Science of Explosiveness

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Goaltending in its current form has gone way beyond the old ways of coaching. Goaltending has become more than just drills and fundamentals. The game has become so much more complex that everyone but the trained coach can over look the simplest things. This article is dedicated to one aspect of movement that is over looked and often neglected.

The science of explosiveness stems from much more than brute power, strength, or conditioning. There is actually physics behind how to get the most amount of push for the least amount of power. Likewise, there is a degree of physics behind controlling the movements. Through Video, and in this case, photos, I break down the science of explosiveness into three main categories that include both standing movements and butterfly movements. These three categories are: Depth of Stance, Angle of Knee, and Blade positioning.

The most well known category that I have come up with is the **Depth of Stance**. In our DVD series we lightly touch on the topic. In a given game or practice there are three main stances that a goalie will find themselves in whether they are aware of it or not. These three stances are relaxed, medium, and preload.

In the ***relaxed stance*** the goaltender is still ready for a shot at any time but is usually following the puck in the zone in minimal threat situations. This stance is an energy saving stance usually used in a situation such as a penalty kill when the puck is being moved around the outside of the zone.

Photo of Relaxed Stance

Photo of Medium Stance

The ***medium stance*** is your standard stance. It is right in the middle of everything. This is usually where most goalies begin. It doesn't consume too much energy, but allows for a higher level of readiness. In this stance the knees are usually just above a 90 degree bend, with the back in an equal and opposite angle. In this stance you should be able to draw a line from the balls of the feet through the knees and finishing at the series shoulders. (For more on this stance, check out our DVD *Goaltending Your Game Starts Here*! There is a whole section dedicated to this with helpful graphic representation)

The ***Preload stance*** is far more reactive than the first two. Preloading is a skill that is taught for specific situations usually coupled with anticipated plays. The Preload stance usually, only involves one leg not both. Common situations that this is used include odd man rushes, back door plays, and multiple passes in tight. The goaltender will see the play developing and anticipate the next pass. While doing this the goalie will bend the outside leg deeper than the medium stance. This deepening of the bend engages all the muscles in the leg top to bottom as well as engages some of the lower back muscles providing maximum power. This is to be used with both caution and scarcity as it consumes a great amount of energy.

Photo of Preload Stance

Brute power, as stated earlier in this article is not the only thing that is involved with control, speed, and explosiveness. The next piece of the science of explosiveness is the angle of the knee to the ice. When I was a freshman in high school, I used to hear my geometry teacher day in and day out, "…that geometry is all around us." As much as it hurts the ego, he was right. Goaltending is nothing but geometry, from the angles, lateral and vertical, and depth that we talk about… all the way to the current topic of the knee; it is all related to geometry!

The angle of the knee to the ice is easiest explained while using a butterfly. Here is a word of caution, just because it is easiest to explain this topic using a butterfly doesn't mean that it only pertains to the butterfly.

Any time the goaltender has to move laterally while in a butterfly, the first thing that is necessary is to bring the outside leg up into a push position. This is where the angle of the knee comes in. Just as in the Depth of Stance, the Angle of the Knee also has three main positions. These positions are less for energy consumption as in the Depth of Stance, but more for the need for control or speed.

The first main position has the ***knee the closest to the ice***. This angle is used for small controlled movements, movements such as a close in rebound. In this type of scenario, the goaltender is forced to move only a small amount. For this position the knee is only raised far enough for the goaltenders blade to touch the ice. Minimizing the distance of the knee to the ice reduces the chances of a five-hole goal as well as minimizes the power of the push ensuring a controlled slide.

The second position of the ***knee is mid height***. This position is the middle ground. This position whether known or not is the primary position that goaltenders use. This position combines the perfect combination of power, speed, and control for a majority of the plays. Most goaltenders using this knee angle are moving a distance of around half the net. For example, if there is a shot taken from the center angle at the top of the crease and the rebound lands on the back door a few feet in front of the goal line. Anything that requires a farther distance and a quicker slide or a shorter distance with a controlled slide will opt for a lower or higher knee angle.

The third knee angle is ***almost vertical or perfectly perpendicular to the ice***. With the goaltender's knee at a perfect 90-degree angle from the ice, it just so happens that the Depth of Bend is just under a 90-degree angle. This combination of the 90-90 angle and bend provides a goaltender the ability to become a shooters worst nightmare. This bend is the maximum power that will be provided by the goaltenders strength. This position again engages all of the muscles at peak performance in the lower extremities as well as engages the lower back muscles. Most common situations that this is used happen to be anything over half the distance of the net, in a scenario such as back door pass, or number 4 classification of rebound. (Refer to Rebound Control chapter of Between the Pipes DVD series, *Goaltending Your Game Starts Here*!) The goaltenders mind frame here is not concerned with a five-hole goal in the immediate position, nor a necessity for a controlled slide. The goaltenders main concern is getting from point A to B with the shortest amount of time. Once in transition the goaltender can focus on bringing the knee back to the ice to seal off the five-hole and controlling the slide. Knowing the three positions of the Knee Angle and the Depth of Bend are still only parts of the equation. These parts can be tremendously hindered with out the proper Blade Positioning.

The most over looked and miss-understood part of explosiveness is the blade positioning. Unlike the other aspects that have been discussed, there are not three different positions; there is only one right position and usually 2 wrong.

The two wrong ways of blade positioning include most commonly; using the heel of the skate and using the whole skate blade.

Using ***the heel of the skate*** is completely improper for a number of reasons. First of all if you are pushing off of the heel then you are not engaging the calf muscle. This is a vital role in explosiveness. If the goaltender is not engaging the calf then the goaltender is only getting half the push. The second issue with using the heel is control. When using the heel the most common problem that arises is rotation. Pushing off the heel creates a small c-cut of a push thus forcing the shoulders around and un-square. The farther the distance the goaltender moves the more prevalent that this may become. The third and final issue with using the heel of the skate is a reduction in the Knee Angle. If a goaltender is pushing off the heel only then the knee physically cannot get to the same position as if they were pushing with the toe.

Using ***the whole blade of the skate*** isn't as problematic as using the heel but it does have one major flaw. This flaw is a lack of precision and power. The best way to describe this is with weight distribution. Let's use a water balloon and a single nail. Setting the balloon on that nail will obviously make it pop. This means that the focal point of the weight is on one single point. As you add more nails the balloon will begin to support its own weight. How is the possible? The weight is beginning to distribute itself over a larger distance or over a larger proportion. This same concept applies negatively on skates. As a goaltender our number one goal is to be precise. In doing so we have to stop and transition on one single point. Following this train of thought what happens if the weight of the goaltender is distributed over the whole blade as opposed to one focal point? The blade will slide farther which and make all the transitions slower and over longer distances.

The only right way to push and use the skate blade is off the toe. The closer a goaltender can get to using one single point on the blade there by focusing all their weight and energy, the more precise and powerful they will become.

The last point that needs to be expressed on this topic is the center of gravity. The center of gravity plays a vital role in explosiveness. For all goaltenders, regardless of size, style or ability, their center of gravity must remain **at all times** in the center of their body at their hips. The most counter productive activity that a goaltender will bring on them is poor center of gravity while moving. If your center of gravity is off, then it will create a delay or hesitation during body transition whether standing or in a butterfly.

That concludes the foundation for the Science of Explosiveness. For more on this topic please contact me at Jeremy@Betweenthepipesgoalieclinic.com