

Muscle Memory Strategy to Improve Accuracy
and Form With the Aid of the
Sharp Shooter

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Introduction

The Reason

Many basketball players today have many difficulties when it comes down to shooting a basketball correct. They can come close, but never have the accuracy needed to put the ball in the basket. The biggest reason their accuracy is off is because many people are either taught, or have developed the wrong way to shoot a basketball. Most people have a tendency to stick out their elbow as if it is mental security that they are protecting the ball. If anybody has played basketball this is one of the basics, the coach is always saying protect the ball. This is engrained in the head of basketball players, and do not even think about it when they shoot the ball. Every little thing helps when in a tough situation like when trying to make a foul shot to win the game. Knowing and perfecting the skill of the proper form will help tremendously when under pressure. It is often said that foul shots is what can win a game when it comes down to the wire, every shot matters no matter what.

The Proper Form

The proper form can sometimes be very difficult to achieve by oneself. Even if help is given from say a coach or maybe just another player sometimes may never get the proper form down. Many people have either their feet staggered, or elbow sticking out in the air; they also will jump forward, backwards, to the sides, and even not even follow through with their shots. All of these things can throw off a person's shot by sometimes just a couple centimeters, but that is just enough for the ball to go bouncing off the rim and into the hands of the defender. The proper form should first start with the shooters sight. The shooter must be focused and aiming just over the front of the rim except if taking a bank shot. (A bank shot is when you hit the ball against the painted square on the backboard. This square was designed that if the ball hit inside

the lines, it would bounce right into the net). Your eyes should never leave the target of right over the rim, even if a defender throws their hands in the air. Keeping your eyes on the target will help you judge the angle, and velocity you throw the ball at.

The next thing to keep in mind is your balance; this is where your feet placement comes into effect. Spread your feet shoulder width apart keeping your toes and ankles straight towards the basket of the hoop. Feet placement should have a toe-to-heel relationship. This means if you are a right handed shooter your right foot goes forward. Your non shooting foot should be still a shoulder with apart but the toes in line with the heel of the shooting foot. This will ensure your balance is maintained because your feet are the foundation of your balance and having a proper foundation will help your shot stay inline. Keeping your hips and shoulder in line with your feet, and keeping your head over your feet (slightly tilted forward, but not tilted to the sides) must also be done to attain proper form and balance. Balancing also includes pre-shot motions. You should flex your knees to a forty-five degree angle. This will provide crucial power you need in order to get the ball to the basket. Often, fatiguing players fail to do this and compensate for the lack of power by throwing the ball from over their head, or from their waist. This is not the proper form, and these actions will not give you an accurate shot. Along with bending your knees, the last thing you must remember while balancing during the pre-shot is to keep your upper body inclined slightly forward towards the net.

Hand position is key when making a shot, and is commonly misunderstood. Your non shooting hand is strictly just for balance. Frequently, people use both hands when shooting a basketball; this is not the proper form. The non shooting hand should be placed on the side of the ball for support. The shooting hand should be on the bottom center of the ball. This hand should be relaxed, and your fingers should be spread comfortably with only your fingertips touching the

ball. When given the chance the ball is most accurately thrown when your fingers are in the horizontal grooves of the ball; this is because it gives the ball a better backspin when you flick your wrist. This backspin can give you another chance to make the basket even if your shot is off. With backspin, if the ball hits the rim just right it will go straight up in the air and have the possibility of going through the basket when it comes down.

Along with hand position is elbow alignment. It is extremely important to have proper elbow alignment because if it is sticking out or in the wrong position your arm won't be in line with the basket. The proper position for your shooting elbow is to have it straight up and down aligned with the basket. Your non shooting elbow can be tilted to the player's comfort.

The Rhythm of shooting a basketball is smooth, balanced, and in line. Everything must be moving in a synchronized order and it is important to remain smooth and keeping your eye on the target the whole time. It starts with the bending of the knees and then pushing off the ground synchronized with your arms going in an upward position. This is followed by the extension of the elbow and the flick of your wrist to create backspin. After this is the follow-through. After releasing the ball from your fingertips wave the ball goodbye. This insures that you are putting backspin on the ball as it leaves your fingertips. During the whole movement it is important to remain keeping eye contact with the target. This rhythm is all about proper positioning and balance. Once you have mastered this skill, you have mastered the jump shot.

Muscle Memory

Muscle memory is described as the movement of muscle in which the muscle becomes familiar in the movement it is making. The most important muscle memory skill that a human will ever learn is the skill to walk. It is so important, and is practiced so much that it does not even have to be thought about, the body just does it. This is mainly because neurons

communicate with the muscle and say “walk now.” In the case of a baby first learning how to walk, their brains are going a mile a minute. They are constantly making connections, and are building what are called as neural pathways in which the muscle gains a sense of memory. This memory does not happen quickly, it takes steps and time to accumulate. At first the baby falls, and falls, but over time with a great deal of trial and error the baby falls less and less. This turns into the baby falling rarely, and then running. The process of muscle memory takes a great deal of time to master. In the case of the baby learning how to walk, it takes them nearly a year. Muscle memory is used in everyday life without even knowing it, even with adults. Take for instance a secretary. They did not learn how to type that fast on a computer over night, it took time and practice for them to first learn where the keys are placed on the keypad. Then they had to be able to type words without looking at the keypad. Once this is done, they can work on getting their muscle memory in their fingers faster and faster.

Another example is for all those who play instruments. Every instrument you play requires a sense of muscle memory. Take for instance some of the world’s fastest drummers. They spend countless hours perfecting and expanding on their skill of being able to hit a drum accurately and extremely fast. Pianists are in the same category as the drummers and any other instrument they must be able to press down on the keys of the piano at the exact rate the sheet music requires, and the exact key or else the whole piece will not sound as good as it should. Without muscle memory, there is no way someone would be able to learn how to walk, or type on a computer, or even learn how to play an instrument well. Just think about if the some of the world’s fastest drummers are really thinking about every strike they take at the drum, a human just can’t process all that information fast enough, this is why there is such a thing as muscle memory.

The whole trick behind muscle memory is a lot of practice, once you have achieved it; it is like an unconscious movement. Take for example if somebody throws a tennis ball at you, your natural reaction is to move out of the way. It is kind of like instinct in which you do not have to think about what you are doing; your body just does it automatically.

Studies have been conducted using muscle memory in the sport of basketball. Some of these studies have been the United States Patent number 5,599,016. This device uses muscle memory to gain consistency in shooting a basketball by making the subject shoot over a bar that is above the head of the user. This makes the person using the machine to learn how to shoot from above their head instead from at their waste.

Another example of United States patented devices that are training aids for basketball is the United States Patent 6,095,936. This device uses a ring that goes around the body of the user, and a coil that attaches to this ring and just above the elbow. The device is designed to keep the elbow in while shooting the ball.

The main idea in both of these patents is to use the machine as a training aid and then take it off and use the muscle memory gained to shoot the same way as if still in the device. Muscle memory is a great way to improve a person's shot.

Anatomy of the Shoulder

The shoulder is made up of three different levels; the bones and joints, ligaments, and finally the muscle and tendons. This piece of the body is extremely complex making it have the greatest range of motion for any joint in the human body.

The first level is the bones and joints. There are three major bones in the shoulder, the clavicle (collar bone), acromion (shoulder blade or scapula), and the humerus (bone above the

elbow). These three bones are held together by four joints, the Glenohumeral joint, the acromioclavicular joint, the sternoclavicular joint, and the scapulothoracic joint.

The Glenohumeral joint is the major joint in the shoulder where the humerus attaches to the scapula in a ball and socket joint also called the spheroidal joint. The design of this joint allows an incredible amount of movement, and is where most of the movement in the whole shoulder takes place.

Where the clavicle meets the acromion is called the acromioclavicular joint, or the more commonly used AC joint. This clavicle is attached to the acromion by two ligaments called the coracoclavicular ligaments.

On the opposite end of the acromioclavicular joint is the sternoclavicular joint, also known as the SC joint. This is a gliding joint and attaches the clavicle to the sternum by four ligaments, giving it a larger range of motion than most other gliding joints.

The final joint involved with the shoulder is the scapulothoracic joint. This is the joint where the scapula glides against the thorax (rib cage). The joint makes it possible for the muscles surrounding the scapula to work together to keep the socket inline.

On the ends of the bones is articular cartilage. Cartilage is a slippery white substance that allows bones to rub together without causing any damage. This is important because without cartilage human bones will grind together thus weakening the body and wearing it down. Weight bearing articular cartilage is typically about one-quarter of an inch thick. Non weight bearing articular cartilage like the shoulder is a little bit thinner.

The next level of the shoulder is the ligaments. Ligaments are soft tissues that bind two bones together. Their main job is to provide stability to the body, and prevent dislocations. A dislocation happens when a ligament tears and the bones it was holding together become

separated. Ligaments can also form labrums. A labrum is a ligament that attaches itself almost completely around another bone. This normally happens with a spheroidal joint because it requires more support than most other joints.

Tendons and muscles are the next level in the shoulder. Tendons are similar to ligaments in the fact that they are soft tissues that connect two parts together. The main difference is that tendons attach muscle to bone when ligaments attach bone to bone. The rotator cuff is an example of tendons attaching to bone. The four rotator cuff tendons attach the deepest layer of muscle to the humerus bone. These muscles allow a human to raise, lower, and move their arm side to side. Like all other tendons, the rotator cuff tendons also provide stability to the shoulder.

The largest muscle in the shoulder is the Deltoid. This is the outermost layer of muscle on the shoulder, and is responsible for lifting the arm when it is away from the side of the body.

Inside the muscles are nerves. Nerves travel throughout the body sending signals to the brain such as pain, temperature, and touch. They can also be sent from the brain to muscle. The three main nerves located in the shoulder are the radial nerve, the ulnar nerve, and the median nerve. They travel through the axilla, also known as the armpit, to reach the brain.

Along with the nerves traveling throughout the body are blood vessels. Blood vessels provide blood to the muscles. The main blood vessel in the shoulder is the axillary artery. This artery travels through the axilla and is the main source of blood to the arm muscles. There are smaller blood vessels branching off of the axillary artery providing blood to other parts of the arm.

Also located in the shoulder is structures known as bursae. Bursae are similar to cartilage because it provides lubrication to two rubbing parts. The difference between bursae and cartilage

is that bursae provides lubrication to two parts that are rubbing together where there is not a joint. Cartilage lubricates friction caused by bones rubbing together.

Abstract

This experiment tested the ability to gain muscle memory with the use of the Sharp Shooter: a basketball shot training device. The testing consisted of three sections, a pretest, a treatment, and a posttest. In the pretest control, the test subjects took 50 normal shots. Each shot taken was recorded as either a missed or made basket. This data was collected assess the accuracy of the subject's shots. Also during the tests there were two cameras set up, one parallel, and one perpendicular of the test subject. The purpose of the cameras was to record the subject's form in taking the shot. Angle measurements from the shooting hand position from the digital images were taken to assess proper form. In the treatment, test subjects trained with a patented device known as the Sharp Shooter used to teach good form when shooting a basketball. The device was developed locally and this study was the first to evaluate its efficacy. In the posttest, the test subjects took another 50 shots and was evaluated the same as the pretest. Data indicates while there was no significant change in accuracy, the form of the subjects was improved and showed less overall deviation.

Materials/Procedure

<i>Supplies</i>	<i>Equipment</i>
<ul style="list-style-type: none">• Basketball• Data sheets	<ul style="list-style-type: none">• Camcorders (2)• Tripods (2)• Basketball hoop• Sharp Shooter• Computer

This experiment will consist of three sections, a pretest, a treatment, and a posttest. Each test will be taken on separate days to minimize fatigue that might impact the test results. The

pretest will be taken as a control. The test subject will take 50 shots the way they normally do. Each shot they take will be recorded as either a missed basket, or a made basket. In conjunction with the made or missed baskets, the subject's shots will be recorded as of where they hit, either the rim, backboard, or air. The rim will be considered shots that just fell through the net too. This data will be brought together to assess the accuracy of the subject's shots. Also during the tests there will be two cameras set up, one parallel, and one perpendicular of the test subject taking the shots. The purpose of the cameras is to record the subject's form in taking the shot. In the treatment, there will be a patented device known as the Sharp Shooter used to teach good form when shooting a basketball. The Sharp Shooter was an invention that was patented by Charlie Stochmal. He is my former basketball coach and he contacted me to test out his device. Subjects will take 50 shots with the device, and the data will be recorded like the previous test. In the posttest, subjects will take another 50 shots, but without the Sharp Shooter. Data will be gathered like in the other test based on if the shot was made or not, and where it hit. The data sheets from the pre and post tests will be gathered and averaged to see if the treatment has worked or not. After the experiment is done, the videos will be assessed and a t-test will be conducted to measure the change of the arc of the ball.

Data

Subject 1 Pretest	Subject 1 Posttest		Subject 2 Pretest	Subject 2 Posttest
90	85		90	86
82	95		92	95
87	90		95	87
90	89		86	90
90	90		90	90
88	85		90	90
84	95		88	92
92	93		85	85
80	84		83	87
88	92		92	91

92	86		83	93
76	80		87	88
95	92		90	86
90	87		91	90
82	88		90	91
95	89		87	86
86	92		85	90
95	95		92	91
90	85		90	88
80	92		82	87
94	90		89	93
88	87		85	85
80	95		90	86
85	82		90	88
93	90		91	85
93	94		81	93
95	90		88	92
83	85		87	85
88	90		86	89
90	84		89	79
89	90		76	85
98	98		89	90
86	86		80	85
80	89		90	90
95	88		83	88
80	92		90	88
90	90		95	86
85	93		97	91
80	80		90	85
90	92		80	86
81	88		90	91
92	85		85	89
90	90		85	90
88	90		90	87
80	90		87	85
82	87		80	93
81	86		89	90
83	92		95	91
83	90		87	92
85	88		90	88

Subject 3 Pretest	Subject 3 Posttest		Subject 4 Pretest	Subject 4 Posttest
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70	85		85	88
71	80		92	90
75	82		86	90
80	80		86	89
86	89		84	91
84	86		87	87
86	84		89	90
82	90		90	89
86	83		86	86
80	86		88	85
75	85		91	90
80	84		90	86
75	90		89	90
79	89		86	89
94	88		85	92
78	85		90	89
76	86		90	87
86	83		91	90
80	80		88	91
81	87		86	87
89	86		89	90
81	90		86	89
85	83		90	90
78	87		86	88
81	85		89	90
84	86		88	91
88	84		92	86
85	82		90	88
90	90		88	90
86	88		91	91
82	85		91	89
79	86		93	88
80	90		89	90
85	88		95	86
82	87		92	90
81	90		90	90
89	86		89	87
80	90		90	91
85	84		84	90
84	90		86	89
82	88		90	88
86	85		85	86
85	90		90	87

84	89		87	86
79	85		85	90
80	84		89	82
89	90		93	89
84	88		90	92
80	85		91	90
86	84		88	88

Chi Square Nonparametric Analysis of Shots Made

Subject:	Pretest	Posttest	Total
1	23	25	48
2	36	29	65
3	29	25	48
4	29	29	58
	Expected	Observed	

$$\chi^2 = \sum \frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}}$$

Expected



$$(22-23)^2 = 4/23 = .17$$

$$(36-29)^2 = 49/36 = 1.36$$

$$(25-23)^2 = 4/23 = .17$$

$$(25-25)^2 = 0/29 = 0$$

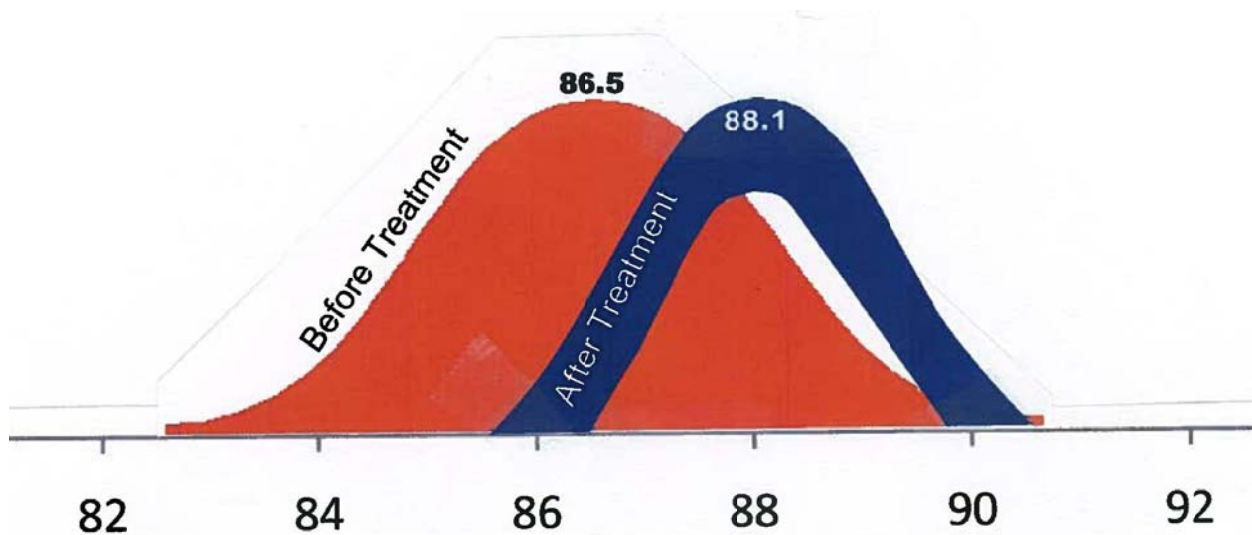


$$\chi^2 = 1.7$$

$$\chi^2_{cv} = 7.18$$



No difference between pretest to posttest in shot accuracy



Conclusion

Testing:

The project that was conducted and completed was titled “Muscle Memory Strategy to Improve Accuracy and Form with the Aid of the Sharp Shooter. The problem that was confronted was, with the aid of the invention of the Sharp Shooter, will this device allow an athlete to gain the proper form to improve their accuracy when shooting a basketball.

There were 4 tests all together that were taken to decipher the effectiveness of the Sharp Shooter. These tests were the chi square nonparametric analysis of shots made, the descriptive statistics test, the tukey HSD post hoc analysis test, and finally, the two-way analysis of variance test. The chi square nonparametric analysis of shots made test was done by taking the shots the subjects made in the pre and post tests and plugging them into the chi square formula. This formula is $\chi^2 = \sum (\text{Observed} - \text{Expected})^2$ divided by the Expected. The observed was the posttest, and the expected was the pretest. This test revealed that there was no difference in shots made between pre and posttests. The descriptive statistics test was taken to show how the range of motion the subject’s elbows swung at. The data is shown in a graph below. This test was done by taking the angles of the subject’s elbow every time they would go to take a shot. This data was collected and then put into software that ran the numbers. The test showed that with the use of the Sharp Shooter the range of the subject’s elbow angles were significantly smaller compared to shooting with their normal form. This means that the subject has gained more accuracy in their shots due to the aid. The tukey HSD post hoc analysis test was conducted to distinguish what groups were different, and what groups were similar. This test is significant in order to further hypothesize if the training aid will benefit future users on a mass scale. In this test, only one out of the four subjects did not perform as well with the aid than the others. A four to one ratio is

fairly good for just a prototype, but even the one subject that did not do as well benefited from the aid. This is significant because it is now known that this aid will only benefit the user. The two-way analysis of variance test was taken in order to prove if the basketball training aid, the Sharp Shooter, had worked or not. This test demonstrates that the basketball training aid had been statistically significant because it shows that the subjects performed differently, in a beneficial way, in the posttest compared to the pretest. The test is easily read to whether or not the testing was significant by looking at the last column. If in this column the number reads less than .05, then the testing was statistically significant, but if the number reads over .05 then the testing was not statistically significant. The testing was calculated at .02 thus making it statistically significant, proving that the basketball training aid, the Sharp Shooter, was a beneficial treatment for performing the proper form when shooting a basketball.

Improvements to the aid:

If improvements were to be made to the basketball training aid, the Sharp Shooter, the guide rod would be extended a little longer in order to fit taller subjects more comfortably. It was found when taller subjects were used, every once in a while the rod would come out of the wheel box. This is a problem when trying to teach someone the proper form. Also, the wristband that held the subject to the guide rod would be able to move in a smoother motion. It was attached to the guide rod by a nut and bolt, so when the bolt was tightened, the strap did not move as freely. This is a problem because when the bolt is loosened in order to allow the wrist strap to move freely, the strap has a possibility of completely detaching itself from the guide rod. Another improvement that can be made to greatly increase the effectiveness of the device is to weld a sheet of metal to the base that can be folded up when not in use. It has been found that even with locking wheels the device moves around a little when the subjects are going through the motions

of taking a shot at the basket. Placing a sheet of metal at the base of the device will allow the subject to use their own weight to keep the training aid in place and not moving around. This will also keep the subjects from being too far in front or too close to the device because it gives them a precise place to stand when shooting the basketball. This will give the device a much greater chance at success if it ever makes it out on the market for sale.

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