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3rd Degree Thesis
Relearning the Basics - Retraining Muscle Memory

Practice makes perfect, right? Well no, practice brings you close to perfection, in all reality, practice is what makes skills permanent. Seeing myself as an elite athlete in various different sports, for the majority of my life. Training at a high level, training my body to do things that many couldn't even dream of. In the beginning, we drill and train certain techniques learning the correct ways to do so, which creates our neuromuscular system memory (muscle memory) for these skills, which later in our training becomes techniques/ skills that we don't have to think too much about the process of how-to, we just do.

Muscle memory is defined by 'the ability to reproduce a particular movement or skill without conscious thought, acquired as a result of frequent training/ repetition of that movement' For example, a newborn baby has no muscle memory, they are a complete blank slate. The only way for a baby to learn to crawl or walk is to do those things, it takes practice (with a great deal of failure), and then gradually they then become skilled at each. This process is achieved by building neural pathways that give the muscles a sense of memory. My instructor and coach Mr Mark Trotter once said to me, "the more you practice a particular something, the more it becomes a habit and the less you have to think about the process of how to do it. In other words, training and practicing a skill becomes completely accustomed to you through the process of muscle memory.

It happens through our neurons communicating with our muscles and saying, "kick now" and the body responding because it knows the way of how to do it. For athletes, muscle memory is an unconscious process. The muscles learn certain types of movement in training, which I believe is an important part of developing as an athlete even more so as a martial artist, in the ability to be able to perform with the appropriate techniques.

Now, what would you do if something were to happen, that put you on the side-lines? It will happen to everyone at some point, maybe not in the way it did to me but there will be a time when an unwanted break in training will arise. Whether it's because of a few crazy weeks at work or school, or an overseas holiday, or more commonly, an injury or some joint pain. Whatever it may be, that has side-lined you, you might have noticed that it doesn't take very long to lose those hard worked for gains in your ability, size, and strength.

In fact, visibly seeing the loss in muscle mass can be a little devastating (trust me, I've been there). It may seem that all is lost, and you have to start back at square one, but that's not entirely true. New evidence in muscle science suggests that all of your hard work may still be paying off, even after months or years of not being able to train. In other words, you may have lost muscle mass and strength, but you can regain it back a lot faster than you would think, through simply just starting to train again.

However, what would you do if you no longer could do the things, the way you have always done them, not being able to engage those muscles because of restricted movement. To then having to retrain your body to do these skills you've been doing for over ten years, to have them look the same as before, be symmetrical to the other side of your body that is not hindered in any way by an injury.

This is where I will use myself as an example, after seriously injuring myself with a complete rupture of my right ankle ligaments and requiring multiple surgeries; over a couple of years. Re-training muscle memory on its own is hard enough, but to re-train and re-learn all the basics in a completely new way, is more so. Finding out that my body heals/ protects itself rather quickly; which is a good and bad thing, meaning the way my body heals is by producing a lot of scar tissue around the joint. This resulted in now having very restricted movement within my right ankle joint compared to the left.

Your mind can be your best friend and your worst enemy, especially when coming back from an injury. I have seen the fittest people just stop when others of their level continue to push on, and the reason for this as you'll probably hear them say "I just had it in my head that I couldn't go any further". Many times throughout each of my sporting careers, I have been told your mind will give up before your body is ready. This is something that is always stuck with me, learning your full potential and breaking through that 'wall', if you think you can't do something, you need to push for the extra few reps, those extra seconds and watch yourself grow stronger mentally. One bad event, or experience, leaves you to choose to make your way back to train and work harder, you have to be able to come back from a loss or setback, otherwise you are not going to be able to learn about anything vital within the sport and within yourself as a martial artist, an athlete or as a person.

I can only recall one period of time that I thought I could not make it back to be able to compete for New Zealand to be at a World Championship level. Most muscle memory is in the brain's cerebellum, it is the part of the brain in charge of controlling sensory and cognitive functions. There are three stages of learning motor skills that develop your muscle memory. The first phase is the cognitive stage, it is when the athlete is introduced to a skill or task, in this phase the main focus is on how to do the skill, and not actually physically practicing the skill. This phase brings the moments of "I don't get it," needing the athlete to watch someone perform the skill, visualize and then analyse that skill. The second phase is the associative stage, it is when the actual physical part; practice of the skill starts, learning the process. It is not necessarily done correctly straight away (nothing works quite so easily), but it is in the understanding of how it is achieved; understanding the feeling of how to perform the skill correctly. The last phase is the mechanical stage, it brings the 'ah-ha' moments, of finally feeling like you are putting everything together. It is when the skill is done automatically with no real conscious thought about the skills you are performing, having the skill become fluent and instinctive.

Injury can damage and disrupt the associated muscle memory that has been ingrained with your set of skills. Through my process of re-learning the basic movements; such as stances and sign wave, I must admit it was very tedious, spending time working on various skills to replace the previous habits I had embedded in myself from several training years. A lot of repetition was needed (a

basic rule we all should know when learning a skill) until the new muscle memory pattern is established, by understanding the processes in the brain; what it must go through to adapt to the changes. At times it was very frustrating, with the amount of time and effort it takes and only seeing small improvements, but being willing to take the time, pushing myself to think that it is possible to redirect the skills and abilities I have within each training.

So how does one, a martial artist, an athlete overcome this and make their return? As mentioned above, making a conscious effort on relearning and or retraining any new skill is needed to replace the previous habit. It definitely does not happen in just one training session, or after just a day or one week. It takes an ample amount of time, strong concentration and determination to be able to change your current muscle memory. It only takes a few thoughts about your mechanics to interrupt your trained muscle memory patterns and change your performance, no matter if changing it because of an injury or just improving technique.

Thinking about these things and the following help me in my successful yet still a work in progress to return back to the level I was at if not greater in some areas than before. Finding your correct form, focusing on the quality of the skill, concentration on finding and performing correct form in practice. Any flaws within your technique will become bad habits. Having bad habits, bad form, or as discussed retraining a habit in a new way, will take a long time to change those habits. Which is why it is also important to have a coach, instructor or training partner, to help in this time of retraining the fundamentals the right way; understanding the process. There are many different resources to use that offer ways to perfect your technique, but nothing can replace an expert analysing your technique and style. That's why working with a coach who can dissect your technique your performances and point out your weakness and critique you on your skills.

At the end of it all, it just takes a lot of practice, practice and some more practice. Correct and quality practice, practice to reach the unreachable perfection. The more you practice and push yourself to achieve the goals you set for yourself in your return to training. The more practice the sooner it will become a part of your muscle memory, having the skills become natural without much thought to it. Improving both overall movement and performance of each skill.