Increase Goal Scoring by Changing the Color of the Goal

Grayson Fertig
US National Bobsleigh Team

In September 1999, the International Table Tennis Federation changed the size of the official ping pong ball from 38 millimeters in diameter to 40 millimeters. Racket covering advancements, enhancing spin and power, made the game so fast that points were commonly being decided in just 2 or 3 strokes. Spectators could neither see the ball nor have time to appreciate the strategy and athleticism of the players. The 40 millimeter ball enhances the game while also appealing to the fans' pleasure. In 1969, Major League Baseball responded to declining batting averages by lowering the height of the pitcher's mound from 15 inches to 10; by the end of the 1970 season the league average had risen from a pre-adjustment mark of .237 to .254. Fifteen years ago Tom Purtzer led the PGA Tour in driving distance, today his 279.6 yards average would have him tied for 120th place. Even the traditional Augusta National Golf Club has lengthened holes, planted trees, and added rough to keep advancements in the game from driving the Masters to obsolescence. Change in sports, as it is in life, is inevitable and if the NHL wants to increase goal scoring then changes must be considered.

Figure 1: the *8i Goal*

The *8i Goal* is a simple idea based on fundamental knowledge of color vision, the phenomenon of color, and how the brain processes that information. The *8i Goal* is a standard goal with respect to size and shape, but rather than the traditional color system, its double-sided netting is colored red on the interior while the exterior remains white and the posts are gray. Red (the interior netting) is the most dominant and dynamic of all colors in the color spectrum, therefore it is the visually optimal target. Leaving the exterior white allows the shooter who is seeing the goal from an angle to locate only red of the netting that the goalie is leaving open. Theory is one thing and application is another. The *8i Goal* concept

was evaluated by Natalia Rodriguez, M.D., an ophthalmologist at the New York Eye and Ear Infirmary. Dr. Rodriguez's stance on the goal's viability is:

"In order to perform laser and microsurgery I am required to know everything there is to know about the eye and vision. I absolutely agree with the concept of the 8i Goal and am certain it will increase the ability to see the target areas and thus increase performance."

The fundamental difference between this concept and most of the other "goal scoring" ideas the NHL has considered is that the *8i Goal* directly impacts each one of the 2,000 or so shots that a team will take during the season, while ideas such as removing the redline, increasing power plays, the obstruction crackdown, moving the goal line, etc are focused on simply increasing the number of shots being taken. Theoretically, Alexander Ovechkin could be given 1 extra shot per game from the top of the circles and while he could score on that extra shot the potential also exists for him to break his stick, hit the post, let a defender make a play, shoot wide, injure himself, etc… One must also consider the potential for a goalie to handle more shots without necessarily yielding more goals. Remember Jean-Sébastien Giguère not even blinking when the competition in the 2002-03 playoffs increased his workload by 5 saves per night. The Conn Smythe winner soaked up pucks dropping his goals against from 2.33 to 1.62. While an idea such as calling more penalties may be able to create more shots due to the ensuing powerplays, it will not increase the players' ability to see the scoring places on those chances as the *8i Goal* will do.

Due to the automatic way the retina of every person's eye focuses red and the brain's subsequent interpretation of that information, it is impossible for today's player to successfully locate the white netting in the currently colored target/net with a high degree of consistency. The lens of the eye (the crystalline lens) has as its major function the fine adjustment in focusing. The lens is necessary to fix objects at different distances from the eye; those adjustments are known as accommodation. Accommodation is the process of bringing the image of an external field to a sharp focus in the fovea of the retina. In coordination with the iris, the wavelength sensitive lens flexes or remains flat according to the stimulation it receives. Colors with shorter wavelengths are focused slightly in front of the retina and colors with longer wavelengths are focused slightly behind. To see red more clearly the lens of the eye automatically adjusts by growing more convex through minute muscle control which pulls the image forward, making it appear nearer, larger, and more visible. Currently, when a player is skating down the wing and looking for a place to shoot the puck, the part of the scene that is the most visually dominant is the posts. Red for all of its attributes must be used to mark the actual target--the netting.

Gray goal posts will not only *not* dominate and not come forward in the player's visual field, as they do in their current form as red, but they will also be less luminous. This is an important adjustment considering the seemingly large volume belonging to red luminous goal posts that delude the shooter into

perceiving less net volume in the areas just around the posts, which are the places where the puck needs to go, especially in today's game where goaltenders are shrinking the net by their own sheer size and skill. In addition, the less-luminous gray posts will not divert the shooters attention in situations such as a "one-timer" or any other split-second shot where the shooter only momentarily focuses the target thus allowing him in those "quick-release" situations to focus only the target red netting.

Another way to make the case for red as the best choice for the target is to take into account other instances in which red is used and how those usages have trained our attention to the color. Color expert Faber Birren reports in his book *Color, Form, and Space* that,

"In air-sea rescue work, the Navy has demonstrated the superiority of red-orange over yellow, white or any other color. Because of its extreme visual impact (richness or chromaticity) it will persist in forcing itself upon human vision."

Humans are conditioned to red, i.e. stop signs, fire trucks, warning labels, therefore it makes sense that a player looking to quickly shoot the puck will have a more immediate reaction to and will more quickly focus a red target.

Beyond heightened responses to red caused by conditioning, researchers have found that humans have an innate connection to red. It has been found that exposure to red activates the Pituitary gland which produces a chemical message that is sent to the adrenal medulla, which then releases the hormone epinephrine. Epinephrine is the hormone that causes increased rate for breathing, blood pressure and heartbeat. In hockey, maybe more so than other sports, the things that seem to be minutiae make all the difference. Hockey players sharpen skates between periods, are finicky over the tape they use, change sticks for a defensive zone face-off, keep their feet outside the blue line on a powerplay to gain that extra foot to maneuver, and on and on ad infinitum so it is not beyond reason to advocate that these highly tuned athletes will benefit from a change to the color of the hockey goal that will maximize their ability to see the open scoring spaces. Over the last twenty years goaltenders have hijacked the game's scoring levels with their advancements in skill and technique and now it is time for the NHL to boldly consider color's potential to impact goal scoring.

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