3

How To's

Starting with Generic and Abstract Playing Fields

This chapter sets forth the basics of decision tree analysis and their roots in probability theory. It leads the reader though a series of abstract "games" and then some simple legal problems designed to demonstrate how to use the method. Those already comfortable with decision trees may wish to skim this over or skip to Chapter Four's discussion of common errors, including prescriptions against distortion of your analysis.

Conceptually, in order to build a decision tree you must:

1) Define the decision: What's the problem? What are the choices? For our purposes, we'll assume that the decision is whether to settle for a stated offer. Or, better yet, to decide the lowest or highest dollar amount at which you would settle a legal claim.
2) Identify the possibilities: What might happen if I decide on one course of action or another? In litigation, identify all of the (foreseeable and) possible procedural and evidentiary twists and turns, as well as their possible consequences, flowing through to various possible ways the case could end.
3) Judge the likelihood: What are the chances that each of these considered possibilities will come to pass? What's the chance of summary judgment, the chance that the critical evidence will be found inadmissible, the chance that the jury will find fraud, and the chance that the damages will be trebled?
4) Figure the net gains or costs—the outcomes or (positive or negative) "payoffs" at the end of the road: What will the net effect be if it works out this way or that way? In litigation, the attorney's fees and other costs incurred from the present to the end of the case must be subtracted to yield a net figure. On the defense side, they are subtracted from $0—in the event of a defense verdict—or from a negative number—the damages award the defense will be obligated to pay. Thus, if liability is found, costs make the defendant's net loss a larger negative number.
5) Mathematical operations: A more careful description of the way the math works will be found later in this chapter. Sufficed to say here that only arithmetic is involved. Probabilities along a path are multiplied to learn the cumulative probability of each possible outcome. To find the discounted value or EMV, each pay-off is multiplied by its cumulative probability and these are added together. The EMV is simply the weighted average value of all possible outcomes.[1]

[1] As will be explained in more detail, the math can be done either from left to right or right to left on the tree, both visually and in fact. The final EMV will be the same, but seeing the operation's flow in the other direction tends to yield different insights. Each, or both, may be important in different cases and client circumstances.

The Power of Cumulative Probability

Decision analysis is built upon the foundation of probability theory, and its observation that probabilities are cumulative: whenever you have to jump through more than one hoop, and the success of each jump is not 100% certain, the probabilities of each jump must be multiplied.

Drawing upon the much used example of a standard, unweighted coin and a completely fair, unrigged coin toss, we all know there's a 50% chance (.5) that it will come up heads and a 50% chance that it will come up tails on each toss. But, what if I want to know how likely it is that the coin will land on heads twice in a row - in each of the two coin tosses? Then I am asking, what is the total or "cumulative" probability of both successive coin tosses coming up heads? What if I will win $10 if and only if that happens?

In fact, the two coin tosses could generate the following four possible combinations of heads and tails:

First toss	Second Toss
Heads 	Heads 
Heads 	Tails 
Tails 	Heads 
Tails 	Tails 

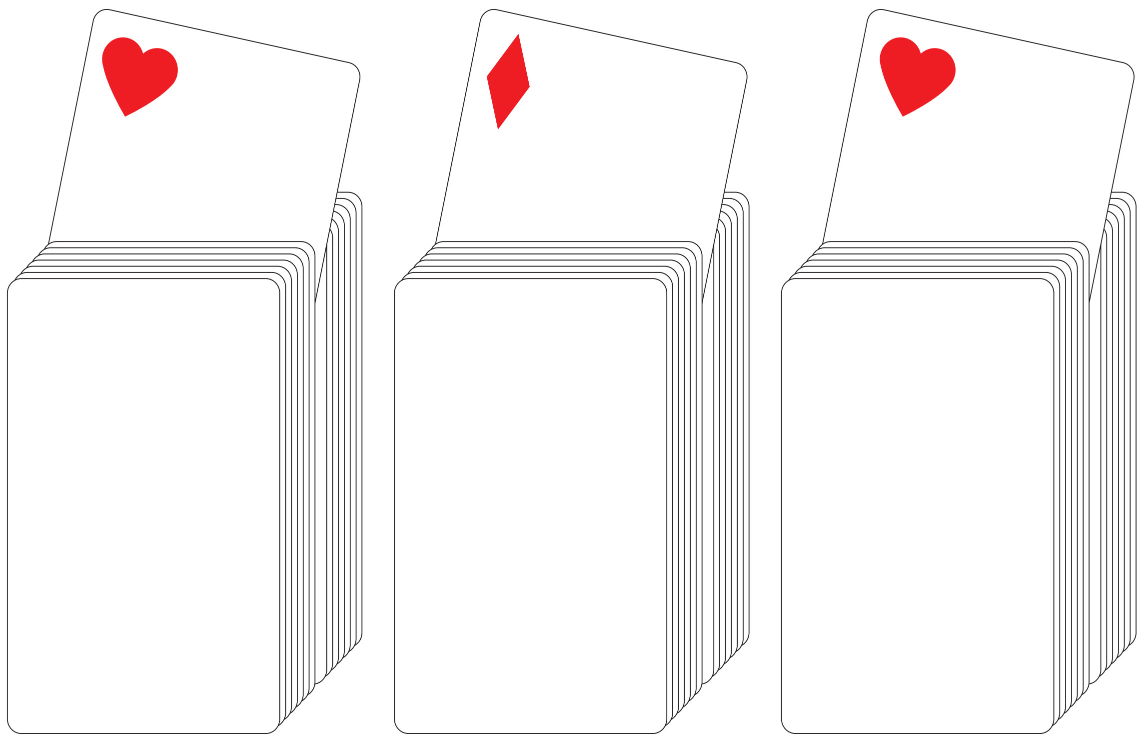
Clearly, "Heads, Heads" is only one of four (25%) of the possible combinations. Thus, the chances are 1 in 4, or .25 (25%) of that first winning two-heads combination.

That's how successive and thus cumulative probabilities work. If there's a 50% chance of an unweighted, two-sided coin toss coming up heads each time, then the overall probability that it will come up "heads" twice in a row is 25%. That is the first 50% probability (.5) multiplied by the second 50% probability (.5). 50% x 50% = 25%. (.5 x .5 = .25).

The set-up and the results are the same if we switch the context to a litigation with one procedural hurdle, then a simple yes or no liability question, and a specified damages amount. If there were a 50% chance of surviving summary judgment, and a 50% chance of a liability finding, these would yield a cumulative 25% chance of a damages award in the specified amount. 50% (survive summary judgment) x 50% (liability verdict with damages award) = 25%.

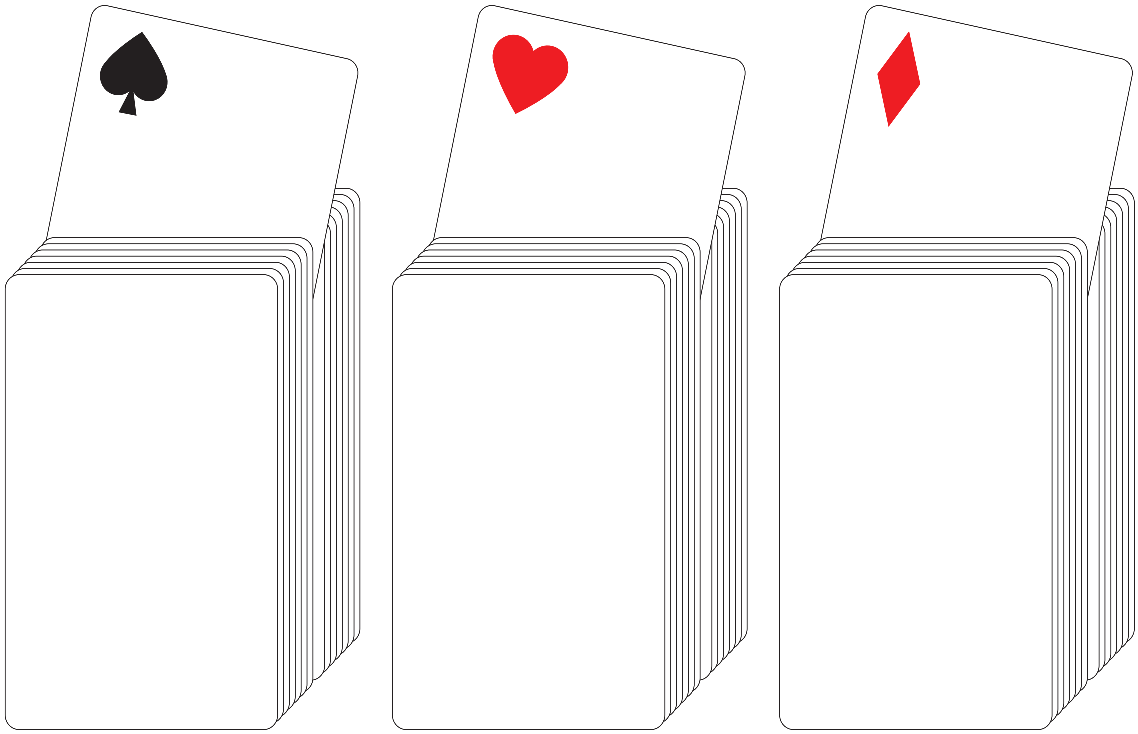
Given that all uncertainties in litigation don't seem to be 50/50—or equally weighted in one direction or another—it makes sense to consider the example of a deck of 100 cards, constructed to include, say 30 red cards (hearts or diamonds) and 70 black cards (clubs or spades).

If I draw three separate cards (but put each back after each draw, so as not to disturb the proportions), what are the chances that I will draw three red cards—hearts or diamonds—in a row?



To perform the analysis, each probability along each path is multiplied and each path's cumulative end probability is multiplied by that net end number. For a deck in which we know 30% of the cards are red, the answer is .3 x .3 x .3 = .027. There's a 2.7% chance of drawing three red cards in a row.

And the chances of first drawing a black card—club or spade—and then two red cards? This would set up as: a 70% chance of a black card, then a 30% chance of a red card, followed by a 30% chance of a red card.



The answer is .7 x .3 x .3 = .063. There's a 6.3% chance of drawing a black card first, and then 2 red cards.

Exercise 1- Weighted Coins for Litigation

Another way to think about it is to go back to the coin toss, but imagine that the coin at each juncture is weighted in accordance with our assessment of strengths and weaknesses. Imagine that the summary judgment "coin" is weighted toward our client's side; we've estimated an 80% chance it will come up heads. And, we are also somewhat confident of a liability verdict, estimating a 60% chance of prevailing at trial.

How would you calculate the cumulative probabilities?

Readers are invited to watch the video, and all of the videos that follow, via live link in an e-book or at the listed url. This first video narrates through the steps of a hand drawn calculation. Or you may wish to skip to the text below, describing the calculation and providing the answer.

Video 01: http://dx.doi.org/doi:10.7945/C22T3D

The cumulative probability of success with BOTH weighted coins is .8 x .6 = .48, or overall, a 48% chance that we will collect the damages award. Using the method's logic, from the plaintiff's perspective, we would multiply the anticipated (net) award by .48 to arrive at the litigation's discounted value.

Now, imagine a litigation in which the plaintiff estimates an 80% chance of surviving summary judgment and a 60% chance of winning $125,000 ($150,000 less $25,000 in attorney's fees). Application of the method in the case is shown below.

This url or video link narrates through a hand drawn application of the method in the case. The text explanation can be found below it.

Video 02: http://dx.doi.org/doi:10.7945/C2Z41T

We have already multiplied .80 x .60 =.48. Thus, we know that the overall chance of getting to any verdict award is .48 or 48%. We would then multiply .48 (the chance of a verdict award) x $125,000 (the anticipated amount of the verdict award), to get to the discounted value of $60,000. If the plaintiff accepts this way of thinking about value, and if he is without risk aversion or emotion, he might be indifferent between a settlement at $60,000 and proceeding down a litigation path. The method is not magic; it simply operates by multiplying each probability along the way to arrive at a cumulative probability for that outcome.

Exercise 2—More Weighted Coins in Sequence

Just to add some more complexity and reality to our imaginary, sequential coin tosses: imagine that a first coin is weighted to create an 80% chance of coming up heads on the first toss and a second coin is weighted to create a 60% chance of heads on the second toss. Now, let's add another layer to the game: we will win $125,000 if we get heads on the second toss, AND double that—$250,000, if we get heads on the third toss. Let's assume the third coin is weighted 75% toward coming up tails. But if only the third toss lands as "tails," we'll still keep the $125,000. (Before that toss, all other "tails" get us $0.)

Well then, what are the cumulative probabilities of ending up with $125,000, or with $250,000, or with $0?

The next video demonstrates how the calculation would be done, as explained in the text below it.

Video 03: http://dx.doi.org/doi:10.7945/C2T99B

Let's look at $250,000 first: we still have an 80% chance of heads on the first toss, and a 60% chance on the second toss, but now we have 25% chance of heads on the third toss. Only that combination yields $250,000. So, the cumulative probability of winning $250,000 is 80% x 60% x 25% = 12%. (.8 x .6 x .25 = .12)

Now, what's the probability of winning $125,000?

Once again, the next video demonstrates the calculation, also explained in the text below it.

Video 04: http://dx.doi.org/doi:10.7945/C26M5B

To calculate the probability of winning $125,000, the math is the same on the first two tosses, but it's 75% on the third toss. So, you have to figure 80% x 60% x 75% = 36%. (.8 x .6 x .75 = .36) (Remember the third toss only affects whether the winnings will be $125,000 or $250,000.)

And finally, what's the likelihood of getting $0 by the coin landing on tails in one of the first two tosses?

The calculation is explained and shown in the next video and in the text below it.

Video 05: http://dx.doi.org/doi:10.7945/C2PM5P

Well, we can actually end up with $0 in two ways: that first toss gives us a 20% chance of a $0. If that doesn't happen, then we may get there in two tosses, the first one would have to have been a heads—at 80%, and the second toss would have to be tails—at 40%, so 80% x 40% = 32% (.8 x .4 = .32). Combine the probabilities of our two paths to $0, and the probability of $0 is 52%.

A direct parallel would be a case in which plaintiff's counsel estimates an 80% chance of surviving summary judgment (or other preliminary dispositive motion), a 60% chance of winning on liability, and, if the jury finds liability, a 50% chance that they award double damages. (For the purposes of this example, let's assume a relevant statute permits this if the defendant's action was willful, etc.)

So, now we know the probability of results at $0 is 52%, at $125,000 is 36%, and at $250,000 is 12%. What's the weighted average—aka discounted value or Estimated Monetary Value (EMV)?

Before looking at the next video or the text below it, the reader is encouraged to give it a try.

Video 06: http://dx.doi.org/doi:10.7945/C2JX11

Multiply $250,000 x .12, to get $30,000; multiply $125,000 x .36, to get $45,000, multiply $0 x .52, and still have 0. Add these together: $75,000 is the answer!

For our legal case, it does NOT mean that a jury verdict is ever predicted to land at $75,000. Quite the contrary. It means that IF YOU WERE TO HAVE THE MISFORTUNE TO LITIGATE THE EXACT SAME CASE A HUNDRED TIMES, we are predicting a little bit more than half the time, you'll wind up with $0. The rest of the time, the results will be either $125,000 (36%) or $250,000 (12%). Assuming our predictions were accurate, and you added up ALL of the 100 results and divided by 100, to get an average, that average would be $75,000.

Scratch Pad Summary

That, in a nutshell, is the conceptual underpinning of risk analysis. The decision question is what to do in light of the possible risks and rewards and their discounted value. The idea is simple, as is the math. Still, it is also true that applying it in even a moderately complicated (two or three step) case can be challenging. It can be downright daunting where the case's procedural path, evidentiary issues, legal theories, and damages claims are just plain complicated.

What we've done so far is a "scratch pad" method of decision analysis or, really, risk analysis. In fact, calculations for a simple tree can be done on a scratch pad. Those inclined to spreadsheets will easily see that Excel does a fine job.

Now, a confession to ease the concerns of those less comfortable with math and formulas in this scratch pad format: this author tends to glaze over when reading math calculations within a paragraph. And, when doing the arithmetic on a pad or in Excel, with a separated box for each cumulative probability calculation, and then multiplication by the dollar amount, they seem disjointed. It's not intuitive to remember how and why they fit together. That is one reason I so strongly prefer to use a decision tree structure even for very simple cases. The math is the same, but the tree provides something to hang it on, to visualize how the pieces—the branches and ends—fit together. For even somewhat more complex cases, and for client communication and comprehension, there is nothing like a tree!

To that end, some tree-building conventions and advice are coming up next.

Symbolic Conventions for Trees

Experience teaches that the only way to become comfortable with the method is to experience it. Thus, this section first introduces a few commonly used tree building terms and their symbols, and then asks the reader to try a few tree-building exercises.

Here are some terms, symbols and graphic conventions you need to know:

Various Nodes and Branches

Critical junctures, turning points or end points on a tree are referred to as "nodes."

Decision Node and its Alternative Decision Branches

A "decision node" reflects a point at which a decision is to be made and is generally represented by a square. Assuming that more than one decision could be made at that decision node, decision branches should be drawn or inserted to its right (at least in languages read from left to right).

While it's pretty simple, this is explained and shown in the next video.

Video 07: http://dx.doi.org/doi:10.7945/C2F39V

The convention is to label or describe the decision branch across the top of its line.

A computer software-generated version is shown next [2]

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[2] As suggested earlier, the software I have long used, and used to generate the trees in this text, is TreeAge, available at www.treeage.com. It was originally designed by Boston lawyer Morris Raker for use in litigation, although the website reflects the company's current emphasis on health care and health policy.

There is a free software called Simple Decision Tree, originally open sourced for Design Professionals Network (http://www.decisionprofessionals.net). Operating as an add-on to Microsoft Excel, this software works well for resonably simple trees. However, it does not permit cutting and pasting subtrees and only rolls back to an EMV; it does not generate cumulative probabilities of each outcome at the right hand margin. It is at http://decisiontree.sourceforge.net

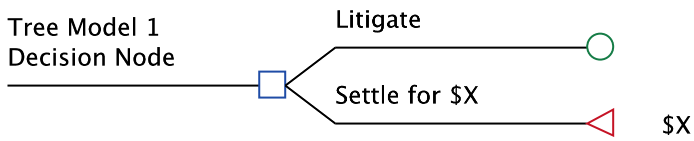
Dan Klein of Klein Dispute Resolution offers an introductory decision tree analysis tool, limited to one probability on the liability question and a three point damages range. Thus it generates only a very basic tree. It is free at his website: www.decisiontree.kleinmediation.com/tree/generator.

As of this date, other software programs I've found that are designed to create decision or risk analysis trees include: Tree Plan, available at Treeplan.com, Precision Tree by Palisades Corporation, and DPL by Syncopation Software. Tree Plan operates as an add-on to Microsoft Excel and is less costly than TreeAge (particularly for the basic package). I make no claims to extensive experience with any of these. However, Palisades often offers instructional programs (at least on-line) for using their software. Information is available at www.palisade.com Syncopation Software's DPL Decision Analysis product appears to be well suited for assessing litigation risk.

Simple visual decision tree presentations can be made with Solutions, offered by SmartDraw at www.smartdraw.com, but it does not perform any calculations.

Other software that is related but not "pure" or classic decision analysis include: "CaseValue Analyzer," developed by Michael Palmer, and "Picture it Settled," developed by Donald Philbin.

I am indebted to Professors Heather Heavin and Michaela Keet at the University of Saskatchewan, College of Law for sharing a pre-publication version of their excellent article: "A Spectrum of Tools to Support Litigation



Chance Node and its Possibility Branches

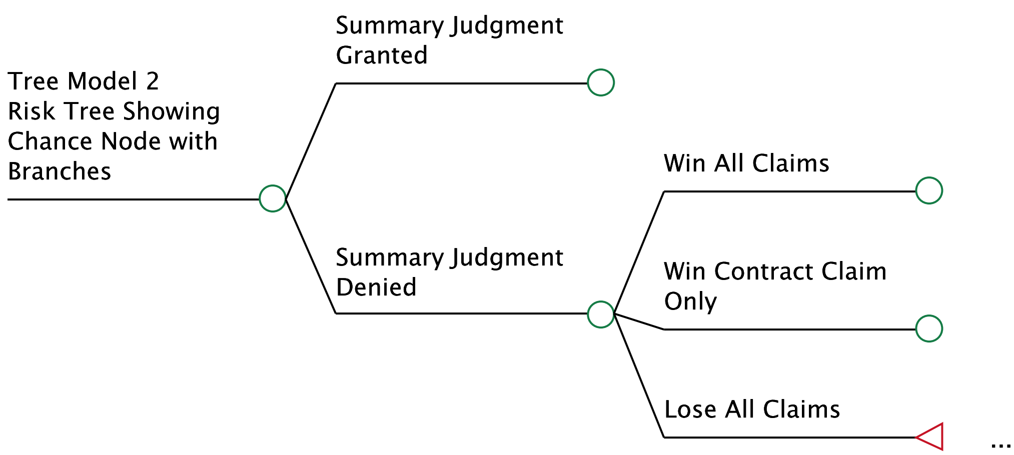
A "chance node," represented by a small circle, as shown above, reflects a point of uncertainty, where we don't control what will happen next. Again, assuming that more than one possible thing could happen from that point, branches would be drawn to the right of the chance node, each representing one possibility. This is demonstrated in the video and shown in the tree that follows soon after in the text.

Video 08: http://dx.doi.org/doi:10.7945/C29D6K

The convention is to label each branch across the top of its line and to place its estimated probability underneath each branch line.

Of course, if there are more than two ways the case could go at this junction, then more than two branches should be included in the cluster.

A computer software-generated version is shown below. Note that this tree and the one that follows are intended to reflect only text discussion thus far. They are not "finished" trees as they stop without going past these two initial sets of chance nodes.

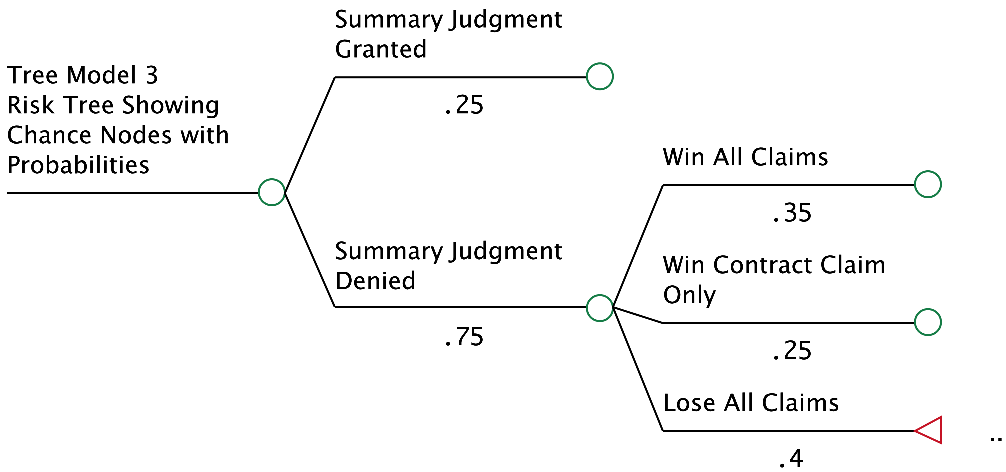


As discussed more fully later, after EACH chance node, the probabilities for each cluster of branches must sum to 100%.[3] If the total is lower, we've missed a possibility; if it's higher, we've overestimated the probabilities for at least one of the possible events.

Risk Assessment: Promise and Limitations," 15 *Canadian Journal of Law and Technology* 265 (2017). Their article discusses many of these software sources, particularly of Michael Palmer's Case Value Analyzer Methodology, and other non-traditional approaches.

Readers are encouraged to contact the author if they know of additional software for decision tree analysis.

[3] This is required by the laws of probabilities for "mutually exclusive and collectively exhaustive sets of events" like those of a specific branch cluster. Clemen, Robert T., *Making Hard Decisions: An Introduction to Decision Analysis*, (1996).



Terminal Nodes for Outcomes or "Payoffs" at the End of Each Path

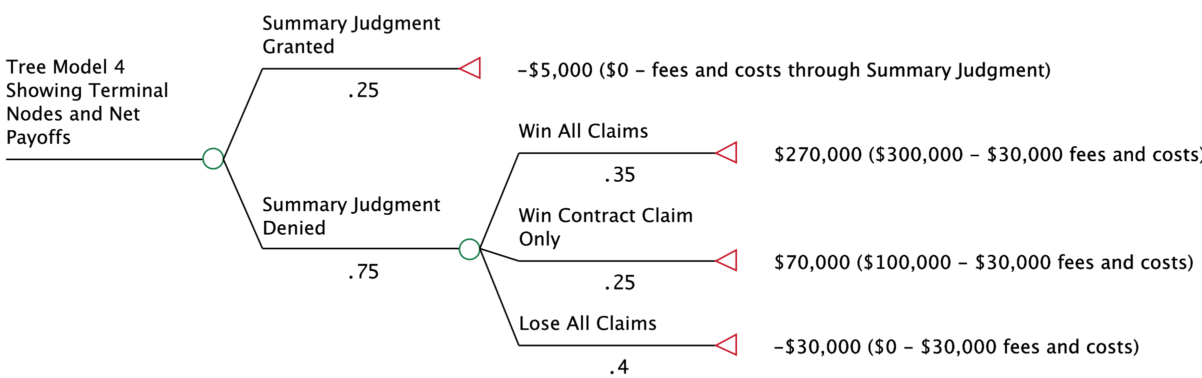
To the far right of the tree, at the end of each branch, there should be a "terminal node," represented by a triangle.

The following rather simple video explains and demonstrates placement of the terminal node.

Video 09: http://dx.doi.org/doi:10.7945/C25M4N

Usually, the "payoff" or net amount that will be lost or gained is written to the right of the terminal node.

The software-generated version follows.



Roll back to Estimated Monetary Value (EMV) a/k/a Discounted Value

To "roll back" the tree is to calculate its discounted value by multiplying each possibility by its probability. As discussed earlier, in the literature of decision analysis, this is commonly referred to as the "Estimated Monetary Value" or "EMV." One way to "roll back" the numbers is to start at the far right of the tree and multiply each pay-off by the probability at that last branch, summing them at each cluster

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Lawyer Marc Victor, whose career has been in writing, training and consulting in decision analysis, further explains: "[T]he uncertainty must be capable of being resolved in at least one of the ways shown on the branches, in no more than one of the ways shown, and in no additional ways beyond those already shown." Victor, Marc B., "Interpreting a Decision Tree Analysis of a Lawsuit" (1998).

of branches, and then moving that sum forward as you multiply it by the likelihood of the next branch, and so on, moving left after performing this operation at each layer of branches. The process moves from right to left.

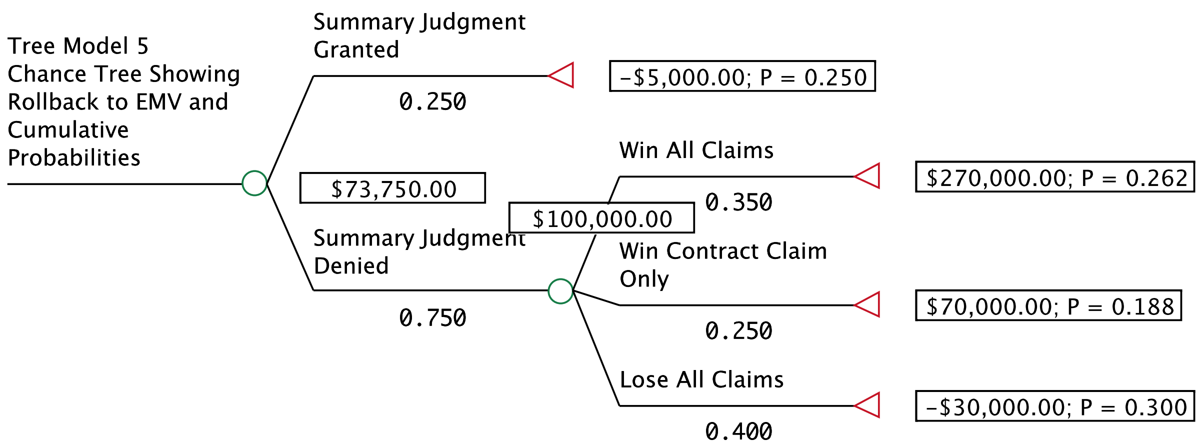
The calculation can also be done at the right hand margin, by multiplying the probabilities from left to right along each path to obtain its cumulative probability, then multiplying each cumulative probability by the damages estimate at the end of the path, and then adding them up. Admittedly, this operation seems like the hard part. It will be unpacked, explained, and demonstrated quite thoroughly in the pages that follow.

The next video demonstrates how you might draw this tree and then "roll it back" by doing the math on the tree's form. Readers are encouraged to give it a try before watching.

Video 10: http://dx.doi.org/doi:10.7945/C21X2R

As explained above, the EMV or discounted value is the number yielded by the roll back operation. It is simply the weighted average of all of the possible outcomes, if the case were tried many, many (say 100) times.

The next tree is what the software generated image would look like, after the roll back.



It's worth knowing and understanding the meaning of the $100,000 contained in the box on the left side of the branch cluster that comes after "Summary Judgment Denied." That $100,000 represents the sum of each possible outcome at the branch cluster to the right, multiplied by its probability. In other words, it is the result of:

- Multiplying the $270,000 "net outcome" or "pay-off" at the top terminal node by its 35% probability, which = $94,500;
- Multiplying the next terminal node net outcome of $70,000 by its 25% probability, which = $17,500;
- Multiplying the last terminal node net outcome of -$30,000 by its 30% probability, which = $12,000.

When you add these together, \$94,500 + \$17,500 + -\$12,000, the sum is \$100,000. Thus, the \$100,000 in that box is the EMV just at that branch cluster. Another way of thinking about it is that \$100,000 is the discounted value of the estimated net outcomes (damages or a defense verdict), if and only if you get past summary judgment. If summary judgment uncertainties are eliminated by the judges' denial of the motion, at that point in time, the EMV of the case would be \$100,000.

But right now, where summary judgment has not yet been decided, to get the overall current EMV, you have to account for the possibility of summary judgment. To calculate the current overall EMV, you would:

- Multiply the possible net outcome if summary judgment were granted, \$0 damages but -\$5000 in costs, by its 25% probability, which = -\$1,250; and
- Multiply the \$100,000 (representing the EMV of all branches to the right) by its 75% probability, which = \$75,000.

Add those together and you find that the EMV for the case at this point: \$73,750.

A reasonable and skeptical reader might ask: "Why multiply that \$100,000 by 75%? Didn't the \$100,000 already involve some multiplying? Yes. As we've seen, the \$100,000 was derived by looking at outcomes that might come *after denial* of *summary judgment*, multiplying each outcome by its probability. But remember, it's far from certain that we will get to that point. On this tree, we've decided there's only a 75% chance that will happen, because there's a 25% chance that summary judgment will be granted. Thus, we have to discount the \$100,000 value yet again, to account for its uncertainty—that the case is only 75% likely to get there.

As discussed in the video via link or url below, it's worth noting that each "P" on the far right hand side of the rolled-back tree refers to the cumulative probability of the outcome at the end of each possible path.

Video 11: http://dx.doi.org/doi:10.7945/C2X396

Having established standard terminology, symbols, graphics, and a few rules, it's time to work though some tree building examples, first for games of chance and then for litigation. The good news is that this text will walk through the math and roll back to the EMV many times again, enabling all readers to become entirely comfortable applying the method.

Encouragement for the Tentative

Those who remember encounters with word problems in elementary school math may also remember the awkward hesitation when first translating from verbal to symbol—math and graphics. Even when we understood the math operations, we might read a word problem, and have a moment or two of "oh gosh, how am I going to do that?!" before our brains could "see" how the words would translate to numbers and symbols. I hereby admit that, at the beginning, when tasked with constructing a decision tree for a case I could easily describe in words, it would suddenly feel like a great time to clean my office. And after that, I might start scribbling numbers on a pad, and then scratch out numbers that seemed in the wrong places or didn't fit together. Only after this bit of avoidance and pen-scratching would I tackle building the branches of the tree—the tree structure.

The truth is, with practice comes comfort and efficiency with word problems and decision trees. Now, I can build trees without much scribbling. It's all about practice. Hence, we move next to practicing with the tree format.

Playing Games On Trees

Before you start, an acknowledgment: the problems in Card Games #1 and #2 on the next few pages are quite similar to the problems used earlier to introduce the idea of cumulative probability and discounted value or EMV. The text asks the reader to try using a tree format to depict the decision or risk problem, and then provides suggested "answer" trees. These exercises are intended to familiarize the reader with where various components are placed and calculations shown in the "answer" trees. You will also see that, as the text moves through each of the Card Game problems, it begins to discuss issues of cost, timing, and risk tolerance. Those impatient with games may prefer to review the Card Game trees quickly, read the brief discussion of risk tolerance, avoidance, and emotion that follows, and then start the exercises that build trees for litigated case problems.

Card Game #1

Imagine that you have the opportunity to play a game of chance. To play, you must buy a deck of 100 cards that contains two card colors. Contained in the deck will be 50 blue cards and 50 red cards. Wearing a blindfold, you will pull a card from the deck. If you draw a blue card, you will win $100. If you draw a red card, you will win nothing.

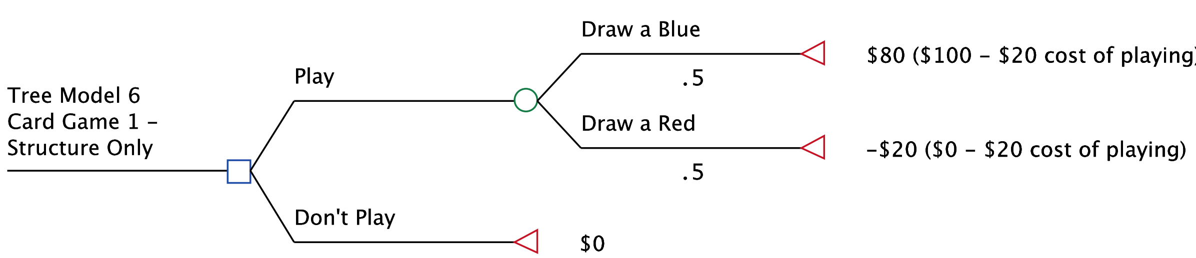
Assume that the deck of cards costs $20.

You must decide whether to buy the deck or not. If you do buy the deck, then you will play.

The reader is invited to try to draw the tree and to roll it back. Of course, you are welcome to watch the next video, which demonstrates how to build the tree structure.

Video 12: http://dx.doi.org/doi:10.7945/C2SD79

Here's the neater, software-generated version.

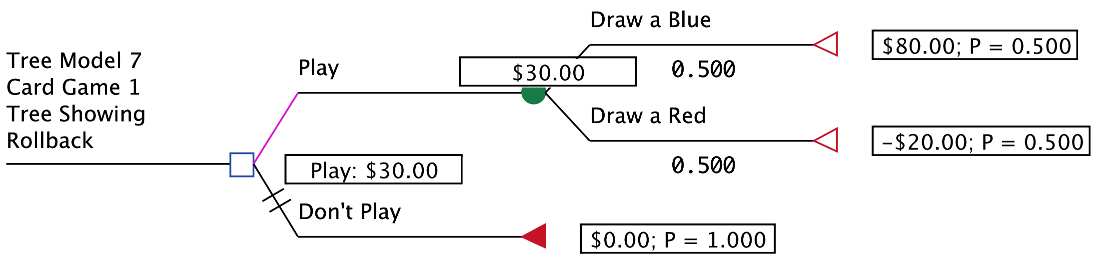


Now, here's a video that begins with the same tree and demonstrates how to go about the roll back calculations. For those who wish to skip the video, the text below it contains the explanation.

Video 13: http://dx.doi.org/doi:10.7945/C2NM40

Note that to roll back the tree, you start to the right of the terminal nodes, at the far right side. The numbers at the far right—used in the roll back calculations—must reflect the *net* payoffs. Thus, it's important to subtract the $20 cost of the deck from the payoffs earned in the game: $100 or $0. This makes the net payoffs at the two branches $80 and -$20. Multiply $80 x .5 (50% of the cards are blue) to get $40. Multiply -$20 x .5 (50% of the cards are red) to get -$10. Add the two together and the total is $30. That's the EMV of this very simple one-step tree.

Here's how the computer generated roll back would look.



Remember, we haven't bought a deck for $20 yet. So, the question is whether it's better to do nothing—don't play at all and pay $0—or play the game with an EMV of $30 (after deducting the $20 deck cost from each payoff.)

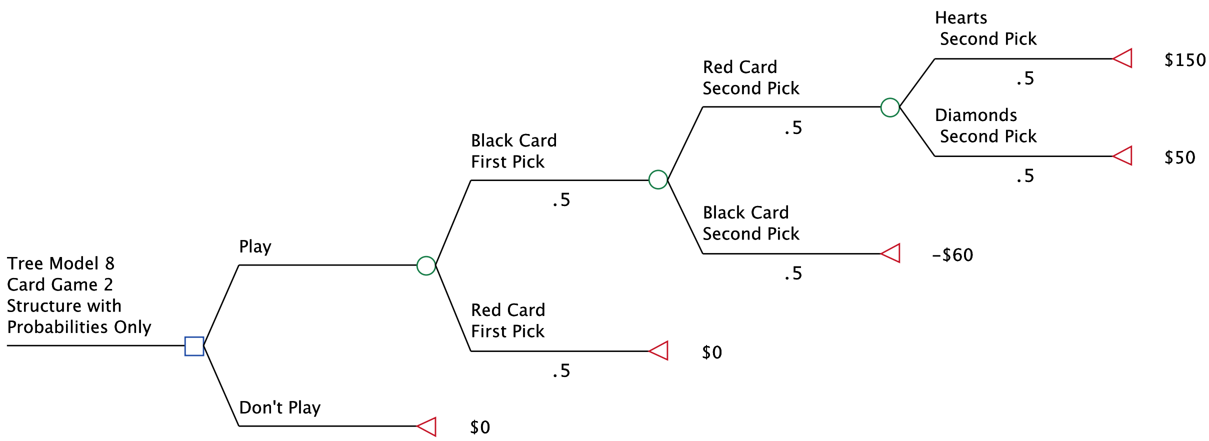
Card Game #2

Now, imagine that a strolling magician with a standard deck of 52 cards wanders by. He assures you that it's a "regular deck" with half black suit cards and half red suit cards. Assume for now that it costs nothing to play the game. The rules are that he will hold the cards face down.

- If you draw a black suited card on your first try, and any red suited card on your second try, you will win at least $50.
- However, if the red suited card you draw on the second try happens to be a red heart (instead of a red diamond), your winnings will be $150.
- If you draw a red card on the FIRST round, you will lose nothing and gain nothing. However, you cannot go on to a next round. Game over.
- But if you draw a black card on the second round, you will lose $60. (Note, whenever you draw a card, you show it to the magician but then put it back into the deck, so the odds don't change.)

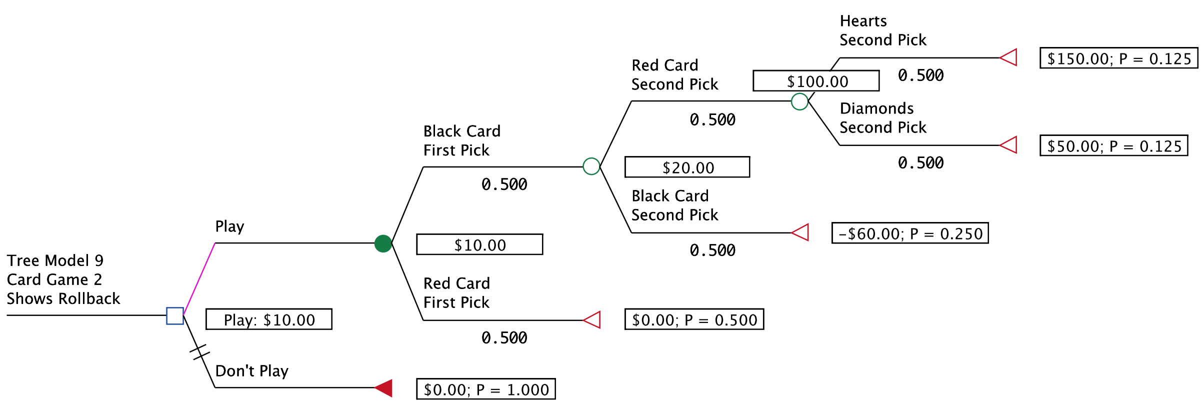
Before you draw the tree, just take a second to recognize that it's not so easy to picture the flow or do the roll back math in your head.

Here's how the tree would look.



Video 14: http://dx.doi.org/doi:10.7945/C2HX3G

The next video reviews how the roll back would be done, and that's of course followed by a neater, software generated version.



Video 15: http://dx.doi.org/doi:10.7945/C2D40G

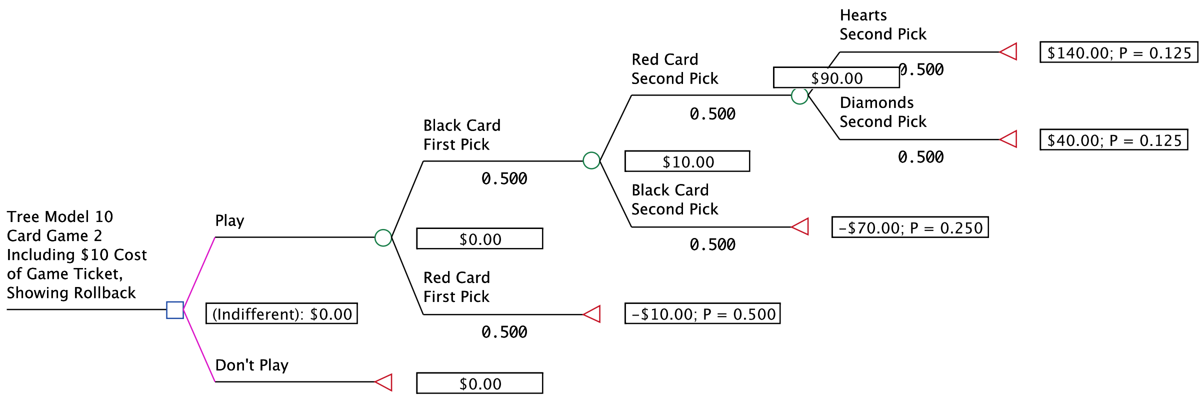
The EMV is only $10. Maybe it would be worth playing if I wouldn't feel too bad about a possible $60 loss. What are the chances of losing that $60? The answer is 25%, reached by multiplying the probabilities along the black-suit-first-round and black-suit-second-round path of the tree: .5 x .5 = .25 (25%).

What are the chances of winning $150? To find that out, follow the path of possibilities and probabilities, from black-suit-first-round (.5), to red-suit-second round (.5), to the chance that it's a red heart instead of a diamond (.5). So the overall probability of winning $150 is 12.5% (.5 x .5 x .5 = .125).

What if the magician will require you to pay $10 just to play the game?

Here's the way you would construct and calculate the tree with after subtracting the $10 cost from the payoffs.

Video 16: http://dx.doi.org/doi:10.7945/C28D81



Here the EMV is down to ZERO!

Card Game #3

This game varies the cost of playing. This time, assume you have already paid an admission fee of $10 just to enter the booth and then you meet the magician before he sets up the card game. Now the rules are:

- There is no additional cost for playing a first round.
- If you draw a red diamond card in the first round, you will win $50 and you will be eligible to play a second round without additional payment. (It is your decision whether to play or not at this point.) In the second round, if you again draw a red diamond card, you will win an additional $500 (added to the $50 won in the first round). If you draw any other red card (presumably a heart), you will win an additional $250 (added to the $50 won in the first round).
- If, after that red diamond draw in the first round (winning $50), you decide to play again, and then draw a black suit card in the second round, you will lose $50. So, your yield will be a total of $0.
- If you draw a red heart card in the first round, you have to pay $20 in order to play a second round. If you draw a red heart again, you will win $100. If you draw a red diamond in that second round, you will lose $50.
- If you draw a black suit card in the first round, you win nothing. You may decide to play a second round, but that will cost an additional $100.
- If you drew a black suit card in the first round and then again in the second round, you will win $60.
- If you drew a black suit card in the first round and then a red suit card in the second round, you will win $1,000.
- You should assume a regular deck, with ¼ cards that are diamonds, ¼ hearts, ¼ spades, and ¼ clubs. And remember that we replace each card after drawing it, so the odds stay the same.

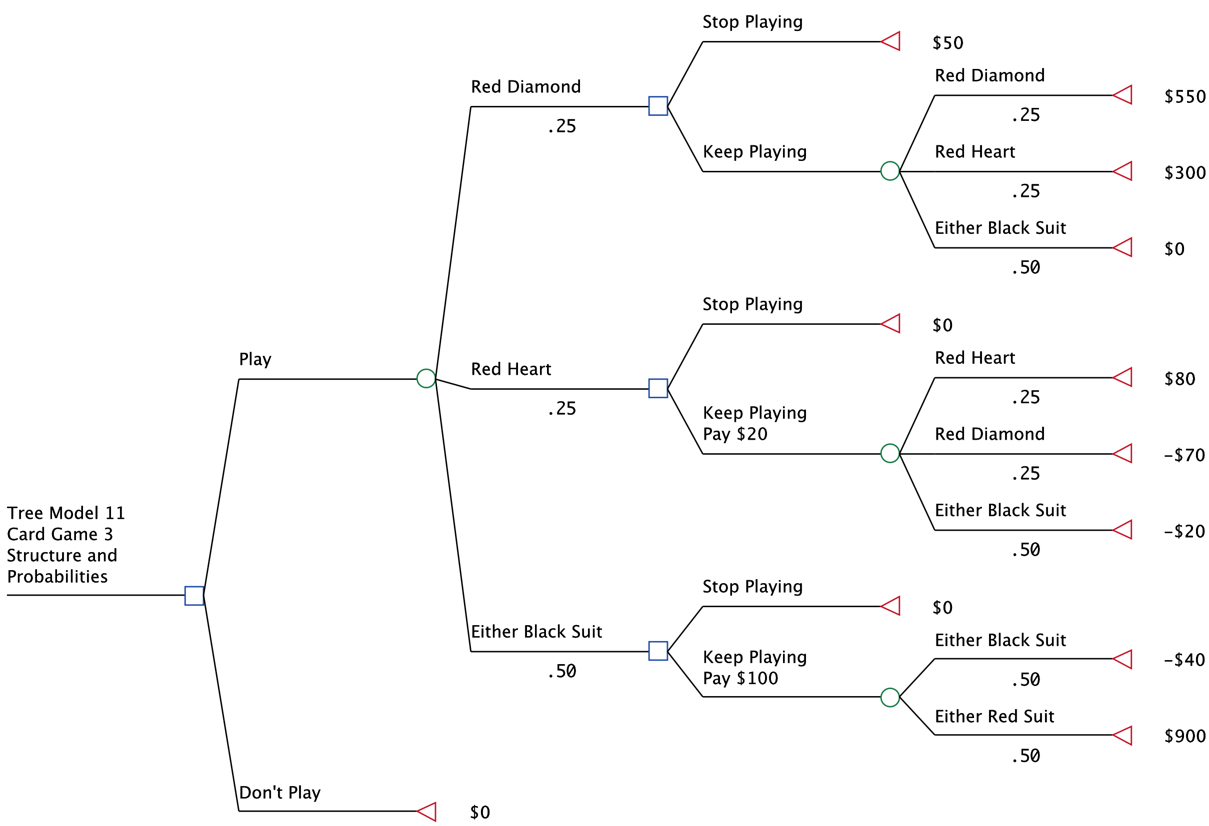
What would your tree look like? How about the roll back?

Before you build this tree, the author acknowledges that this sounds complicated. But if you build the tree methodically, it will be less difficult than it seems. The good news is that if you can do this one, you've made real progress.

The video below demonstrates how to structure the tree, before the roll back.

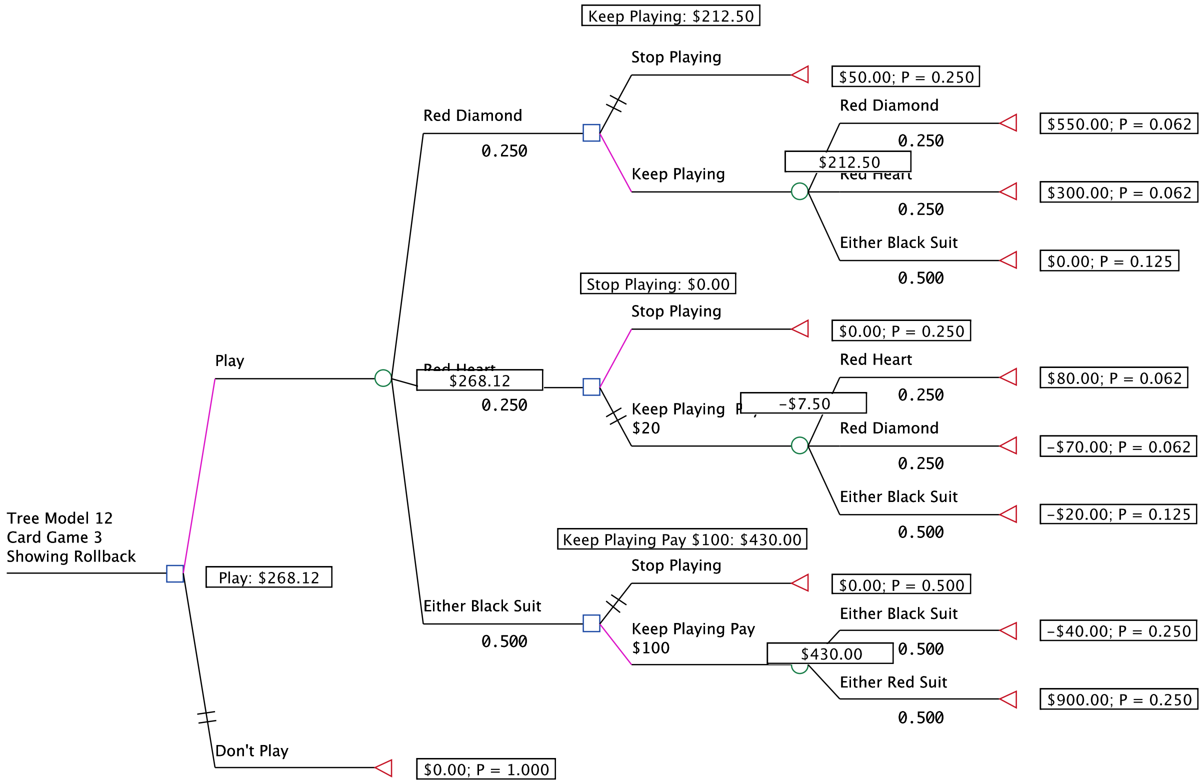
Video 17: http:.//dx.doi.org/doi:10.7945/C24M63

And here's what it would look like, generated on the computer.



The next video works through a hand drawn and calculated roll back operation and its results. As usual, the neater software version follows.

Video 18: http://dx.doi.org/doi:10.7945/C20X2F



Note the two lines // intersecting some of the post-decision node branches on this tree. These are the software's way of communicating its recommendation not to choose that branch path. It assumes the recommendation will be followed and uses only probabilities along the other paths to calculate the EMV.

One question this may raise is: what about that original $10 paid to enter the magician's booth? Should it be added to the tree as a net cost? The answer is no! Remember, unlike the previous game in which we were deciding whether or not to pay and play, here the expenditure has already been made. It's a sunk cost. The only cost that should be subtracted from the pay-off is one we have not yet paid, but will incur along the way.

Card Game #4

Finally, the last game before practice problems on legal cases.

This time, imagine that same regular deck of cards. There will only be one round of play—one chance to draw from the deck. You may decide to play or not, but you do not have to pay to play.

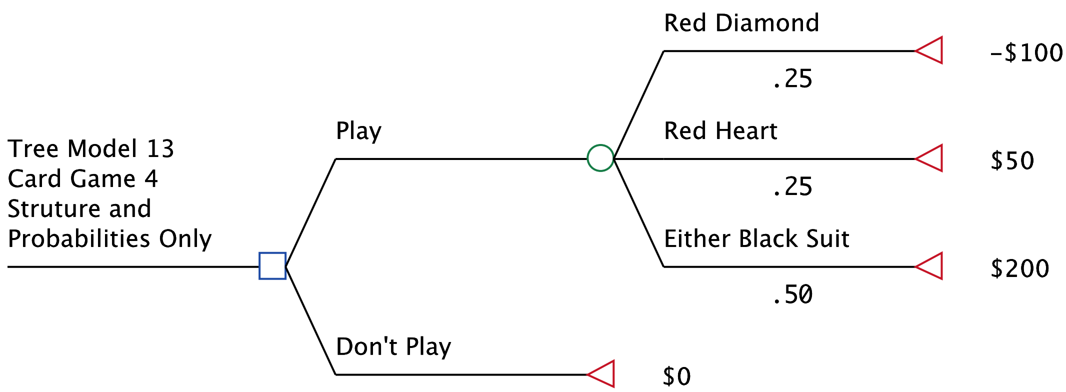
- If you draw a red diamond, you will lose $100.
- If you draw a red heart, you will win $50.
- If you draw a black spade, you will win $200.
- If you draw a black club, you will win $200.

What would the tree look like?

The next two videos and printed trees demonstrate different ways you might go about building the tree.

Video 19: http://dx.doi.org/doi:10.7945/C2W416

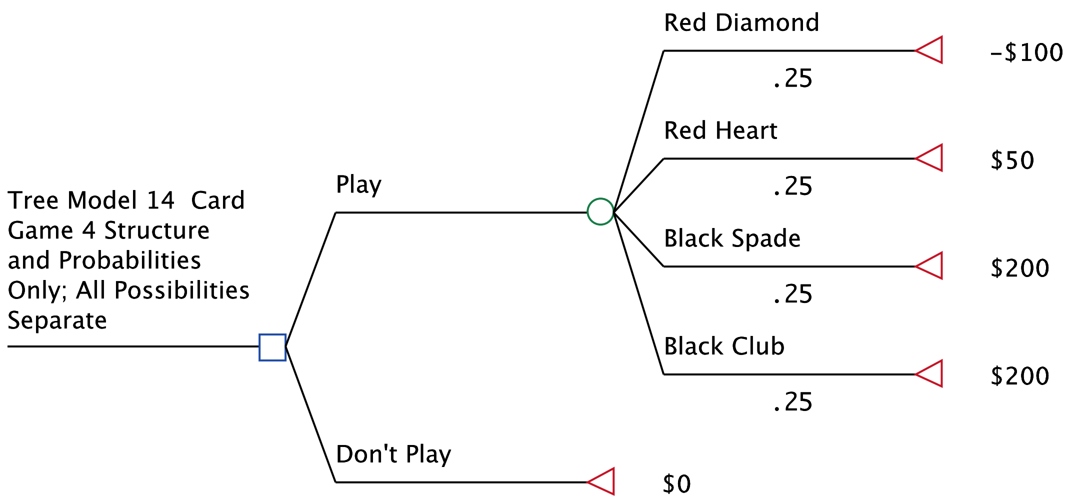
The printed version is shown below.



You could also have done it as shown in this second video.

Video 20: http://dx.doi.org/doi:10.7945/C2RD70

Now, here's the printed version of the tree.

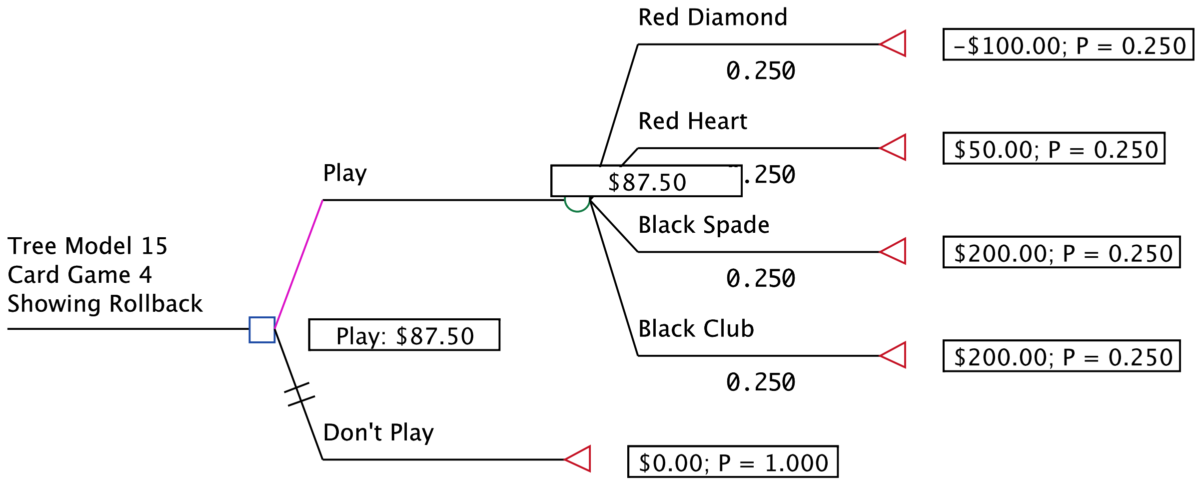


The next video demonstrates how you would roll it back to the EMV, on both trees.

Video 21: http://dx.doi.org/doi:10.7945/C2MQ3B

Note that the roll back results to the EMV are exactly the same as are the cumulative probabilities for each dollar amount. Either way is correct.

Here's the software-generated version showing the roll back operation.



When is it okay or even better practice to collapse branches for a combined probability? T he answer is: when everything (costs, payouts and probabilities) AFTER that point would have been the same along each branch. Collapsing the branches (and combining their probabilities) creates a less cluttered tree. That's less important when we're playing card games, but more so when mapping the inevitable complexity of a real case.

Abstractions of Risk Tolerance, Avoidance, and Emotion are Real

Before we leave the realm of the abstract, it's worth considering how we might play differently or feel differently about playing, if the possible gains and losses were much larger. What if you could win or lose tens of thousands or hundreds of thousands, or more? And what if you could play each game hundreds of times and average the results?

Everyone's general, personal tolerance for risk is different. While most of us prefer certain gains over risky options, our break points differ. If presented with the opportunity to toss a coin or pick a card for the chance to win $10,000, I might be very happy to take $2,500 instead. Others might hold out for an offer of $4,000 or $5,000 or more.

Leaving aside personality driven attitudes toward risk, circumstances will affect our responses. Today, even I might be willing to risk a $500 loss for say, a $3,500 gain (the price of a modest vacation). If I lose $500, I won't be happy but I'll still eat. My response might have been different in student days. On the other hand, a decision between two alternatives where there is only an upside (win much or nothing) feels very different from a decision between two alternatives where you may win but also risk losses—an obligation to pay. Finally, our decisions would no doubt be different if we were to play a game many, many times and take the average (as an insurer might) versus one time only.[4]

[4] A brief additional discussion of working with risk aversion or risk tolerance can be found in Chapter Eight. More extensive discussion of risk preferences and risk tolerance and how these may be graphed and factored into decision analysis for an individual can be found in various books included in the reference and bibliography section, including (at least): Clemen, Robert T., *Making Hard Decisions: An Introduction to Decision Analysis* (1996); Raiffa, Howard, *Decision Analysis: Introductory Lectures on Choices Under Uncertainty* (1968); Raiffa,

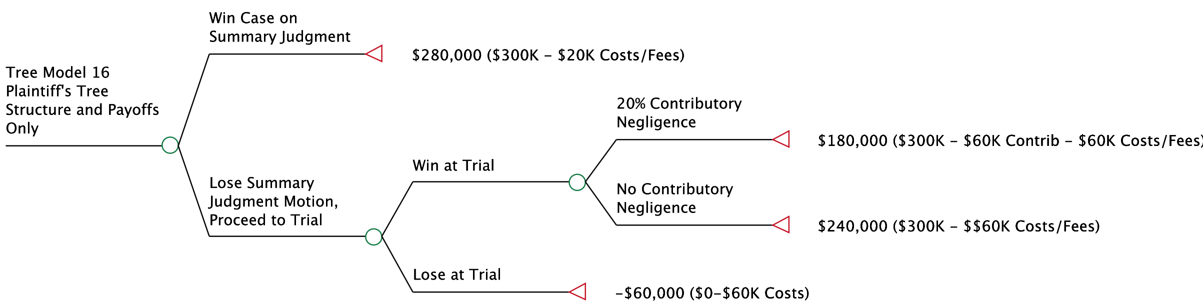
Moving to Real Fake Cases

Imagine that you are plaintiff's counsel (in an hourly fee case), and you have explained the future litigation path to the client. The client then summarizes:

> Okay, *here's how I understand what might happen: If I win and get summary judgment in our favor, I will collect $300,000 in damages but I will pay $20,000 in attorneys' fees between now and then. If I lose on summary judgment but prevail on liability, I will pay an additional $40,000 in attorneys' fees through trial but will collect $300,000 in damages. If there is contributory negligence I will receive only $240,000 assuming 20% contributory negligence. However, if the defendant is bankrupt it will be a long time be*fore *I see a dime.*

Try to draw what the structure of the tree might look like, WITHOUT percentages, before peeking at the tree below:

Video 22: http://dx.doi.org/doi:10.7945/C2GX1D



Next the client asks, "Well, what are the chances of all of this?" You respond:

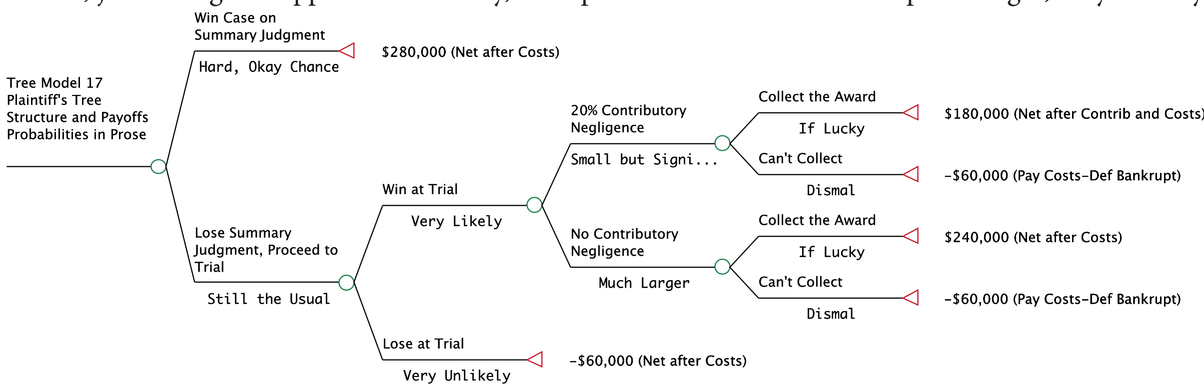
> *Well generally, it's hard for a plaintiff to get summary judgment. Still, we have an okay chance, making it worthwhile to file because so much of the discovery evidence was uncontested. I do think you are very likely to win on liability, but I am concerned about some small but significant chance of a contributory negligence finding. And based on what I see of their balance sheet, the defendant's chances of staying afloat financially are pretty dismal.*

Here's what the tree would look like with the probabilities written in prose, first demonstrated and explained in the video and then shown with a printed tree.

Howard; Richardson, John; and Metcalfe, David. *Negotiation Analysis: The Science and Art of Collaborative Decision Making* (2007); and Hammond, Keeney, and Raiffa, Howard, *Smart Choices: A Practical Guide to Making Better Life Decisions* (1999).

Video 23: http://dx.doi.org/doi:10.7945/C2C68W

In fact, just seeing it mapped out this way, with prose instead of numerical percentages, may be very



helpful to some clients.

But to do anything more with the tree, it's necessary to supply percentages for two reasons:

1) You can't roll back the tree, or even see the cumulative probabilities for each outcome without percentages along the way.
2) The prose will very, very often mean different things to different people. To you, "very likely" may mean 65%, but to your client, it may mean 85% or more. "Small but significant" may mean 25% to you, and 10% to your client, and so on. (Chapter Ten includes a more detailed discussion of this point.)

Percentages' Protection against Under or Over Inclusive Possibilities

As stated earlier, in order for decision tree analysis to have any claim to validity, the probabilities of the branches in each branch cluster following a chance node must sum to 100%, not more and not less. That's a hard rule, dictated by the rules of probability that are the foundation for a decision analytic approach.

After all, a chance node represents a significant juncture of uncertainty. When a future event is marked by a chance node, it means we know something will happen here, but we don't control it. Even as we seek impact, we still lack the power to determine what will happen. Thus, a chance node is followed by branches that represent POSSIBILITIES—the possible twists a case might take, the way a judge might rule on key evidence, the jury's decision to award punitive damages or not, etc. If probabilities assigned to these branches are lower than 100%, it means that we have underweighted or missed a possible branch; if the probabilities add up to more than 100%, then we have over weighted at least one branch and/or added a branch that should not be there. The branches must be mutually exclusive; their possibilities cannot overlap.

Consider the following example: could it be that, at noon today, there is a 40% chance of all sun, a 40% of complete cloudiness, and a 60% chance of mixed clouds and sun? That can't be right: these probabilities total 140%. For decision analysis (whether to bring sunglasses), we would have to ask the weatherman for separate probabilities of sun only, clouds only, and a cloud-sun combination that add up to 100% (assuming a 0% chance of precipitation).

Taking this into a personal injury suit, we can't have a 60% chance of a negligence finding, a 40% chance of a causation finding, and a 40% chance of a no liability finding. Negligence and causation are not mutually exclusive. But both are necessary. Thus, if there's really only a 40% chance that the jury will find causation, then there must be a 60% chance of no causation.[5] Moreover, if there's only an independent 60% chance of establishing negligence (for example, by failure to meet a defined standard of care), and a 60% chance of establishing causation—both are in doubt and both essential elements of a liability finding—then the total probability of liability is only 36%. [.6 x .6 =.36]

In my view, this mathematical rule of a 100% sum for each cluster of branches, combined with a careful deliberative process for estimating probabilities are strong reasons to eschew mere adjectives about likelihood and insist on percentages instead. Why?

First, when writing in prose and imagining what might happen next, it is easy to miss a possibility. Counsel might observe that summary judgment could be won or lost, but fail to notice a theory by which the judge could grant the motion in part. When sketching out a decision tree, the best practice is to ask: are these all the branches? Do they add up? Could there be another possibility? Have we missed something? Somehow, the act of drawing and seeing those branches arrayed on the page focuses our attention on what we might have missed.

Secondly, the method's requirement to use numerical probabilities tends to generate reflective dialogue, with oneself, a colleague, or the client. Saying "quite a strong chance" is easy. Saying "65%" suggests more care. And, it tends to inspire more care. When asking himself what he really thinks the percentage chances are of getting past summary judgment, the lawyer ruminates over the theories and arguments: "What have I missed? Why am I having trouble with percentages of summary judgment or not. Maybe it's not that simple. Let me look at their brief again...ahhh, I suppose it's possible possibile that the judge will take just that one argument seriously and grant partial summary judgment!" Through this process, otherwise neglected issues rise to the surface for thoughtful consideration.

Robust Structure With A Simple Approach

All that's required to build an entirely robust tree for a legal case is curiosity, patience, familiarity with the basics, and someone with thorough knowledge of the case (not necessarily the tree builder). Really, even the most complex tree can be constructed based upon the responses to a series of simple questions:

- What will happen next?
- What will happen after that?
- Is that the only possibility?
- What if that first possibility is the one that happens, then what?
- If you go to trial and liability is found, what are the likely damages?
- What will happen with a stingy jury, a reasonable jury, and a generous jury?

Even though the plaintiff and the defense may estimate different probabilities and damage numbers, the structure of the tree is usually about the same on both sides.

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[5] See the section titled "Avoid a Natural Mistake of the Methodical", later in the chapter, for a word of caution regarding deconstructing separate legal elements of a claim or defense. It is important to structure a tree and estimated probabilities to be as consistent as possible with the way we anticipate a jury would approach its decision.

Below are a few simplified hypothetical legal case examples to practice drawing and rolling back a tree.

Simple Hypothetical—Plaintiff's Perspective

The parties will soon commence settlement negotiations in a simple case. Assume:

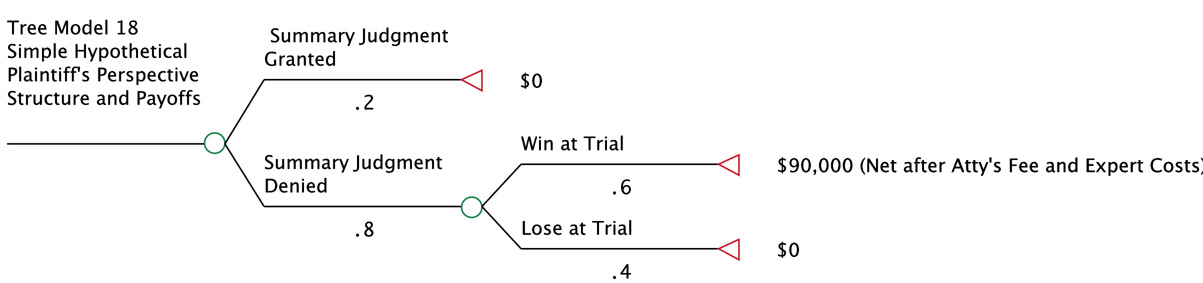
- If no settlement is reached, defense will move for summary judgment. Plaintiff has an 80% chance of defeating the summary judgment motion.
- Plaintiff has a 60% chance of winning at trial.
- If the plaintiff wins at trial, the damages award will clearly be $150,000.
- The plaintiff has a 1/3 contingency fee agreement. Expert fees are deducted AFTER deduction of the attorney's fee.
- Expert fees of $10,000 will be incurred after summary judgment motions through trial.
- If there is no recovery, the attorney knows he will not enforce the plaintiff's obligation to reimburse expert's fees (Assume the plaintiff has minimal surplus disposable income or savings).

Try to draw the tree and insert the probabilities and NET payoffs given. Then perform the roll back calculation to arrive at an EMV from the plaintiff's perspective.

The next video explains and demonstrates how to draw the structure, and is followed by the printed tree.

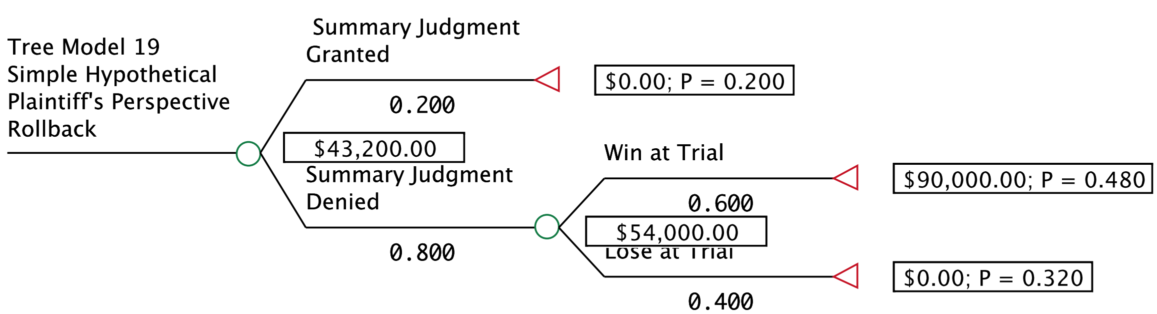
Video 24: http://dx.doi.org/doi:10.7945/C27D6Z

Now, here's roll back operation on the tree, first as a video and then in printed form.



Video 25: http://dx.doi.org/doi:10.7945/C23Q42

As shown, because the plaintiff will have to pay the expert's fee and the attorney's fee (1/3) from the award, they should both be subtracted. The "Simple Hypothetical" states that the lawyer will not seek to



collect the expert's fee (which was advanced) if there is a defense verdict. So, it would only be deducted in the event of a plaintiff's verdict.

Simple Hypothetical—Defendant's Perspective

The parties will soon commence settlement negotiations in a simple case. Assume:

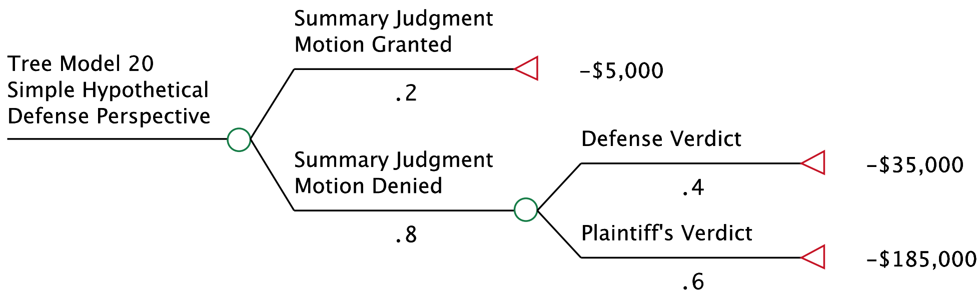
- Absent a settlement, defense will move for summary judgment. You estimate an 80% chance of plaintiff's defeating the summary judgment.
- You estimate that the plaintiff has a 60% chance of winning at trial (which means your client would have a 40% chance of no liability finding).
- If the plaintiff wins at trial, the damages award will clearly be $150,000.
- Significant discovery has been completed and $15,000 in fees have already been billed and paid.
- Defense fees from this moment through the summary judgment motion are estimated at $5,000.
- Defense fees *after* arguments on the summary judgment motion, through trial preparation and trial, are estimated to be $20,000.
- Expert fees of $10,000 will be incurred through trial (but after summary judgment motions).

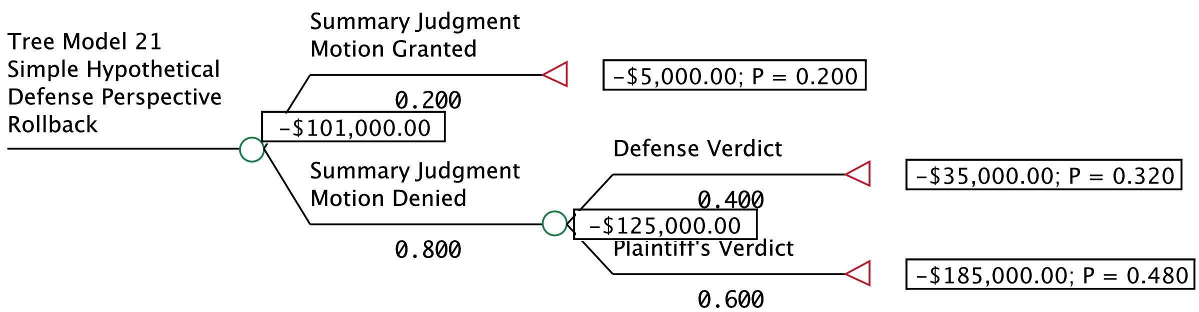
Try to draw the tree and insert the probabilities and NET payoffs given. Then perform the roll back calculation to arrive at an EMV from the defendant's perspective.

A suggested tree structure and then the roll back are demonstrated and explained in the next two videos.

Video 26: http://dx.doi.org/doi:10.7945/C2ZX1R

Video 27: http://dx.doi.org/doi:10.7945/C2V70J





Note: the trees above keep past costs out and future cost in! ONLY fees and costs to be expended or received from the then current moment forward should be added to or subtracted from any anticipated award to arrive at the payout figure used for calculation. In other words, sunk costs—past expenditures on attorneys' fees—should NOT be included in the end payouts, even as negative numbers or losses. The same is true for attorney's fees already incurred, even if they haven't yet been invoiced or paid. They are still an obligation incurred before the tree's construction and any current decision. *The decision tree looks FORWARD in time, and asks what would be a good decision now, based on what will or might happen and its potential costs and benefits.*

Often, this is particularly important when working with the defense side (or any client who has already incurred attorney's and expert's fees). Psychologically or emotionally, they want to "count" these: they don't want to consider settling for any amount that doesn't seem to justify their expenditures. This psychological/emotional component is strong, real, and normal. But it doesn't change the logic (and good sense) that sunk costs should have no part in current decisions. In fact, explaining to a business client that this method "won't allow" past expenditures can be helpful. You are just following the rules of the method. And you can always write down the past expenditures somewhere on the page—just don't enter them onto the tree.

Closer to Reality

Try drawing and calculating a tree for this somewhat more realistic case problem below about an injury to a gymnast, titled "Balanced Trees on Balance Beams."

Balanced Trees on Balance Beams

You represent the defendant, American Steel Company, in a case involving the collapse of a civic center during a gymnastics competition. The plaintiff, Robin Lancer,[6] was a 12-year-old gymnast performing a balance beam routine at the time of the collapse. She suffered multiple injuries and was hospitalized for three days following the incident. She also suffered the emotional trauma of the event, particularly from watching her best friend (another talented gymnast) die as a section of the roof crashed upon her. Robin's lasting injury initially appeared to be to her wrist. Her primary care physician diagnosed carpal tunnel syndrome and Robin underwent surgery for the condition. Unfortunately, the surgery led to only marginal improvement. Based upon further expert review of Robin's medical records and the condition of her wrist, one expert has stated that he believes she suffered a disc injury in her back, which is causing weakness in her wrist and arm. The expert report discussing this analysis was provided to Robin and her counsel just days prior to the mediation. Robin plans additional tests regarding her medical condition, but all parties decided to go ahead with the mediation process. If the disc is determined to be causing or contributing to Robin's symptoms, she may or may not decide to have disc surgery, depending upon the precise diagnosis and physician's recommendations.

Robin sued American Steel Company under a strict liability theory—that its steel bars failed, causing the accident. American Steel Company brought in the concrete supplier, Acme Concrete, alleging that faulty mixing and an inappropriate installation of the concrete caused the accident—that there was

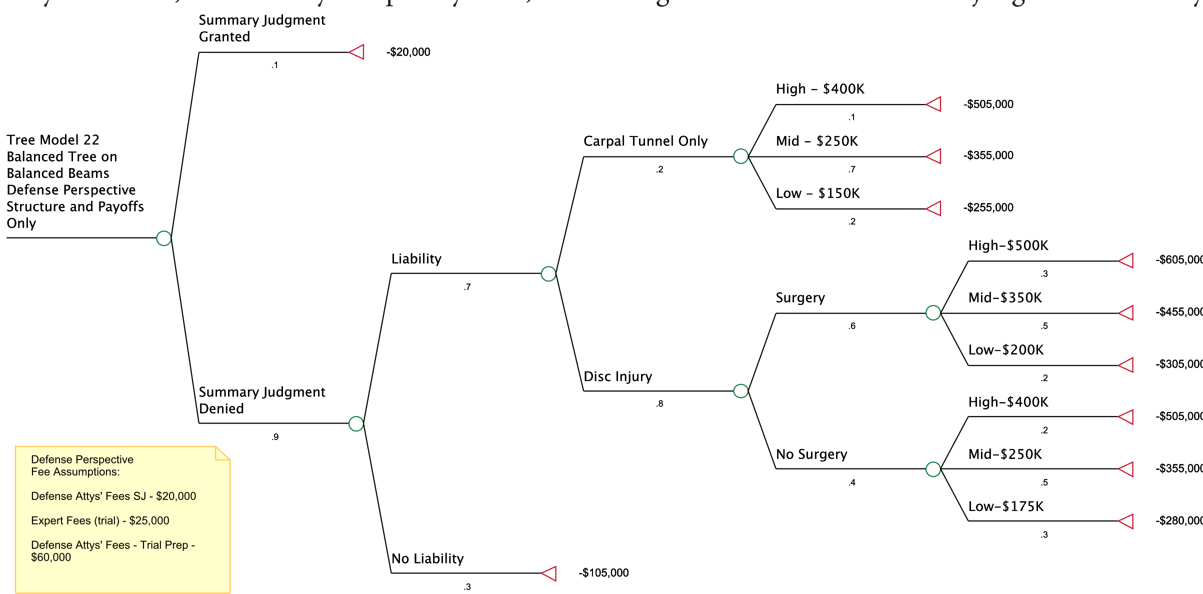
[6] Fact pattern derived from: Perry, Janet, G., "Counseling and Negotiation—The Settlement of Lancer v. American Steel," *Professional Responsibility for Lawyers, A Guided Course* (1991).

nothing wrong with the steel reinforcing bars. Acme Concrete is insolvent, and filed for bankruptcy protection prior to this litigation.

First, draw the neutral tree—get the structure. Then, supply some wildly hypothetical numbers that sound right to you. Do the calculations: roll back the tree to an EMV before taking a look at the author's version below.

Video 28: http://dx.doi.org/doi:10.7945/C2QD7P

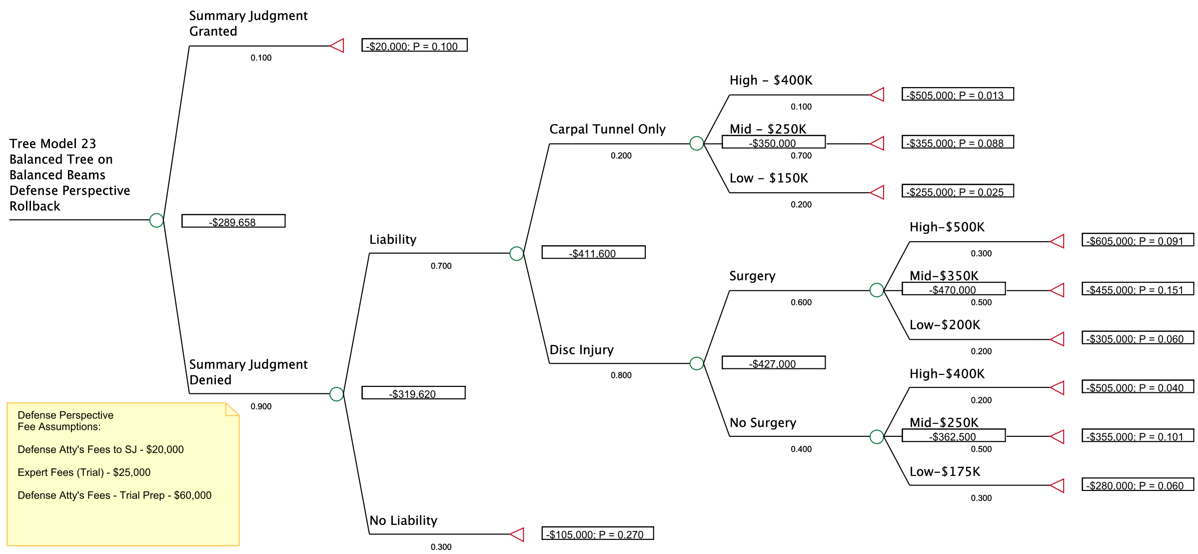
As you can see, if there's any complexity at all, structuring the decision tree involves judgment. You may



have created a different tree structure that is also a worthy map of the case, maybe better.

Focusing on the tree shown here, you can see that it boils the liability question down to whether (and the probability that) the defendant will avoid liability entirely. Because the other defendant is bankrupt, if this defendant is liable for 1%, he's on the hook for all of it. Building the parts of the tree structure related to jury findings and damages questions involves judgment calls too. As you can see, it branches in two directions where different factual findings will lead to very different damages calculations. So, if the plaintiff is found "just" to have carpal tunnel syndrome and not a back injury, some of the damages components would be very different (surgery vs. no surgery). These are legitimate possibilities (reflected as branches) to consider and discuss when structuring the tree. The version shown is just one cut at the problem. In a real case, the attorney's analysis—whatever it is—would direct the structure of the tree and the damages numbers. And that would of course be discussed with the client.

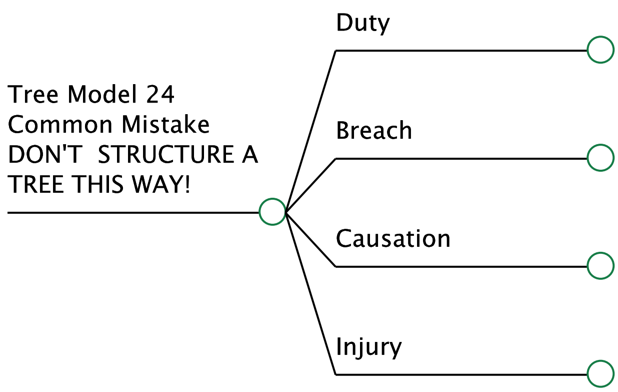
Here's how it would roll back to an EMV as well as the cumulative probabilities of each outcome. Given the number of calculations, it makes sense to move at this point in the text to the neater, computer-generated version below. The roll back operation and calculations are done in exactly the same way as shown in earlier hand-drawn examples on video.



Avoid a Natural Mistake of the Methodical

One mistake many novice lawyer tree-builders make when constructing their first tree is to automatically start the tree by drawing separate branches for each requisite element of a legal claim. After all, we're trying to think carefully and methodically about legal doctrine. Our law school professor would ask us to recite the necessary legal elements.

Usually, these appear as a stacked set of branches. For example, in a personal injury claim, the plaintiff must demonstrate: duty, breach of duty, causation, and injury. So, the novice might instinctively begin by sketching out:



There are (at least) two problems with this approach. First, none of the individual branches lead you anywhere. Assume that duty will be established—then what? Then you also have to establish breach of that duty, then causation, then injury.

On a decision tree, each branch has to lead you to a next step, a next question. Even though they are the four prongs of a test for liability, that doesn't necessarily make them four legitimate branches on a tree.

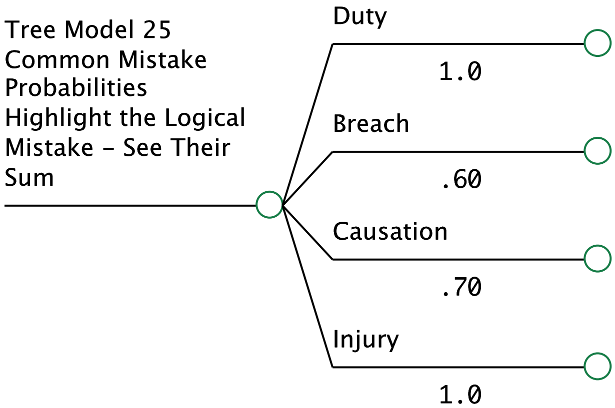
Just as important, the branches and paths following a chance node must be mutually *exclusive*. Clearly, these are not. Indeed the opposite is true. We need all of them to succeed.

The fact that they are not mutually exclusive will become clear when you try to assign probabilities. If none of the prongs are in doubt—each will be assigned probabilities of 1.0 or 100%—making the total 400%. That can't be right.

More realistically, some of the elements will be quite certain—undisputed—and others not.[7] For example, consider a case in which a customer slipped and fell on carrot juice in a grocery store aisle. Assume it has been acknowledged that the store owes a duty to its customers. However, breach of that duty is very much in doubt: the store claims it had no notice of the spill, or the condition of the floor was perfectly fine. Let's assume further that causation is questioned, as the defense alleges that the plaintiff's injuries were entirely pre-existing, or that the reason she fell was her preposterously precarious shoes, not the floor. Her injuries and medical expenses are not in doubt.

Here's what you would see if you tried to assign probabilities to the branches, reflecting the fact that the duty and the injury were clear, but there's some uncertainty regarding breach of that duty (estimated 60% likely) and causation (estimated 70% likely).

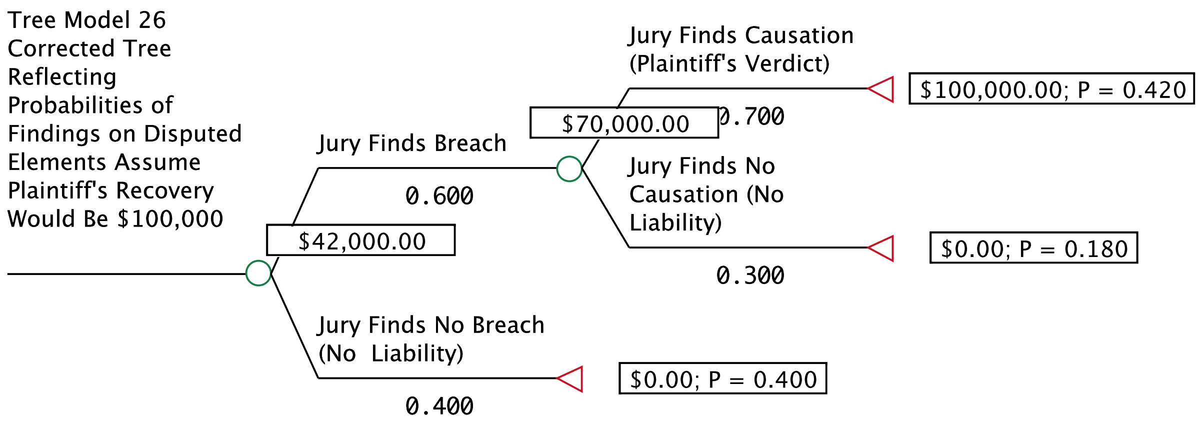
Tree Model 25
Common Mistake
Probabilities
Highlight the Logical
Mistake - See Their
Sum



These add up to considerably more than 100%! Even if you include branches for only those elements in doubt—breach and causation—they do not (and need not logically) add up to 100% because they are not mutually exclusive.

As a technical matter, the required elements of a legal claim could be introduced as sets of branches that, together, address the liability question. Let's assume that summary judgment is not a concern (hasn't been raised or has been decided for the plaintiff). One could construct a tree using the contested elements of negligence as follows next.

[7] See the discussion in Heavin, Heather and Keet, Michaela, "Litigation Risk Analysis: Using Rigorous Projections to Encourage and Inform Settlement," *Journal of Arbitration and Mediation* (forthcoming): 15, suggesting that "allowing *de minimis* concerns to tip towards 100% prediction means that the lawyer can focus the risk assessment on true areas of uncertainty in the case."



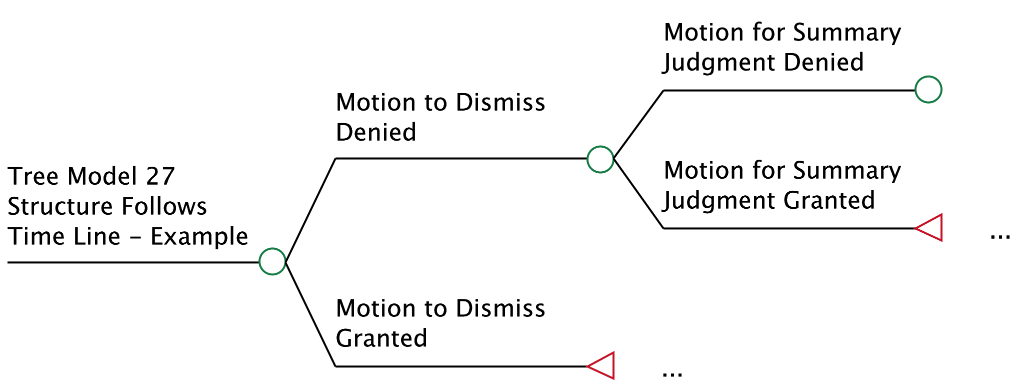
In this case, since you need breach of duty AND causation, the cumulative probability of liability would be only 42% (.6 x .7).

The question is: does that sound right? If the tree-builder lawyer REALLY thinks a jury will look at these questions entirely separately, and the same jury that finds breach of duty is still no more than 70% likely to find causation, then the 42% would be the overall likelihood of liability. Not pleasant for the plaintiff or her lawyer to hear, but the mathematical result of cumulative probability, appropriately applied.

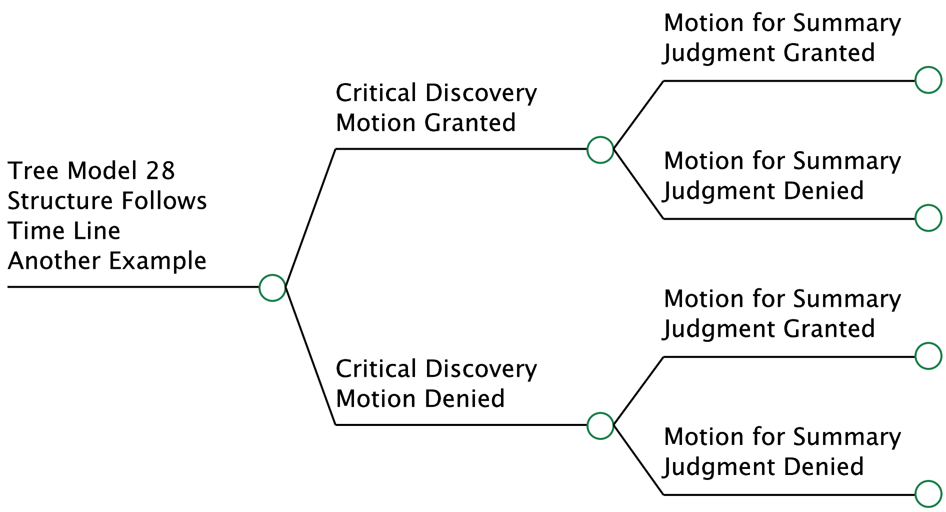
On the other hand, plaintiff's lawyer may be right to argue that this is a distortion because the jury will not view elements separately but will more holistically decide whether the defendant grocery store is liable. Or, he may argue that, even if the jury works through each element of the claim, as instructed, the jury that finds breach of duty, is far more likely to also find causation than "just any" jury. In other words, the jury that finds breach of duty may be 90% likely to *also* find causation—putting the cumulative probability of liability at 54% (60% x 90%).

The Natural and Optimal Order of Things

A not-always-obvious choice for the tree builder is how to order sets of branches on the tree. Following basic junctures within the case timeline is natural, easy, and good practice. So, if motions to dismiss will be filed before motions for summary judgment, branches mapping possibilities for the motion to dismiss would naturally come before, or to the left of motions for summary judgment.



The same would be true for specific critical uncertainties in discovery (if you choose to put these on the main tree). These would unfold earlier in time than any ruling on a summary judgment motion. Indeed, they would likely impact the strength of the motion, or perhaps the chance that one will be filed.



Though "earlier in time" is a helpful criterion for ordering the various sets of branches, it is often not operative. We don't know the order in which a judge or jury will consider the evidence and theories in a case. Indeed, "jury deliberation" has a black box quality. Unless the jurors are asked to consider and answer particular, directed questions, it's hard to say how they actually sift through what they have seen and heard.

Timing aside, it's important to consider two additional criteria for deciding whether a set of branches —really a set of grouped possibilities—should come earlier or later, meaning further to the left or next to the right, along the paths of the tree.

The first criteria of what possibility will *influence* what comes next. For example, in a wrongful death case, the judge's decision on a preliminary motion to disallow bifurcation of the liability and damages phases of a trial would impact the evidence admitted, and the likelihood of liability finding. Similarly, in a business case, the results of a motion to exclude certain parole evidence may influence the likelihood that the jury will find liability, find fraud, and award high damages within a range. After all, that is why the defense would move to exclude this evidence—because of its impact on the jury's decision making. Thus, in either case, the motion would come before, or to the left of branches assessing likelihood of liability.

The same could be said when building a tree in an early phase of litigation, when you don't yet know what the results of experts' analysis will be, let alone how strong or weak (subject to legitimate attack) their conclusions will be. Depending on the case particulars, the strength or weakness of the expert may affect the chance of liability, the chance of the jury's embracing a particular theory, the likely damages range, or all three. Thus, the set of branches outlining the possible results of the experts' analysis would appropriately be placed to the *left* of liability findings and damages.

Of course, it's also true that the motion to bifurcate, the evidentiary motion, and the experts' results will all have come earlier in time in these cases than jury deliberations on liability. When deciding to order among those three, the question is which sets of possibilities will influence the others.

A related but not quite identical criterion for placement is whether one set of branches of tree branches should affect the tree builder's *predictions* about branches that will come after it. In other words, the different branch paths don't directly impact the jury's or the judge's decision, but they do suggest different assessments of probabilities and damages by the tree builder. For example, in a case involving theories of fraud and breach of contract, if a jury were to find fraud, then the tree builder would be wise to think there's a high likelihood that they disliked the corporate defendant and want to punish him. In a personal injury case, if the jury finds contributory negligence, the tree builder might more heavily weight the possibility that they will not land at the high end of a possible damages range (even before contributory negligence proportions are subtracted).[8]

Thus, the order of the sets of branches might be thought of as seeking to map out alternative logical/emotional flow or narratives the jury might adopt. "If, then" becomes the operative question. If this happens—if it turns out that the jury thinks this way—then would that affect my predictions of what else that same jury might think and decide to do? That ordering of "if then" provides wisdom as to the order of your branch sets.[9]

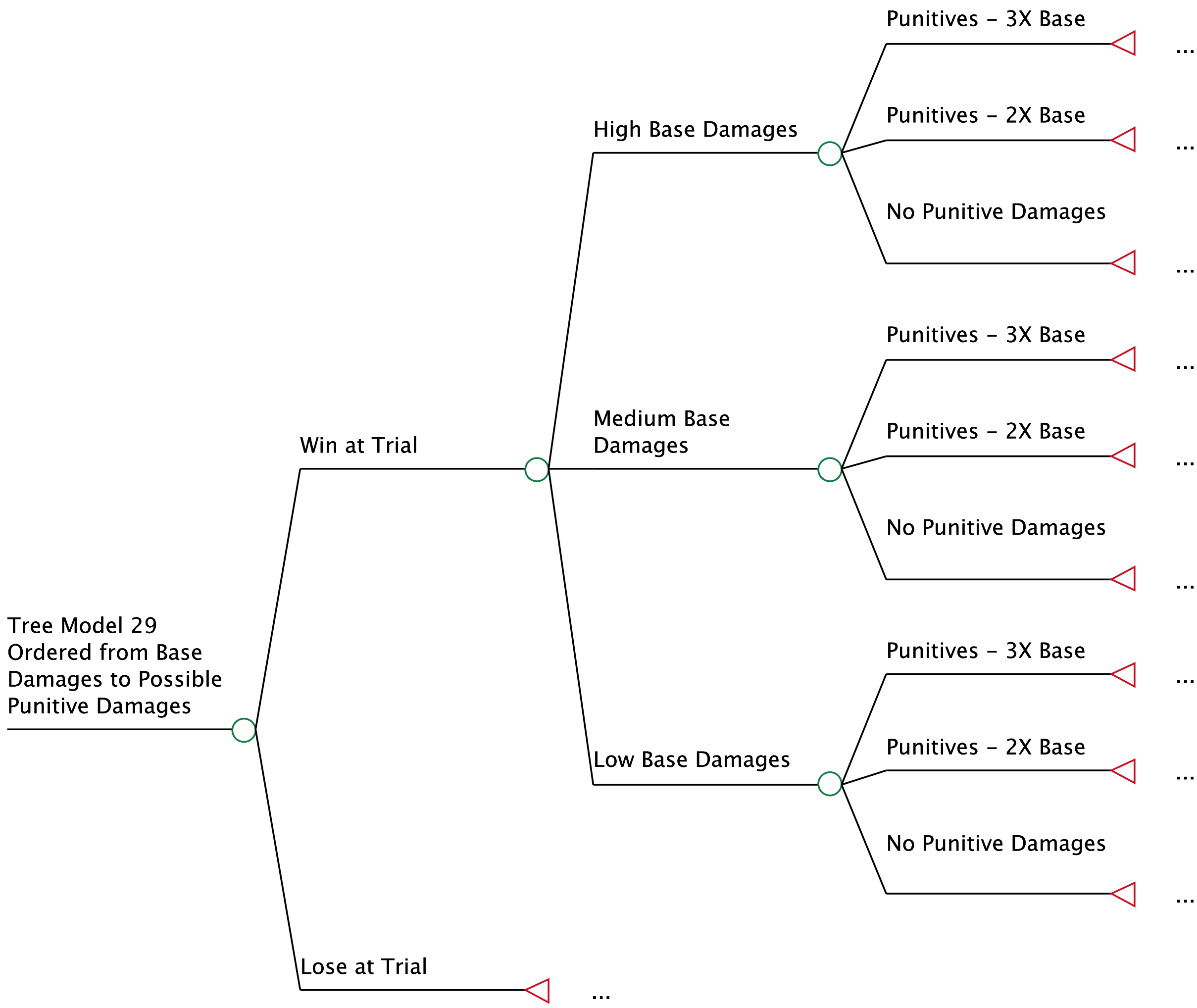
A Question of Clarity

Sometimes, there is no foreseeable causal or predictive relationship between various possibilities. Assume a question about whether the jury will award emotional distress damages (and how much), or a question about whether the jury will award punitive damages at all and, if so, how much, at 2X or 3X the base (according to statute). Assume further that it's just about impossible to figure out how the two relate to one another. A jury awarding multiple damages might be more stingy on emotional distress, from a sense that some amount is too much. Or, it might be that punitive damages suggest jury anger and the angry jury will also be happy to award high emotional distress. We have no idea. In what order should these be placed on the tree? I suggest using whatever order will be more clear and less unwieldy.

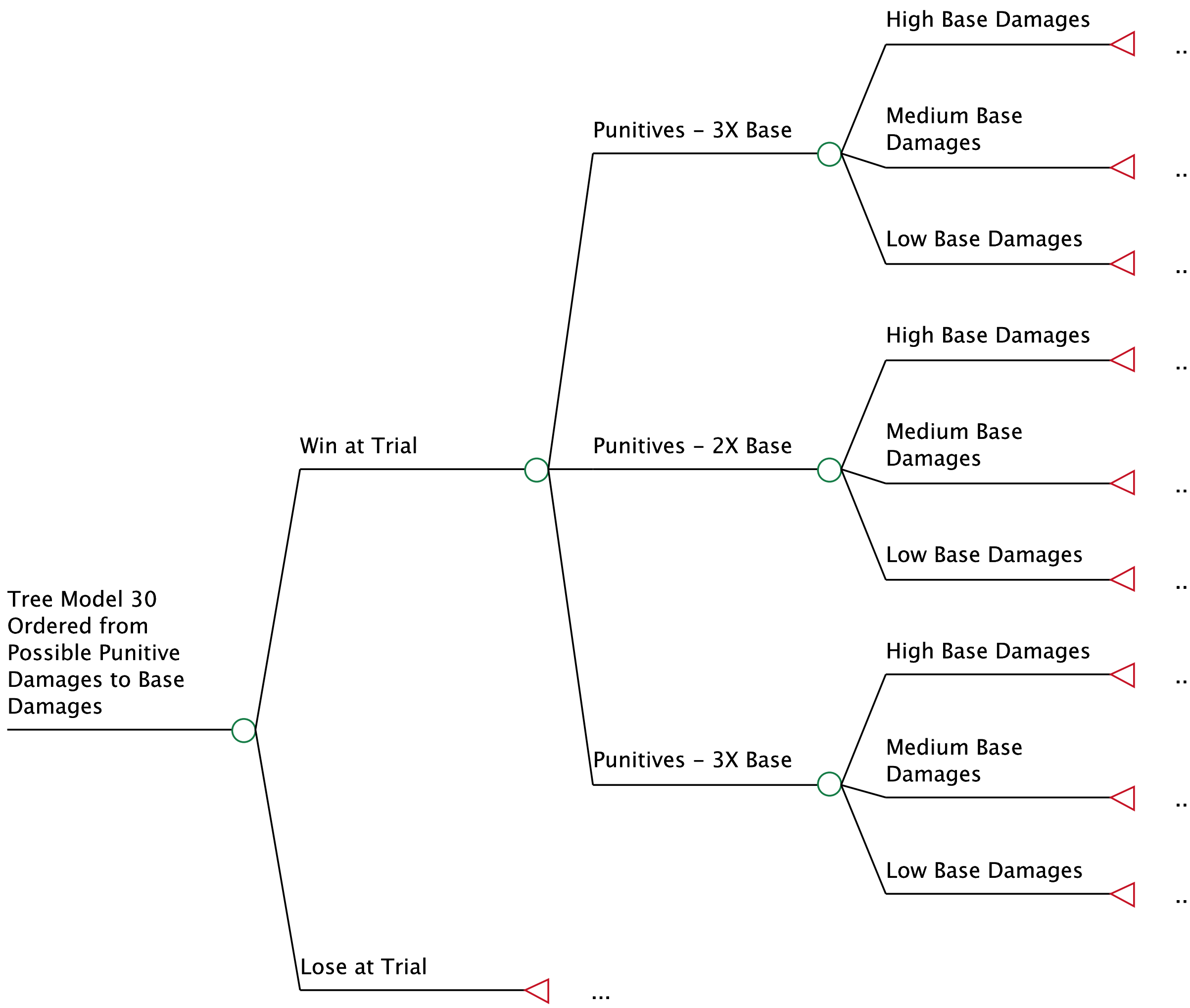
Consider a tree that shows possible high, medium, and low base damages, and then different levels of punitive damages: $0 or punitive damages at two or three times a base amount.

[8] See discussion of linked events, information, or decision-maker's findings that may impact subsequent probabilities or predictions in Chapter 11.

[9] Imagine a case in which, after all evidence has been submitted, the defense makes a motion to dismiss a fraud claim on legal grounds. If even the somewhat conservative judge rejects the motion, that might inspire the defense to reassess the likelihood of the jury finding fraud. (Yes, if the judge dismisses it, there's a 0% chance of fraud damages.) Assume that in a vacuum and before the ruling, the defense had considered the fraud claim extremely weak. The judge's ruling, and perhaps his comments, might be a source of feedback that should inspire defense counsel to reassess.



Next is a tree for the same case, with the branch clusters sequenced differently.



I might suggest opting for the second of these two trees as it more clearly shows where the end numbers come from: we see the high, medium and low base and then their multiplication where punitive damages are assessed. In other words, it may flow better with the lawyer's narrative explanation to his client. This is a close call. Perhaps our "right answer" is to use the presentation order that flows with the narrative, highlights issues being discussed, and enables the client to easily see where those end numbers come from.

Final Words on the How To's and When

If you've worked through all of the problems and absorbed the advice on tree structure in this text thus far, you're no longer a novice. You've got the basics. As you have seen, decision tree analysis requires us to deconstruct possible twists in various possible litigation paths, and how those twists impact what might come next. A more complex case takes time and will have more layers of branches, but the method and the logic are the same. And it's important for your tree to map your best sense of how the case might unfold. Uncertainties should not be ignored, inflated, or disingenuously placed. The tree is to be measured against what sound, experienced, and nuanced legal analysis would tell us in prose form.

Before we leap from basic method to practice, it's fair to address the question of when a lawyer can or should begin sketching out a tree for a case. The answer is that there's no time like the present, once the basic shapes of the case have come into focus. However, just as one's prose description of a case and its challenges and uncertainties shift over time, so should the tree. Unexpected twists in discovery may give rise to unanticipated motions. An expert deposition may legitimately lead to a change in your prediction of damages, or of the chances that damages will fall in a high or low range.

I intended this project to teach the basics for competent use of this method in legal practice, and also to move beyond basics toward its sophisticated application in more complex cases. In fulfillment of the latter goal, the pages that follow offer suggestions for best practices, highlight common errors and distortions to avoid, discuss some more subtle, technical judgments, and provide advice on using the method for communicating with clients.