his body, the more he can transmit to the public. The less he is thinking of what to do with his body, the more he can feel and transmit emotion. The best training that he can possibly do is to have full control of his tools with the best precision possible.

The actor of today is a fast learner. The timeframe of rehearsals has shrunk and the actor needs to keep up with every change. The film industry is even worse, as the cost of productions is raising each day, the actors have less and less time to learn, rehearse and perform. Most of the times they will use the best technical take and not the actors best take, so the actor needs to be almost perfect every time.

The theatre and film industries are special because they are always different and are based on other industries in the world. This is obvious in the way the professional athletes train, the stuntmen train, the construction men build a house, the art department build the set, the robotics engineered arm from factories is used for precise movement of the camera, the water sprinklers from fire safety systems are used to recreate rain on sets and so on. The actor needs to gain his character abilities in a short timeframe. Every character has different abilities, and a good

actor will learn them all. It is important for the actor to know the most efficient way to learn any skill thus how his body and brain works.

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