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Form as Formalization

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FORM AS FORMALIZATION

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I. INTRODUCTION

There are, roughly speaking, two approaches to applying computing to law, which can be thought of as a bottom-up approach and a top-down approach. The bottom-up approach uses large amounts of data in some way—to make predictions, for example. Machine learning techniques such as neural nets embody this approach. This is generally seen to be the approach with the most potential, the one that leads to the ‘data driven future’¹ of legal practice. The top-down approach would derive conclusions from the law itself, after making the law legible to the computer in some way, perhaps through hand-encoding, perhaps by using natural language processing or some similar approach to permit the computer to ‘read’ the actual text of a statute or regulation.

The top-down approach, also sometimes called computational law, is generally considered to have much less potential.² But even those who dismiss computational law point to one example of success in encoding the law: TurboTax and similar tax compliance programs. Thus one finds enthusiastic references to creating “TurboTax for police complaints,”³ “TurboTax for copyright,”⁴ “TurboTax for immigration,”⁵ and so forth.

¹ See Daniel Martin Katz, *Quantitative Legal Prediction—or—How I Learned to Stop Worrying and Start Preparing for the Data Driven Future of the Legal Services Industry*, 62 EMORY L.J. 909 (2013).

² *Id.*

³ Cynthia H. Conti-Cook, *Open Data Policing*, 106 GEO. L.J. ONLINE 1, 18 (2017) (describing a website “designed like TurboTax for police complaints” that “publish[es] the complaint as the subject decides, with non-governmental actors, the press, or local civil rights attorneys”).

⁴ Lorelei Laird, *Two Reluctant Entrepreneurs Turn the Challenge of Copyright Duration into a Business*, 102-May ABA J. 54 (2016), http://www.abajournal.com/magazine/article/two_reluctant_entrepreneurs_tackle_the_challenge_of_copyright_duration_into (describing a program, Durationator, that “takes basic information about a work and determines its copyright status in any country in the world” and “looks like TurboTax for copyright”).

⁵ Robert Schoon, *TurboTax for Immigration Paperwork: Clearpath’s Latino CEO Seeks to Make the Process Easier*, LATIN POST, (Jan. 29, 2014, 5:11 PM), <http://www.latinpost.com/articles/6585/20140129/turbotax-for-immigration-paperwork-clearpaths-latino-ceo-seeks-to-make-the-process-easier.htm> [<https://perma.cc/SNC8-R67G>] (“Similar to the consumer-minded TurboTax system, a software style often called a ‘wizard,’ Clearpath asks users simple questions online to analyze what they’re trying to achieve. It then brings up the right immigration forms and inputs users’ answers, with the goal of saving time, money, and frustration in the process.”).

J.B. Ruhl and Daniel Martin Katz argue:

Tax software companies are essentially selling the simplification of the Tax Code for the user, yet they must provide a product that accurately calculates the user's tax liability under any scenario and thus must somehow pack all of the Tax Code's substance into the software program. ... If the software is too complex, for example, it may be very difficult to update the program as Congress changes the Tax Code, as a change in one provision cascades in effect to other provisions. It would be in a tax software company's interests, therefore, to develop a program that is no more complex than needed to produce accurate user tax liability calculations. Perhaps a good measure of Tax Code complexity would then be the complexity of reliable tax compliance software.⁶

Such characterizations of TurboTax and other similar programs are incorrect. Tax preparation programs do not encode the law. Rather, as this paper argues, these programs **encode the tax forms**, which are not law, and which are prepared by the government itself. The difficult part of the coding, and the judgment calls, are almost entirely performed by the government, not by those who code tax preparation software. Tax forms are extraordinary in that they are designed so that people who do not know or understand the law can still comply with the law. Indeed, people may have absolutely no idea why they are filling out certain lines, or what the legal implications of those lines are. Yet they do fill out the forms, and thus they do comply with the law. Tax preparation programs do not simplify the law, because tax forms do not simplify the law. Rather, tax forms collect information and turn portions of the law into an algorithm for taxpayers to apply. And because forms turn law into algorithms, the forms themselves—not the instructions, but the actual forms, the actual way that entries are set to interact with each other—may contain judgments about the law, sometimes law that is unclear.

⁶ J.B. Ruhl & Daniel Martin Katz, *Measuring, Monitoring, and Measuring Legal Complexity*, 101 IOWA L. REV 191, 196 (2015).

This paper examines tax forms to learn more about how coding law can be beneficial. Part II investigates the relationship among forms, tax preparation software, and the law, and introduces the elements of a form: inputs, outputs, and algorithms. Part III uses the casualty loss rules for individuals, and the recent change in those rules, as an example of the implementation of law through tax forms, and provides an example of a form's structure resolving an ambiguity in a statute. Part IV suggests some possible next steps, including creating more-flexible tax forms and formalizing the law itself. Part V concludes.

II. Tax Preparation Software, Tax Forms, and the Law

a. Tax Preparation Software

Tax preparation software is often presented as an example of top-down computational law. For example, Michael Genesereth, a computer science professor, the founder and research director of Stanford's CodeX Center for Legal Informatics, and a leader in the field of computational law, writes: "Intuit's TurboTax is a simple example of a rudimentary Computational Law system. Millions use it each year to prepare their tax forms. Based on values supplied by its user, it automatically computes the user's tax obligations and fills in the appropriate tax forms."⁷ Computational law, he explains, is based on "Computational Logic," which "represent[s] facts and regulations as sentences in formal logic" and "use[s] mechanical reasoning techniques to derive consequences of the facts and laws so represented."⁸ It is highly unlikely that this accurately describes how TurboTax works, for a number of reasons.

First, tax preparation software was first developed in the mid-1980s, and use of the software rose precipitously through the 1990s.⁹ By 1991, approximately 25 million individual returns were prepared using

⁷ Michael Genesereth, *Computational Law: The Cop in the Backseat* (2015) (unpublished manuscript), <http://complaw.stanford.edu/complaw/readings/complaw.pdf>.

⁸ *Id.*

⁹ Rodney Mock & Nancy E. Shurtz, *The TurboTax Defense*, 15 FLA. TAX REV. 443, 445 (2014).

tax preparation software.¹⁰ (This is to be distinguished from electronic filing.) By 2002, nearly 47 million returns were filed electronically, some by individuals and some by practitioners.¹¹ (Presumably even more returns were being *prepared* electronically.) Given this timeline, it is highly unlikely, if not impossible, that tax preparation software encodes the actual tax law. In the mid-1980s (and arguably even today), it was simply not possible that tax preparation software could have put anything other than the forms on the computer.¹²

Second, and perhaps even more compelling, the purpose of tax preparation software is, as one might expect, to prepare tax forms. Preparing the forms by encoding the actual law and then deriving the apparently correct results from that encoding would involve an extraordinary amount of unnecessary, and probably harmful, work. The goal of the tax preparation programs is to fill in blanks on the forms that are submitted to the government. As this article shows, the forms themselves abstract away from the law. It is entirely unclear why tax preparation companies would do anything other than track the forms.

To be clear, tax preparation software companies do not claim to have formalized or coded the Internal Revenue Code and accompanying regulations. Intuit, for example, which makes TurboTax, discloses in its SEC filings that it provides programs to aid with “tax preparation.”¹³ Risks facing the Intuit business model thus include federal or state government’s becoming involved in preparing returns,

¹⁰ Robert E. Nelson & Joseph W. Langer, *Preparation Software Increasingly Tied to Electronic Filing*, 75 J. TAX’N 294, 294 (1991) (some of these were prepared directly by taxpayers, while others were prepared by tax practitioners).

¹¹ Table 4 – Number of Individual Income Tax Returns Filed Electronically and Accepted, by State, Fiscal Year 2002, I.R.S. (FY 2002), <https://www.irs.gov/pub/irs-soi/02db04nr.xls>.

¹² To bring home even further that Intuit is in the business of tax return preparation, not tax law formalization, on January 2, 2019, when the 2018 tax form for casualty losses had not yet been released, attempting to enter casualty loss information in TurboTax resulted in this message: “The Casualties and Thefts Area Will Be Ready Soon. You’ve done a great job starting your taxes early, but the IRS is still working on finishing up the casualties and thefts area (Form 4684) for 2018. That means this area isn’t quite ready yet. . . . We’ll let you know when the form is ready, and help you finish your return. We expect this form to be ready for you on 01/25/2019” (printout on file with author).

¹³ INTUIT, INC., FORM 10-Q 9 (2019).

thus freeing users from reliance on the private tax software.¹⁴ Similarly, Deloitte, one of the largest accounting firms, does see the promise of artificial intelligence, but not, at least as described in its public documents, top-down artificial intelligence. Rather, Deloitte has described using large amounts of data to train computers to ask and respond to relevant questions from consumers.¹⁵ And attempts to use natural language processing to make the tax code legible to machines have not been successful, due in part to the complexity of the language of the tax code.¹⁶

All of this strongly suggests that tax preparation software encodes forms, not statutes or regulations.¹⁷ Tax preparation software can nonetheless add value in many ways. For example, the software can use answers to questions it poses to decide which forms are relevant. Tax preparation software can lead people through forms, just as software ‘wizards’ lead people through the steps to, for example, set up computer programs. The software can use machine learning and other big-data techniques to help taxpayers resolve questions related to

¹⁴ *Id.* at 42. Risks do also include “the need to incorporate unpredictable and potentially late tax law and tax form changes each year and because our customers expect high levels of accuracy and a timely launch of these products to prepare and file their taxes by the tax filing deadline. Due to the complexity of our products and the condensed development cycles under which we operate, our products may contain errors that could unexpectedly interfere with the operation of the software or result in incorrect calculations. The complexity of the tax laws on which our products are based may also make it difficult for us to consistently deliver offerings that contain the features, functionality and level of accuracy that our customers expect.” *Id.* at 48.

¹⁵ *E.g.*, DELOITTE, ARTIFICIAL INTELLIGENCE—ENTERING THE WORLD OF TAX (2019), <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-artificial-intelligence-in-tax.pdf>.

¹⁶ *See, e.g.*, Bjarne Berg, *Machine Learning (ML) in US Tax Regulations*, PWC: TAX RES. & INSIGHTS (Aug. 29, 2017), <https://www.pwc.com/us/en/services/tax/tax-technology-blogs/machine-learning-in-tax.html> [<https://perma.cc/K3JC-CPMK>] (failing to use natural language processing to capture the US tax code and regulations); Marcos Pertierra, Sarah Lawsky, Erik Hemberg, & Una-May O’Reilly, TOWARDS FORMALIZING STATUTE LAW AS DEFAULT LOGIC THROUGH AUTOMATIC SEMANTIC PARSING, MIT COMPUTER SCI. & ARTIFICIAL INTELLIGENCE LAB (July 2017), http://groups.csail.mit.edu/EVO-DesignOpt/groupWebSite/uploads/Site/ASAIL_2017_Pertierra.pdf (proceedings of Second Workshop on Automated Detection, Extraction and Analysis of Semantic Information in Legal Texts (ASAIL)) (failing to use natural language processing to extract rules from a particular section of the Internal Revenue Code).

¹⁷ Repeated attempts to have actual tax preparation companies confirm this supposition have not been successful.

ambiguous inputs.¹⁸ Some software purports, for better or for worse, to be able to assess a user's audit risk.¹⁹ And the software can implement the actual calculations required by the form, in the order in which the form requires them. But the value tax preparation programs provide is almost certainly not derived from coding the actual statutory and regulatory law.

b. Tax Forms

The balance of this paper assumes that tax preparation programs do in fact follow tax forms, rather than the law directly. These programs are then not encoding the law, because tax forms are not law. The status of instructions is clear: a taxpayer cannot rely on the instructions to tax forms to defend particular legal positions.²⁰ Indeed, one judge has suggested that taxpayers cannot even rely on IRS publications, of which instructions are one type, to avoid penalties.²¹ Forms are distinct from instructions. One court, for example, has distinguished between what is requested on the "face" of a form, and what is requested in the instructions for that form.²² But the same reasoning that denies

¹⁸ See *infra* B.1.

¹⁹ For example, TurboTax's "audit meter" "gives you a visual indication of your possible audit risk." *About the Audit Risk Meter*, INTUIT, INC., <https://ttlc.intuit.com/questions/1900711-about-the-audit-risk-meter> [<https://perma.cc/S5CL-EXXZ>]. The problem, of course, is that the audit meter can suggest to taxpayers that they should make their return more conservative, but it might also suggest to taxpayers that, depending on the taxpayer's appetite for risk, there room for some more favorable treatment without triggering an audit. The stoplight-like coloring of the audit meter, running from green, low risk, through yellow, to red, high risk, is particularly suggestive.

²⁰ E.g., Dashiell C. Shapiro, *Can Taxpayers Rely on IRS Form Instructions?*, TAX NOTES 945 (2015) (citing many cases in which courts refused to permit taxpayers to rely on instructions); see also *Wilkes v. United States*, 50 F. Supp. 2d 1281, 1287 (M.D. Fla. 1999) (noting that instructions on a form are "generally consistent with Plaintiff's reading of the statutes . . . [but] they are not of such moment as to be dispositive").

²¹ Order, *Bobrow v. Comm'r*, 2014 ARD 079-1 (Nega, J.), *refusing to reconsider* *Bobrow v. Comm'r*, 107 T.C.M. (CCH) 1110 (2014) ("[T]axpayers rely on IRS guidance at their own peril . . . [H]ad petitioners argued reliance on Publication 590 in their briefs, such an argument would not have served as substantial authority for the position taken on their tax returns [and thus could not mitigate a section 6662 accuracy-related penalty].").

²² *Estate of Merwin v. Comm'r*, 95 T.C. 168, 180-81 (1990). I was able to find only example of an actual error on a tax form's algorithm—not in the form structure itself, but in the requested inputs. In 1982, Line 1 of the Schedule Q to Form 706 initially read, "Transferee's tax as apportioned (from worksheet, (line 7 / line 8) X line 34 for each column)." It should have read "Transferee's tax as apportioned (from worksheet, (line 7 / line 8) X line 35 for each

instructions the status of law should treat the form the same way. Forms themselves are not statutes or regulations.

Forms themselves are, rather, a *formalization of the law*, because they translate the law into a series of automatic steps applied to taxpayer-supplied inputs.²³ As formalizations, they are not simplifications of the law, as are some instructions.²⁴ This may seem a strange claim. Consider, for example, the Form 1040-EZ. Form 1040-EZ calculated individual income tax liability and was a mere 14 lines long.²⁵ But it was not a simplification of the law. Rather, the form was a precise implementation of the law *for the people who were permitted to use Form 1040-EZ*. Part of the implementation of the law was limiting the use of Form 1040-EZ to those for whom it was not a simplification: people who were single or married filing jointly, younger than 65, had no dependents, had income below \$100,000, and so forth.²⁶

column).” The IRS initially issued the form in June 1982, discovered the error in September 1982, and corrected the error in November 1982. Announcement 82-141, 1982-44 IRB 15. This error cost at least one taxpayer a significant amount of money, reducing a credit from \$104,350 to \$35,562. The return preparer apparently did not see the correction when she prepared the form, even though a copy of the notice correcting the form was placed in each form. *See Boryan v. United States*, 690 F. Supp. 459 (ED Va. 1988). The court held that the taxpayer could not receive a higher refund, notwithstanding that the error was due to the incorrect form. The statute of limitations had already run, and the equities did not, the court held, weigh particularly heavily in favor of the taxpayer, because the notice of correction was issued five months before the return was filed; the form was permanently corrected within the statute of limitations; and familiarity with the statute should have suggested that the credit was approximately one-third of the correct amount. *Id.* at 467.

²³ For a discussion of the benefits of the formalization of tax law, see generally Sarah B. Lawsky, *Formalizing the Code*, 70 TAX L. REV. 377 (2017).

²⁴ *See, e.g.*, Joshua D. Blank & Leigh Osofsky, *Simplexity: Plain Language and the Tax Law*, 66 EMORY L.J. 189, 207-14 (2017) (presenting examples of instructions’ presenting contested law as clear and omitting possible exceptions).

²⁵ As of tax year 2018, the 1040-EZ is no longer with us, having been replaced by the redesigned Form 1040. *About Form 1040-EZ, Income Tax Return for Single and Joint Filers With No Dependents*, I.R.S., <https://www.irs.gov/forms-pubs/about-form-1040-ez> [<https://perma.cc/NTJ9-6JVT>] (last updated March 26, 2019).

²⁶ The list of requirements was long. People were able to use the form only if they met the following requirements: single or married filing jointly; under age 65 and not blind at the end of the tax year; do not claim any dependents; taxable income of less than \$100,000; no adjustments to income; claimed no tax credit except the earned income credit; had only “wages, salaries, tips, taxable scholarship or fellowship grants, unemployment compensation, or Alaska Permanent Fund dividends, and . . . taxable interest . . . not over \$1,500,” and some people who earned tips were still not able to use the form; and not claiming an increased standard deduction due to casualty loss related to property in a Presidentially declared disaster

Forms have three components: **inputs, outputs, and algorithms**. The algorithms transform the taxpayer-provided inputs into outputs. Tax forms are unusual among most governmental forms because of their relatively high ratio of outputs to inputs and the relative complexity of the calculations required. This is why computer preparation was a natural fit for tax forms even in the mid-1980s, as opposed to other forms. Other forms—immigration forms, for example—primarily collect and organize information. Tax forms, however, do things with numbers. Computing thus added value even in the very early days of spreadsheets.

To take a fictional example, imagine that the entire tax statute consisted of the following: “Income includes income from whatever source derived. Taxable income means the excess, if any, of income over trade and business expenses.” The form could be implemented as follows:

Line	Description	Type
1	Income	Input
2	Trade and Business Expenses	Input
3	If line 1 is more than line 2, enter the difference here. If line 1 is equal to or less than line 2, enter 0 here.	Output

In this form, lines 1 and 2 are inputs, line 3 is an output, and the command in line 3 to either enter the difference between lines 1 and 2 or to enter zero is the algorithm. The ways that inputs are combined could also be called the “form structure.”

What does this imaginary form show? First, what should be input into the form may be ambiguous. Inputs may require defining a particular term that is difficult to define precisely. For example, Form 1040 lists various types of specific income and then requires the taxpayer to

area. I.R.S., Dep’t of the Treasury, CAT. NO. 12063Z, 1040 EZ INSTRUCTIONS 2017 6, 7 (2018), <https://www.irs.gov/pub/irs-prior/i1040ez--2017.pdf>.

include “Other Income,” listing type and amount.²⁷ “Income” is a classic example of a term that is not clearly defined in the tax law.²⁸

Similarly, in our simple example form, the inputs are problematic. The meaning of “income” is unclear. Further, it is not clear what constitutes a “trade or business expense.” Perhaps the regulations or instructions in this imaginary world would attempt to expand upon the terms. Indeed, much could be said about what goes into lines 1 and 2. Second, tax law’s aversion to negative numbers²⁹ means that even the simple rule in our imaginary statute is not completely straightforward to implement. After all, it would not be correct to say, for line 3, “Subtract line 2 from line 1 and enter the result,” because this could result in negative taxable income. The language in the imaginary form for implementing the algorithm tracks the IRS’s usual approach to dealing with implementing language such as “the excess (if any) of A over B.”³⁰

Third, what should be input into forms may be ambiguous, but once the information is input, implementing a form’s algorithm is

²⁷ I.R.S., DEP’T OF THE TREASURY, CAT. NO. 71478F, SCHEDULE 1 (FORM 1040) (FY 2018), [HTTPS://WWW.IRS.GOV/PUB/IRS-PDF/F1040S1.PDF](https://www.irs.gov/pub/irs-pdf/f1040s1.pdf).

²⁸ See generally Alice Abreu & Richard Greenstein, *Defining Income*, 11 FLA. TAX REV. 295, 299 (2011) (noting the “widespread uncertainty and disagreement about what counts as the kind of ‘accession to wealth’ that should be taxed—that is, widespread uncertainty and disagreement about what the language in the Internal Revenue Code and *Glenshaw Glass* means”).

²⁹ E.g., Eric A. Lustig, *Negative Basis Reconsidered*, 32 GONZ. L. REV. 45, 46 (1997) (discussing the “aversion” of Congress and the IRS to negative numbers in the context of tax law); Lee A. Sheppard, *Reading Section 357(c) Out of the Code*, 47 TAX NOTES 1556, 1557 (1990) (noting that Congress “abhor[s]” the idea of a negative basis).

³⁰ If one were coding such language one could write $\text{MAX}((A - B), 0)$, indicating that one should enter the maximum of (a) the difference between A and B and (b) zero, or, put another way, one should enter $A - B$ if the result is a positive number and zero if $A - B$ is zero or negative. Technically, one has to tell the computer what to do to implement $\text{MAX}(X, Y)$ if $X = Y$. The instructions might be, for example, “Return X if $X > Y$ and return Y otherwise,” which will return Y when $X = Y$. This shows up in Section 168(b)(1), which implements depreciation for certain property as “the 200 percent declining balance method, switching to the straight line method for the 1st taxable year for which using the straight line method with respect to the adjusted basis as of the beginning of the year will yield a larger allowance.” I.R.C. § 168(b)(1) (2017). There will always be a year when the allowance for the 200 percent declining balance method and the straight line method are the same, but the rule does prescribe what to do—specifically, use the 200 percent declining balance method. *Id.*

straightforward. In the imaginary form, once you have the inputs for lines 1 and 2, what to do with those inputs is not ambiguous, and results in a third number, the output, the taxable income. The tax law isn't as simple as the imaginary tax law, and seeing that forms can, by form structure, implement rules even when the inputs the algorithm uses are genuinely ambiguous terms is another way of seeing the obvious point that forms are useful even in the face of genuine ambiguity. (By form structure, I mean the parts of a form itself other than the inputs. For example, how are the inputs combined? In what order do these combinations happen?)

More generally, there are two kinds of answers to questions raised by a statute: answers that are usefully represented by a form structure, and answers that are not usefully represented by a form structure. These two categories do not map cleanly onto rules and standards, in the classic sense.³¹ Only certain kinds of questions or ambiguities can be resolved by form structure. The only thing that can be concluded is that if an answer is usefully resolvable by a form structure, the answer must be a rule (because form structure can implement only rules). But this does not mean that the only possible answer to the question is a rule; the question might also be resolvable by a standard (though in that case, the resolution could not be implemented by a form). I suspect there is no question that cannot be answered with a rule (though not all questions can be answered *well* with a rule), and not all rules will be usefully represented by a form structure.

Finally, beyond what this imaginary form can teach us, an algorithm can implement only a rule. Because the algorithm is automatic, the link between the algorithm and the law may not be straightforward. In particular, the algorithm itself may resolve ambiguity in the law. Inputs leave room for ambiguity. The algorithms imposed by a form and the structure of a form do not. Once a form has its inputs, the answer is fixed. But the structure of the form may itself be resolving gaps, ambiguities, or misstatements in the statute.

³¹ See generally, e.g., Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L. REV. 557 (1992).

It is completely obvious that statutes raise questions that must be resolved by other lawmakers. Statutes, often by design, include gaps and ambiguities.³² These gaps and ambiguities are resolved by courts, regulations, and, in the tax context, other guidance such as notices and rulings. It has also been recognized that the instructions of tax forms sometimes purport to resolve ambiguities in the law, sometimes in favor of the government, sometimes in favor of the taxpayer.³³ Instructions are, as others have noted, not law. If an ambiguity is not satisfactorily resolved by the form instructions, or if a taxpayer disagrees with the form instructions, one would know that the question was not satisfactorily resolved, or was resolved in an objectionable way.

The resolutions of questions by form structure are less obvious. If a taxpayer disagrees with the IRS's position on an ambiguity related to an input, he will probably know that he disagrees (for example, he may read the instructions, understand that the instructions are only aspirational on the part of the IRS, and decide not to follow them), but can still use the form. He will enter an input that later he may have to defend in an audit, or in court. But *given that input*, the outputs of the form will follow the IRS's position (and will be correct as a matter of law, assuming that the IRS's position is correct as a matter of law). In contrast, if a taxpayer disagrees with an ambiguity that is resolved by form *structure*, he will simply not be able to use that form.

III. An Example: Personal Casualty Losses

These abstract ideas are best seen in the context of an actual statute and an actual form. This section first lays out the law with regard to the deduction of casualty gains and losses, and then shows how that complex law is digested into Form 4684, Casualties and Thefts.³⁴

³² See, e.g., Joseph A. Grundfest & A.C. Pritchard, *Statutes with Multiple Personality Disorders: The Value of Ambiguity in Statutory Design and Interpretation*, 54 STAN. L. REV. 627, 628 (2002); Nicholas Quinn Rosenkrantz, *Federal Rules of Statutory Interpretation*, 115 HARV. L. REV. 2085, 2155 (2002); Jarrod Shobe, *Intertemporal Statutory Interpretation and the Evolution of Legislative Drafting*, 114 COLUM. L. REV. 807, 867 (2014).

³³ Blank & Osofsky, *supra* note 25, at 194.

³⁴ Section 165(h) was not added until March 31, 1962, and applied to disaster losses after December 31, 1961. Act of March 31, 1962, Pub. L. No. 87-426, § 2, 76 Stat. 51 (amending

a. The Law: Section 165(h)

The Internal Revenue Code states as its general rule regarding losses that a deduction is permitted for any loss, to the extent not compensated for by insurance.³⁵ In a perhaps surprising twist, however, given this general rule, losses of individuals are not deductible.³⁶ An exception to the exception is provided for casualty losses: individuals may deduct losses that arise from “fire, storm, shipwreck, or other casualty, or from theft.”³⁷ The deduction for casualty losses is limited by Section 165(h).³⁸ A taxpayer can incur gains from a casualty, “personal casualty gains,”³⁹ when the amount received due to the involuntary conversion of property due to a casualty exceeds the taxpayer’s basis in the property.

The text of the statute states a number of rules clearly, including the following:

- (1) Personal casualty losses are permitted to be deducted only to the extent they exceed \$100. This is per *casualty*, not per item.⁴⁰ Call this the ‘\$100 haircut.’
- (2) Personal casualty losses are deducted above the line to the extent of casualty gains.⁴¹ Personal casualty losses in excess of personal casualty gains are deducted below the line, if the taxpayer itemizes deductions.

internal revenue code with respect to treatment of casualty losses in Presidentially designated disaster areas). Something like current Section 165(h) was not added until September 3, 1982 (prior to that time, 165(h) dealt only with disaster loss). Tax Equity and Fiscal Responsibility Act of 1982, Pub. L. No. 97-248, § 203(a), 96 Stat. 422 (adding the 10% of AGI rule).

³⁵ I.R.C. § 165(a) (2017).

³⁶ I.R.C. § 165(c) (2017).

³⁷ I.R.C. § 165(c)(3) (2017).

³⁸ The limiting language is reproduced in full in Appendix A, and it is worth at least glancing at this language to appreciate its complexity and its at least initial obscurity. This section of the paper discusses the pre-2018 law related to casualty losses; the new law is discussed in a later section.

³⁹ I.R.C. § 165(h)(3)(A) (2017).

⁴⁰ I.R.C. § 165(h)(1) (2017).

⁴¹ I.R.C. § 165(h)(4)(A) (2017).

- (3) Personal casualty losses are permitted to the extent of personal casualty gains dollar for dollar.⁴² Personal casualty losses in excess of personal casualty gains are permitted only to the extent they exceed 10% of the individual's AGI.⁴³ Call this the 'AGI haircut.' This is total casualty losses, not casualty by casualty, or item by item.
- (4) If the taxpayer is covered by insurance, a casualty loss is available only if the individual files a timely insurance claim.⁴⁴

Some questions that arise naturally from these rules are resolved directly and explicitly by the statute. For example, one might wonder whether the \$100 haircut or the 10% AGI haircut is applied first. The statute addresses this directly: "personal casualty loss" for purposes of paragraph (2), the AGI haircut, is determined after the application of paragraph (1), the \$100 haircut.⁴⁵

Other questions are resolved by the plain language of the text, although not explicitly. For example, does the \$100 haircut also apply if there are not casualty losses in excess of casualty gains? That is, if the only role of the casualty losses is to offset casualty gains, will all the casualty losses be permitted to offset the casualty gains, or must the casualty losses be reduced by the casualty gains? This is not explicitly addressed by the statute, but from the plain language of the statute it appears that the \$100 loss applies first: "Any loss... described in subsection (c)(3) shall be allowed only to the extent that the amount of the loss ... exceeds ... \$100."⁴⁶ And "personal casualty loss" is defined as "any loss described in subsection (c)(3)."⁴⁷ One can imagine this as a \$100 deductible that applies to any casualty loss deduction.

Yet other questions are not addressed by the statute, but are addressed in the regulations. The statute does not define personal casualty loss

⁴² I.R.C. § 165(h)(2)(A)(i) (2017).

⁴³ I.R.C. § 165(h)(2)(A)(ii) (2017).

⁴⁴ I.R.C. § 165(h)(4)(E) (2017).

⁴⁵ I.R.C. § 165(h)(3)(B) (2017).

⁴⁶ I.R.C. § 165(h)(1) (2017).

⁴⁷ I.R.C. § 165(h)(3)(B) (2017).

beyond “loss described in subsection (c)(3),”⁴⁸ and Section 165(c)(3) refers simply to losses arising from casualty, etc. The regulations fill in the details: the amount of the casualty loss is the lesser of (1) the fair market value of the property before the casualty less the fair market value of the property after the casualty, or (2) the basis of the property.⁴⁹ Put another way, a tax loss is available for destruction of property only to the extent one has invested appropriately taxed dollars in that property, but no matter how many appropriately taxed dollars one has invested, one’s tax loss cannot be more than one’s economic loss.

Finally, and of most interest for our purposes, other questions are addressed by neither statute nor regulation. For example, what is a casualty? More technical questions also lurk in the statute. For example, what is the result when insurance received is less than the basis of the property but greater than the economic loss due to the casualty? This last is perhaps a non-obvious question, so some explanation is in order.

As already described, casualty gain is ‘recognized gain’ from a casualty. ‘Gain’ is the excess of the amount received over basis.⁵⁰ So if the insurance received is greater than the basis, there is casualty gain. Casualty loss is the lesser of the economic loss and the basis, but only to the extent not offset by insurance received. If the insurance received is less than both the economic loss and the basis, then there is casualty loss, equal to the lesser of the economic loss or the basis, minus the insurance received.

But is there a casualty gain, a casualty loss, or neither if the insurance received is less than the basis (so there is not casualty gain), but greater than the economic loss? This is addressed nowhere in the statute or in any binding guidance from the IRS. An IRS publication regarding casualty losses states that there is no casualty gain or casualty loss:

⁴⁸ *Id.*

⁴⁹ Treas. Reg. § 1.165-7(b)(1) (1977).

⁵⁰ I.R.C. § 1001 (2017).

The mere fact that the insurance proceeds exceed the cost of repairs does not in and of itself result in taxable income to the taxpayer. Any gain from a casualty is determined by the amount of insurance proceeds and any other form of compensation received or expected to be received in excess of the amount of the taxpayer's adjusted basis in the damaged property prior to the casualty. In this example, the taxpayer would not recognize any gain because the amount of the insurance proceeds is less than the taxpayer's pre-disaster basis in the residence.⁵¹

This is indeed the answer that makes sense. Consider the question another way: if property is completely destroyed, and the basis prior to the casualty is greater than the economic loss due to the casualty, then loss property has been destroyed:

$$\text{Basis} > \text{Value Before} - \text{Value After}$$

$$\text{Basis} > \text{Value Before} - 0$$

$$\text{Value Before} - \text{Basis} < 0$$

But the casualty loss rules are constructed so that any loss incurred that isn't due to the casualty is not deductible.

Put another way, if the property had been sold instead of destroyed by a casualty, a loss would have been realized, but could not have been recognized, because personal losses are generally not recognized unless an exception applies. A taxpayer does not get to deduct that portion of the loss just because the property was destroyed in a casualty. So the taxpayer will deduct any portion of the loss due to the casualty, but not the portion due to the property's having lost value before the property was destroyed.

⁵¹ FAQs FOR DISASTER VICTIMS – CASUALTY LOSS, I.R.S., <https://www.irs.gov/businesses/small-businesses-self-employed/faqs-for-disaster-victims-casualty-loss-valuations-and-sections-165-i> [<https://perma.cc/TYK3-WWFC>] (last updated July 29, 2019).

Now imagine that insurance is received. If the amount of insurance is greater than the basis, that's casualty gain. If the amount of insurance is less than the economic loss, then there is some casualty loss (but not the full amount of economic loss, because it's offset by the insurance received). But what happens if the insurance is less than the basis but greater than the economic loss? There should not be any casualty gain, because there's gain recognized only if the amount received exceeds basis.⁵² But neither should there be any casualty loss, because the lost amount is effectively disallowed loss. And why is this "loss" disallowed? Because that portion of the value was not destroyed by the casualty.

To summarize, some of the questions listed above are answered directly by the statute or by regulations, and others are not.

Answered by statute or regulations	Not answered by statute or regulations
Must an insurance claim be filed in order to take a casualty loss deduction? Is the \$100 haircut or the 10% AGI haircut applied first? When casualty losses do not exceed casualty gains, does the \$100-per-casualty haircut still apply? What is the amount of the casualty loss?	What is a casualty? When insurance received is less than basis and greater than loss of value, is there casualty gain, casualty loss, or neither?

The questions can be further divided into those questions that can be resolved by the form structure, and those that cannot.

⁵² It might still be correct to include the overinsurance amount as income, but not as casualty gain. Thanks to Professor Larry Zelenak, at Duke Law, for this point.

	Answered by statute or regulations	Not answered by statute or regulations
Not resolvable by form structure	Must an insurance claim be filed in order to take a casualty loss deduction?	What is a casualty?
Resolvable by form structure	Is the \$100 haircut or the 10% AGI haircut applied first? When casualty losses do not exceed casualty gains, does the \$100-per-casualty haircut still apply? What is the amount of the casualty loss?	When insurance received is less than basis and greater than loss of value, is there casualty gain, casualty loss, or neither?

Some of these questions will be resolved by the structure of Form 4684,⁵³ but some cannot be.

b. Form 4684: Casualties and Thefts

Form 4684 addresses casualty and theft losses for individuals. The form condenses a large amount of law. The only inputs on Form 4684 are, for each destroyed or damaged property, (1) a description of the property, (2) the cost or basis of the property, (3) insurance, if any, for the property, (4) the property's fair market value before the casualty, and (5) the property's fair market value after the casualty.⁵⁴ This information takes up five lines for each property. Yet the form itself is 18 lines long. Thirteen lines are thus outputs. Divide these into 'interim outputs,' which feed into other lines on the same form, and 'final outputs,' which feed into other forms. Form 4684 has 11 interim outputs; one either interim output or final output (line 15); and one final output (line 18).

i. Ambiguous Inputs

What constitutes correct inputs may not be easily resolved. The form asks, for example, for the description, basis, and insurance for

⁵³ See *infra* Appendix B.

⁵⁴ There is one more piece of information the form implicitly requires: whether the casualty that resulted in the loss was a federally declared disaster. But the form does not explicitly ask for this information.

“property lost or damaged from the same casualty or theft” to be grouped on different forms. This raises a number of questions, none of which can be answered by the structure of the form.

Consider the definition of ‘casualty.’ A “personal casualty loss” is, as described in Section 165(c)(3), a loss “aris[ing] from fire, storm, shipwreck, or other casualty, or from theft.” The statute does not further define casualty for these purposes. Whether a loss is due to a ‘casualty’ isn’t usefully addressed by the way that the statute is translated into a form, because it asks about a definition, a concept.

The definition of casualty is addressed in the instructions to the form, but not comprehensively. The instructions highlight what are presumably some of the more common items that do not constitute casualties (misplaced or lost money or property; items that break under ‘normal conditions’; ‘progressive damage to property’; decline in the market value of certain stock⁵⁵), but don’t claim that this list is exhaustive.

Instead, to define the limits of ‘casualty’ one turns to a series of cases. For example, the value of a house decreased because a neighboring house was the site of a notorious crime. The instructions do not address such a situation, at least in part because it’s so uncommon. A court held that this decline in value did not constitute a casualty loss.⁵⁶ Courts use canons of statutory interpretation to analyze this question. A court reasons, for example, that the term “casualty” must be interpreted *in pari materia* with the other items on the list—fire, storm, shipwreck, and so forth—and these items all involve physical damage or loss, so a casualty must involve physical damage or loss.⁵⁷ All of these events are “sudden, unexpected or unusual.”⁵⁸ And so forth.

⁵⁵ I.R.S., Dep’t of the Treasury, CAT. No. 12998Z, 2018 INSTRUCTIONS FOR FORM 4684, 2 (2019), <https://www.irs.gov/pub/irs-pdf/i4684.pdf>.

⁵⁶ *Caan v. United States*, 83 A.F.T.R.2d 99-1640, 99-1641 (C.D. Cal. 1999).

⁵⁷ *E.g.*, *Adams v. Comm’r*, 36 T.C.M. (CCH) 1219 (1977); *Pulvers v. Comm’r*, 407 F.2d 838, 839 (9th Cir. 1969).

⁵⁸ *Matheson v. Comm’r*, 54 F.2d 537, 539 (2d Cir. 1931).

A ‘big data’ approach could provide some guidance with respect to this question. A computer could look at all of the cases that address the question of what constitutes a casualty and predict whether the current situation is sufficient like those cases to qualify as a casualty. A tax preparation program could use such an approach to determine what questions to ask the taxpayer and could guide the taxpayer as to whether certain losses would qualify as casualty losses.⁵⁹

The question of what constitutes a casualty could also be resolved by a rule. For example, the rule could be that a ‘casualty’ for purposes of Section 165(c)(3) is anything that is a federally declared disaster. (This is not the current law; it’s simply an example.) This is trivially resolvable by a computer—it could just check to see whether the casualty described was on the list of federally declared disaster.

ii. Implementing Law Through Form Structure

Other portions of the law are implemented through the structure of the form itself. The portion of the form for personal use property has 18 lines and only four inputs for each piece of property (and only three inputs that are used in the rest of the form, as if the inputs are simply a description of the property). From one view, this is a long form for so few inputs. But from another view, given that it implements, without simplifying, the statute and regulations, it is extraordinarily concise. It incorporates answers to all the questions described in Section A above, primarily through ordering of calculations.

Not all rules are implemented by ordering, of course. The form implements the regulation’s rule to determine the amount of economic loss directly. The taxpayer is instructed to enter the basis of the property (line 2) and then calculate the difference between the fair market value before and the fair market value after the casualty (line 7), and then to enter the smaller of the two (line 8). This is the casualty loss.

⁵⁹ Blue J Legal, for example, uses “deep learning” to answer the question of whether a worker is better classified as an independent contractor or an employee—a distinction that is classically not determined by a clear rule. BLUE J. LEGAL: TAX FORESIGHT, <http://www.bluejlegal.com/tax-foresight> [<https://perma.cc/92WP-L75A>].

But many of the more complicated rules are implemented through ordering. Consistent with the statute, the form permits casualty loss to offset casualty gain dollar for dollar by reducing casualty gain by casualty loss (line 15) and only then reducing the amount of casualty loss by 10% of AGI (lines 16 through 18). And it permits the deduction of casualty loss to the extent of casualty gain above the line by instructing the taxpayer to enter casualty gain *reduced by casualty loss* on Schedule D, the schedule for Capital Gains and Losses (line 15). (Notice as well that the form thus implements the rule that if personal casualty gains exceed personal casualty loss, such gains and losses are treated as capital gains and losses.)⁶⁰ It is only casualty losses in excess of casualty gains that will be entered on Schedule A, itemized deductions (line 18).

These answers are, as discussed above, absolutely clear in the statute, either explicitly or implicitly. The taxpayer may not understand that by filling out the lines in the particular order requested he is implementing these particular rules, but that seems unimportant, since they are absolutely the law.

Moreover, if the taxpayer does understand the effect of the ordering, the law may be clearer on the form than in the text. Take the rule that the \$100 haircut applies even if gains are greater than losses. Recall that this was implicit in the statute, not explicit, and someone reading the statute once or twice might still not understand after reading the statute whether the \$100 haircut truly acts as a deductible or reduces only losses after the losses are netted against the gain. Someone who understands the form will have no doubt about the answer to this question (or at least about the IRS's approach to this question); the form makes it absolutely clear.

Additionally, even someone who doesn't understand what the form is doing, if they can frame the question and they trust the form, can figure out the answer by running some numbers through the form. If they check what happens when there is \$90 of casualty gain and \$120

⁶⁰ I.R.C. § 165(h)(2)(B) (2017).

of casualty loss, they will know that the \$100 haircut reduces losses before losses offset gains.

These are advantages of having law digested into a form: some rules are clearer to someone who understands the form, and the rule can be checked even by someone who does not understand the form. Forms are helpful, then, if the law is absolutely settled, but is complex in its presentation.

c. Resolving Ambiguity Through Form Structure

But what if the law is not absolutely settled and clear? That is, what if there is an ambiguity in the law? Some ambiguities, as discussed above, must be resolved prior to determining inputs. But some ambiguities in the law can be resolved through the structure of the form itself. And this presents concerns.

Once the taxpayer has determined what numbers to enter onto the form, there is no discretion involved in filling out the form. The outputs are automatic, as it were. This is why tax forms, as discussed, are so amenable to being put on a computer. Thus, if an ambiguity is resolved through a form's structure, a taxpayer who disagrees with the form's resolution of the ambiguity cannot use the form at all.

Additionally, if an ambiguity is not obvious, the form will not reveal that an ambiguity exists. The taxpayer must understand the meaning of 'casualty loss' before he can create the inputs for the form. But once those inputs are created, the form no longer reveals any ambiguity. Because over 90% of tax returns are prepared using computer,⁶¹ the extent to which the law is implemented via the algorithm of the form is even less transparent than was before computer preparation became the predominant approach to tax returns. A computer program asks for

⁶¹ In 2017, 131,663,509 individual tax returns were filed electronically; 18,202,777 individual tax returns were filed on paper, but of those, 7,739,356 were computer generated. I.R.S., DEP'T OF THE TREASURY, PUBLICATION 6187: CALENDAR YEAR PROJECTIONS OF INDIVIDUAL RETURNS BY MAJOR PROCESSING CATEGORIES 5 tbl.1A (Rev. 10-2018), <https://www.irs.gov/pub/irs-prior/p6187--2018.pdf>. Thus, slightly over 93% of returns, at least, were prepared by computer.

inputs and provides outputs. The return preparer does not see the interim steps.

i. Insurance Between Basis and Economic Loss

Consider, for example, the question described above: what is the result with respect to casualty gains and losses when insurance received is less than the basis of the property but greater than the economic loss due to the casualty? As explained above, there is no law on point. There is an answer that makes sense, but as any tax lawyer, tax professor, or tax student can tell you, that a tax answer “makes sense” does not necessarily mean that the answer is correct. ‘Tax logic’ does not always do a good job of holding up. One cannot reason one’s way to an answer in tax law.

But the tax form absolutely resolves the question, and there is no opportunity, once someone is using the form, to come up with any other solution.⁶²

Line 4 is casualty gain. This is the excess of insurance received with respect to the property (line 3) over the basis of the property (line 2). This number will always be positive or zero, because the form itself says to skip line 4 if the basis of the property received (line 2) is greater than the insurance reimbursement received (line 3). Thus, if the basis exceeds the insurance received, there will be no casualty gain. If the loss in economic value is less than the basis, then line 8 will be the loss in economic value. Line 9 instructs the taxpayer to subtract the amount of insurance (line 3) from the loss in economic value (line 8), and if the amount is zero or less, to enter zero. That amount equals the casualty loss. If the amount of insurance is greater than the loss in economic value, the subtraction will result in a number less than zero, and the taxpayer will enter zero. So if the insurance is less than the basis of the property but greater than the economic loss, there is no casualty gain and no casualty loss.

⁶² To be clear: the form resolves the question of what amount, if any, should constitute casualty gain or loss. It does not resolve the question of whether, for example, the overinsurance amount should count as income. That question is outside the scope of the form.

Now, even though this answer makes sense, it is not anywhere in the statute or the regulations. Publications are, as discussed above, not binding law. But a taxpayer who uses Form 4684 to report casualty gains and losses will follow this rule, perhaps without even realizing it, as it's not addressed in the instructions. And the taxpayer will follow the rule because of the way that the form requires the taxpayer to combine the various pieces of information the taxpayer enters.

ii. Disallowing Losses from Non-Federally Declared Disasters

An example from the 2017 Tax Act is perhaps even more intriguing, because it involves not just a question that is unresolved by the statute or regulations, but a genuine ambiguity in the statutory text. The 2017 Tax Act changed the law regarding casualty losses. In addition to the other requirements previously laid out in Section 165(h), for the years 2018 through 2025, only casualty losses due to federally declared disasters ("FDD losses") are deductible, except that casualty losses not due to federally declared disasters ("non-FDD losses") are permitted to be used to offset casualty gains.⁶³

Casualty losses that are not due to federally declared disasters are still permitted to offset casualty gains. Thus taxpayers use non-FDD casualty losses to offset casualty gains, and then use FDD casualty losses, to the extent permissible, to offset other gains.

One possible algorithmic approach to implementing the 2017 law is something like this:

- A. Separate damaged items into casualties. Classify casualties as FDD or non-FDD.
- B. Sum all gains from all casualties into a single number ("Total Gain").
- C. For each casualty, sum all losses and reduce by \$100 per casualty.

⁶³ I.R.C. § 165(h)(5) (2017).

- D. Sum all FDD casualty losses (after \$100 per casualty deduction) ("Total FDD") and, separately, sum all non-FDD casualty losses (after \$100 per casualty deduction) ("Total non-FDD").
- E. Reduce Total Gain by Total non-FDD, but not to less than zero.
- F. If any gain remains after reducing Total Gain by Total non-FDD, reduce that by FDD casualty losses, but not to less than zero.
- G. Reduce any remaining FDD casualty losses by 10% of AGI (but not to less than zero); this reduced amount may be entered into itemized deductions.

For example, assume that there are three casualties, A, B, and C, with the following characteristics:

Casualty	A	B	C
Total Gain	\$5,000	\$2,000	\$0
Total Loss	\$0	\$8,000	\$13,000
FDD	Yes	Yes	No

Each of the losses would get a \$100 haircut, resulting in the following post-haircut:

Casualty	A	B	C
Total Gain	\$5,000	\$2,000	\$0
Loss Post-Haircut	0	\$7,900	\$12,900
FDD	Yes	Yes	No

The \$12,900 losses of non-FDD losses would be used to offset the total gain of \$7,700. No FDD losses would be used to offset the gain, because there would be more than enough non-FDD losses. The non-FDD losses would then be thrown out; the FDD losses would be reduced by 10% of AGI (let's say, for purposes of this calculation, that

AGI is \$5,000, so 10% of AGI is \$500), and the remaining losses, $\$7,790 - \$500 = \$7,290$ would be deductible.⁶⁴

This is the approach described in, for example, the Federal Tax Coordinator, a tool for tax practitioners:

[W]here an individual has both personal casualty gains and personal casualty losses for a tax year, the individual first reduces the amount of personal casualty gains by the amount of nonfederal casualty losses. Any remaining personal casualty gains are then used to reduce the amount of the taxpayer's deductible federal disaster losses. Any remaining federal disaster losses are deductible to the extent they exceed the 10%-of-AGI floor.⁶⁵

This is a reasonable approach—perhaps the most reasonable approach. (Let's call it the 'Standard Reading.') But the Standard Reading is not the only possible reading of the statute. The statute states:

[A]ny personal casualty loss which (but for this paragraph) would be deductible in a taxable year beginning after December 31, 2017, and before January 1, 2026, shall be allowed as a deduction under subsection (a) only to the extent it is attributable to a Federally declared disaster (as defined in subsection (i)(5)).⁶⁶

But what "personal casualty loss...(but for this paragraph) would be deductible"? Only those losses remaining *after* the \$100 haircut, then the netting against gains, and then the 10% of AGI haircut. If this is the correct approach, the steps should be as follows:

- A. Separate damaged items into casualties. Classify casualties as FDD or non-FDD.

⁶⁴ Feel free to add zeroes to these numbers until you find the discussion interesting.

⁶⁵ Personal Casualty Losses of Individuals are Nondeductible for 2018–2025 Unless Attributable to a Federally Declared Disaster, Fed. Tax Coordinator 2d (RIA) ¶ M-1900A, 2018 WL 1616828 (2019).

⁶⁶ I.R.C. § 165(h)(5)(A) (2017).

- B. Sum all gains from all casualties into a single number ('Total Gain').
- C. For each casualty, sum all losses and reduce by \$100 per casualty.
- D. Sum all casualty losses (after \$100 per casualty deduction) ('Total Losses').
- E. Reduce Total Gain by Total Losses, but not to less than zero.
- F. If any losses remain, reduce them by 10% of AGI.
- G. Remove any deductible losses not attributable to a federally declared disaster. What remains may be entered into itemized deductions.

It is not clear what of the remaining would be attributable to a federally declared disaster, because it is not clear what losses the 10% of AGI haircut reduced. It could have reduced non-FDD losses first, FDD losses first, or reduced both proportionately. If it reduced FDD losses first, the answer will be the same as that produced by the earlier steps. Otherwise, if there are more non-FDD losses than there are total gains, the losses deductible will be different with this second approach than with the first approach.

For example, with the same numbers above, the total losses are \$20,800. There are plenty of losses to offset the \$7,700 gain, with \$13,800 of losses remaining. In the absence of 165(h)(5), the total deductible losses, after the 10% haircut, would be $\$13,800 - \$500 = \$13,300$. This is permitted "only to the extent it is attributable to a Federally declared disaster." What portion of this is attributable to a Federally declared disaster? It depends on what the \$500 haircut related to the 10% AGI rule reduced. If it reduced FDD losses and non-FDD losses proportionately, then the haircut reduced the losses as follows:

<i>proportionately</i>	Before 10% haircut	Reduction	Remaining
Non-FDD remaining before reduction	\$5,900	\$214	\$5,686
FDD remaining before reduction	\$7,900	\$286	\$7,614

So there are \$7,761 of deductible losses.

If the 10% of AGI haircut reduced FDD losses first, then the answer is the same as above: \$7,740 of deductible losses.

<i>FDD first</i>	Before 10% haircut	Reduction	Remaining
Non-FDD remaining before reduction	\$5,900	\$0	\$5,900
FDD remaining before reduction	\$7,900	\$500	\$7,400

If the 10% of AGI haircut reduced non-FDD losses first, then the answer is even more favorable to the taxpayer: there are \$7,790 of deductible losses.

<i>non-FDD first</i>	Before 10% haircut	Reduction	Remaining
Non-FDD remaining before reduction	\$5,900	\$500	\$5,400
FDD remaining before reduction	\$7,900	\$0	\$7,900

The most logical answer is that the 10% haircut reduced the losses proportionately, but proportionate reduction is always the most sensible answer (in my view), and it is not always the result when considering how to distribute something among dissimilar items.⁶⁷

The larger point is not that the second reading (let's call it the 'Alternate Reading') is necessarily correct. But it is a plausible reading of the 2017 Tax Act, based solely on the law's text. And no legislative history suggests otherwise.

The form for 2018 losses chose the Standard Reading. And this decision was implemented *structurally*, because the difference between the readings is the order in which computations are done. The 2018 Form 4684 itself is almost identical to the 2017 form, except that it includes the following language in the line on which the taxpayer is to enter aggregate losses: "If you have losses not attributable to a federally declared disaster, see the instructions."⁶⁸ The instructions

⁶⁷ For example, in a part gift/part sale, basis is distributed to the gifted portion first. Treas. Reg. §§ 1.1001-1(e), 1.1015-4(a). In a like-kind exchange, basis is, essentially, distributed to the non-boot items first. In an installment sale, basis is generally distributed proportionately, but in certain situations is distributed to debt first. IRC § 1031; Treas. Reg. § 1.1031(d)-2. And so on.

⁶⁸ I.R.S., Dep't of the Treasury, Cat. No. 12997O, Form 4684 ¶ 14 (2018), <https://www.irs.gov/pub/irs-prior/f4684--2018.pdf>.

provide a worksheet, Worksheet 1-1, for people with such losses, and the worksheet implicitly enforces the Standard Reading.⁶⁹ The total casualty losses that are permitted to be entered on the form are the sum of (a) all non-FDD losses (after the \$100 haircut) and (b) the lesser of (i) all FDD losses (after the \$100 haircut), and (ii) all casualty gains.⁷⁰

Worksheet 1-1. Losses Not Attributable to a Federally Declared Disaster—Line 14

1. Add the amounts from line 12 of all Forms 4684 reporting losses not attributable to a federally declared disaster	1. _____
2. Add the amounts from line 12 of all Forms 4684 reporting losses attributable to a federally declared disaster.	2. _____
3. Enter the smaller of line 1 or line 13 of Form 4684	3. _____
4. Add lines 2 and 3. Enter the result here and on Form 4684, line 14	4. _____

This is exactly equivalent to the Standard Reading as described above,⁷¹ but it is more compact. This extreme compactness is typical of tax forms.⁷² The compactness reduces the compliance burden (fewer steps to take) but also reduces the chance that the person using the form will understand what is happening or why he is being asked to

⁶⁹ I.R.S., SUPRA NOTE 56, at 5.

⁷⁰ Annoyingly, the worksheet does not tell the taxpayer what to do when FDD losses and casualty gains are equal—or, to put it in the terms of the worksheet, when line 1 of the worksheet equals line 13 of Form 4684. Obviously this does not create a practical problem, but technically the worksheet is underspecified. I.R.S., SUPRA NOTE 69, (2018).

⁷¹ See *infra* Appendix C.

⁷² I created my description of the Standard Reading before the actual form instructions were issued. While I was able to describe the idea algorithmically, the form writers were able to capture the idea much more elegantly. This has been my experience whenever I try to make a form for a particular provision before looking at the actual form: I can make one that works, but I always end up using more lines than the actual form.

take these steps. Indeed, a taxpayer who uses a tax preparation program will have no idea that such a decision has been made. The tax preparation program asks the taxpayer to input the basis, fair market value before, and fair market value after, of each of the properties, and to indicate which of the casualty losses were due to a federally declared disaster. The taxpayer might then receive the information that \$7,400 of losses were deductible. (It's also possible that this would simply be incorporated into taxable income and the taxpayer would never see this number.) The taxpayer would not know that she had casualty gains that were offset by casualty losses. She would have no idea where the \$7,400 number came from. She would not even know that adjusted gross income had anything to do with the \$7,400 result, because the program would not ask her to input her adjusted gross income for this determination (because the program would pull the AGI from other information entered). She certainly would have no idea that there was another outcome possible under another reading of the statute. And a program would have absolutely no chance to work in the taxpayer's favor when implementing the algorithm of the form, because to stray from the prescribed algorithm is to enter an answer that the IRS will easily be able to pick up as wrong on a simple computer review of the taxpayer's forms.⁷³

Contrast this with the situation in which a taxpayer disagrees, for example, with the statement in the form instructions that taxpayers cannot deduct "[b]reakage of china, glassware, furniture, and similar

⁷³ It is perhaps worth mentioning the 'TurboTax Defense' here. I could find no example of a TurboTax defense that involved the claim that the computer program implemented a form incorrectly. The original 'TurboTax Defense,' raised during the confirmation hearings of Timothy Geithner, was that his computer preparation software had failed to prompt him to enter particular information. *Nomination of Timothy F. Geithner, Hearing Before the S. Comm on Fin*, 111th Cong. 15 (2009) ("Mr. GEITHNER . . . I used Turbo Tax to prepare my returns. . . . Sen. GRASSLEY. Did the software prompt you to report income and pay self-employment taxes on your IMF income? Mr. GEITHNER. Not to my recollection, Senator."). One can imagine this as a failure to send the taxpayer along the correct path on a flowchart (an incorrect or missing Decision), not as a failure within a calculation (a mistake within a Process). Other cases involve mistranscriptions of information into the program or a failure to input information accurately, with taxpayers claiming they were justified in thus filing their taxes because the software let them do it. For a general discussion of the TurboTax defense, see Mock & Shurtz, *supra* note 10.

items under normal conditions.”⁷⁴ The taxpayer would have inputs into the form with which the IRS would disagree, because the taxpayer would include amounts as casualty losses that went against the definition of casualty loss. But the taxpayer could still use the form, and *given the taxpayer’s views on the breakage of china*, the amount of deductible losses would come out correctly. And the program itself could work to the taxpayer’s advantage. Depending on the sophistication of the program, its questions might be finely tuned based on machine learning or other big data analysis to hone in on the interpretation of “casualty” that balances favorability to the taxpayer with likelihood of triggering an audit, or likelihood that a position would be upheld on audit.

IV. Next Steps: Flexible Forms, Coded Law

Given the above discussion, this section suggests how tax forms could be improved; why software programs for other areas of law are and will remain unlike TurboTax; and possible steps forward in coding law itself.

a. Flexible Forms

Imagine a situation in which the IRS was truly not sure how to implement a particular statute, and that the different implementations had to be played out in the form’s structure, not in inputs. Forms are deterministic now, but they don’t have to be. There are alternatives to this locked-in approach for questions that must be resolved by form structure. There are at least five possible approaches: lock-in, choice, probabilistic, expected value, and no form.

First, the IRS could take the traditional approach and *lock-in* one particular reading of the language. The example above of Section 165(h), for example, locks in the Standard Reading. This approach, as discussed above, has some advantages. A lock-in form, like any form, makes it easier for a taxpayer to comply with the law as the IRS sees

⁷⁴ I.R.S., *supra* note 56, at 2. To be clear, I do not see any legitimate reason to disagree with the form’s statement.

it. A lock-in form may also make it easier for the taxpayer to understand the law, as the taxpayer can try out different numbers to see how they affect the bottom line. On the other hand, a lock-in form has its disadvantages. It makes any structural resolution of ambiguity difficult to detect, and someone who wishes to take a different approach cannot use the form at all. But this is not the only possible approach to the form.

Second, the form could give the taxpayer a *choice*, perhaps with additional information. For the casualty loss example, the form might say, “We believe there is a 60% chance that the correct form reflects the Standard Reading, and a 40% chance that the correct form reflects the Alternate Reading. Would you like a form that implements (a) the Standard Reading or (b) the *Alternate Reading*?” The taxpayer could then select one alternative, and the form would implement whichever alternative the taxpayer selected.⁷⁵ This would essentially provide the taxpayer with two forms; he could choose whichever form he preferred, and the IRS would know what approach he was taking and could audit the form appropriately.

Third, the IRS could create a *probabilistic* form. Again, for the casualty loss example, this form would take into account that the IRS thought there was a 60% chance that the correct reading was the Standard Reading and a 40% chance that the correct reading was the Alternate Reading. The form could provide taxpayers with the Standard Reading 60% of the time and the Alternate Reading 40% of the time. Again, there would essentially be two forms, but instead of letting the taxpayer choose, the taxpayer would be assigned a form. The chance of getting each form would depend on a random weighted selection. Using the numbers above, the deduction would be \$7,400 on roughly 60% of returns and \$7,614 on roughly 40% of returns. Neither position would subject the taxpayer to a penalty. Again, the IRS would know what approach the taxpayer had taken. This approach is probably not workable, as the IRS would essentially be charging

⁷⁵ Cf., e.g., EDWARD PACKARD, *THE CAVE OF TIME* (1979) (choosing your own adventure). The choice could also include either or both of the probabilistic and expected value approaches that follow.

different taxpayers different amounts of tax, which seems potentially problematic from an administrative law, or perhaps even a constitutional perspective.

Fourth, a form could calculate the *expected value* of the outcome—weighting the loss generated by the Standard Reading at 60%, the loss generated by the Alternate Reading at 40%, and summing the two. Again using the numbers above, the permitted deduction would be \$7,486.⁷⁶ While the outcome may be confusing to taxpayers, it's hard to imagine that for most taxpayers the final answer would be any more inscrutable than the answer computed strictly under either the Standard or Alternative Readings.

Finally, the IRS could *issue no form that resolved the question. The 2018 form could have looked exactly like* the 2017 form, and the instructions could have included language close to that of the statute—perhaps the language currently in the instructions, but without the worksheet:

For tax years 2018 through 2025, if you are an individual, losses of personal-use property from fire, storm, shipwreck, or other casualty, or theft are deductible only if the loss is attributable to a federally declared disaster. ... *An exception to the rule limiting the deduction for personal casualty and theft losses to federal casualty losses applies where you have personal casualty gains to the extent the losses don't exceed your gains.*⁷⁷

This provides the taxpayer with the law, but doesn't give them the algorithm to apply the law. This is perhaps the most problematic approach, for a number of reasons. First, even someone who has every intent to comply with the law may have a difficult time doing so. A taxpayer may want to use the Standard Approach, but may be unable to implement it accurately. Second, issuing no form at all does not affect all taxpayers equally. A taxpayer who can afford to hire a tax

⁷⁶ $(60\% \times \$7,400) + (40\% \times \$7,614) = \$7,486$.

⁷⁷ I.R.S., *supra* note 56, at 1-2 (emphasis in original).

preparer will be at a distinct advantage. Third, auditing the no-form approach will be extremely difficult. Unlike the situation in which the IRS has corralled the taxpayer into one of two possible approaches, the taxpayer might have taken any approach at all, and might have calculated the answer to that approach incorrectly.

b. TurboTax for... Tax

If “TurboTax for X” means more than simply “a computer program to help apply the government’s suggested approach to legal issue X,” in the United States, at least, for the same reasons tax may be uniquely suited to computational law, tax may be uniquely suited for a program like TurboTax. TurboTax is useful because it collects information, *and* guides taxpayers through a morass of forms, not all of which apply to them, *and* processes the information it receives. It’s not a wild coincidence that TurboTax exists only for tax, as tax law uniquely has forms that require extensive⁷⁸ computational processing of the inputted information.⁷⁹

“TurboTax for police complaints,”⁸⁰ for example, is a program that will “publish a complaint as the subject decides, with non-governmental actors, the press, or local civil rights attorneys.”⁸¹ The website describes creating what sounds like a database of police complaints that allows “Online Report Filing, Digital Evidence Uploading ... Department Identification Tools, Publicly Searchable Reports, Officers’ Names Made Public, Social Media Sharing ... Commitment to Open Data.”⁸² This is entirely unlike TurboTax,

⁷⁸ From a human perspective. Utterly trivial, from a machine perspective.

⁷⁹ The reason for the distinctive nature of tax law deserves more consideration. One possibility is that most law in the United States is based on common law, rather than being code based. But that explanation does not seem sufficient, as the usefulness and flexibility of forms and formalization when it comes to the tax law depends at least in part on the processing the law requires. Another possibility relates to the *subject* of the law. Tax law may be unique in how much its subject is numbers, and numbers that may start out loosely tied to the real world but that can be subject to endless manipulation that strays far from tracking anything occurring in the real world. I am working on an as-yet untitled paper that digs further into this issue.

⁸⁰ Conti-Cook, *supra* note 4, at 18 (describing OpenPolice.org, a “pending” website, as “TurboTax for police complaints”).

⁸¹ *Id.*

⁸² OPENPOLICE.ORG, <https://openpolice.org> [<https://perma.cc/QR6G-VRL5>].

except that it is on line. It does not even appear to apply the law to facts; rather, it collects and publishes facts.

The supposed “TurboTax for copyright”⁸³ also appears distinctly unlike TurboTax. This program, Durationator, gathers relevant law relating to copyright from a range of sources around the world. And this program does apply law to facts: it takes facts about a work and determines its copyright status in various jurisdictions. But again, it is essentially “a big database,”⁸⁴ in this case of copyright laws.

The purported “TurboTax for immigration”⁸⁵ is in some ways the most like TurboTax of these three examples. This program does not seem ever to have launched, but when it was publicized in 2014 and 2015 the phrase “TurboTax for immigration” turned up repeatedly.⁸⁶ Similar programs do now exist, though. Essentially, these programs help individuals understand what forms to file, what information to include on the forms, and where to send the forms. Some programs also take that information and enter it into the forms, which the applicant can then print and mail in.⁸⁷ (Strikingly, individuals’ immigration forms cannot be submitted electronically.)

These programs are similar to TurboTax in that the government has created forms that define compliance, and the programs help the individual interact with and complete those forms. But immigration forms are entirely inputs. The programs guide users through the forms,

⁸³ Laird, *supra* note 5, at 55, 59 (describing a program, Durationator, that “takes basic information about a work and determines its copyright status in any country in the world” and “looks like TurboTax for copyright”).

⁸⁴ *Id.* at 56.

⁸⁵ Schoon, *supra* note 6 (“Similar to the consumer-minded TurboTax system, a software style often called a ‘wizard,’ Clearpath asks users simple questions online to analyze what they are trying to achieve. It then brings up the right immigration forms and inputs users’ answers, with the goal of saving time, money, and frustration in the process.”).

⁸⁶ E.g., *id.*; Maria Eugenia Alcon, *Clearpath CEO Felice Gorordo Aims to Simplify Immigration Applications*, NBC NEWS (May 15, 2015, 12:16 PM), <https://www.nbcnews.com/news/latino/startup-aims-simplify-immigration-applications-n359266> [<https://perma.cc/U9SM-NJVH>].

⁸⁷ E.g., FILERIGHT: IMMIGRATION SOLUTIONS, <https://www.fileright.com/features> [<https://perma.cc/LSA5-YJ3J>] (“Answer simple questions about your life situation, one step at a time and FileRight software will complete and properly format the required USCIS application documents for you.”).

helping them understand which forms to fill out, but there are no algorithms and no outputs. One can imagine the immigration programs as flowcharts with diamonds (“Decision”) and rhombuses (“Input/Output”) but no rectangles (“Process”). In contrast, TurboTax not only organizes information and inserts that information into the appropriate form, but also transforms the information. This is a difference in the nature of the underlying law.

I can think of no other area of law in which the government does or could create forms that involve such extensive processing of information, though some other forms do contain algorithms. But even those forms have a relatively high number of inputs compared to the number of implementing algorithms and outputs. The Federal Sentencing Guidelines Worksheet A for individual offenders, for example, requires five or more inputs and provides a single output, which is accomplished merely by summing all previous inputs.⁸⁸

c. The Future of Computational Law

Because forms implement the law through algorithms, forms can provide insight about the future of computational law.

First, just as nobody argues that forms are useless because sometimes what constitutes the best inputs are ambiguous, so too arguing that formalizing the law is useless because some inputs are ambiguous is untenable.⁸⁹ Simply because a form cannot do everything does not mean it cannot do anything; the same is true for codifying the law. One can think of forms, and of codified law, as in part guiding the user on a path from input-ambiguity to input-ambiguity. The tax law solicits inputs and then combines those inputs; each of these steps is important.

Second, forms show that formalizations of the law can hew either more or less closely to the structure of the language of the law itself.

⁸⁸ I thank Professor Mark Gergen, at Berkeley Law, for the sentencing form example.

⁸⁹ For a more general and extended discussion of formalizing the Code, see Lawskey, *supra* note 24.

Each approach has benefits and drawbacks.⁹⁰ Compare, for example, the difficulty of amending the law when it is compacted in the form, as opposed to written out in a statute. The new limitation on casualty losses was not difficult to add to the statute. The rest of the statute remained untouched; all that was required to impose this new limitation was to append an additional paragraph to Section 165(h). Translating that new language to the form was more difficult than adding the language to the statute. If the 2017 law simply stated that only casualty losses due to federally declared disasters are deductible, no change would have been necessary for the form except to include a new element in the definition of “casualty loss.” But casualty losses not related to federally declared disasters are still permitted to the extent of casualty gain. Thus, the question must be answered by means of form structure.

Similarly, creating an algorithm as compact as those on forms requires the coder to resolve ambiguities in form structure (such as the ambiguity described above that lurks in new Section 165(h)(5)). If a coder were tracking the language of the law more closely, he would probably end up simply coding the ambiguity. It is not clear whether this is an advantage or a disadvantage; it would at any rate permit resolution of the ambiguity to be delayed and perhaps to be resolved by a court, explicitly, rather than a coder, implicitly.

Finally, understanding how forms work, and that it is very likely that forms, and not some more abstract coding of the statutory language, underlie tax preparation software, suggests that claims of the encroaching dominance of artificial intelligence and the law should be viewed with a mix of fondness and skepticism. That a computer does something does not mean that artificial intelligence is involved.⁹¹ Computers are excellent at implementing algorithms, but that will never put tax lawyers out of work. Tax forms are not “paper computers.” They are not flexible; they cannot make leaps of inference. On the other hand, a computer that could find novel ways to

⁹⁰ For further discussion of the usefulness of formalizations that track statutory language, see Sarah B. Lawsky, *A Logic for Statutes*, 21 FLA. TAX REV. 60, 78-79 (2017).

⁹¹ The definition of artificial intelligence is not clear, but whatever it is, it is safe to say that, for example, checking a list and finding a matching name is not artificial intelligence.

combine rules such that a taxpayer could follow the law and yet significantly reduce his taxes would be impressive (and frightening, at least for the government). But this would probably require giving the computer the entire corpus of the relevant law, as structured, a task that at this point, barring significant advances in natural language processing, seems difficult if not impossible.

V. Conclusion

Tax law has a reputation as the one area of law in which computational law has had some success. This is true in some sense: compressing tax law into algorithms has been an extremely successful pursuit, and one that has been critical to effective tax compliance. But these algorithms long preceded today's purported explosion of the field of artificial intelligence and the law. Rather, these algorithms have been created and implemented by the government since even before the income tax was introduced in 1913.⁹²

Once tax forms are understood as brilliant, dense implementation of complex law through algorithms, possible improvements for these forms become obvious. And while computational law may have great potential, a better understanding of what tax preparation software actually does can help make expectations for computing and the law more realistic.

⁹² Indeed, Form 1040, which accompanied the 1913 income tax, is aptly named, as it is the 1,040th form issued by the Internal Revenue Service! I.R.S., DEP'T OF THE TREASURY, IRS HISTORICAL FACT BOOK: A CHRONOLOGY 1646-1992, 87 (1993) ("The form was numbered 1040 in the ordinary stream of numbering forms in sequential order by the Bureau of Internal Revenue.").

VI. Appendices

a. Appendix A: Section 165(h)

(h) Treatment Of Casualty Gains And Losses

(1) Dollar limitation per casualty

Any loss of an individual described in subsection (c)(3) shall be allowed only to the extent that the amount of the loss to such individual arising from each casualty, or from each theft, exceeds \$500 (\$100 for taxable years beginning after December 31, 2009).

(2) Net casualty loss allowed only to the extent it exceeds 10 percent of adjusted gross income

(A) In general—If the personal casualty losses for any taxable year exceed the personal casualty gains for such taxable year, such losses shall be allowed for the taxable year only to the extent of the sum of—

(i) the amount of the personal casualty gains for the taxable year, plus

(ii) so much of such excess as exceeds 10 percent of the adjusted gross income of the individual.

(B) Special rule where personal casualty gains exceed personal casualty losses—If the personal casualty gains for any taxable year exceed the personal casualty losses for such taxable year—

(i) all such gains shall be treated as gains from sales or exchanges of capital assets, and

(ii) all such losses shall be treated as losses from sales or exchanges of capital assets.

(3) Definitions of personal casualty gain and personal casualty loss— For purposes of this subsection—

(A) Personal casualty gain

The term “personal casualty gain” means the recognized gain from any involuntary conversion of property which is described in subsection (c)(3) arising from fire, storm, shipwreck, or other casualty, or from theft.

(B) Personal casualty loss

The term “personal casualty loss” means any loss described in subsection (c)(3). For purposes of paragraph (2), the amount of

any personal casualty loss shall be determined after the application of paragraph (1).

(4) Special rules

(A) Personal casualty losses allowable in computing adjusted gross income to the extent of personal casualty gains

In any case to which paragraph (2)(A) applies, the deduction for personal casualty losses for any taxable year shall be treated as a deduction allowable in computing adjusted gross income to the extent such losses do not exceed the personal casualty gains for the taxable year

...

(5) Limitation for taxable years 2018 through 2025

(A) In general

In the case of an individual, except as provided in subparagraph (B), any personal casualty loss which (but for this paragraph) would be deductible in a taxable year beginning after December 31, 2017, and before January 1, 2026, shall be allowed as a deduction under subsection (a) only to the extent it is attributable to a Federally declared disaster (as defined in subsection (i)(5)).

(B) Exception related to personal casualty gains—If a taxpayer has personal casualty gains for any taxable year to which subparagraph (A) applies—

(i) subparagraph (A) shall not apply to the portion of the personal casualty loss not attributable to a Federally declared disaster (as so defined) to the extent such loss does not exceed such gains, and

(ii) in applying paragraph (2) for purposes of subparagraph (A) to the portion of personal casualty loss which is so attributable to such a disaster, the amount of personal casualty gains taken into account under paragraph (2)(A) shall be reduced by the portion of such gains taken into account under clause (i).

b. Appendix B: Form 46884

This single page is sufficient if there are personal losses only and only a single casualty.

Form 4684 Department of the Treasury Internal Revenue Service Name(s) shown on tax return	Casualties and Thefts ▶ Go to www.irs.gov/Form4684 for instructions and the latest information. ▶ Attach to your tax return. ▶ Use a separate Form 4684 for each casualty or theft.	OMB No. 1545-0177 2018 Attachment Sequence No. 26																																																												
SECTION A—Personal Use Property (Use this section to report casualties and thefts of property not used in a trade or business or for income-producing purposes. You must use a separate Form 4684 (through line 12) for each casualty or theft event involving personal use property. If reporting a casualty loss sustained in 2018 from a federally declared disaster that occurred in 2016, or from Hurricane Harvey, Tropical Storm Harvey, Hurricane Irma, Hurricane Maria, or the California Wildfires, see the instructions before completing this section.)																																																														
If the casualty or theft loss is attributable to a federally declared disaster, check here <input type="checkbox"/> and enter the FEMA disaster declaration number. (See instructions.)																																																														
1 Description of properties (show type, location (city, state, and ZIP code), and date acquired for each property). Use a separate line for each property lost or damaged from the same casualty or theft. If you checked the box and entered the FEMA disaster declaration number above, enter the ZIP code for the property most affected on the line for Property A.																																																														
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2 Cost or other basis of each property																																																														
3 Insurance or other reimbursement (whether or not you filed a claim) (see instructions) Note: If line 2 is more than line 3, skip line 4.																																																														
4 Gain from casualty or theft. If line 3 is more than line 2, enter the difference here and skip lines 5 through 9 for that column. See instructions. If line 3 includes insurance or other reimbursement you did not claim, or you received payment for your loss in a later tax year																																																														
5 Fair market value before casualty or theft																																																														
6 Fair market value after casualty or theft																																																														
7 Subtract line 6 from line 5																																																														
8 Enter the smaller of line 2 or line 7																																																														
9 Subtract line 3 from line 8. If zero or less, enter -0-																																																														
10 Casualty or theft loss. Add the amounts on line 9 in columns A through D																																																														
11 Enter \$100 (\$500 if qualified disaster loss rules apply; see instructions)																																																														
12 Subtract line 11 from line 10. If zero or less, enter -0- Caution: Use only one Form 4684 for lines 13 through 18.																																																														
13 Add the amounts on line 4 of all Forms 4684																																																														
14 Add the amounts on line 12 of all Forms 4684. If you have losses not attributable to a federally declared disaster, see the instructions Caution: See instructions before completing line 15.																																																														
15 • If line 13 is more than line 14, enter the difference here and on Schedule D. Do not complete the rest of this section. • If line 13 is equal to line 14, enter -0- here. Do not complete the rest of this section. • If line 13 is less than line 14, and you have no qualified disaster losses subject to the \$500 reduction on line 11 on any Form(s) 4684, enter -0- here and go to line 16. If you have qualified disaster losses subject to the \$500 reduction, subtract line 13 from line 14 and enter the smaller of this difference or the amount on line 12 of the Form(s) 4684 reporting those losses. Enter that result here and on Schedule A (Form 1040), line 16, or Form 1040NR, Schedule A, line 7. If you claim the standard deduction, also include on Schedule A (Form 1040), line 16, the amount of your standard deduction (see the instructions for Form 1040). Do not complete the rest of this section if all of your casualty or theft losses are subject to the \$500 reduction.																																																														
16 Add lines 13 and 15. Subtract the result from line 14																																																														
17 Enter 10% of your adjusted gross income from Form 1040, line 7, or Form 1040NR, line 36. Estates and trusts, see instructions																																																														
18 Subtract line 17 from line 16. If zero or less, enter -0-. Also, enter the result on Schedule A (Form 1040), line 15, or Form 1040NR, Schedule A, line 6. Estates and trusts, enter the result on the "Other deductions" line of your tax return																																																														
For Paperwork Reduction Act Notice, see instructions. Cat. No. 120970 Form 4684 (2018)																																																														

c. Appendix C: Form and Standard Reading Equivalence

The Standard Reading requires the following:

- A. Separate damaged items into casualties. Classify casualties as FDD or non-FDD.
- B. Sum all gains from all casualties into a single number ("Total Gain").
- C. For each casualty, sum all losses and reduce by \$100 per casualty.
- D. Sum all FDD casualty losses (after \$100 per casualty deduction) ("Total FDD") and, separately, sum all non-FDD casualty losses (after \$100 per casualty deduction) ("Total non-FDD").
- E. Reduce Total Gain by Total non-FDD, but not to less than zero.
- F. If any gain remains after reducing Total Gain by Total non-FDD, reduce that by FDD casualty losses, but not to less than zero.
- G. Reduce any remaining FDD casualty losses by 10% of AGI (but not to less than zero); this reduced amount may be entered into itemized deductions.

Consider the only two possible situations: the amount of the Total non-FDD is greater than or equal to the Total Gain, and the amount of Total non-FDD is less than the Total Gain.

If the amount of Total non-FDD is greater than or equal to the Total Gain, then the amount of losses that move to the 10% AGI Haircut stage equals the amount of Total Gain (because non-FDD losses can be used to offset all of the Total Gain), plus the Total FDD. So, in other words, when $\text{Total non-FDD} \geq \text{Total Gain}$, the losses that can be used equal $\text{Total FDD} + \text{Total Gain}$.

If the amount of Total non-FDD is less than the Total Gain, then the amount of losses that move to the 10% AGI Haircut stages equals Total non-FDD (because all of the Total non-FDD can be used against

Total Gain), and then all of the Total FDD (some of which will be used to offset Total Gain, and some of which will be moved to the 10% AGI Haircut Stage and perhaps eventually used to offset non-casualty gains or other income). So, in other words, when $\text{Total Gain} > \text{Total non-FDD}$, the losses that can be used equal $\text{Total FDD} + \text{Total non-FDD}$.

To summarize, the total losses that can be used equal $\text{Total FDD} + \text{the lesser of Total non-FDD and Total Gain}$. And this is exactly what the form worksheet calls for.

**Worksheet 1-1. Losses Not
Attributable to a Federally
Declared Disaster—Line 14**

1. Add the amounts from line 12 of all Forms 4684 reporting losses not attributable to a federally declared disaster	1. _____
2. Add the amounts from line 12 of all Forms 4684 reporting losses attributable to a federally declared disaster.	2. _____
3. Enter the smaller of line 1 or line 13 of Form 4684	3. _____
4. Add lines 2 and 3. Enter the result here and on Form 4684, line 14	4. _____

Line 1 calls for “the amounts from Line 12 of all Forms 4684 reporting losses not attributable to a federally declared disaster.” Line 12 on the Form 4684 is casualty loss, reduced by the \$100 haircut. This is equivalent to Total non-FDD. Line 2 calls for the Line 12 entries for federally declared disasters—that is, Total FDD. Line 3 calls for the lesser of Line 1 and Line 13 of the Form 4684. Line 13 of the form is the sum of all casualty gains—Total Gain. So Line 3 asks for the lesser of Total non-FDD and Total Gain. And Line 4 asks for the sum of Line 2 and Line 3, that is: $\text{Total FDD} + \text{MIN}(\text{Total non-FDD}, \text{Total Gain})$.