

**Going for it: When risk is worth it and when it isn't**

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On February 1<sup>st</sup>, 2015 the Seattle Seahawks faced the New England Patriots at the University of Phoenix stadium for the American football world championship. Down by four points with 26 seconds left on the game clock and the ball on the 1-yard line, all the Seahawks had to do was hand the ball off to their all-pro running back Marshawn Lynch to clinch a victory. He had just blasted off a 4 yard run to get his team to that point. They only needed 1 measly yard to reach immortality. All they had to do was run the ball and they would be crowned champions.

Instead, quarterback Russell Wilson (himself a pretty good running threat) threw a slant pass to the right. Malcolm Butler, a little known Patriots rookie corner, cut the pass off and intercepted the ball. New England, not Seattle, ran the clock out and won the championship.

Immediately, the media started the blame game. Why would Seahawks coach Pete Carroll call a pass play? Was this in offensive coordinator Darrell Bevell's game plan? Why didn't Russell Wilson audible to a run? Everyone and their dog knew the pass was a dumb idea.

But why was this decision considered so obviously stupid?

It seems facetious to ask, but the answer is more interesting than you might think. Throughout evolutionary history, humans have had to deal with risk. In the scientific judgment and decision-making literature, risk is most typically defined as outcome variance. Let's take a simple example to illustrate this concept. Imagine someone has to decide between the option of receiving a guaranteed \$5,000, or the option of gambling on a 50% chance at \$10,000 (with a 50% chance of getting nothing). Both options have the same mean expected value. Put another way, over the long run, we would expect both choices to yield \$5,000 on average. However, the first option is the less risky option because there's only one possible outcome. The second option is considered the riskier option because it has relatively more potential outcomes (in this case, two), meaning it has higher outcome variance<sup>1</sup>.

So which option would you personally choose? In a vacuum, a certain \$5,000 option is too good to pass up for most people. It's the safer option that gives you some value no matter what. With the second option you *could* gain more but there's also the possibility you could get absolutely nothing. There are some people who are more inclined to take risks than others<sup>2</sup>, but for the most part people don't feel the need to expose themselves to potential downsides. The possible benefits often aren't worth facing possible costs.

Although people seem to avoid risk at baseline, there are many scenarios in real life where normally risk-averse people are forced to take risks. These circumstances are usually defined by someone having to meet some sort of need; that is, situations with a gap between where you are and where you want to (or need to) be. Let's complicate our earlier gambling example. This time, imagine that your bookie Tony isn't so happy about a \$10,000 debt you still owe him (he's promised to send his friends over for a little playtime if you don't pay him by the end of the day). Which option would you choose now: \$5,000 for sure, or a 50% chance at \$10,000? Would you even really consider the certain \$5,000 option?

When there's a large gap between where you are and where you want to be, the safe option is rarely satisfying. Under these high need circumstances you're basically forced to choose a risky option whether you like it or not – it's the only way you could possibly meet your need. This simple principle is laid out in risk-sensitivity theory<sup>3</sup>. It's why you'd choose some chance at \$10,000 over a certain \$5,000 when Tony is involved. Voraciously hungry birds also show a similar pattern of behaviour when they are foraging for food. It's why we see elevated crime rates in cities with higher income disparities – people at the bottom can't get what they need (or want) with "safe" options (like a minimum wage job that isn't good enough to feed a family). There are abundant examples of risk-sensitivity through many domains of life.

Returning to football, risk-sensitivity explains why football teams choose to pass more than they normally would in certain scenarios. Passing is riskier than running. With a run, a team is likely to gain some amount of yards. When passing, a team usually gains more yards than running *if they are able to complete the pass*, but there's also the possibility that the pass falls incomplete and they get no yards at all (not to mention the added possibility of an interception, or an incomplete, or a sack, all of which make passing a lot riskier than running).

Unlike the general public, football teams tend to be more risk-prone than risk-averse. Some teams also have better passing personnel; they have a more accurate quarterback, receivers with better hands, and/or an offensive line that will give the quarterback enough time for the play to fully develop. Having better players usually leads to a higher yards-per-passing-attempt for that team, and a stronger inclination towards risk, because they can pull it off better than weaker teams.

However, nobody debates about whether or not a team will pass *even more than they're used to* whenever they are far from getting a first down or losing by a lot of points (or both). A team is more likely to pass if they need 10 yards to get a first down than they are if they only have 5 yards to go. A team losing by 14 in the fourth quarter is way more likely to pass than a team that is tied or winning. It seems too obvious to point out, but that's exactly why this consistent team behavior is such a great example of risk-sensitivity theory at work<sup>4</sup>. It's like seeing another advertisement about using your phone while driving; easy to brush off until someone you know gets into a car accident playing Pokémon GO.

The Seattle Seahawks are a cautionary tale. They took a risk when there was no need. Though, in a counterintuitive way, the team showed off a related evolutionary risk-taking principle. Researchers have proposed something called the *relative state model*<sup>5</sup>, which suggests

that decision-makers take risks through one of two possible pathways: a need-based pathway or an ability-based pathway. The need-based pathway essentially follows the risk-sensitivity theory principle: people should take risks when low-risk, safer options are unlikely to meet their needs.

The ability-based pathway, on the other hand, suggests that people should take risks when their abilities and environment allow them to more successfully engage in risk-taking and are more likely to get the benefits. To take an extreme example, someone might become a UFC fighter if they are stronger, faster and have better dexterity than those around them because they get access to better social and mating opportunities, even though there's a chance that they end up bloody and beaten after a fight (or a series of fights). The Seahawks were an above average passing team during the regular season, ranking 10<sup>th</sup> in the footballoutsiders.com passing DVOA rankings<sup>6</sup>, and had just marched 75 yards down the field to get into scoring position, mainly through a bevy of gorgeous passes by Russell Wilson. The perceived downside of passing was likely underestimated in their eyes in that scenario, and the potential benefit of scoring through a pass would have made them seem like counterintuitive risk-taking geniuses.

It's also possible the coaching staff in Seattle overthought the choice. A key principle laid out in risk-sensitivity theory is that risk-sensitive decision-making doesn't require much explicit thinking. Instead, risk-sensitivity operates through a simple heuristic rule of thumb<sup>7</sup> (take risks if you're far away from a desired or goal state). Maybe the Seahawks thought they could somehow use the clock more effectively by passing.

We'll never know. The one thing we do know is that, most of the time, it's better to take risks only when the situation calls for it. The Seahawks probably didn't need to take their big Super Bowl risk and that decision will haunt them forever.

## References

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