# Using Risk Analysis as a Mediation Tool

## By Evan Slavitt

This article is about using risk analysis to help analyze cases in mediation. The author provides a simple, step-by-step introduction to this sophisticated tool so that even the most math-phobic practitioner can follow it. It covers the fundamentals of probability, assigning values to judgments, dependent and independent events, the use of decision trees, sensitivity analysis, and how to use these concepts in the legal and mediation context.

**Successful mediation presents two related challenges: conveying the complexities of a case to the mediator1 so he can engage opposing counsel and the parties in productive dialogue. The most common way of conveying the complexities of a case to the mediator is verbal advocacy. In essence, each side argues its case to the mediator and the adversary, hoping to convey the most strength while conceding the least weakness. There will always be a place**

for such advocacy in mediation. However, it has several weaknesses. First, advocacy is entirely qualitative.[2] As a result, it is hard to compare one side's advocacy with another's. Thus, the adjectives used in advocacy have no common meaning. For example, if one side says it has a strong case, how strong is "strong"? And how much stronger is "very strong"? In addition, the discursive technique does not tend to lead the parties to separately evaluate different aspects of a conflict and then come together to reach some common ground. Finally, it is hard to determine how changes in an evaluation of one aspect change the evaluation of the case as a whole.

**One underused technique that can ameliorate the weaknesses of verbal advocacy risk analysis. Risk analysis involves making judgments in quantitative terms, thereby allowing for more precise and productive discourse.**

One underused technique that can ameliorate these weaknesses is risk analysis (also called probability analysis). Risk analysis involves making judgments in quantitative terms, thereby allowing for more precise and productive discourse.

Part I of this article provides a basic introduction (written for the most math-phobic attorney) to the elements of risk analysis. Part II demonstrates how to use risk analysis to evaluate cases. Part III discusses a refinement called "sensitivity analysis." Part IV covers risk analysis in the settlement context and Part V demonstrates this process in the context of mediation.

## Part I. The Elements of Risk Analysis

Probability is essential to making decisions under uncertainty. It is something that people do intuitively every day. When we look out the window and decide whether to carry an umbrella, we are calculating probability—how likely it is to rain and how likely we are to be outside when it does.

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Almost every aspect of law requires some decision making under uncertainty. Clearly, uncertainty is present in every litigation, but it also appears in business negotiations, real estate disputes, and every circumstance in which lawyers make a judgment. The use of probability only formalizes what is already implicit in the process.

### *Basic Probability*

"Probability" is the likelihood of a particular statement of fact being true. Thus, the statement "It will rain this afternoon" has a particular probability of being true. Probability can also be applied to events that have occurred in the past, but only if the truth or falsity of such event is unknown to the person making the evaluation. Naturally, every statement about the past is either true or false, since the past is known.[3]

This means that the concept of probability is only meaningful for statements that can be said to be objectively true or false. It makes no sense to talk about the probability that a picture is artistic, or that book is exciting, or that a bride is beautiful. Similarly, it is not meaningful to talk about the probability that a person will be treated fairly or justly. These are subjective statements that cannot be said to be objectively true or false.

It is important that the statement of fact under analysis not contain implied judgments. Implied judgments are frequently found in the use of adjectives and adverbs. For example, the statement "The client will receive a large recovery" contains a judgment of what is large and what is not. A better statement would be "the client will recover at least $1 million." The second statement removes the subjective element and makes the statement subject to testing through risk analysis.

The probability of a statement about the past can range from 100% (1.00),[4] meaning absolute certainty of truth, to 0% (0.0), meaning absolute certainty of falsehood. Setting aside purely philosophical problems, the probability that George Washington was the first president of the United States is 1.0. The probability that George McGovern was elected President is 0.0.

Most statements about the future have a probability between 0.0 and 1.0. Predicting the out-

come of a trial is a matter of probability. While additional knowledge may help refine the prediction, the process is inherently subject to uncertainty. Assigning particular probabilities to particular outcomes helps determine how much. Behind every assignment of probability is our experience with recurring events.

What do we mean when we say that a coin tossed into the air has 50% probability of coming up heads? First of all, the statement will either be true or false; it cannot be half true. Second, since we know from experience that every coin toss must come up either heads or tails, the statement means that over the long run, it will come up heads about 50% of the time and tails about 50% of the time. Thus, we can say before we know the outcome that the probability of any particular toss coming up heads is 50%. Putting the matter into a formula, we get these three equations: p(heads)=0.5[5]; p(tails)=0.5; p(heads or tails)=1.0[6]

Here is a table showing the possible outcomes.

**Table 1. Two Possible Outcomes on a Coin Toss**

| OUTCOME | Heads | Tails |
|---|---|---|
| PROBABILITY | 50% (0.5) | 50% (0.5) |

The formula is another way of saying that there is a 50% chance that a coin toss will come up heads, a 50% chance that it will come up tails, and a 100% chance that it will come up either heads or tails because those are the only two possibilities.[7] Thus, some outcome must happen.[8]

This is worth emphasizing. When we add together the probabilities of all possible outcomes, they must add up to 100% (1.0). If the probabilities do not add up to 100%, then one outcome has not been accounted for, or the probabilities assigned to the existing outcomes are incorrect.

**Quiz:** What is the probability that a fairly rolled die will come up six on a particular roll?

**Answer**: To determine all possible outcomes, count the faces on a die. Since a die is a cube with six faces, there are six possible outcomes: one for each face of the die. Each face has the same probability of appearing on a fair roll of the die: 1/6 (approximately 0.166 or 16.6%). Thus, the probability of rolling a six is about 16.6%.

**Table 2. Probability of Each Side Turning Up on a Roll of the Die**

| OUTCOME | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| PROBABILITY | 16,6% | 16,6% | 16,6% | 16,6% | 16,6% | 16,6% |

### *Joint and Independent Probability*

The next step is to understand joint and independent probability and how to calculate the probability of several events.

Two events are independent if the probability of the occurrence of one is not affected by the occurrence or non-occurrence of another event under consideration. Thus, the probability of heads on a coin toss is independent of the result of the previous toss. Sometimes this is counter-intuitive. Many people think that if a coin has come up heads 10 times in a row, the probability of heads on the 11th toss has decreased to less than 50%. This is not true. Each coin toss is independent of history.

Events are dependent on each other if the probability of one occurring *is* affected by another event under consideration. Example: The probability of being dealt an ace in the middle of a poker game depends on which cards have been dealt before. If no aces have been dealt, the proportion of aces to non-aces increases, thereby increasing the probability of getting an ace. For the first card dealt, the probability of getting an ace is 4 out of 52 (0.076) or 7.6% because there are four aces and 52 cards in total. If the first card dealt is not an ace, then the probability the next card dealt is an ace changes to 4 out of 51 or 7.8%.

It is not always easy to tell whether probabilities are dependent or independent. For example, it is commonly believed that a "very good" case on liability increases the probability of a larger award of damages even if, as a matter of law, these two judgments should be independent.

Complicating this somewhat is that two events that may be independent of each other could be dependent on some third event. Suppose you wanted to know the probability that two children would have the same color hair. The color of each child's hair depended on the genetics of the parents, not on the color of the other's hair.

In general, the probability that at least one of two *independent* events will occur is calculated by adding the probabilities together. For example, the probability that one roll of a die will come up 1 or 2 is the probability of a 1 plus the probability of a 2, or 0.166 + 0.166 = 0.33 (33%). (See Table 2.) Common sense tells us this is correct because a 1 or 2 represents 1/3 of the possible six outcomes.

**Quiz:** What is the probability that three coin tosses will produce two tails and one heads (in any order)?

**Answer:** One way of solving this is to note that there are eight possible outcomes,[9] and the desired results occur in three of them.

**Table 3. Possible Outcomes on Three Coin Tosses**

| | |
|---|---|
| H,H,H | T,H,H, |
| H,H,T | **T,H,T** |
| **H,T,H** | **T,T,H** |
| **H,T,T** | T,T,T |

As a result, the probability is 3/8 (or 0.375 or 37.5%). Another way of analyzing the problem is to say that the probability of each outcome is 0.125. There are three outcomes that meet the criterion so the probability of one of them arising is 3 x 0.125 or 0.375.

The probability of two independent events *both* occurring—i.e., joint probability—can be determined by multiplying (not adding) the probability of each of them.

**Quiz:** What is the probability of tossing two heads in a row?

**Answer:** It is the probability of tossing heads (0.5) on the first toss times the probability of tossing heads on the second toss (also 0.5):

0.5 x 0.5 = 0.25 (25%).

This is consistent with our common sense, since there are only four possibilities:

**Table 4. Potential Outcomes on Two Coin Tosses**

| | |
|---|---|
| 1. Heads, Heads | 2. Heads, Tails |
| 3. Tails, Heads | 4. Tails, Tails |

The outcome that we are concerned about is one of the four possibilities or 1/4 or 25%.

It doesn't matter whether we toss the same coin twice in a row or two coins at the same time. In either circumstance, we cannot toss two heads in a row without two tosses coming up heads.

**Quiz:** What is the probability that in two tosses of one coin (or one toss of two coins) that we won't get two heads?

**Answer:** As one might expect, the probability of an event *not* occurring is one minus the probability of that the event will occur:

p(~e) = 1-p(e)

This illustrates that it is essential to clearly define the event to avoid mixing its occurrence with its non-occurrence. It is a very different question asking what is the probability that the defendant will be found liable on *every* count versus on *at least* one count.

Suppose a complaint has three counts (A, B, and C) and each has an independent probability of success of 33%. To determine the probability of being found liable on all three counts requires us to multiply all the probabilities:

p(A) x p(B) x p(C) = 0.33 x 0.33 x 0.33 = 0.035 or 3.5%

Based on this calculation, it seems highly unlikely that the defendant would be found liable on all three counts. Whether the defendant will get off on *all three counts* is a very different matter. This calculation similarly involves multiplying the probabilities of each outcome:

p(~A) x p(~B) x p(~C) = 0.67 x 0.67 x 0.67 = 0.30 or 30%

This assumes that each count can be evaluated independently. If, on the other hand, the three counts had a common element (e.g., contract claim and *quantum meruit* claims may share common elements), then it would not be accurate to treat them as separate claims. In those circumstances, the elements must be analyzed rather than the counts themselves.

**Quiz:** What is the probability of three coin tosses coming up heads, tails, then heads, exactly in that order?

**Answer:** Unlike the earlier example (see table 4), the specific order is important. Thus, there is only one result that meets these criteria. The probability is 1/8 (or 0.125) determined by using this formula:

p(a) x p(b) x p(c) = p(H) x p(T) x p(H) = 0.5 x 0.5 x 0.5 = 0.125 or 12.5%.

### *Basic Valuation*

With these tools in hand, we can begin to put a value on probable outcomes. What we are doing is valuing certainty. For example, if you have a $1 dollar bill in your hand, then the probability of having that dollar is 100% and the value to you of that dollar is $1.

Now let's look at this in the context of a coin flip. Suppose you will receive $1 if you flip a coin and it comes up heads but nothing if it comes up tails. How do you value this coin flip? You calculate the value by multiplying the probability of the outcome times the value of the outcome:

(p(heads) x $1.00) + (p(tails) x $0) = (0.5 x $1.00) + (0.5 x $0) = $0.50

Over the long run[10] this situation will return, on average, $0.50 per flip. Several observations can be made from this

**By analyzing the possible outcomes of a lawsuit or arbitration and comparing their weighted values to a settlement offer, an attorney has a basis to determine whether the offer is fair and how to advise the client.**

example. First, even though the "weighted" value[11] of each flip is $0.50, no single flip will ever yield that precise amount.

A corollary of this point is that even a series of flips will not necessarily average that amount. The longer the series, the more likely that the value will approach the weighted average, but any given series of flips always has some chance of being substantially higher or lower. Thus, the odds of flipping eight heads in a row is only 0.00390625 (about 4/10 of 1%), but the more times the person flips the coin the more likely that, at some point, that series will the value will increase nearing the weighted average. This is what permits the notion of a "fair wager."

**Quiz:** What would you pay for the opportunity to flip a coin where you get $1 for heads but nothing for tails?

**Answer:** The answer is the weighted average of the outcomes or $0.50. Any more you and will lose money over the long haul; any less and you will make money over the long term. It is this calculation that allows casinos to make money. The bets their patrons make are very slightly unfair, and thousands of them are made every hour. Thus, the small advantage the casino has on each bet generates profits over time.[12]

What relevance does this have in the legal context? If you substitute the word "litigation" for "wager" and the word "settlement" for "price," it becomes clearer. By analyzing the possible outcomes of a lawsuit or arbitration (or a potential contract dispute) and comparing the weighted value to the settlement offer on the table, an attorney has some basis to determine whether the offer is "fair" and how best to advise the client. Let's apply these principles to a legal problem.

## Part II. Risk Analysis in the Legal Context

### *Example A: A Simple Case*

Your client was hit by a car while riding his bicycle. He suffered a broken arm and $10,000 of medical expenses (all but $500 covered by insurance) as well as lost wages of $12,000. The liability case is relatively strong but not without some doubt. Opposing counsel conveys a proposed settlement of $8,000. Assume that the settlement is for a single cash payment.

Should you recommend it? Applying risk analysis, you begin by determining the value of the settlement:

p(settlement) x $8,000 = 1.0 x $8,000 = $8,000.

This seems intuitive. If accepted, the settlement is certain. But in some circumstances, this may not be true. What if there was a collection risk, with no guarantee by a solvent party? Therefore, in complex litigation with multiple parties, even a settlement may be subject to risk analysis.

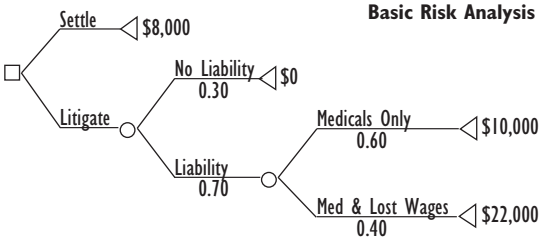
Next, you have to put a value on a litigated result. In example A, there is one count of negligence. Assume comparative negligence is not recognized in the jurisdiction, so the only two possible results are liability or non-liability. As you believe your client's case is strong, but not a home run, based on experience, factual analysis, and other judgmental factors, you assign the likelihood of success (i.e., non-liability) at 70%. In the event your client is found liable, you believe there is a 60% chance of recovering only medical expenses of $10,000 (because of the collateral benefit rule); and that there is a 40% chance that your client will recover both medical expenses and lost wages. Mathematically, the valuation is as follows:

[p(liability) x p(medical only) x medical damages] + [p(liability) x p(full damages) x full damages] + [p(non-liability) x damages if no liability] = [0.7 x 0.6 x $10,000] + [0.7 x 0.4 x $22,000] + [0.3 x $0] = [$4,200] + [$6,160] + [$0] =$10,360

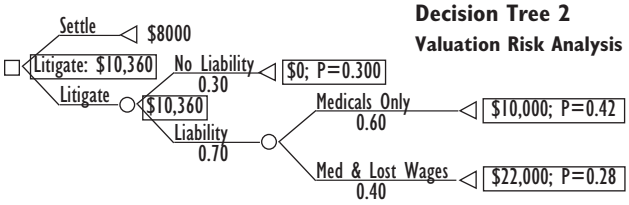
Observe that the term [p(non-liability) x damages if no liability] will always equal zero because there will be no damages if there is no liability. The term is included here only in the interests of completeness.

Turning to the two damage amounts, $10,000 and $22,000, these are typical calculations made in this type of case. It may be easier to understand the same example if set forth in a visual way.

**Decision Tree 1**
**Basic Risk Analysis**




Decision Tree 1 contains the same information as the equation above but it is easier to understand.[13] Each branch represents a possible outcome. There are two branches at the liability stage because there are two possible outcomes and they add up to 100% for the reasons discussed above. Similarly, there are two outcomes arising from the liability phase and they too add up to 100%. The weighted value associated with each outcome, and the sum of all the weighted values, is the value of the litigation.




**Decision Tree 2**
**Valuation Risk Analysis**

To read the above decision tree—sometimes called a "rolled back" analysis—it is useful to start at the right. The three boxes next to the triangles show the value of each outcome and the probability that the particular outcome will occur. The boxes in the middle of the diagram reflect the weighted value of that particular branch. Thus, $10,360 is the value of the litigation branch. In the event of multiple branches, there could be values associated with sub-branches assuming one gets to that point.

Like the equation, the diagram indicates that the probability of no liability is 30%, while the probability of receiving medicals only is 42% (the sum of 70% x 60%), and so forth.

Based on this risk analysis alone, the settlement offer is less than the weighted (probable) value of a litigated outcome. From that point of view, the settlement should not be recommended.

### *Further Thoughts about Example A*

Looking at the settlement side, the value of the offer is $8,000. As noted above, it is generally true that a settlement results in certain or near certain payment.

There is more to the litigation side. Every judgment about the outcome of a lawsuit involves a judgment about risk. Risk analysis makes explicit what is implicit in each of these judgments by assigning a numerical value to the judgment. An even chance is 50% or 0.5. Two out of three is 66% or 0.66. Near certainty is 80%.[14]

Once probabilities are assigned to each outcome, the rest is simple math. Attorneys who are concerned about the calculation, or who want to shortcut the process, can use a computer program to do the math.

In making a recommendation to the client about whether or not to settle, there are several factors that must be made very clear. First, the client must understand that he will go through litigation only once. As a result, the will only get one of the possible outcomes. He may get nothing, or he may get $10,000 or $22,000. What the client will never get is exactly $10,360.[15]

For many clients, settlement is more attractive because it avoids the risk of getting nothing, which tends to be more important to them than the chance of getting the maximum. This is called being "risk averse." Corporations, especially those involved in a great deal of litigation, may be less risk averse or "risk neutral." Indeed, there may be occasions when, for policy or other reasons, a person or entity may pursue litigation that is worth less than the settlement value.

In Example A, a client who is not short of cash might be willing to risk a litigated outcome. Or he might prefer to take what is offered in settlement because he would be ahead of the game. In either event, it is the client's choice, not the attorney's, and this must be explained so that the client does not think the attorney is giving him "the answer."

Second, the client must made to understand that the nature of trials involves attorneys making judgments as to which attorneys might differ, and that assigning numbers to these judgment does not change their fundamental nature as judgments.

*Taking Legal Costs into Account*

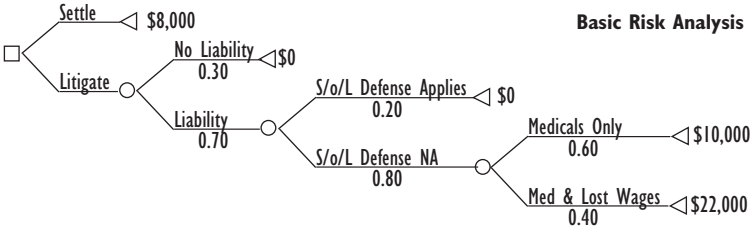
In Example A, the out-of-pocket loss was $500. In the event of settlement, it will take $500 to document the settlement. If the case goes to trial, it will cost $2,500 in attorney's fees. In this situation, the value of the settlement is:

p(settlement) x [$8,000 - $500] = 1.0 x $7.500 = $7,500

The value of the litigation is:

[p(liability) x p(medical) x medical damages] + [p(liability) x p(full damages) x full damages] + [p(non-liability) x damages if no liability] - cost of litigation = [0.7 x 0.6 x $10,000] + [0.7 x 0.4 x $22,000] + [0.3 x $0] - $2,500 = [$4,200] + [$6,160] + [$0] - $2500 = $7,860

Thus, when you take litigation costs into account, whether to take the settlement offer becomes a much closer question.[16] If the lawyer were to use a range of litigation costs rather than a specific number, the resulting analyses would yield a range of settlement and litigation values that could be compared.



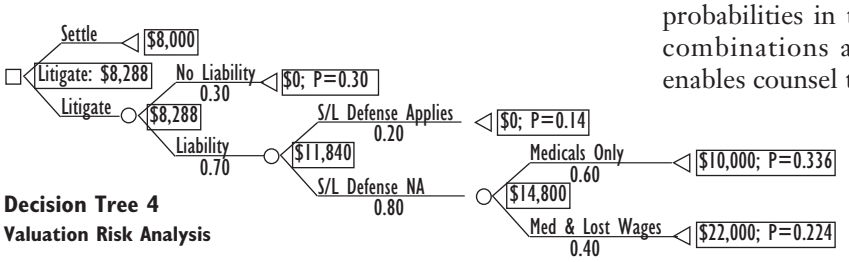

**Decision Tree 3**
**Basic Risk Analysis**

*Taking a Defense into Account*

Returning to example A, suppose the defendant asserts the statute of limitations (S/L) as a

defense. If it were to succeed, the plaintiff would not recover anything. If it were to fail, then it would not affect the possible outcomes of the litigation. For risk analysis purposes, the lawyer should analyze the defense separately.

The decision tree analyzing the valuations yields the following results.




**Decision Tree 4**
**Valuation Risk Analysis**

Note that the value of the case dropped—as expected—because a defense has been interposed.

### *Example B: Multiple Causes of Action, Defendants, etc.*

Many lawsuits contain more than one cause of action. Usually lawyers put in every possible legal theory to increase the chance of success. Similarly, many cases have multiple defendants.

To do a risk analysis, you must determine which claims are independent and which are not. For example, a claim that a company is liable under the doctrine of *respondeat superior* is dependent because liability hinges on jury finding its employee to be liable. By contrast, claims alleging breach of contract and tortious interference with a contract may be independent; one can lose one claim and win the other. Where claims are independent, the sum of the probability of all outcomes need not add up to 100%.

How can independent claims be represented in a risk analysis? The same way that the two coin tosses were represented—by analyzing the different possible combinations. Whether each outcome is treated separately or as part of the branch called "liability" depends on what you decide is the best way of presenting the information to your client.

Example: Take a case involving two causes of action: one in contract, the other in tort. The defendant's counsel offers $50,000 to settle the lawsuit. Plaintiff's counsel thinks the contract case has issues but is worth pressing because it would yield higher damages. She decides to assign the contract claim a 25% chance of success. Counsel thinks the alternative tort theory has a higher chance of success, but is worth less in damages. So she assigns it a 60% probability of winning. The probability of no liability in contract is 75%, in tort it is 30%.

Counsel determines that the two claims are independent of each other. Thus, the sum of the probabilities does not add up to 100%. Indeed, they exceed that figure. Here is the equation:

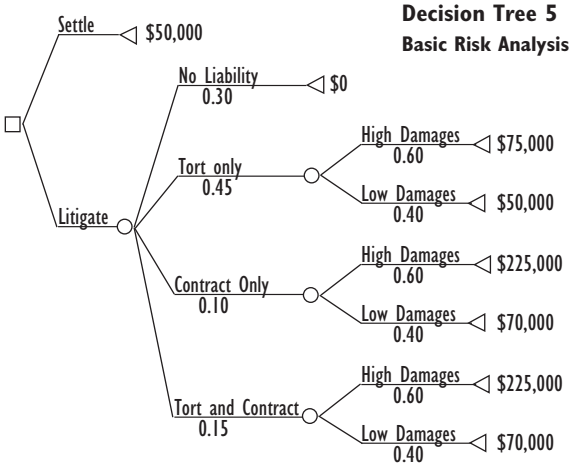
p(no liability) + p(tort) + p(contract)] = 0.30 + 0.25 + 0.60 = 1.15 or 115%

A more meaningful exercise is to derive the joint probabilities in this example. The four possible combinations are depicted in Table 5. This enables counsel to calculate their joint probabilities. This is done by multiplying the probability of the two components of each combination times each other. Note that the sum of the four joint probabilities equals 1.0.

**Table 5. Joint Probability of Legal Claims**

| OUTCOME | PROBABILITY |
|---|---|
| ~K, ~T | 0.75 x 0.40 = 0.30 |
| ~K, T | 0.75 x 0.60 = 0.45 |
| K, ~T | 0.25 x 0.40 = 0.10 |
| K, T | 0.25 x 0.60 = 0.15 |

Based on counsel's assigned probabilities of success, we can see that there is a 45% chance that the contract claim will fail and the tort claim will succeed.



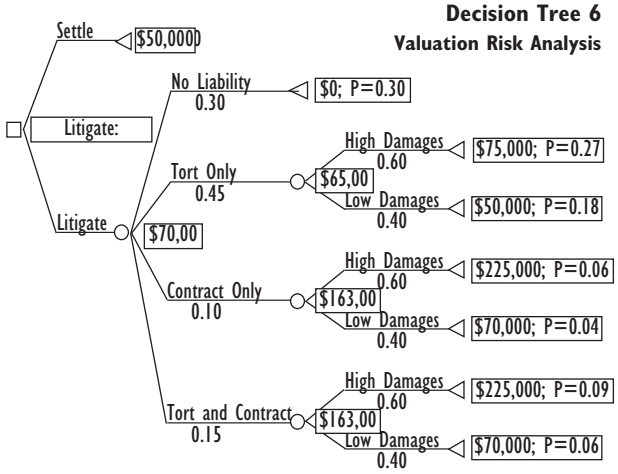

**Decision Tree 5**
**Basic Risk Analysis**

Once this has been calculated, then counsel can make a risk analysis by estimating damages for tort and contract claims. This is shown in Decision Tree 5. Note that the high and low damages for the contract branch and the tort-and-contract branch are exactly the same. This makes sense because the contract damages in this case are larger than the expected tort damages, and if contract damages were awarded, they would supercede the tort damages because the tort claim was an alternative, fallback claim.

For any cause of action, the probability of liability must be equal to or less than 100%, and taken

together with the probability of non-liability must equal 100%. The reason, as noted above, is that liability excludes the possibility of non-liability, so they are the only possible outcomes.

Once this analysis is completed, the valuation can be calculated.




Math aside, does Decision Tree 6 tell us that there is no relationship between the two causes of action? Here we can admit that these causes of action are not quite as independent as all that. Every experienced lawyer knows that once a jury finds against a defendant on one cause of action, the likelihood increases that the defendant will be found liable on other theories. This is a natural part of trial dynamics, which has the jury developing strong positive or negative feelings for one for the parties or counsel. This truth certainly should be explained to the client, but it need not inhibit use of risk analysis. Counsel can ignore these secondary effects if she likes on the assumption that the analysis is not intended to be that precise. Or she can adjust the probabilities or use "sensitivity analysis" (discussed below) to compare different variables.

In Decision Tree 6 you can see that four different levels of damages were analyzed. Any number of exclusive possibilities could be included, as long as the sum of their probabilities adds up to 100%.

In this example, using four different damages levels better represent the palette of outcomes that could be anticipated in a jury trial.

Notice that the probabilities of damages are higher in the tort branch but the amounts are lower than in the contract branch. The probability that damages will be awarded are different for the contract and tort claims because the lawyer making this analysis believes that if the jury finds that the defendant committed a tort, it will be more disposed to award more in damages. The reasoning is that jurors infer some impropriety from a finding of tortious conduct. One could make the same inference about a finding of fraudulent conduct. This is associated with the emotional dynamic of trials.

The amount of damages differs because the law permits different types of recoveries for breach of contract and for tortious interference. The lawyer who made this analysis estimated different damages outcomes based on the different rules applicable to damages in contract and tort cases.

**Part III. Sensitivity Analyses**

A given risk analysis represents one particular set of probabilities and outcomes. What happens if there is a change in one of the variables? What is the impact on the probabilities and outcomes? These questions can be answered by a process called sensitivity analysis. It involves varying the various probabilities or outcomes and then comparing them. For example, the lawyer may deem the base case to be the most probable analysis, but he can also generate a "best case" and "worst case" analysis. This allows for a fuller understanding of the judgments that were made for the risk analysis.

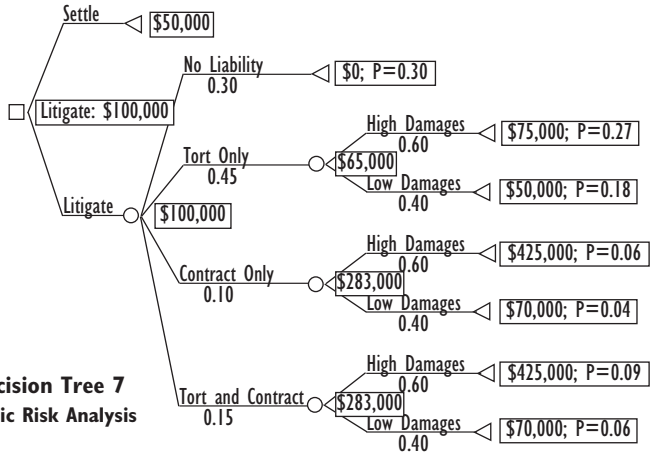
First, the lawyer takes the original analysis (the "base case") and changes one parameter. As a general rule, only one parameter is changed at a time to allow the impact of that change to be identified. Then the lawyer redoes a recalculation. After this is done several times, the lawyer can compare all the changes.

***For example, the lawyer may deem the base case to be the most probable analysis, but he can also generate a "best case" and "worst case" analysis.***

Take the tort and contract example on the previous page as a base case; then change one of the parameters. Then change the maximum damages in the breach of contract claim to $425,000. (The number chosen could be associated with a particular legal contingency—for example, whether or not some piece of evidence is admissible, but does not have to be).

The revised analysis appears on Decision Tree 7 on the next page.

Comparing this decision tree with Decision




**Decision Tree 7**
**Basic Risk Analysis**

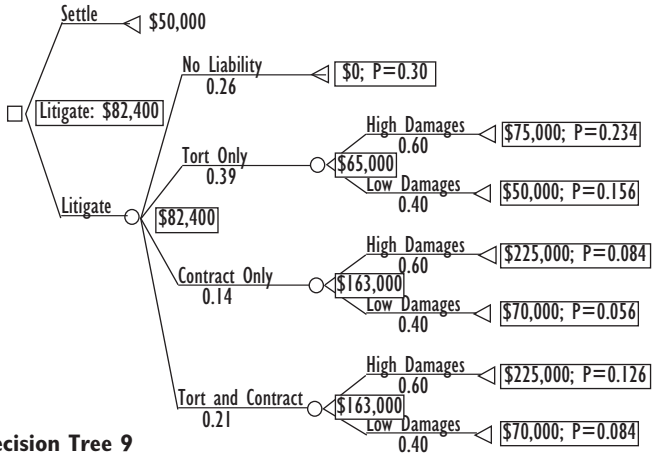
Tree 6, changing the high estimate for breach of contract damages increased the value of the case by $30,000. That this is less than $200,000 should not be surprising because common intuition tells us that the value of the increase of one outcome is less than its nominal value whenever there are other outcomes to take into account. What may be less intuitive is how much less the impact is. Here, because of all the other precedent probabilities (i.e., the earlier events that must occur to get to that outcome, changing two outcomes has a detectable impact, but perhaps less than might be expected.

There are at least two implications of this. First, the client can see that chance of a larger recovery is a long shot and will not have much impact on the value of the case unless the amounts are truly astronomical. This should help to bring even the most optimistic client back to earth. Second, it raises a litigation strategy question. If there is significant risk associated with increasing the maximum damages for breach of contract, the lawyer and client could conclude that the effort might not be worth the candle. For example, if it would double the length of the trial and possibly cause jury alienation, the better course might be to trim it out of the plaintiff's presentation.

Looking at another variation on the base case, change the probability of liability on the breach of contract count from 25% to 35%. The recalculation yields the results in Decision Tree 8 below.

Running the valuation analysis yields the results in Decision Tree 9 below.

The impact of this change is not that significant. This diagram tells us that a disagreement over the precise probability of prevailing on the contract claim, provided it is in the same neighborhood as the base case, does not significantly change the value of the case.

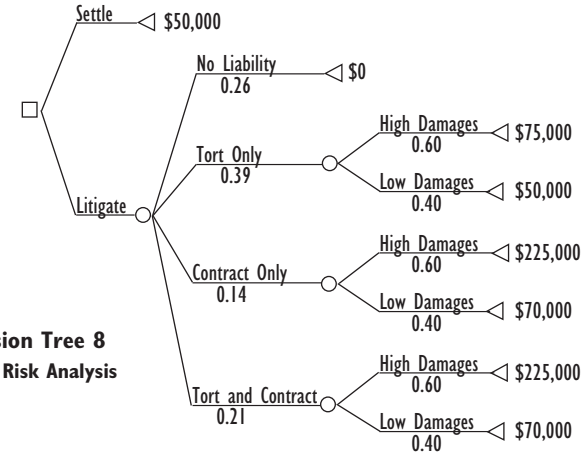



**Decision Tree 9**
**Basic Risk Analysis**

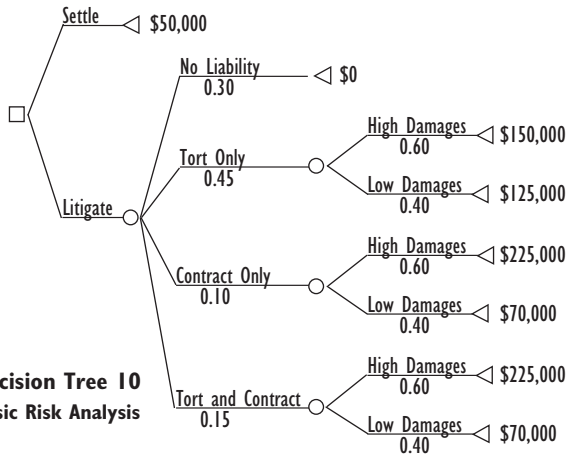
Let's look at one more variation. Increase two possible tort damages outcomes by $75,000 each. Analyzing this new probability tree yields the result in Decision Tree 10 on the next page.

Running the valuation analysis yields the results in Decision Tree 11 also on the next page.

This diagram shows that a relatively small increase in tort damages has the same impact as a large increase in contract damages, and more impact than changing the probabilities of the contract claim by 10 percentage points. As a result, the lawyer and client might agree that effort should be put into increasing tort damages rather than the other options. If nothing is possible at that time, then at least they




**Decision Tree 8**
**Basic Risk Analysis**




**Decision Tree 10**
**Basic Risk Analysis**

understand the importance of the judgments going into the base case estimate.

### Part IV. Understanding Risk Analysis in Settlement

Once a risk analysis is performed on a case, it is tempting to infer that the resulting "fair value" automatically represents the settlement value for a particular entity. This is not true. Here's why.

#### *Ability to Pay*

An essential consideration is the ability of the defendant to pay a judgment. Consider a corporation that faces potential liability of $50 million. But the most it could pay is $20 million. It is a "maximum payout" defendant. From its point of view, two things are true. First, if the "fair value" of the case is at or around its total assets, it has no incentive to settle because it cannot do worse than going bankrupt. It is better off going to trial and hoping for a good outcome, regardless of how unlikely that is.[17]

Second, it can cap every outcome at $20 million, thereby making its own "fair value" much less than it would be in the abstract. This means that unless plaintiff's counsel is aware of the ability to pay issue, even if both sides have roughly equal views of the likelihood of the various outcomes, each will come up with very different fair values of the case.

#### *Perceived "Need"*

The other side of the coin is the "minimum receipt" plaintiff. There are times when, for rational reasons, a plaintiff may decide that any settlement less than some amount simply does not get the job done. Take a tort case in which there is a minimum cost for the purchase of a needed long-term care package. The plaintiff may decide that anything below that threshold amount simply does not make a difference because if he cannot purchase the care package, he and his wife will be obliged to rely on a government program that will vacuum up any residual assets. As a result, for this plaintiff, a rational strategy is to stick to a settlement number that exceeds the "fair value" of the case.

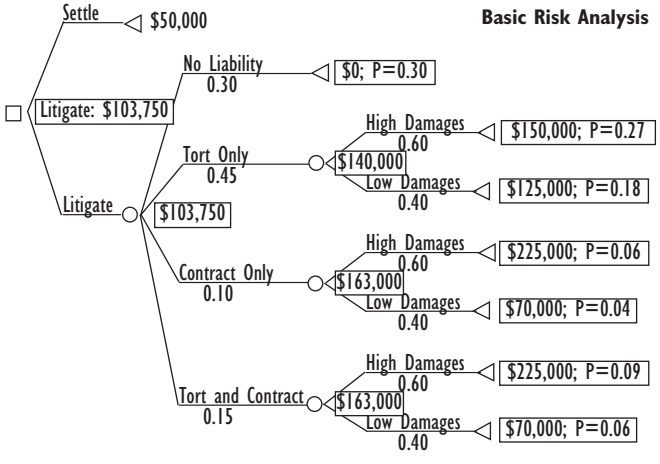
In practice, the pure example of this is rare. It is much more common for the plaintiff to value the impact of certain settlements non-linearly. In other words, each additional dollar is not necessarily of equal value to the plaintiff. There may be various thresholds or "break points" that make significant difference.[18]

#### *Attitude Toward Risk*

The probability analysis set forth above is "risk neutral." In other words, it neither favors nor disfavors risk versus certainty. Thus, under this an analysis, a person should be indifferent as between a 50% chance of $100 and a certainty of $50. However, most people and most corporations are not entirely risk neutral. They either favor risk—"risk loving"—or are averse to risk—"risk averse."

As a result, counsel must determine the client's attitude toward risk. In general, it is not useful to frame the question in the technical terms of "risk loving" or "risk averse." Instead, counsel should work with the client to identify the factors that would affect this judgment. For example, an individual client may be risk less willing to bear even a relatively small risk of an adverse out come because he does not have a portfolio of litigation across which they can spread the risk. A corporate client with 50 personal injury lawsuits may easily accept risk because it can spread it over a large number of cases.

**Decision Tree 11**
**Basic Risk Analysis**



Turning to settlement, then, the outcome of the probability analysis becomes the starting point for determining a settlement position. After the initial "risk neutral" mathematical analysis is complete, the client's attitude toward risk must be factored in. This will yield an adjusted value for settlement purposes.

### *Non-Monetary Factors*

In many cases both monetary and non-monetary considerations go into a settlement. For example, a common issue in most settlements is the confidentiality of the settlement itself. Because this has no direct monetary value as compared to the impossibility of confidentiality of a litigated outcome, it cannot be directly integrated into a risk analysis.

There are two ways of dealing with non-monetary factors. First, they can be analyzed separately. Thus, a settlement position would include a monetary aspect and a non-monetary aspect. Each side of the settlement would be treated separately. To the extent that trade-offs between monetary and non-monetary factors are necessary, they are analyzed on a purely judgmental basis.

The problem with this approach is that it makes it very difficult to negotiate two-sided settlements. Because it depends on qualitative comparisons, it is difficult to evaluate different offers. This is not an insuperable problem, but it should be recognized by the lawyer and client.

The second way of dealing with non-monetary factors is to assign each of them a designated value. (Since this is an approximate exercise it should be treated only as a tool for settlement.) This approach serves two purposes. It forces the client to focus on the relative importance of non-monetary factors, not only in comparison to financial factors, but also in comparison with each other. Thus, for example, the client may have to consider how it values a non-competition provision compared to a bar against soliciting employees. This imposes a discipline on the conversation between counsel and client in making sure there is full communication concerning priorities in settlement.

The other purpose of the exercise is that it enables some direct comparisons between monetary and non-monetary factors in settlement offers. In addition, it can be used to induce the other side to more clearly communicate its own comparative valuations of monetary and non-monetary factors.

### *Institutional Considerations*

Some corporations and governmental parties have what are called "institutional considerations." These concern not just the case at issue, but the impact of how the case is resolved on future cases. Thus, a settlement in a particular case could signal the filing of future similar cases. Similarly, a large, publicly reported jury verdict in a litigated case could inflate the value of future cases. Thus, taking into account the future implications of either settlement or trial could substantially change the case value assigned through risk analysis. How is this done? One way is to take this into account in the initial valuation of the consequences of a settlement or damage award. Since this could inflate the value of one or more outcomes, it might not be appropriate to disclose this to a particular opposing party. A second way of dealing with the problem is to create an entirely separate stage of analysis to fold in the probabilities of future cases. This keeps the information about the case separate although it does add another layer to the analysis.

### *Collection Risk*

Not every defendant can pay what is owed. A judgment might not be collectible. An unsecured settlement involving payments over time also may pose a risk of collection. Since the risk of non-collectability can alter the value of the case (as opposed to the estimated judgment), it should be taken into account in any analysis of settlement versus trial, or up-front settlement compared to a payment over time.

For the sake of clarity sake, it is best to do add another probability stage to the analysis or tree, rather than integrate it into the basic risk analysis. Not only does this make clear the role this factor plays in the evaluation, it also focuses the settlement discussion on ways to change that probability without substantially changing the terms of the underlying settlement.

## Part V. Risk Analysis in Mediation

The more educated the mediator, the more effective she can be. Communicating the background facts of the case and, if necessary, an overview of the law to the mediator is a necessary foundation. It is at that point, however, that the advocate must explain his views of the case. Traditionally, this advocacy uses only qualitative terms. The mediator is likely to hear both advocate say their client's case is "strong" or "very strong," and that the other side's case is "weak," "ridiculous," and "frivolous."

This poses several problems for the mediator. First, these qualitative judgment are subjective and cannot be meaningfully compared. How does "strong" compare to "very strong." How does "weak" compare to "very weak."

Second, qualitative judgments are not particularly amenable to dissection at different phases of a case or on particular issues—e.g., liability v. damages, a *prima facie* case vs. valid defense. Most likely this is due to the fact that counsel probably made a comprehensive judgment about the case taken as a whole, rather than concrete aspects of it.

Risk analysis would help the mediator become acquainted with the case in a focused way, clarifying each judgment or valuation.Risk analysis would reduce subjective opinion to a numerical value; and it would facilitate the discussion of strengths and weaknesses. From a practical point of view, it would also give the mediator a basis to go to the other side to press them to explain how their judgments differ.

### *Example C—Presentation in Pre-Mediation Statement*

Here is an example of risk analysis presented in the context of a plaintiff's mediation statement.

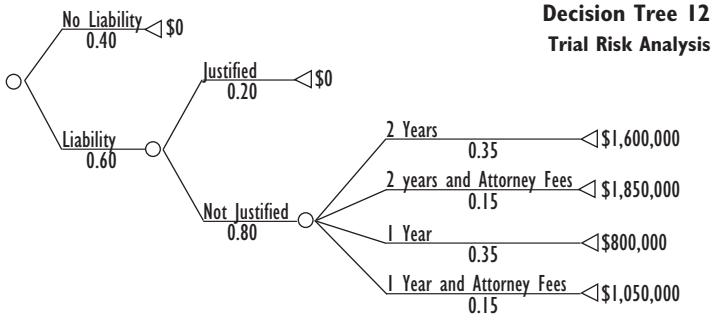
Ms. Plaintiff recognizes the vagaries of the jury trial process. Her analysis of this process is as follows:

Probability of prevailing on existence of contract or interference: 60%

Probability of prevailing on Defendant's improper termination: 80%

Probability of one year damages: 50%

Probability of two year damages: 50%




**Decision Tree 12**
**Trial Risk Analysis**

Probability of attorney fees: 30%

This analysis includes both legal and jury dynamic issues. It also takes into account the fact that Ms. Plaintiff has several paths to liability that are somewhat independent. As result, it is not enough for Defendant to continue to harp on the difficulty of proving an oral contract.

Based on that analysis, the mathematical settlement value of this case is approximately $612,000. What also should be taken into consideration is that Ms. Plaintiff must recover at least her attorney fees together with an amount that will cushion her transition. Otherwise, settlement simply isn't worth while. As a result, for her, any settlement less than $850,000 is not worth accepting since it will not accomplish those goals. Put another way, she will be better off trying for a full recovery with the risk that she will get nothing rather than taking a settlement that does not meet her objectives.

This analysis tells the mediator how the plaintiff sees the case. The fact that there is a liability case and then a separate justification defense is articulated in the probability tree. This allows the mediator to understand that the liability case breaks into two different conceptual pieces. The damage branches take into account two different damage calculations, both with and without attorney fees. As a result, the mediator can now press the other side and determine if they see the structure of the case differently or if they evaluate the probabilities differently.

### *Presenting Your Case*

It is common in mediation for each side to make a presentation in a plenary session before they are separated for the shuttle diplomacy that takes up most of the time in a mediation. There are also occasions when the parties reconvene at the request of the mediator. Each of these is an occasion when counsel can talk directly to her opposite number, who must at least pretend to listen. It is also an important opportunity for counsel to talk directly to the client.

This opportunity should not be wasted. The temptation always is to wax eloquent and deliver a stirring opening or closing. But the problem is, the better the speech, the more it will be discounted as pure legal rhetoric. Business people are much more interested in data and numerical analysis. Even for clients who are not, the presentation of a risk analysis can force them to think about the differences between the parties' views of the case.

A dispassionate analysis that uses a probability tree will be less dramatic, but it will often have more persuasive power. By foregoing traditional rhetoric and advocacy, counsel can establish his good faith and willingness to compromise that is consistent with mediation. Since every reasonable probability tree shows a chance of losing at each stage, it demonstrates, in a way that speech can-

not, that counsel acknowledges the possibility of losing the case at trial. This does not mean that counsel must show the client and opposing counsel the worst case scenario. Even the relatively rosy version will demonstrate a clear acknowledgment of the possibility of loss.

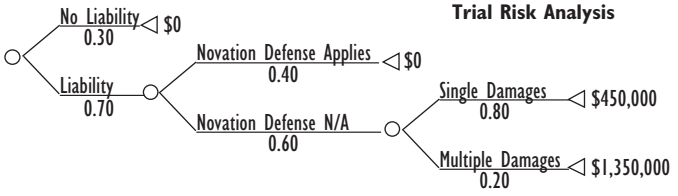
### *Example D: "Reverse Engineering" the Opponent's Case*

Yet another use of risk analysis is to "reverse engineer" settlement proposals made by the opposing party.

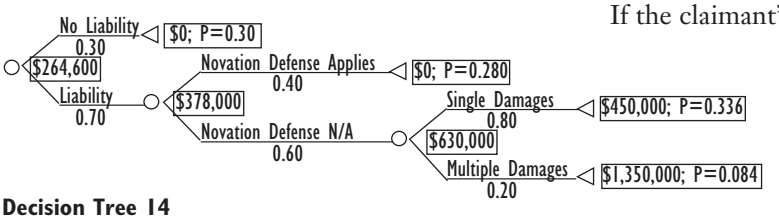
Often settlement proposals are not well explained by the lawyer making the offer. A decision tree risk analysis allows counsel to adjust the probabilities and/or outcomes to determine if there is some mix that yields a number near that of the settlement proposal. If there is, it may give some insight into the foundation for the proposal. If it does not, it may be that the party making the proposal is approaching the litigation with a fundamentally different conceptual framework (or no real framework).

The defendant's lawyer in a breach of contract case may perform the following analysis[19]:

**Decision Tree 13**
**Trial Risk Analysis**




The analysis generates a fair value for the case of $264,600.




**Decision Tree 14**
**Valuation Risk Analysis**

As counsel and client view the case, an offer from their side in the $200,000 range, or a demand from plaintiff in the range of $300,000 would reflect their analysis in Decision Tree 14 above. The difference between those numbers and the "fair value" of the case are due to a mix of negotiation strategy and positioning.

However, the plaintiff makes a demand for $600,000. A reasonable modification of the probabilities or outcomes falls far short of that demand. Indeed, even assuming certain liability and taking into account only the novation defense, $600,000 is still about double the value of the case.

If counsel rejected the offer as absurd, or made a counterproposal that is in a totally different range, he could poison any possibility of settlement in the future. Instead, counsel responds with a series of questions to elicit the reasons plaintiff has for making that particular offer.

In a more formal way, either directly to opposing counsel or in the context of mediation, the lawyer could actually present a risk analysis[20] to help the parties focus on the areas of disagreement. This would show that the lawyer understands and has taken into account the strengths of the opposing position. It also would allow him to ask the opposing counsel to focus on other areas of parity or weakness. Using risk analysis, counsel who have a tendency to trumpet one aspect of the case to the exclusion of the others can take each parameter in turn and ask opposing counsel how and why he or she disagrees with that estimate.

The same process can be used in a mediation to explain a settlement position to the mediator. Often at the beginning of the mediation, even the best-intentioned and most diligent mediator is not fully familiar with the issues, and does not yet understand which issues are key. Risk analysis provides a useful structure for understanding the claimant's position and is a tool to help make progress with the other side.

In addition to the basic risk analysis, sensitivity analyses can be helpful in settlement discussions. If the claimant's counsel does not have the ability to recalculate a probability tree in real time, she can bring to the table several different versions of the most likely responses. It may turn out that a change in damages or one of the probabilities will not substantially change the fair value of the case. Putting that before opposing counsel can provide an objective basis to press for an explanation of the reason why counsel believes that a change is so important.

### *Example E: Sample Settlement Discussion*

Let's return to the contract dispute in Example C. During the settlement discussions, the defense counsel puts forward an offer of $50,000 but refus-

es to explain the basis for it. He also will not increase the offer. The discussion could proceed as follows:

[P = Plaintiff's counsel]

[D = Defendant's counsel]

P: I got your offer, but I am not sure I understand how you got there.

D: I think we have a very strong case and that is all that it is worth.

P: I don't want to let settlement fail just because the two parties misunderstand each other. Here is the way I look at the case. [Shows a version of probability analysis] As you can see, I give some allowance for the strength of your case. I also recognize that you have an affirmative defense that has its own strength. I understand that you think multiple damages are unlikely, but the statute does provide for them and they are at least plausible under the *Nuzzo* case that came down last year. Even when I do that, damages are still in the range of $250,000 to $300,000. I can't see how you are in the range you are.

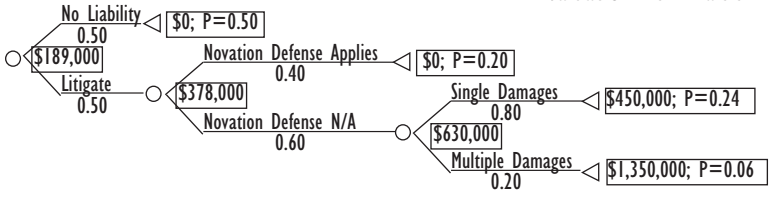
D: I think that you are underestimating the strength of our liability case.

P: OK, but even if I change the probability on that to a 50/50 approach—and mind you, I am not conceding that is correct because I have a signed contract here on my desk—I still see that the case is worth at least $200,000 given the damages that are relatively clear. What am I missing? [The plaintiff is looking at Decision Tree 15.]

D: Well, you are not taking into account the novation defense.

P: Actually, as you saw from my fax, I am actually breaking that out and giving a separate evaluation for that defense.

**Decision Tree 15**
**Valuation Risk Analsis**

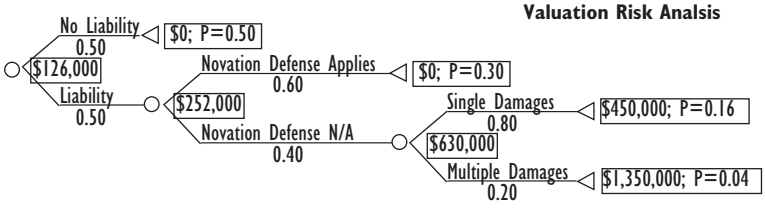



D: I think you have the numbers backward. We have a 60% chance of winning on that, not you.

P: I understand, but even taking that into account, and even assuming the 50/50 chance on liability, which I still don't concede, your offer is still way out of the range. [Counsel is looking at Decision Tree 16.]

D: What do you mean?

**Decision Tree 16**
**Valuation Risk Analsis**




P: Even giving you the benefit of the doubt on both of those points, your offer really should be at least $125,000 to get rid of this case. Surely you agree $50,000 is far below that amount?

D: Let me go back and think about that. And don't call me Shirley.

## Conclusion

Risk analysis is not a panacea for settlement of disputes. Fundamental differences of opinion about possible outcomes or the likely range of damages could still preclude settlement. On the other hand, there will be situations when risk analysis will promote settlement and help the parties communicate with each other or with the mediator. ■

## ENDNOTES

[1] The mediator is alternately referred to as "he" or "she." No preference or assumption should be inferred from such usage.

[2] As used in this article, a "qualitative" analysis refers to an analysis that does not use numerical values. By contrast, a "quantitative" analysis uses numbers. Each technique has its strengths and weaknesses.

[3] Quantum mechanics issues, such as the Paradox of Schrödinger's Cat, are not addressed in this article.

[4] The terms 100% and 1.0 are equivalent from a mathematical point of view. 100% is another way of saying 100 divided by 100 (100/100) or 1. Similarly 50% is 50/100 or 0.5, and 0% is 0/100 or 0.

[5] In all of the formulas in this article, p stands for probability and the word in parentheses is the event being evaluated. So the first equation reads "the probability of heads equals 0.5."

[6] In this equation, the "event" consists of two opposing facts. The facts under analysis need not be mutually exclusive. One could evaluate the probability that in a two-horse race, one or the other will win. In that particular case the probability of the event will still be less than 1.

[7] Another way of saying the same thing is that p(heads or ~heads) = 1. In this context, the symbol ~ means the negation of the expression (i.e., it can be read as "not"). In this example, if a coin is not heads, then it is tails; so tails is the same thing as ~heads. In other cases, the negation of a particular outcome does not necessarily imply another specific outcome. To say that a house is not red does not mean it is blue; it could be yellow, orange, or striped.

[8] Some readers may note that the coin could land on its edge and this decision tree leaves that possibility out. True, but it makes sense to ignore a probability below a minimal threshold.

[9] This can be easily calculated. Each coin toss has two possible independent outcomes. Thus, the total number of outcomes is 2 x 2 x 2 = 8. Another way of framing this calculation is $2^3 = 8$. The basic term "2" is the number of outcomes; the exponent "3" is the number of tosses. Here is another example. The number of outcomes from tossing a die twice is $6^2$ or 36. There are six possibilities with each toss because the die has six sides. Once can also mix and match. For example, the number of outcomes from tossing a die twice and then flipping a coin twice is $6^2 \times 2^2$.

[10] There is no magic number that is "the long run." The more flips, the more one approaches this concept, but any finite series of flips—no matter how many—has some probability of diverging from the average.

[11] The term "weighted value" is used because each outcome is weighted by the particular probability assigned to that outcome. Outcomes with a higher probability are given more weight.

[12] For this reason casinos do not mindwhen a patron wins a substantial amountof money on a particular bet or pull on the slot machine; they know that they will make it back over time.

[13] In all of the decision tree diagrams, a box represents a decision to be made. A circle represents the possible outcomes that may occur at that stage. A triangle represents the result or endpoint of each branch of the analysis.

[14] Given the uncertainty of litigation, I never assign a probability of success higher than 80% (or lower than 20%) on basic liability. This accounts for the vagaries of trial results and also reminds clients that lawyers can never guarantee an outcome.

[15] Juries can do bizarre things, so the term "never" may be excessive. The point is that this amount is not one of the defined outcomes. So, for purposes of the analysis, the probability assigned to this specific outcome is 0%.

[16] In the event of a contingency fee, a similar adjustment can be made by reducing the results by the appropriate percentage.

[17] In this context the following story is useful. Mr. X is caught stealing in a far-away kingdom and is sentenced by the king to death. Before he is led away, Mr. X tells the king that this is a shame because the king will never see him teach a pig to sing. Intrigued, the king offers Mr. X one year of freedom to prove this claim. If he fails, he will be executed. Mr. X takes the offer and walks out of jail. A friend sees him and says, "Have you lost your mind? There is no way you can teach a pig to sing." Mr. X replies, "You are probably right, but a lot can happen in a year. The king might die. I might die. And who knows, I might teach the pig to sing." From Mr. X's point of view, this is an entirely positive outcome. He cannot die more than once, so there is no downside to taking the king's offer. Even if the probability of each outcome is extremely low, he is better off not dying now than being executed.

[18] Example: Imagine a 6-foot tall person trying to see over a 10 foot fence. A two-foot-high step stool does no good. He still can't see over the fence. Adding one more foot doesn't make that stool 50% better. The person still can not see over the fence. However, adding an additional foot makes a huge difference. Now the person can see over the fence standing on tiptoe. Thus, the second additional foot is worth a great deal more than the first. Adding yet another foot may is of only marginal value.

[19] This decision tree has no "settlement" branch; it is a pure litigation analysis. Once a settlement offer is received or accepted, then a settlement branch could be added to evaluate the decision. As usual, the percentages and damage estimates are based on the attorney's judgment and legal and factual analysis.

[20] It generally would not be the base case, but a reasonable best case scenario that would be disclosed.