To Punt or Not to Punt

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Vilification

“The Cowboys deserved to lose” [Associated Press 1995]. This terse assessment by John Madden, esteemed sportscaster with the Fox television network and Super Bowl–winning former National Football League (NFL) coach, seemed to have grossly understated the sentiments of nearly every sports analyst in the country. On December 10, 1995, the favored Dallas Cowboys lost to the Philadelphia Eagles after Cowboys head coach Barry Switzer made what came to be the most vilified coaching decision in sports history. Fort Worth Star columnists Gil LeBreton conceded, “There may have been worse decisions made in the annals of time. The Edsel. The leisure suit. Adam biting on the apple. But this wasn’t just a colossal blunder yesterday. This was irrational. This was amateurish. This was ... Switzercide” [LeBreton 1995]. A headline in the Dallas Morning News pleaded, “Get Barry Out of Here Immediately,” with the columnist proceeding to label Switzer the “clown in the cold” who “made a national fool of himself” in making the decision that “should have gotten him fired on the spot” [Galloway 1995]. Even Texas Governor George Bush, Jr., felt compelled to criticize the coach publicly.

The Decision and Its Outcome

What was this coaching decision that prompted the host of a local home-finance radio program (on KRLD–AM) to implore its listeners not to call in to complain about Switzer? [Associated Press 1995]. On a crucial fourth-down play late in the game, Switzer ordered his offense to try for a first down when the rest of the viewing world “knew” he should punt. Dallas had the ball on its own 29-yard line, facing fourth down and a foot to go, in a game tied 17–17 with two minutes left to play. A moment earlier, Emmitt Smith, judged by many to be the best running back in the league, had unsuccessfully tried to gain the necessary foot; but the officials ruled that the play never occurred because the two-minute warning had whistled. Dallas fans breathed a collective sigh of relief, confident that the coach would come to his senses during the television timeout and properly punt the ball away. He did not. He tried the exact same play again, “load left,” with the exact same result. The Eagles gained possession
of the ball and proceeded to kick the game-winning field goal a few plays later. Though the Cowboys players publicly stood behind their coach, the national media went into a frenzy. According to census reports, Cowboys fans were so upset that half the population of Texas moved to Mexico.

Was It the Right Thing to Do?

Did Switzer make the bonehead call of the century, or is it possible that he was right and the rest of the world was wrong? Although it is difficult to infer from interviews exactly what was on the coach’s mind, we argue here that his consecutive decisions to go for the first down may not have been as “dumb and dumber” as NBC analyst (and another former Super Bowl–winning coach) Mike Ditka suggested [Associated Press 1995].

The advantage of punting in that situation is simple enough. If the team chooses to go for the first down instead of punt, and the first down attempt fails, the result is disastrous. The opposition gets the ball in prime game-winning field goal position. This is exactly what happened to the Cowboys, and it could have been avoided had they chosen to punt the ball 30 or 40 yards down the field. That probably would have forced the Eagles to drive a substantial distance back into Cowboy territory before reaching field goal position. If the Cowboys defense could stop them following a punt, and there was probably better than a 50/50 chance that they would do so, then the game would go into “sudden death” overtime: The first team to score (in any fashion) wins.
While the dire consequences of botching a first down attempt in that situation are universally understood, the consequences of punting the ball away are more nebulous. Punting the ball downfield makes it substantially less likely that the game will be lost “on the spot,” but it may increase the chances of ultimate defeat. It is human nature to want to avoid the call that might lead to instant death on the field. Going for the first down is considered risky, a “big gamble,” whereas punting the ball away is considered “safe.” Most fans have a vague notion that everything will hopefully somehow work out for the best if the team punts—“The defense (we hope) will hold, and then we will win in overtime (we hope). But just don’t let the game ride on one play....” The purpose of this article is to examine more carefully the tradeoff between punting and not punting in Coach Switzer’s situation.

Suppose that a menacing stranger comes along and offers you the choice: “I will either kick you in the knee right now with probability 1/4, or I will leave you alone but come back tomorrow and kick you in the knee with probability 1/3.” In everyday life, you may discount the future and decide to go with the higher probability of getting kicked tomorrow. Still, if all you care about is never getting kicked (i.e., not losing), you will take the first option, even though the potential pain associated with that option is more immediate. The analysis below shows that punting the ball away may be analogous to getting kicked later but with higher probability—defeat may be slower but surer.

The Mathematical Model

Consider the tree diagram in Figure 2. At the top of the diagram, we assume that the Cowboys must decide whether to try for the first down or punt.

![Figure 2. Diagram of the dilemma faced by Coach Switzer ("OT" stands for "overtime").](image)

If they attempt the first down, the attempt may succeed, with probability \(q\), or it may fail, with probability \(1 - q\). If the Cowboys fail, then we will be hard on
the coach and assume that they automatically lose, though it is far from certain that the Eagles would actually score starting from about the Dallas 30-yard line. If the Cowboys succeed, and with less than two minutes remaining in the game, we assume that either they subsequently score and win in regulation time, with probability $p_1$, or they fail to score and the game goes to overtime, with probability $1 - p_1$.

If the Cowboys instead punt on fourth down, the Eagles get possession of the ball (barring their fumbling and losing the ball). With probability $p_2$, the Eagles score before time expires. If the Eagles do not score in regulation time, which occurs with probability $1 - p_2$, the teams are tied and go into overtime.

If the game is tied at the end of regulation time, the Cowboys’ coach expects them to win in overtime with probability $p_3$—presumably about 50%, but higher or lower depending on the relative fatigue of his players, the overall quality of the team, and so on.

Whether or not punting is optimal depends on the coach’s subjective beliefs about the probabilities associated with these various events (see Table 1 for a summary of the notation).

<table>
<thead>
<tr>
<th>Notation for probabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>$q$</td>
</tr>
<tr>
<td>$p_1$</td>
</tr>
<tr>
<td>$p_2$</td>
</tr>
<tr>
<td>$p_3$</td>
</tr>
<tr>
<td>$p_4$</td>
</tr>
</tbody>
</table>

These conditional possibilities capture the most important elements of the coach’s decision. Other more complicated possibilities have been ignored for the sake of tractability. For example, the Eagles might return a punt for a touchdown, or they might fumble a punt away; or the Cowboys could fail on the first-down attempt, but the Eagles might fumble on the next play and the Cowboys run the ball back for a touchdown. In fact, either team could lose the ball at any time. Abstracting from these events seems reasonable because they are rare events that could happen to either team; they tend to cancel each other out in the analysis. Perhaps more important, the coach and his staff cannot take into account every possible contingency anyway.
Analysis of the Model

Based on this model, we can easily derive the following formula for when the Cowboys should go for the first down instead of punting the football:

Result. The Cowboys should go for the first down if

\[ q > \frac{(1 - p_2)p_3}{p_1 + (1 - p_1)p_3}, \]

which simplifies to

\[ q > \frac{1 - p_2}{1 + p_1} \]

in the case that both teams have an equal chance in overtime.

To obtain this result, we determine the probability that the Cowboys win the game if they punt and the probability that they win if they go for the first down. Then we solve for the critical value of \( q \) (the probability of making the first down) that makes these two probabilities the same. If the coach believes that the true value of \( q \) is higher than this critical value, then he should go for the first down. Otherwise, he should punt.

Suppose first that the Cowboys punt. In this case, the Cowboys win if the Eagles fail to drive for the winning points \((1 - p_2)\) and the Cowboys score first in overtime \((p_3)\). Since by construction these may be treated as independent events, the probability that the Cowboys win if they punt is \((1 - p_2)p_3\). Alternatively, if the Cowboys go for the first down, then the Cowboys win if

- they make the first down \((q)\) and they drive for the winning score \((p_1)\), or
- they make the first down \((q)\), fail to score in regulation time \((1 - p_1)\), and score first in overtime \((p_3)\).

Therefore, the total probability that the Cowboys win if they go for the first down is \(qp_1 + q(1 - p_1)p_3\). Hence, going for the first down instead of punting is optimal if

\[ qp_1 + q(1 - p_1)p_3 > (1 - p_2)p_3. \]

Rewriting, this means the Cowboys' decision to go for it on fourth down is optimal if they believe that

\[ q > \frac{(1 - p_2)p_3}{p_1 + (1 - p_1)p_3}. \]

As a special case, let \(p_3 = 0.5\) (i.e., each team has a 50/50 chance of winning in overtime). Then the Cowboys should go for the first down if

\[ q > \frac{1 - p_2}{1 + p_1}. \]
In words, it makes more sense to go for the first down if the chances of converting are sufficiently high, the chances of scoring if converting sufficiently high, and the chances of stopping the Eagles after punting are sufficiently low. Figure 3 gives level curves for various values of the function \((1 - p_2)/(1 + p_1)\).

![Figure 3](image)

**Figure 3.** For a specified value of \(p_1\) and of \(p_2\) (assuming equal chance of winning in overtime), the Cowboys should go for the first down if the probability of making it is greater than \((1 - p_2)/(1 + p_1)\). This graph shows level curves of that function, for (from top to bottom) the values .1, .3, .5, .7, and .9.

At this point, we can examine how the critical value of \(q\) varies with the other probabilities. Suppose that \(p_3 = 0.5\), so that both teams have an equal chance of winning in overtime. As a first approximation, let \(p_1 = p_2 = 1/3\). That is, suppose that the Cowboys have a 1-in-3 chance of moving the ball for a score in regulation time if they make the first down, and the Eagles have a 1-in-3 chance of winning in regulation time if they receive a punt. In this case, the probability that the Cowboys win if they make the first down is

\[
\frac{1}{3} + \frac{2}{3} \cdot \frac{1}{2} = \frac{2}{3}\]

their chance of winning if they punt is only

\[
\left(1 - \frac{1}{3}\right) \cdot \frac{1}{2} = \frac{1}{3}\]

Their chance of winning is thus twice as great if they make the first down than if they punt. Thus, even if the Cowboys expect to lose for sure if they fail on a first-down attempt, they should try anyway, as long as they believe that they have at least a 1-in-2 chance of making it. The Cowboys provided data following the game suggesting that over the previous six years, the play that they had called had been successful about 95% of the time.

The numbers do not change much if you assume that the Cowboys had a better than 50/50 chance of winning in overtime. In fact, even if the Cowboys thought that they would win for sure in overtime, they should still have gone for the first down if \(q > 1 - p_2\). So if the Eagles had a 40% chance of driving
for a field goal if they received a punt, then the Cowboys should have gone for the first down if their chance of making it was greater than 60%.

The intuition is clear: The Cowboys should be loathe to give up control of the ball. While punting greatly reduces the risk of a quick death, with (near) certainty it turns the ball over to the other team. A decision to punt robs the team of the important opportunity to win the game in regulation time while only reducing, and not eliminating, the other team’s opportunity to win in regulation time. Although possession of the ball is critical in this instance, we do not advocate so-called “clock-management” strategies during the general course of a game. Sackrowitz and Sackrowitz [1996] argue convincingly that game plans aimed specifically at taking time off the clock are usually misguided. They assert that the offense should generally be trying to maximize scoring production instead of trying to keep the other team’s offense off the field. In the present instance, there was realistically only enough time for one more drive by one of the teams, and it was advantageous to be that team.

Was It a “Colossal Gamble”?

It is not clear why sports commentators often refer to some types of calls as “gambles” (a “colossal gamble,” in the present case), while some other call would not be considered a gamble. There is really no meaningful concept of a gamble in a play call, assuming that the only objective is ultimate victory. That is, there are no “risky calls.” There are only “good calls” and “bad calls,” with the good calls being the ones that yield the highest probability of ultimate victory. This is because there is no middle ground between winning and losing (except for the unlikely possibility of a tie at the conclusion of overtime).

If you take $100 to Las Vegas and bet it all on the spin of a roulette wheel, then you have traded, say, the security of $100 for the chance to return home with either $200 or with nothing. Betting on the wheel is a gamble, because you could instead just hold on to the $100. Your choice whether to bet depends on your attitudes toward risk. With a play call, there is no way to metaphorically stand pat on the original $100. The coach will end up with either $200 or nothing. Risk and risk-aversion should not enter the discussion. A play has to be chosen, it will result in an unknown outcome, and the trick is simply to figure out which roulette wheel bet (or play call) yields the best odds.

One way to think about this is to imagine that there are two possible play calls, A and B (such as punt or not punt), and that you have decided that the ultimate probability of winning is slightly higher with choice B than with choice A. If your only goal is to win, can there ever be a case when you should call play A instead of play B, regardless of your general attitudes toward risk or any other consideration?

A play call may appear to be “risky” when it has a large and immediate bearing on the anticipated outcome of the game. Having a large and immediate bearing, however, is not the same as being risky. Consider the possibility of a
fake punt in the middle of a game. Most observers would consider a fake punt risky. However, in what sense is punting less risky than a fake punt? With a fake punt, you are risking the possibility that the other team gets favorable field position. But by playing “safe” and punting the ball, you are denying yourself the chance to continue a drive toward a score before your opponent gets that opportunity. Is this less “risky”? Down the road, it may turn out that you needed that extra score.

The fake seems risky because you quickly gain information about the ultimate probability of winning. Your probability of winning may jump from a current 60% to say 30% or 80%, depending on the outcome of the play. Trading that 60% chance for one of the other probabilities would be risky if probabilities were like dollars and you could take them home with you. The probability of winning, however, is eventually going to converge to either 0% or 100% no matter what plays you call, since one team is eventually going to win. You have to give up that 60% probability sooner or later; if your only goal is to win (and not draw out the suspense), then timing should not matter.

For risk analysis to be relevant, risk preferences (e.g., degree of risk aversion) must be relevant. But regardless of risk preferences, the only optimal choice is the one that yields the higher expected probability of ultimately winning. Two coaches with the same probability assessments should still choose the same play, irrespective of their risk preferences.

Risk assessment can become relevant, however, if winning is not the only goal. Perhaps the team also cares about the final point spread, total yards gained, or not having players injured for future games. Unlike victory versus defeat, none of these is an all-or-nothing proposition. A team losing by 20 points in the fourth quarter may rationally forego choosing the plays considered most likely to lead to a comeback victory (e.g., many passes, not punting near their own goal line, etc.) because those plays may also be the plays most likely to lead to a blowout defeat, which might hurt team morale. With this amendment to a team’s objectives, risk preferences matter. A fake punt is risky in that it increases the variance of the final score and thus the chances of a lopsided loss. The team might not want to risk a lopsided loss, so it may not choose plays most likely to lead to a victory. Such risk, however, is irrelevant to the team that cares only about maximizing the chance of victory.

That the first-down attempt had just failed prior to the two-minute warning has little relevance to the decision whether to go for the first down again. The correct call the first time, whatever it was, was probably the correct call the second time. It might be reasonably argued that the coach should have at least called a different running play, but even that is not clear, especially since the defense might have expected a different play.
Conclusion

Based on the above analysis, it hardly seems fair to label Switzer’s decision the “bonehead call of the century.” The Cowboys, with their star running back and powerful offensive line, had been gaining at least a yard about 95% of the time in such situations; and this time they needed only a foot.

The public incredulity surrounding Switzer’s decision was based not on skepticism about the Cowboys’ chances of gaining the necessary yardage (most people agreed that their chances were good) but rather on the disastrous consequences if the play failed. Our analysis emphasizes the equal importance of considering the potential positive consequences of making the first down.

By making the first down, the team would have dramatically increased its chances of winning in regulation time while virtually eliminating its opponent’s opportunity. One of the teams, but not both, was likely to get a chance to drive for a game-winning field goal. The team that received that opportunity would have a distinct advantage, both because it would be in a position to win in regulation time and because it would not likely be in a position to lose. Given the Cowboys’ chances for making the first down, along with the importance of having the last possession in this instance, we find that it was completely reasonable for the Cowboys to have gone for the first down—even if its failure had guaranteed a loss.

Since it is too difficult to calculate formulas on the sidelines, coaches must rely largely on intuition and rules of thumb. Even if formulas could be quickly derived and calculated, there would still be the difficulty of assessing the relevant intermediate probabilities. Rules of thumb, however, may often be inappropriately inflexible. Former Cowboys coach Jimmy Johnson, now coaching the Miami Dolphins, criticized, “When you have fourth down on your own 29, I don’t care how short it is. You punt the ball” [Associated Press/Nando.net, Dec 11, 1995]. This typical view holds that the relative gains from making the first down in such situations, compared with punting, are always so small that it is better to punt if there is any chance that the first-down attempt will fail. But as shown in our analysis, the advantage of making the first down compared with punting may be huge, even when the team is not behind. There must be some subjective probability of making the first down which justifies its attempt. Our analysis suggests that even a fairly modest expectation for success would have been sufficient justification.

Of course, we do not suggest that teams should never punt! Teams facing a fourth down probably should punt in most cases. It seems likely, however, that teams punt too often and too late into the game, especially when they are more than one score behind. In many instances, teams seem committed to strategies aimed more at “not losing big” or “not losing dramatically” than at actually giving themselves the best chance to win.

In general, teams may be too content to tie the score, or remain tied, when they have a good chance to take the lead. For example, a team losing by three points near the end of regulation may not place sufficient weight on the value
of scoring a touchdown instead of a field goal. The implicit strategy is often to “tie the score now (or keep it tied) to be “safe’ and then worry about winning the game later.” Hence, if there is time for only one more play from scrimmage, the team will probably attempt the game-tying field goal regardless of how close the ball is to their opponent’s goal line. They do not want to “risk” losing on the spot. The problem, however, is that a team trailing by three points near the end of regulation ultimately needs to score at least four more points before its opponent scores any. Perhaps more often than realized, the best opportunity to get those necessary points is “right now” while already near the goal line. Getting to overtime, while perhaps psychologically satisfying after being behind near the end of regulation, is not tantamount to winning.

A parallel concern with many fans is that they do not want to see “all their eggs in one basket.” Consider a team that has just scored a touchdown on the last play in regulation time, cutting the other team’s lead to one point. It can “play safe” and kick the extra point to extend the game to overtime, or it can “take a chance” and try to win the game in regulation time with a two-point conversion. However, the team should play for overtime if, and only if, it thinks its chances of scoring first in overtime are greater than its chances of making that single play. In what sense can it ever be “safer” to extend the game to overtime if the latter probability exceeds the former (or vice versa)?

Since the Cowboys were tied, they could not win without being the first team to make another score. Punting the ball would have been “gambling” that they would score first in overtime when they had no assurance that the game would even get that far. They would have denied themselves the chance to win in regulation time, while simultaneously simply handing the Eagles the opportunity to do so. We show that Coach Switzer’s decision was consistent with playing the odds correctly. Although the “not punt” option seemed to involve taking a big gamble while the “punt” option did not, we argue that the terms “gamble” and “risk” are really misnomers in such situations.

What should the Cowboys have done?

They should have gained one foot more on third down!

References


Brady, Erik. Switzer’s decision all academic now. USA Today (13 December 1995) C1.


LeBreton, Gil. 1995. This move may have buried Cowboys. Fort Worth Star-Telegram (11 December 1995).

**About the Author**

Brent Kreider is an assistant professor of economics at the University of Virginia. A summary of this analysis appeared in Brady [1995]. In his spare time, he writes about economics.

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**Introduction**

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