

# Law's Arithmetic

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**Date :** August 11, 2021

Edward Cheng, Ehud Guttel and Yuval Procaccia, *Sequencing in Damages*, 74 **Stan. L. Rev.** \_\_ (forthcoming, 2022), available at [SSRN](https://ssrn.com/abstract=3988888).

My favorite type of paper is the type where you hit your forehead asking yourself: how did I miss this simple point? How did everyone else miss it? Why didn't I write this paper myself, given that its main insight was under my nose for so many years? In *Sequencing in Damages*, Edward Cheng, Ehud Guttel and Yuval Procaccia (hereinafter: CGP) made me hit my forehead. The paper is forthcoming in the Stanford Law Review, and deservedly so.

CGP's paper is about law's arithmetic. It is a well-known stereotype that students go to law school because they cannot stand math. Perhaps this is why lawyers, judges and law professors seem to fail in applying what looks like really simple math.

Consider the following elementary school exercise:

$$(1,200,000-400,000) * \frac{1}{2} = 1,200,000 * \frac{1}{2} - 400,000$$

True or False?

Everybody knows it is false: the left-hand side equals 400,000 and the right-hand side equals 200,000. Subtracting and then multiplying is not the same as multiplying and then subtracting. And yet although the order of operations matters courts, lawyers and professors get (intentionally or not) different answers to this (and similar exercises) all the time.

Consider Jill who is a victim of a tort. Jill suffered harm of \$1,200,000. At trial, it was discovered that Jill's health insurance had already paid \$400,000 to cover her medical expenses. Because she lives in a state which has modified the "collateral source rule", this payment should be deducted from her damage award. The arithmetic problem begins because Jill was also found to be 50% negligent.<sup>1</sup> Should the payment by the collateral source (CS) be deducted first, and then comparative fault (CF) applied? In that case Jill will receive \$400,000 (like in the left-hand side above). Or perhaps it should be the other way around, and the CF should be applied first and only then the CS deducted? In that case Jill will receive only \$200,000 (like in the right-hand-side above).

CGP show that courts do not reach a uniform answer to this simple question even though there are only two options to choose from. And if courts err in this simple example, one should expect courts to err when they try to solve lengthier arithmetic exercises, such as when a \$500,000 damages caps is added to the mix. Should caps apply first, second or third in the order of operations? It turns out that this time we do not have just two options, but rather six, none of which is equal to the other. Here are the six options (→ means applying the \$500,000 caps):

1. Caps first, CS second, CF third:  $(\$1,200,000 \rightarrow \$500,000 - \$400,000) * \frac{1}{2} = \text{\$50,000 recovery}$
2. Caps first, CF second, CS third:  $\$1,200,000 \rightarrow \$500,000 * \frac{1}{2} - \$400,000 = \text{\$-150,000}$
3. CS first, Caps second, CF third:  $(\$1,200,000 - \$400,000) \rightarrow \$500,000 * \frac{1}{2} = \text{\$250,000}$

4. CS first, CF second, Caps third:  $(\$1,200,000 - \$400,000) * \frac{1}{2} = \text{\$400,000}$
5. CF first, CS second, Caps third:  $\$1,200,000 * \frac{1}{2} - \$400,000 = \text{\$200,000}$
6. CF first, Caps second, CS third:  $\$1,200,000 * \frac{1}{2} \rightarrow \$500,000 - \$400,000 = \text{\$100,000}$

Two quick things to note. First, option 2 yields a negative number, meaning the plaintiff perhaps needs to pay the defendant \$150,000(!), or at the very least should receive nothing. That might be an easy option to rule out. Second, if we add a fourth component to the exercise such as the plaintiff's failure to mitigate her harm, we will get 4-factorial or 24 different options. And if we add a fifth component, such as when the plaintiff settled with one of the defendants for an amount different from that which the court later found the other defendant to be responsible for, we get 5-factorial or 120 different options.

But then, with so many options how one can even expect courts to reach the correct answer? Remember, judges were once our students and (as we have agreed above) many of them came to law school to escape math...

Returning to Jill's problem, CPG find that courts apply different approaches even to this simple two-option problem. They then show that courts commit similar errors when they deal with other two-option arithmetic problems such as when comparative fault and mitigation of damages both exist, and more. Further, CPG go beyond just showing courts land everywhere and also offer a solution. And the solution they offer is conceptual, not formulaic. In my own view, when properly applied, their solution can solve not just Jill's two-option problems, but also the more complicated 24 or 120-option problems. As CPG correctly explain, the key is to properly conceptualize what is at stake in each stage of the arithmetic exercise. And the good news is that this is exactly the exercise students, lawyers, and courts are trained to master.

Let's give one quick example for how properly conceptualizing what's at stake transforms what seems like an arithmetic problem to one of public policy. CPG conceptualize Jill's two-option problem by observing that the problem is one of allocating a windfall that would accrue if the insurance money the plaintiff received from her insurance company is added to the pot of money she receives from the injurer. And, as the above exercise showed, if one applies the collateral source first, the victim benefits more than if one applies comparative fault first (recall Jill received \$400,000 in the former case and only \$200,000 in the latter). CPG argue that most cases where the collateral source is applied first involve broad public-interest programs such as Social Security or Medicare. To have individual wrongdoers benefit from these programs at the expense of victims "would seem strange, if not perverse." (P. 23.) In contrast, in many of the cases where comparative fault was applied first, the wrongdoer was a government entity and therefore protecting the public coffers became an important interest. To be sure, one need not necessarily agree with CPG's explanation to appreciate the fact they offer one. In their paper, CPG further explain how to solve the other two-option arithmetic problems they discovered.

The truth is that courts face more than just a problem of arithmetic when they decide the order of operations in calculating tort damages. They are facing classic problems of applying form to content, of revealing legal rules' internal logic, or of implementing policy goals. Therefore, even our math-deterred students should find these problems not just important but also decipherable.

In sum, anyone studying, teaching, practicing, or judging tort cases needs to read CPG's new paper. It is clear and simple, it is correct to the dot, and it is insightful both as a matter of theory and as a matter of practice. What else can one ask from a paper?

1. Although in some jurisdictions if P is 50% (or more) at fault, P recovers nothing, for simplicity I am assuming that such a rule does not apply.

Cite as: Ronen Avraham, *Law's Arithmetic*, JOTWELL (August 11, 2021) (reviewing Edward Cheng, Ehud Guttel and Yuval Procaccia, *Sequencing in Damages*, 74 **Stan. L. Rev.** \_\_ (forthcoming, 2022), available at SSRN), <https://torts.jotwell.com/laws-arithmetic/>.