

Do Muscles Really Have Memory – Part II

Go for a drive. No problem; been doing it most of my life. Brush my teeth. No problem; been doing it all my life. Typing on the computer. No problem; been doing it for a decade now. Iron my shirts. Haven't done too much of that, so probably going to experience difficulty. So how do we remember all these things day after day after day?

Your ability to remember or reproduce a given skill, either a fine motor skill or a gross motor skill, is such a wonderful thing. In fact, once you figure it all out, you will be able to learn more bowling techniques and adjustments than you could ever imagine. I'm not kidding. If you want to become an elite bowler, then you need to start grasping the concept of muscle memory, and how it impacts skill-based learning and precision.

Do you ever forget how to brush your teeth, comb your hair, or walk and chew gum with your eyes closed? Nope, not really. You may become 'rusty', but the lack of precision does not constitute forgetfulness. It's a sign of mold and mildew, rust, and frozen gears, not broken gears. Being out of shape doesn't mean your body can never be in shape.

Muscle Memory and the Brain

Muscle memory is the interaction between the brain and the nervous system. In sport science we call it "proprioception". Proprioceptors are the nerve endings that tell the brain where your arms, hands, legs, feet, fingers, toes, etc. are located in time and space. In fact, it tells the body without even seeing them. In sport science we call this a kinesthetic sense of awareness. A person that types without looking at the keyboard exemplifies the proprioceptors at work. Without conscious thought, the fingers of the typist strike the correct keys, and often at a quick rate. This is muscle memory or proprioception at work. Without it, you would look down at the keyboard the entire time. Without it, you would have to watch yourself dribble the basketball or soccer ball the entire time.

Proprioceptors or Stretch Receptors relay information to our brain. They tell the brain where the body is in relation to time and space. Close your eyes and move your hands around, your brain can still interpret where the body or body part(s) are without seeing them. It's a sense of body positioning. The brain analyzes the information, and provides you a clear sense of our body's orientation and or movement.

So, what's all of this got to do with bowling? Everything! The more you bowl, whether it's correct technique or not, the more muscle memory patterns you establish. On the negative side, the more ingrained these patterns become, the harder and timelier they are to change. Remember last month, patience and precise practice equals skill development and successful change in your game. On the positive side, the more your muscle memory patterns develop, the more you become unaware of your physical bowling, the movements and biomechanics. Therefore, muscle memory frees the mind-brain-body to focus on a particular bowling objective: hitting your mark, converting a spare, or establishing new muscle memory under the guidance of a coach. That's when you can let it go, or just operate "in the zone."

Learning a new skill is nothing more than establishing new muscle memory patterns. Reproducing your approach and delivery all establish and further reinforce your muscle memory patterns. It's not surprising to realize that if you had to consciously think about each of your body movements, you would not be able to perform such complex tasks with any degree of success.

Re-Establishing Muscle Memory

So, how do we change our muscle memory patterns? During bowling, if you are performing the conscious movements properly, you will experience an occasional amount of success. For every successful delivery that results in the intended objective (goal orientation) the conscious mind experiences positive reinforcement. This positive feedback is also experienced by the subconscious mind, the psyche, which solidifies the muscle memory patterns. Basically, the more you practice, the more opportunity for successful objective achievement, resulting in psychological positive reinforcement and further muscle memory patterning. According to my good friend and fellow BEC instructor, Rich Williams, the old adage that 'practice makes perfect' is not just a saying; it's a physiological fact!

This all sounds fine and dandy, but sometimes bowlers struggle to find themselves or some form of "feel" or success. It's highly debated what constitutes success and how one should measure it in bowling. I personally use and like the objective forms of evaluation, similar to what I use when evaluating a bowler and their potential talent. If you have not recently had your game profiled, or your potential evaluated by a professional instructor or talent scout, then let me know, and I'll see to it for you.

If you cannot directly find the success or “feel” you are searching for while retraining your muscle memory, then go for outside help. This is when coaching can provide you direct muscle memory reinforcement. Under the direction of a good coach, the positive feedback can come in the form of verbal feedback from their analysis of your training. Particularly when you can’t “feel” what you perceive and are looking for. When we provide instruction to improve a particular aspect of your game, we often use verbal forms of positive reinforcement such as “Perfect!” “That’s it!” “Yes!” or a high five to provide the positive reinforcement. That’s largely because when retraining your muscle memory, everything you may be working on will “feel” awful, awkward, or unnatural. Often this is the sign of change and a good sign at that.

Using Muscle Memory to Your Advantage

You’ve practiced religiously, worked on your game, adhered to the advice of your coach or the coaches at the Bowlers Educational Clinic, so why can’t you consistently perform well yet? As your physical muscle memory develops, the *mental* aspect of your training and game become a more important factor. In other words, once you have the bowling knowledge and the physical side of muscle memory evolving and patterning, you can then gain a significant advantage with the mental approach to bowling, as well as good physical fitness.

If you ask many of the professionals of the individual participation sports (bowling, golf, etc.) what they were thinking of at the moment of performance, they are likely to say “nothing”, or non-descriptive words like “execute” or “trust”. Why? Because their body has been ‘trained’ to do so and their muscle memory has been precisely patterned. They have established the necessary muscle memory patterns to perform well in their sport. So, they are finally to a point where they can “Let it go.”

Remember the sailor? Just as he established muscle memory to compensate for the motion of the ship; when he returns to land, his legs will feel unstable at first; then new muscle memory will be established and he can begin to adapt to a normal walk. Very little effort by the conscious mind is necessary to override muscle memory. Proprioception at its best.

Overriding muscle memory

As mentioned earlier, bad habits in bowling are difficult to change due to the associated muscle memory that has been established. So how do you successfully override it? With conscious effort. You must concentrate on the new skill that is to replace the previous habit.

Let’s say that a bowler has been pushing the pushaway to the right rather than toward the target. For that bowler to change, they would have to concentrate on counterbalancing by placing the ball to what they think is the left during the pushaway; and they must do so until the new muscle memory pattern is established. Not just one practice session, one day, or even one week. During the time it takes to make it a complete part of your game. That may take weeks, months, or even years. We can’t say how long it takes, only when it arrives permanently. Depending on how long they have been bowling, this can take quite an effort and lots of practice.

Needless to say, once muscle memory is established, it is essential not to think about any other physical movements during the approach. This is really tough. Although it takes strong concentration 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 entire performance. Imagine thinking about the ball position in the swing after the second step of your approach, or think about the position of the arm that is not swinging the ball just before your release. Chances are that you will not have a very good delivery. It is important to realize it only takes a few mere thoughts to disrupt muscle memory, and will ultimately have a negative effect on your game.

A Muscling Conclusion to Remember

Perfecting your game through knowledge of the sport and practice is essential to establishing sound muscle memory patterns. When it is time to practice and train, think about the given item you are working on every second of every shot. Then move on to the next item. When it is time to compete, let the mind go blank and let muscle memory take over. When you have achieved that level of mental discipline, you are truly in “the zone” and can reach whatever level of performance you choose.

Look for this and other information on sport psychology for bowling in a new publication called **The Mental Game** soon to be released. I’ve reviewed it and I think it’s right down our alley.