**Introducing Decision Tree Analysis in**

**Law School or Lawyers’ Classrooms:**

**An Instructors’ Guide[[1]](#footnote-1)**

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Within what I more publicly call the “Client Science Course,” called the “Client Counseling” at the University of Cincinnati College of Law, I include an introductory module on using decision tree analysis for client communication (and also the lawyer’s legal analysis). One of the course’s “Five Client Counseling Challenges” is referred to as “Wisdom in the Face of Inevitable Uncertainty.” The course offers up decision tree analysis a tool for a lawyer and a client dealing with and communicating about uncertainty, and thus a way to meet that challenge.

Largely drawn from an Instructor’s Guide written for that course, this document describes the way I teach its introductory decision tree analysis module.

**Introducing the Topic**

Because I’m a bit of a stickler regarding terminology, I generally begin by explaining that many people use the terms “Decision Analysis,” “Decision Tree Analysis,” “Litigation Risk Analysis,” and “Risk Analysis” interchangeably. There are some distinctions: Decision analysis is technically broader, encompassing a variety of ways to deconstruct and analyze the benefits and costs of making a decision. The word “tree” refers to the use of a visual tree structure (with branches and sub branches running laterally across the page). Risk analysis, referred to as litigation risk analysis when limited to the litigation context, focuses more narrowly on assessing the probabilities, costs and consequences of possible twists and turns in the litigation path that will affect range of possible litigation outcomes, such as jury awards, judicial decisions and awards, or appellate court decisions and awards.

In the context of lawyer-client counseling, Decision Tree Risk Analysis is ONE method for clearly, rigorously, and “collaboratively” thinking through uncertainty—particularly risk—consequences, and their impact. I do use and teach the method using a graphical tree structure (and not just a spreadsheet or influence diagram).**[[2]](#footnote-2)**

If you are unfamiliar with the method, and you’d like to have step-by-step grounding in the theory and the method, I am hereby shamelessly plugging my recent book on the topic. The first half of the text really walks you through the basics, in much the same way I teach it in the course, but with deeper and careful explanation of the reasoning and logic. The electronic version includes video inserts reflecting what I put on a black board or white board when teaching the material. The second half of the book discusses more subtle and advanced use of decision trees for more complex cases.

On the other hand, if such things come easily to you, and a quick overview is fine, it may be enough to read some of the excellent articles posted on this website.

In my view, the *visual* aspect of the decision tree is important for client counseling. The value of using this method is two-fold:

* It forces more careful, thorough, deliberate thinking and discussion of what might happen – the possibilities, the likelihood - probabilities, and the consequences – outcomes and costs. For example, WITHOUT using this method, when an attorney orally tells a client he or she has a “pretty good case,” what in the world does that mean – to the lawyer or to the client?
* It facilitates clear and thorough communication and may reduce negative emotional impact, on the client or, at least, on the lawyer-client relationship. When the attorney walks the client through a decision analysis in his case, it provides a constructive and shared logic and a framework for client decision-making.

Before taking up teaching and your students learning the basic method, I suggest clearing any tension in the room upfront by asking how many students HATED math; how many loved it; and how many, in fact, have some sort of math-intensive technical background or talent. I reassure the math phobic that EVERYONE will be able to learn this—it’s arithmetic, not calculus. Still, for them, “the mathy part” may seem like an intimidating foreign language. I ask them not to be intimidated and reassure them that NO question is silly, and if anyone is still unsure how to use this method in a simple case by the time this unit is done, I’ll be happy to review it. I’ll also acknowledge to the more math-inclined that part of the presentation may seem too simple or obvious. Ask them to bear with and perhaps help the rest of us. Note that we also will work on the skill and strategy involved in communicating with the client using decision analysis.

To my great surprise, I have found that the vast majority of students see the value of this method and its usefulness. (Lawyers’ groups are more likely to push back on it.) Within the context of a course focused in lawyer client communications, law students experience it as a welcome change from the “touchy feely”; they are comfortable with using its logic and reason.[[3]](#footnote-3)

I often note up front that if you ask attorneys whether they use “decision analysis,” some will say “sure, all the time.” But if you press them, you’ll find they understand it to mean just thinking in rough terms about whether the case is risky and roughly what they think might happen, before pulling a settlement recommendation out of their hats.But MOST of these lawyers do not use the decision tree analysis or risk analysis in a correctly structured, methodical, and thorough way. And, I would argue that, used too roughly—not properly—can lead to significant distortion of results and unfortunate decisions.That’s another reason I am committed to teaching this material: I want our students to do it RIGHT!

You’ll see that the powerpoints (also available on the website) [Let’s make this a live link] for introducing the method are light-hearted and consistent with what’s written here. Just as in the book, I start with the comic strip about the lottery ticket, and ask if it’s true that the odds of winning the lottery are indeed 50/50. The answer, of course, is no. But does it matter? Not really, only a dollar is at stake. Plus, one could argue that the pleasure derived from anticipating a possible win—those lovely daydreams of what we would do with millions of dollar—have a utility value worth more than the dollar’s investment. The uncertainty is the fun. Being a party to litigation is akin to having a lottery ticket. However, I have yet to hear of a client who derived only pleasure from the process and the wait. Of course, the defense’s lottery is generally negative; the question is whether his ticket will yield losses and how much.

I developed a somewhat longer version of the poem [Make live link] on the powerpoints for a presentation years ago and people seem to enjoy it. In class, I use it the shorter version a segue to ease the worries of the math phobic.

The powerpoints for this segment are intended to be reasonably self-explanatory, enabling an instructor to more or less walk through, encouraging questions and comments, of course. After introducing the very basics, I do use a class handout. [Make live link] I prompt the students to do the exercises/problems contained in the powerpoints on scratch paper, and then follow the “answer” on each page of the handout.

## 4 Basic Steps to Structuring a Decision Tree

First, I emphasize that there are four basic steps to structuring a decision three. These involve very simple, common, and intuitive logic. As reflected in the powerpoints, they are:

1. Define the decision: What’s the problem? What are the choices?
2. Identify the possibilities: What might happen if I decide on one course of action or another?
3. Judge the likelihood: What are the chances the possibilities will come to pass?
4. Figure the net gains or costs: What will the net effect be if it works out this way or that way?

To illustrate the four basic steps, and how common they are to all sorts of decisions we make, I show the four steps in parallel for three types of decision contexts:

### 1. Define the Decision

* First, in a home mortgage decision, should the buyer attain a variable or fixed rate mortgage?
* Second, in a vacation decision, should the vacationer go to Cape Cod or the Berkshires?
* Finally, in a legal case, should the client continue to litigate or settle for the money currently on the table?

### 2. Identify the Possibilities

* Home mortgage decision: If we choose a variable mortgage rate, our payments could go up, down, or remain the same. Additionally, we need to consider the amount they could go up or down.
* Vacation Decision: It might rain. It might be cool. It might be sunny and warm.
* Client decision: I might win or lose on summary judgment. There might be a finding of significant negligence, contributory negligence, or no negligence. Additionally, the defendant could pay the judgment awarded or could file for Chapter 11 Bankruptcy.

### 3. Judge the Likelihood

* Home mortgage decision: With the economy the way it has been, I think it is unlikely the rates will go down by more than a point or two, but they could go up by a great deal.
* Vacation decision: I have never picked a week of good weather. I am convinced it is likely to be cool and/or rainy some or much of the time.
* Client decision: Summary judgment is unlikely due to a factual issue. Liability is very likely, but significant contributory negligence is not. There’s an even chance of bankrupting them by then.

### 4. Figure Net Gains and Costs

* Home mortgage decision: If the rate goes up by 2 points, the net additional cost over 30 years will be $30,000 (can discount to present value).
* Vacation decision: Dollar costs of the two vacations are the same. But if it rains on Cape Cod, there is nothing to do but eat and go to outlet stores. I will be miserable. If it rains and I am in the Berkshires, I can go to concerts, plays, and museums. I will be happy.
* Client Decision: If I win on summary judgment, I will collect $250,000 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 $40,000 in attorneys’ fees through trial but will collect $250,000. If there is contributory negligence I will receive only $200,000 with 20% contributory negligence. However, if the defendant is bankrupt it will be a long time before I see a dime.

*Handout the packet with the front page titled “Anatomy of a Decision Tree” if you have not yet done so.*

## Anatomy of a Decision Tree

Walk the students though the pictures of components of a decision tree and their conventional labels. (The powerpoints are helpful here.) Make sure the students understand that each “chance node” or branch cluster must have a sum of 100% or the Expected Value will be skewed and misleading. In real terms, if a cluster did not equal 100%, it would mean that we failed to consider a possible outcome, or we gave too much weight to a possible outcome.

Rollback is the operation that involves multiplying each outcome by the likelihood that it will happen, and then adding those numbers together, and multiplying the sum by its likelihood.

It’s easier to see graphically, but if I have a case with a 50% chance of liability, and IF there is liability a 25% chance of a verdict of $100,000, a 50% chance of a verdict of $200,000, and a 25% chance of a verdict of $500,000 (never mind fees for the moment), to roll it back I would:

Multiply .25 by $100,000 = $25,000

Multiply .50 by $200,000 = $100,000

Multiply .25 by $500,000 = $125,000

Total is: $250,000

Now, I have to multiply $250,000 by .5 (likelihood of a verdict at all) = $125,000

$125,000 = the Estimated Monetary Value (EMV). Rollback is the operation that gave us the EMV.

It is important that the class understand the meaning of the EMV**. The EMV is the WEIGHTED average of the results if the case were tried one hundred times. It is NOT what the plaintiff will receive in any single trial.**

Before asking students to work through the Fair Decision Game Problems, I sometimes ask if students had any trouble with word problems in elementary school math. Lots of nodding will be observed. Assume that you actually understood the math operations that were involved. Sometimes, you would read the word problem, and there would be a moment—or a few very long moments—of hesitation and “oh gosh, how am I going to do that?!” before your brain could “see” how the words would become numbers and symbols. You’ll get more nods from the class. I will acknowledge that, sometimes, faced with the challenge of constructing a decision tree for a case I could easily describe in words it would coincidentally feel like a great time to clean my office. This one generally gets a laugh. I’ll qualify it by saying this was true before becoming more adept and feeling confident of the method, but not so much now.

The point is that there is a natural felt barrier or hesitation when we have to translate from verbal to symbol—math and graphics. That is normal and it dissipates only with practice. We have to get into the habit of moving from words to drawing trees. That’s why I’ll ask the student to do the “Fair Decision Game” in several steps—moving from very easy to somewhat more complicated—and practicing the shift from words, to scratch pad, to structuring trees.

The Fair Decision Game is set up on the powerpoints.

For each Fair Decision Game problem, give the students a chance to think about the hypothetical, and then make sure they think about it terms of the four steps above. (Define the decision. Identify the possibilities. Judge the likelihood. Figure the net gains or costs.) The students should not struggle at defining the decision and possibilities, and they should understand the probabilities and pay-offs.

I suggest instructing them first to do a “scratch pad” version of the calculation, I generally put up the “scratch pad” powerpoint first, and then ask them to draw it using the tree structure. After everyone is done, I put up the “answer” on powerpoint and encourage the students to turn to it in their handout.

The process is repeated for Games 2 and 3.

Note that in Game 3, the tree could be constructed with four different outcome branches—each assigned a probability value of 25%. Or, it could be constructed with one branch (combining red, blue and green branches) assigned a probability value of 75% and another branch assigned a value of 25%. First, emphasize that neither is wrong; both are right and will yield identical EMVs. However, in practice, it’s probably wise to “shmush” (collapse) the red, blue and green branches for the combined 75% value. Why? The tree is more cluttered and there’s no difference in the outcomes at the end of each branch.

When is it okay (indeed better practice) to collapse branches for a combined probability? The answer is when everything (costs, payouts and probabilities) AFTER that point would have been the same along each branch.

Additionally in Game 3, it’s important to highlight that the dollar amounts are increased. Students must also think about “can I afford to play?” Hence, ask the powerpoint questions: “Would you play if you were given one try?”; “Would you play if you were given 100 tries?”; and “Would you choose to sell your ticket if the gamesman offered you $10,000 not to play?”.

Do spend some time discussing these and the implications. You can ask for a show of hands as to who would settle for $x under these circumstances, what about $y? Everyone’s tolerance for risk is different.

An interesting twist on relative resources and power can be raised here. You might pose the question: “What if losing $100,000 would cause you to go bankrupt and you would be unable to pay the debt?” Somewhat perversely, would there be more of an incentive to play, knowing that you didn’t have $100,000 to lose?While having financial resources generally is an advantage, that’s not always true. Sometimes, being close to bankruptcy (having no resources) can be a source of power.

Game 4 - The Marble Roll (Back) Challenge

I began using this “Marble Roll (Back) Challenge after teaching the material for several years for two reasons: to introduce the idea of cumulative probabilities – successive layers of risk – in an abstract problem; and to work the arithmetic of the roll back to EMV early in the unit. (In previous years, we didn’t actually get to doing the arithmetic for multi-layered risk until we had transitioned to legal case examples. Students find the “roll back” arithmetic hard; even if their calculators are doing the work, they find it conceptually difficult. Thus, I now work through the roll-back, how the math works, and what exactly the calculations are doing, in a more abstract “marble game” tree first. Lots of questions arise, some sweating involved. And, after you’ve worked the roll back math for the marble roll back, you can explicitly make the link to the structure of a litigated case. Later in the unit, when you demonstrate and/or have students do an EMV roll back in a litigated case example, the foundation has been laid.

If pressed for time within the initial class session on the topic,[[4]](#footnote-4) I’ve been known to put this off until the following day. But, as indicated above I prefer to get it in early. I do tell the students that they shouldn’t worry if it seems hard, and I also tell them that if they can (eventually) do a roll back on this one, they really have mastered the method. (If you want to get it in on the first day, but you are concerned about covering the rest of the material, you can always hold back and try to squeeze it in later if there’s time for one last item at the end of the afternoon.)

A barebones description of the “The Marble Roll (Back) Challenge is in the powerpoint text:   
A Tale of Two Jars:

Jar number 1: Pay $100.

There are 400 blue, 300 red, and 300 yellow marbles.

If yours is blue - $0. If it’s red - $400.

If it’s yellow- $800.

Jar number 2 – 50% chance of doubling your winnings. Pay no more.

Put it on a tree, then roll it back!

What is it worth to play the two jars?

To put a bit more prose on its bones, explain to the class to imagine they have the opportunity to play another game. It will cost them $100 to play. Assume their decision is whether to play the game; they have not yet paid anything.

The way the game works is that, after paying $100, the student will draw a marble from a jar that contains 400 blue, 300 red, and 300 yellow marbles. If they draw a blue marble, they win nothing. A red marble wins $400 and a yellow marble wins $800.

After that first jar, they will have the opportunity to double their winnings by drawing a marble from a second jar. There is no additional cost for the second round. In that second round, imagine there’s a jar with 500 black and 500 white marbles (any color combos that create a 50/50 chance of one or the other. If the student selects whatever the winning color, he or she will double their winnings. If not, then the student simply keeps the winnings from the previous round.

First, have the students map it on a tree, and then check to see their tree structures are correct. Then ask them to do the math to roll it back. The powerpoints contain the correct structure and the roll back.

It’s a nice exercise that forces students to add and subtract winnings and costs for the net payoffs, and then to roll the result back to an EMV. I also ask them to calculate the cumulative probability at each end node. It’s worth some discussion of what this all means, how it might impact their decision to play or not, and the value of the opportunity to play, and how the picture of risk changes after the first round uncertainties are resolves.

## Litigate or Settle Game

Next, I have the students apply the basics in the “litigate or settle” powerpoint. I ask them to draw the structure of the decision tree first for the plaintiff’s side. They should just put in words instead of probability numbers, and should put the numerical estimates in the proper places. I put up the “answer tree” which is also in their handout packages, ask if there are any questions, and then ask them to do the same thing for the defense tree.

This is the first time we’ve built a tree explicitly within a litigation context. The students should see that the STRUCTURE of the tree is the same for both sides (as is often true).But, the plaintiff and the defense may each see the probabilities and the outcomes differently. And students should see that attorney’s fees would be deducted from the defense side, win or lose.

I encourage the students to see that the tree easily could 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?
* 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?

Could they roll back these trees to get an EMV? No! Why not? There are no percentages; we can’t do the arithmetic calculations with “very likely,” “long shot,” or “entirely possible.”

I know there will be skepticism about assigning numerical probabilities. “Garbage in, garbage out” is the usual objection. “It’s not possible to put a number on it!” “We can’t really know the number.”

*To address these doubters, put up the powerpoint marked: Qualitative Resistors Surrender: What’s the settlement value?*

## Qualitative Resistors Surrender: What’s the settlement value?

Refer to the powerpoint titled: “Qualitative Resistors Surrender.” Explain that you’re going to read each of the case assessments, out loud. Everyone will hear your vocal inflection, etc. For each case assessment, immediately after you read it, each student should quickly write down what he thinks a fair settlement value would be—a settlement value he would recommend. Work your way through the three case assessments. When you’re done, ask for a show of hands as to how many wrote down their highest number for the first, a middle number for the second, and a lower number for the third. Virtually, all of the hands in the room will go up. What does this mean? It means that ALL of us ARE ALREADY using numerical probabilities as discount factors to arrive at a settlement value. We just don’t necessarily acknowledge it.

### *Prose vs. Percentages*

I ALWAYS end this day (or evening) with this segment because it is important, makes a powerful impression, and it’s great, great fun. (I do mean always. If my time management skills were subpar that day, and it appears that not all of the introductory materials on decision analysis can be squeezed in, I’ll skip something else and come back to it the next day, rather than end without doing this segment.)

First, ask the students to take out a piece of paper on which to write a series of 8 probabilities (so, not a tiny piece of paper). Explain that you will read, out loud, the statements on the powerpoints with particular inflection (and you’ll repeat each one twice with an effort at the same inflection). The students should record the probability percentage they would mean if they had said the statement exactly the way you did. In other words, what percentage would they be thinking if they had said it to a client that way? Do this for each statement on the two powerpoints.

When it’s done, announce that you’re going back to the first one, and ask for a volunteer to shout out a probability he or she recorded. Then ask for shout outs for any higher percentages. Any lower? This very quickly starts to sound like an auction with “Who has lower than 60? I heard 45. Anyone lower than 45?” For each of the 8, record the highest and lowest percentages in the class. It is very, very rare to have a range smaller than 15 percentage points (maybe a 10% range three or four times in the last 17 years). Even 15% is low. The VAST majority of the ranges are 20% and often 30% or 40%. For some of the prompts, it’s not unusual for reported probabilities to straddle the 50% mark: some students thinking that the prose statement (and my inflection) a 30% chance of winning, and others thinking that same statement meant a 60% chance of winning.

All you have to do is ask: Why does this exercise matter? Students immediately understand that a lawyer may use prose and mean 50% - 60%, and his client may interpret that prose as 80% or 90%. (Indeed, I have seen that moment as a mediator, when I asked the lawyer what probability he would assign to his client’s construction case claim. The lawyer said: ‘I think we have a really strong case—maybe 60%.” The client was *not* happy, and interjected: “When you said that, I thought you meant something like 90%.” I never would have invested all of this time and money for a 60% case.”)

And of course, another benefit is that you CAN do the mathematical calculations with numerical probabilities in place.

It is important to acknowledge the danger of false precision. Students often raise this point (and if they don’t, then I raise it the next day). Yes, that can be a problem. And NO one can or should be sure that a case is 55% vs. 60% likely to win or lose. You will never be able to test the proposition, because you are not going to try the case 100 times. However, we do have a gut sense that a case is in the 75-80% range, and not the 50-55% range. The probability you name might be thought of as the center of the “gut” range. And, as we’ll see, the method lets you test the impact of differing probabilities, as a way of acknowledging the imprecision of any single probability assessment.

## End of the Segment/Day

This website (as well as the Clientscience.com website) includes decision tree problem sets titled “Simple Hypos” and “Balanced Trees on Balance Beams.” I explain to students that they are required to make a good faith effort to draw these trees, assign values as stated in the materials, and perform a roll back to reach an EMV for each one. I encourage them to “wrestle with” their decision trees by themselves and bring the results to class as proof of their good faith efforts. These will not be graded. I do explain that for a substantial period of time in the next day’s class they will work in groups to check, correct, redo and talk through their answers.

I emphasize that the goal is for them to become comfortable with the method, as it will enable them to build a real map of any case. On a real map, the United States is not the east coast, west coast, and a blur of some land in between. We want to know what those Midwestern, Southern, Plains, and Rocky Mountain states contain. Similarly, decision tree analysis encourages methodical, rigorous thinking when done well. It prompts important questions about what might happen, and provides a logical way to consider (and calculate) the implications for client settlement decisions.

*Note: If you will want to use a student for a decision-tree client dialogue demo in the next class segment, it’s best to identify a possible volunteer by the end of class. Ideally, it would be a student who seems comfortable with the method), or who is a ham and indicates some practice experience (particularly on the defense side). If student agrees to play a part, you would give him or her the case description and completed decision tree. And you would agree upon which of you is going to take the defense client role and which the expert-in-decision-trees lawyer role in the next class session.*

**Next Decision Tree Analysis Segment or Class Session (after students have had non-class time to independently work through the problem sets, *Simple Hypos* and *Balanced Trees* on Balance Beams).**

This segment begins as a 30-minute “charette” in which students work on their decision trees from the “Simple Hypos” and “Balanced Trees on Balance Beams” together. Before the 30-minute segment, I ask that students form into groups of three. I may request a show of hands as to who found the homework exercises to be easy (maybe due to some background in the method). Then, I ask those students to scatter themselves around the room to work within students who were less confident in their Simple Hypo and Balance Beam trees and calculations. Instruct the students to compare trees and computations within the group to see if they match, and discuss where they differ.

Try to discuss and reason through the differences, and come up with the right answers together. Explain that you will roam around, but any group with a question should raise their hands to summon you for help, or come and tap you on the shoulder. The room will be a buzz of activity and discussion. This half hour is energizing and interesting. Your active engagement with the student groups gives you a clear idea of what they are struggling with, and gives you the chance to explain it in close range.

*At the end of the half hour, I go back to the front of the room, and one by one, project the “answers” to the Simple Hypos and the Balanced Trees on Balanced Beams trees. It’s important to spend time with each one. I might first ask, did your trees end up looking like this one? Can someone walk us through how the EMV calculation was done? How did you arrive at the “payouts” at the end?*

The Simple Hypos are deliberately formulated to teach certain key points, and the students should be clear on these by the time the unit is done:

1. All fees and costs to be expended or received from that moment forward should be added to or subtracted from any anticipated award to arrive at the payout figure used for calculation. So, in the simple hypo, if 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. In the Simple Hypo, client’s perspective, I have stated 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.
2. Assume a client who says, “I’ll settle if I can get, in my pocket, whatever amount is the EMV of litigating, as shown in the decision tree analysis.” Note that for the plaintiff, if the EMV were $10,000, the Settlement Amount would have to be $15,000, because 1/3 of the settlement - $5,000 would be paid to the attorney and 2/3 to the plaintiff. Each Simple Hypo has a question about how much the settlement would be to equal the EMV.
3. The Simple Hypo, Attorney’s Perspective, highlights the conflict between attorney and client set up by a contingency fee arrangement (particularly when it is not a million dollar case – but even in a quite substantial case). The value of the attorney’s time to be expended are put forward as an estimate of his opportunity costs; they are not what his full billable rates would be. Still, it has to be acknowledged that the attorney’s time has a value. The attorney’s “payout” is 1/3 of the award MINUS the value of time expended (beginning at the time the tree is constructed).

Because the value of the attorney’s time is deducted from the payout, the attorney’s EMV from the litigation is MUCH, MUCH lower than his clients. And, the settlement amount needed to yield that much for the attorney is MUCH lower too.

Sometimes here, and sometimes at the end of the entire Simple Hype/Balance Tree exposition, I tell a story of a mediation in which it seemed to me (as mediator) that the plaintiff’s lawyer turned on his client, exerting great pressure to settle at a low number. I couldn’t quite understand it. As the neutral, it seemed to me that the plaintiff had a pretty strong case. At first the defense had offered nothing or almost nothing, and plaintiff’s counsel was adamant about the strengths of his client’s case. Somewhat later in the day, when the defense offer had come up, but still seemed very, very low to me, the plaintiff’s attorney (in caucus with his client) started emphasizing all of the defense arguments, and ignoring their own. It was uncomfortable, as he was exerting what I thought was inappropriate pressure for the client to settle awfully low.

At that time, I was working part time at Harvard Business School, on a team assembling materials for their negotiation curriculum. I was working on an ADR unit, and was in the process of doing a teaching note on litigation risk analysis, using a plaintiff’s personal injury case. It broke out the value of the plaintiff’s attorney’s time. I had been asked to do a separate analysis from the plaintiff’s and the plaintiff’s attorney’s perspectives (as in these Simple Hypos). I kept getting very large gaps between their EMVs – and thus large differences in the settlement values needed to equal their EMVs. At first, I thought I had made a mistake. But I hadn’t. The analysis and the math were correct. And those uncomfortable moments in the mediation was the on-the-ground proof. In a contingency fee case, depending upon how much legal work still needs to be done, and relative payouts, the attorney may be motivated to settle at a much lower figure than his client.

This is just a fact. I do NOT oppose contingency fees. In fact, without a contingency fee, most of us would be unable to afford legal representation. And most attorneys who work on contingency maintain the highest ethical standards. They would NOT exert undue pressure on their clients.

The punch line and prescription is for students to be aware of this force, and NOT to bow to it. And, I strongly suggest NEVER AGAIN doing a separate tree for the client and the attorney. After all, the question is NOT what’s the best decision for the lawyer. The ONLY question is what’s the best decision for the client.

1. For the attorney, his past expenditures to advance the expert’s fees can be counted positively in the payout in the event of a plaintiff’s verdict, because the attorney will get it back from the award (in addition to his contingency fee). But it cannot be counted as a loss if it has already been expended. (See discussion of sunk costs below.)
2. Sunk costs – past expenditures should NOT be included in the end payouts (even as negative numbers or losses). The decision tree looks FORWARD in time, and asks what would be a good decision now, based on what will/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 paid 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. Many students who have worked part time or in the summer will understand this and bring it to the discussion. I will explain that 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.
3. The *Balanced Tree on Balanced Beams* problem is a bit more complex, and a good one to work through the calculations – how to do the rollback math. It also illustrates that, once there’s any complexity at all (and most of life and law has some), structuring the decision tree involves judgment. How much should you “reduce” or make things simpler? Why? My sample answer tree boils down the liability question to whether (and the probability that) the defendant will avoid liability entirely. Because the other defendant is bankrupt, if this defendant is in for 1%, he’s on the hook for all of it. This tree illustrates that there are judgments to be made in constructing part of the tree relating to jury findings and the damages questions. My general advice is to create branches where a different factual finding 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), and some the same. If the student were working with a partner in a law firm on constructing this tree, there could be robust discussion regarding all of these questions. My tree is just one cut at the problem. If it were a real case, the attorneys’ analysis would direct the structure of the tree and the damages numbers. And that would of course be discussed with the client.

Review of the answers to the problem sets, including exegesis as to attorneys’ fees and the role of judgment and reality in constructing a tree can take quite a bit of time: 30 minutes to an hour, depending on the class.

The absolutely prime goal here is to make sure that EVERYONE in the room understands the method and could do it themselves in a reasonably straightforward case. I state that clearly and strongly encourage any and all questions. I advise sticking with this segment until at least that goal has been accomplished.

Time permitting, after review of the *Simple Hypos* and *Balance Beam* trees, I go back to the question of what EMV means – mathematically and to clients cases such as these. I will devote considerable class time to discussing this, both the technical meaning and whether it “should” mean anything to a client. The technical answer is that the EMV is the average of all possible results, weighted by their probabilities. Why should that matter so someone whose case will be tried only once?

The point is that there is no “should” here. EMV is not a moral imperative. The EMV is a data point, arrived at through a certain methodical logic and operation. For some clients, its method and its logic are compelling; they feel that they are “being logical” by settling at or near the EMV. Or, because of its logic, they are comfortable allowing it to influence their settlement decisions. Other clients will not respond to it. (Note: because I think this discussion is important, if going through the answer sets was lengthy and the group is getting tired, I’ll end the segment with the pep talk outlined below, and go back to the question of meaning just after the break.)

A pep talk on value for their legal practice seems appropriate here. I take one (or both) of two tacks:

1. Even if you NEVER use a decision tree with a client (and we will soon practice doing just that), formulating a decision tree for a case – just drawing the structure, in your office – is a way to insure your analysis is suitably thorough and rigorous.

If you are an associate, researching a small question within a large case – drawing out the whole case tree will enable to see where your research question fits. That will enable you to ask good questions and to see what research path makes the most sense.

If nothing else, forcing yourself to draw the tree will force you to consider all of the possibilities at each turn – to raise questions you might not have considered. Better now than later. That is just plain good legal practice. Of course, it is also important to update the tree as the case develops.

To illustrate, I describe a not-so-hypothetical mediation.Imagine that the mediator turns to defense counsel and asks where this case is going next. Defense counsel answers with the procedural posture: they intend to file summary judgment motion. The mediator responds: “I understand you are filing a summary judgment motion. Is this an all or nothing motion?” to which defense counsel responds: “Hmm… I had not really thought about that”. Plaintiff’s counsel chimes in that there is a possibility of partial summary judgment that would leave some of the higher damages claims, even if not certain. The mediator turns to both lawyers and asks: “Okay, so if the Court grants partial summary judgment on issue A, B, and C, where does that leave your case with X, Y, and Z”. When she says this, another blank looks comes across the lawyers’ faces; they hadn’t considered that. Or, perhaps defense counsel chimes in with: “Actually, if that happened the plaintiff would only be able to get damages on X, Y, and Z”. Or, one lawyer says, “and at that point I would file a motion in limine to exclude certain evidence, which frankly I am confident we would win that”. Once again, the mediator turns to the other lawyer and asks “Have you considered what would happen if they filed that motion *in limine*”? Ah that deer-in-the-headlights look at the mediation table.

As a mediator, I expect and respect that attorneys will disagree about the likely outcomes. But, I don’t have high regard for attorneys who appear not to have thought about these questions. (And I know it means they haven’t discussed the uncertainties with their clients.)

1. Your adeptness at mapping the case through a decision tree will impress your supervising attorney! While not really new, I acknowledge that this method is NOT often used in a complete and rigorous way even by experienced attorneys. The tree may yield important insights: missing information that would be significant (or not) for settlement value or trial outcome; motions that would affect value or not; or ways to prioritize spending the client’s limited litigation dollars. If so, and you show this to the partner, that’s a feather in your cap as you serve the client well. Even if you never show it to the more senior partner, mapping will help you ask or suggest the right questions of the client and for trial or motion preparation.

It’s definitely time for a break or, in a shorter time format, to end the day’s class.

***A note on timing: if you’re lucky, you’ve accomplished all of this in 60 – 75 minutes: 30 minutes in “charettes”; 30 minutes to review and discuss the answers; 15 minutes on more extended discussion of meaning. Sometimes (but not usually) the review is quicker. IF you add a 15-minute break, you’re at 75-90 minutes. This leaves you only 90 – 105 minutes (realistically 90) until the end of the segment.***

***Note that if you will do the “demo” described as the second option below, you may wish to hand it out during the break or as preparation for your next class.***

***I should add that, for a number of years, I had been disappointed by students’ ability to correctly complete the decision tree required among the final submissions in my client counseling course. Thus, I have opted to extend class discussion and review time on decision trees for as long as necessary to REALLY make sure the entire class understood and could apply the method. While I don’t forego the demo, I do allow teaching basics to cut into the fun of showing off really complicated trees in prior cases, and even to take time away from the lawyer-client communication piece.***

**After the Break/In the Next Class**

With luck, you may accomplish three more things in this next segment: discuss examples of how this method was useful in real cases; demonstrate how a lawyer might work with a client to introduce the idea of decision tree analysis and walk him or her through a tree; have the students practice. However, as they say, “two out of three isn’t bad.”

### Walk through real life examples

Regarding examples: for this, I leave you to your own experience or gathered war stories, or the powerpoints, which outline how the method can be useful for dialog with you client and with opposing counsel. One important point to make is that many clients don’t care much about EMV. After all, they will only have one trial. They are intensely interested in the payout numbers on the right side, and what is the cumulative probability of each outcome. Learning that, 50% of the time, the outcome would be more or less than $X; only 20% chance that it would be as much as $y is highly relevant to their decision-making. It’s also true that in some highly emotional cases, if a client can see that his very high number (the value of the loss) is “on there”, but discounted for multiple risks, he somehow feels better. He can see that value was counted.

1. **Demonstrate how one might use the tree in discussion with a client**

I generally use a sexual harassment/gender discrimination case for this. A summary of the case as well as a complete decision tree can be found on the website and labeled sexual harassment case [Make link live]. I have done this with a professional colleague in town who typically represents defense clients (and who uses and respects decision analysis), and I have also done it with a student from the class (with warning). Depending on whom you’re working with, you can have them act as the decision tree expert lawyer and you as the defense client or vice versa.

I have found it best to distribute a hard copy of the completed tree to all students so that they can follow along with the demo. That is much less cumbersome than trying to project it as you speak. And, even well projected, the tree is detailed and thus hard to read from a distance. While you certainly may distribute the case write-up, I don’t believe it’s necessary. It’s not dissimilar to the facts in the case assessment exercise, but from a definite defense perspective. And it seems more interesting to have the facts emerge as the lawyer and client “on stage” discuss settlement, the tree, and the twists and turns the litigation may take. The defense client should be played as initially resistant, sure this case can just “go away” on summary judgment like so many others, and that it couldn’t possibly be worth more than nuisance value, and so on.

If I’ve done the demo with an attorney from the local community who does have experience using decision trees in practice, I will ask him or her to talk about it. Every attorney has a different story; the students appreciate and benefit from hearing an outside voice.

1. **Student practice with clients**

With some luck, you still have an hour or at least 30-40 minute left before a break or end of the class session. I suggest having students go back to the *Balanced Trees on Balance Beams* tree, also known as the Lancer Defense tree. They should take on lawyer and client roles, with lawyers explaining the method to their clients. If you’re pressed for time, you could have the first round focus more on explaining the method and approach, let the client ask questions, respond etc. The debrief can be the classic: “What phrasings worked well and which were unclear or problematic?” Then have them switch roles and continue discussing the branches of the tree, what they mean, etc., followed by another short debrief. Students generally see quite clearly how the approach could be useful in practice.

## Closing Points

Building and working with trees requires judgment and skill, and some focus on both legal realities and communication value and impact. You DO want your client to be fully informed. A tree that is too simple may distort reality and validate sloppy thinking. Conversely, a tree that reflects every single twist and turn may be hopelessly complicated and impossible for the client to understand. Further, it is doubtful that a jury will carefully break down and follow every theoretically possible twist and turn in a trial.

Our psychological biases when assigning probabilities or estimated payoffs may (unintentionally) skew the numbers and thus the EMV and the outcomes. Or, your client’s incomplete narrative may cause you to assign higher probabilities of success or a damages amount than a full account of the facts would justify. This point often comes up earlier, as students ask how one decides on the numbers to use, or argue against the method because of the problem of assigning numbers, but it’s worth repeating here. The tree’s analysis is only as good as the judgment of its builder. And it is only as valuable to the client as he believes it to be.

I re-emphasize my willingness to work with any student who is struggling with this method, even in constructing the tree for the Final Counseling exercise. I offer to schedule a review or Q&A session if enough students send me an email, and anyone is welcome to stop by with questions.

1. This piece has been adapted and largely excerpted from: Aaron, M, The ClIent Science Course Instructor’s Guide, Second Edition, 2017, available at [www.clientsciencecourse.com](http://www.clientsciencecourse.com).] The referenced materials - powerpoints, problem sets, and trees – are available both on this “Risk and Rigor” website, as well as at clientsciencecourse.com. Please note that I generally teach this material in the context of a client counseling workshop/course that takes place either over 5 intensive days or weekly 2.5 to 3 hour sessions. Or, I have taught it as the initial 5-6 hours of a two day workshop on decision tree analysis. While I have made an effort to untie this instructor’s guide from the logistical and timing specifics of these contexts, their marks no doubt remain. [↑](#footnote-ref-1)
2. *Note:* Some people prefer to structure a problem as a decision tree first. Others find that building an influence diagram helps them to think through the problem. I rather clearly fall within the first camp. In my Advanced Decision Analysis course, I have sometimes asked students to construct an influence diagram before creating a decision tree to help think through how decisions are affected by different forces.

   As stated in the introductory portion of this text, I do use TreeAge’s decision tree software – TreeAge Pro. While a long time user, I regretfully recognize that TreeAge has become more expensive and less flexible to work with for limited time and student usage. Alternatives exist: There is an open source decision tree software called SilverDecisions. It’s fairly simple, and a little bit cumbersome, and doesn’t offer easy sensitivity analysis – but it is free! It can be found at <http://silverdecisions.pl>

   Dan Klein of Klein Dispute Resolution offers 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. The good news is that the tool is free at his website: [www.decisiontree.kleinmediation.com/tree/generator](http://www.decisiontree.kleinmediation.com/tree/generator). Simple visual decision tree presentations can be made with Solutions, offered by SmartDraw at [www.smartdraw.com](http://www.smartdraw.com)., but it does not perform any calculations. [↑](#footnote-ref-2)
3. It was student requests for more on this topic led to my developing and teaching an “Advanced Decision Analysis” course, taught separately. And that is no doubt what led me to undertake a book and now a website of resources for teaching and practicing with decision trees. [↑](#footnote-ref-3)
4. I generally have the luxury of at least a 75 – 90 minute class session to cover the introductory material, followed by a problem set assignment to be completed before the next session. If your class periods are shorter, you may have no choice but to cut this within the initial presentation. I suppose you might assign it in addition to the problem set material, and plan on more in-class time during your next session, to review both this roll back and the problem set trees. [↑](#footnote-ref-4)