

How to Select a Hockey Stick

(How the Correct Stick Increases the Efficiency of the Highly Elastic Collision Between a Hockey Stick and a Puck)

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When the great Gordie Howe was asked in an interview what was the most common error made by young hockey players today he said it was selecting the incorrect hockey stick. From my experience as a scientist and coach, I fully agree. A hockey stick must be selected on two main physical characteristics: size and flex. When speaking of size it is not only the length of the stick but also the size of the shaft, size of the blade and weight of the stick. An incorrectly fitted hockey stick I feel is more detrimental to the development of a hockey player than incorrectly fitted skates.

To fully understand why selecting the correct hockey stick matters we must first understand what happens when a hockey stick strikes a hockey puck. We will describe the interaction of the player with the stick and puck in common terms. When a hockey stick hits a hockey puck the energy necessary to cause the puck to travel at high speeds does not come solely from the strength of the player. This is evident when you watch players like 2004 NHL MVP Martin St. Louis who is 5'9" and 185lbs but can shoot the puck nearly 100mph. How does he do this? He selects the proper stick and understands the power is in the form AND the stick.

When a player takes a hockey shot regardless if it is a wrist shot, snap or slapshot a significant amount of energy comes from the coiling of the stick's shaft. By coiling I mean the bending of the stick's shaft. We will use the slapshot as our discussion point since this is the most exciting for young players to shoot and best illustrates our reasoning for proper stick selection. Although, as a coach I like to see the wrist and snap shot developed before the slapshot. The reason for this is the accuracy of a wrist shot can be transferred to a slapshot but the opposite is not always true. I am talking about proper follow through, hand position and body mechanics. It is difficult for any young player to get the mechanics of a slapshot correct unless they understand and can execute the wrist and snap shot. An efficient wrist, snap or slap shot is highly dependent on the correct stick selection.

When shooting a slapshot the blade of the stick should hit the ice surface 2-4 four inches behind the puck. If done properly, you should hear two sounds in quick succession, the stick striking the ice then the blade hitting the puck. As the stick hits the ice and slides towards the puck the player should be rotating their hips open, transferring their weight from the back to the front leg and bending their knees. The fundamental mechanics of the hips are similar to hitting a baseball. Why does the player need to rotate the hips, transfer their weight and bend their knees? This is the motion that allows the player to coil or bend the shaft of the hockey stick. Next time you see a picture of a NHL player taking a shot notice the shape of the shaft of their stick and how flexed their knees are. The coiling of the hockey stick is where the stored (potential) energy comes from that causes the puck to travel at high speeds. Another important aspect is where the puck strikes the blade. If you

remember your high school physics and lever arms, you will know that the farther away from the heel of the stick you hit the puck the more twisting force the puck puts on the shaft of the stick, which can decrease accuracy. The puck should hit about halfway between the middle and heel of the blade. When the stick finally hits the puck there should be a significant bend in the shaft of the stick, this is the coiling of the stick. Shortly after the stick hits the puck the shaft of the stick uncoils and releases the stored energy and this energy gets transferred from the shaft of the stick through the blade and to the puck. The energy stored in the stick's shaft that gets transferred to the puck is the main energy source for causing the puck to travel at high speed. The player's ability to bend the shaft of the stick is based on the flex of the stick, the size of the shaft and the mechanics of the player when they execute the slapshot. This is why flex and size of a stick are so important especially for young players.

I have seen it many times in my years of coaching that the parents buy their young player an adult stick because the youth's favorite NHL player uses the same stick. This is doing a significant disservice to the young player and your pocket book. Why is this? The first thing you have to do when a young player uses an adult or junior stick is trim the shaft to fit the youth player. The cutting of the shaft changes the flex rating of the stick. To illustrate: take a popsicle stick and hold it at both ends and try to bend it near the middle, it flexes fairly easily. Now cut 25% of the popsicle stick off and try to flex the remaining 75%. You need much greater force to get the same amount of flex compared to when the popsicle stick was whole. This same effect happens when you cut an adult or junior stick to fit a youth. A 95 flex stick may become 100 or even 125 flex once cut. The shorter you cut a stick's shaft the more strength it takes to flex it. So if an adult uses a 95 flex stick, how can a youth coil the shaft of the same trimmed shaft that is now over 100 flex? The youth will never have a powerful slapshot, snap or wrist shot since they all require the shaft to bend.

I recommend a 40-65 flex for all players under 100 pounds. How will you know when to buy a higher flex? When the player's shot starts getting erratic or they break the shaft. Why does an erratic shot indicate the flex is too low? When the flex is too low the player will over coil the shaft and the stick becomes what is called a whip stick. The shaft is coiled so much that the shaft's energy causes the blade to whip in space and the player will lose accuracy on their shot.

Let's examine the other characteristics of the hockey stick that affect a young player. The size of the shaft is rarely considered when selecting a stick but may be as important as the flex. What is easier to stop from spinning a large or a small shaft, keeping in mind the size of a youth player's hand? All things being equal a smaller shaft is easier to hold. When a young player is given an adult or junior stick to use the shaft is about 15-25% larger in size compared to a youth stick. This makes it harder to prevent the stick from rotating when the player hits the puck. If the player can not firmly hold the stick from moving or rotating in their hands they will not have a hard or accurate shot. As we discussed earlier a significant amount of energy is transferred from the coiled shaft to the puck. We also mentioned the need to hit the puck closer to the heel than the tip of the blade. The blade of the sticks acts as a lever (moment) arm that tries to transfer some of the energy stored in the coiled shaft into twisting (torsional) energy that could cause the shaft to rotate in the player's hands. So

if a player uses a shaft that is too large for them to hold firmly some of the energy that should be used for accelerating the puck is used to rotate the stick in the player's hands, causing the puck to move slower and be off target.

Next let's examine the length of the blade. As mentioned previously the length of the blade has a direct effect on how much the stick tends to want to rotate in the player's hands. If the youth player is using an adult stick then the blade will be longer. Again this creates a larger lever (moment) arm that tends to want to twist the stick in the player's hands. Also, when an opposing player strikes the end of the longer adult blade they apply more force due to a longer lever (moment) arm causing the player's stick to rotate and lose the puck off their blade. Another point to consider is: when a youth player is using a smaller youth blade then graduates to a larger blade the larger blade will appear huge to the player and give them more confidence and control of the puck.

Lastly let's look at the weight of the stick. An adult stick weighs significantly more than a youth stick due to the larger shaft and blade. The added weight will hinder the quick movement of the stick especially when the player is a defense man and sweeping their stick in front of themselves to prevent a pass or shot. A lighter youth stick will allow the player more coiling, speed and acceleration when they shoot the puck. It will also allow them to move the stick faster and with more force in defensive moves and poke checks.

Now let's briefly discuss the difference between wood and composite sticks and shafts. A composite stick bends more evenly, has greater acceleration when it uncoils and is lighter. The down side of composite sticks is the higher acceleration and release speed of the puck off the blade tends to cause youth players to be less accurate with them. The shorter the time the puck spends on the blade the harder it is to control. The composites also do not telegraph the feeling of the puck through the stick to the player as efficiently as a wood stick does. A youth player needs to feel the puck on their stick to gain confidence in their stick handling. The feel of the puck on a wooden stick is much more evident to the stick handler when compared to a composite stick. Once a youth player can handle the puck with their heads up they are ready to graduate to a composite stick.

Finally, how do you size the length of the stick to the player? With skates on, hold the stick up to the front of the player with the blade down and the shaft vertical. The top of the shaft should end between the player's chin and nose. Some players, like myself, have their sticks cut below the chin, this tends to aid in handling the puck when it is close to the body. Defensemen will normally have longer sticks but it should not extend past the player's nose. When a stick is too long it is easier for an opponent to move the player's stick due to increased leverage and it is much harder for the player to play the puck close to their body. The best stick handlers I have ever coached had their stick cut 2 inches below their chin. This player could weave the puck not only through opponent's legs but his own skates too. His near body puck control was amazing, and he was consistently at the top of the leader board.

You would not expect a youth baseball player to use a 32oz bat so why expect a youth hockey player to use an oversized stick. There is a wide selection of 45 flex and lower

youth sticks on the market. Select one that fits your player in flex, weight and length. Do not let the marketing select the stick for you. Have the player hold the stick in their hands with their gloves on and you try to twist the stick. It should take a significant effort for you to twist. Also, have the player hold the stick on the floor with their hands in shooting position and try to flex the shaft of the stick. They should be able to flex the shaft without using all of their strength. If they can not flex the shaft with medium effort at least an inch the flex is too high. This all applies to adult and junior selection of sticks to. If you need help, go to a reputable hockey shop and ask for help in selecting the correct stick. If your youth player has a strong shot due to the correct selection of their stick they will be a much happier player. Good luck and game on!

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