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Application of Computer-Assisted Analysis Techniques to Taxation

Richard J. Kovach

APPLICATION OF COMPUTER-ASSISTED ANALYSIS TECHNIQUES TO TAXATION

RICHARD J. KOVACH*

INTRODUCTION

IN RECENT YEARS an exciting series of developments has begun to take place for those interested in the law of taxation. Computer programs intended to facilitate legal analysis are emerging,[1] and many of them are designed to provide specific analyses of tax problems. The emergence of computer-assisted legal analysis coincides with an increased interest in the application of deductive logic in an effort to reduce or eliminate syntactic ambiguity[2] in legal drafting and statutory analysis.[3] This use of deductive logic involves a process known as "normalization."[4] The interrelationship of normalization and computer-assisted legal analysis results from the computer's virtue of syntactic clarity, a product of its mathematically-derived deductive ability to relate verbal propositions, represented symbolically, with each other by means of precise logical operators.[5]

Of course, the computer has advantages in addition to syntactic clarity. It can store for easy access from a keyboard information that would otherwise occupy shelves (or rooms) of paper. It can derive and transmit conclusions and other information with near instantaneous speed, integrate

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*Associate Professor of Law, The University of Akron School of Law; A.B., Oberlin College, 1970; J.D., Harvard Law School, 1974.

[1] A review of significant attempts in the 1970's to develop computer systems for legal analysis is contained in Comment, *Emerging Computer-Assisted Legal Analysis Systems,* 1980 B.Y.U. L. REV. 116.

[2] Syntactic ambiguity may be illustrated by a simple example: Assume that in order for X, a legal conclusion, to be evaluated as true, a rule states that "proposition A and proposition B or proposition C must be true." Does this mean that X will hold if only proposition C is true? The answer is yes if we mean the following, stated symbolically: (A and B) or C→X. The answer is no if we mean: A and (B or C)→X.

    Now assume that the legal conclusion, X, results from the application of a tax statute and that one of the propositions (A, B, or C) is true only if a particular taxpayer is deemed to be a corporation. If the entity in question is a trust that might be classified as a corporation pursuant to Treas. Reg. § 301.7701-2 (1977), then the legal analysis will have to be directed toward resolution of the *semantic* ambiguity resulting from use of the word "corporation" in the statute.

[3] Although the development of computer applications for legal analysis is fairly recent, it should be noted that Professor Layman E. Allen of the University of Michigan began work on applications of symbolic logic to legal language approximately twenty-five years ago. *See* Allen, *Symbolic Logic: A Razor-Edged Tool for Drafting and Interpreting Legal Documents,* 66 YALE L.J. 833 (1957).

[4] Normalization breaks down a statement of a legal rule into its constituent propositions and rearranges them so as to avoid syntactic ambiguity. *See* Allen & Engholm, *Normalized Legal Drafting and the Query Method,* 29 J. LEGAL EDUC. 380 (1978).

[5] These logical operators, which are also used in normalization, are "if," "if and only if," "and," "or," and "not." In addition, parentheses are used to clarify whether groupings of symbolically represented propositions, as opposed to individual propositions, are linked by particular connectors in a chain of propositions.

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complex numerical calculations with verbal analysis, and memorize for de-layed retrieval individual user input (a form of automatic notetaking).[6] These advantages are available to all analysts of the law but are particularly attractive to those whose legal specialties are "code" oriented, since statutes in tandem tend to produce extraordinary interpretive complexities. Indeed, it is not surprising that topics in federal taxation have been popular subject matter choices both for normalization analyses and for the first legal analysis computer systems available for our examination.[7] Not only does taxation have a degree of verbal complexity at least as great as that of any other legal subject, but it involves unique numerical complexities as well.[8] The depth and breadth of substantive and procedural rules in taxation offer a fertile proving ground for any analytic approach that purports to provide en-hanced clarity, organization, or informational manageability.

Thus, it may be useful at this early point in the development of com-puter-assisted legal analysis to speculate on the full potential for computer applications to taxation in light of the analytic complexities commonly encountered in tax work.

I. Approaches to Tax Analysis

At its simplest, a computer "system" might be a mere table of infor-mation or checklist that gives the user an opportunity to apply information to the problem at hand in an organized manner.[9] Such a system would serve as a well-understood enhancement of the human brain's own powers of memorization and organization. A highly complex system, on the other hand, might attempt to simulate more subtle functions of the human brain, such as those which operate when we apply rules or other generalizations to information at hand in order to reach conclusions or make useful ob-servations.

Perhaps the most enterprising attempt to encode analytic functions which go beyond were memory and organization to what might legitimately

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[6] The use of word processors for drafting and the use of the LEXIS and WESTLAW sys-tems for legal research have no doubt contributed greatly to an awareness by lawyers of the general advantages (and limitations) of office-oriented computer systems. The introduc-tion of low-cost computer systems for home use will add to this awareness.

[7] Over the past few years a large number of computer systems have been prepared for use by tax accountants and others who regularly prepare income tax returns and related forms. Unfortunately, information about these commercially used systems is seldom published for public access. Generally, such systems are oriented exclusively toward numerical computa-tions. Insurance companies have also developed systems that relate to estate planning com-putations.

[8] Persons who doubt this statement should consult I.R.C. § 341(e) (1976). All further references in text and footnotes are to sections of the Internal Revenue Code of 1954, as amended to date, and the current regulations thereunder.

[9] For a discussion of the use of relatively simple decision tables and flow charts in tax prac-tice, *see* Ainslie, Kenney & Schwayder, *Decision Tables - A Tool for Tax Practitioners*, 3 Tax Adviser 336 (1972).

approach "artificial intelligence" is the TAXMAN system developed by L. Thorne McCarty.[10] TAXMAN is an experiment in the simulation of the analogical function of human intelligence. The computer receives a body of verbally stated information (relating to a corporate reorganization situation) and analyzes its input against conceptual structures stored in the computer's memory. If the semantic structure of the input matches certain programmed structures, the system is able to draw corresponding legal conclusions.[11] As might be expected, a designer of this kind of system faces many technical problems relating to the development of rules for the expression of semantic equivalencies and the creation of a sufficiently comprehensive data base with which to match input data. Even if the scope of necessary input data could be defined by such a system for a user who might not otherwise realize exactly what kinds of information the system needs to make a complete and accurate analysis, the technical difficulties just mentioned appear likely to result in slow and difficult development for this approach to legal analysis coding.[12] The idea of feeding a broad range of verbal information into a computer capable of analyzing large numbers of data combinations against a coded structure so as to produce pertinent legal conclusions is fascinating to say the least. However, while we wait for the inherent problems of such a system to be resolved, computer systems affording more immediate practical results are currently available and ripe for further development into increasingly more useful applications.

If a computer system limits the form of data input by requiring the user to provide a series of "yes" or "no" responses to questions posed (or "true" or "false" responses to propositions presented), perhaps coupled with appropriate numerical data provided by the user, then conclusions can be deductively drawn from the input data directly, and the need to translate verbal data into semantic patterns to be matched with the computer's store of patterns is eliminated. Examples of useful applications of this kind of straightforward deductive coding are CORPTAX, CHOOSE, and SEARCH, developed by Robert Hellawell of Columbia University.[13] CORPTAX analyzes whether a stock redemption will be treated as a distribution in exchange for stock under the "substantially disproportionate"

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[10] McCarty, *Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning*, 90 HARV. L. REV. 837 (1977).

[11] TAXMAN, for example, will receive unsolicited information pertaining to stock ownership, stock transfers, and corporate status, and determine whether a particular nonrecognition reorganization has occurred under § 368. *Id.*

[12] TAXMAN's creator states that his approach "could lead to several practical applications" but acknowledges that there are "serious deficiencies" in the system. *Id.* at 892.

[13] Hellawell, *A Computer Program for Legal Planning and Analysis: Taxation of Stock Redemptions*, 80 COLUM. L. REV. 1363 (1980); Hellawell, *CHOOSE: A Computer Program for Legal Planning and Analysis*, 19 COLUM. J. ON TRANSNAT'L L. 339 (1981); Hellawell, *SEARCH: A Computer Program for Legal Problem Solving*, 15 AKRON L. REV. 635 (1982),

test of section 302(b) of the Internal Revenue Code.[14] CHOOSE analyzes whether it would be wise from a tax point of view to choose a branch operation or a foreign subsidiary as a vehicle for a foreign mining investment. SEARCH analyzes the attribution rules of section 318, finds all legal attribution routes for a given fact pattern, and calculates the attribution amounts. Each system asks the user for specific numerical data and "yes" or "no" answers to appropriate questions. Thus, the data input is limited to the establishment or denial of specific propositions which automatically determine a consequence under the rules governing the range of legal conclusions defined by the program. Although the user sees the data input transformed into pertinent conclusions, he is not presented with a step-by-step application of the governing tax rules, nor with the rules themselves.

Another approach for limited input deductive coding might be labeled simply "comprehensive normalization." JUDITH[15] and LAWGICAL[16] are examples of this approach. Each of these systems presents the user with an analysis "menu" of legal consequences accompanied by the series of premises that must or may hold in order for particular legal consequences to result. In other words, the rules that produce the ultimate legal consequences being analyzed are broken down into their necessary and permissive "elements."[17] Since the propositions that serve as elements are often quite complex, they are "expanded" by the presentation of a second level of constituent propositional elements, which, if the complexity warrants, can be expanded into a third level of constituent sub-propositional elements, and so forth. The user input consists of a series of determinations of whether particular propositional elements are fulfilled throughout the primary propositional chain and the various expansions, as needed. The user applies the available information when prompted by the computer to enter "true" or "false" until either the analysis is completed or the available information for the case being analyzed is exhausted. Once the input terminates, the computer automatically evaluates the entered responses deductively to determine which higher level propositions, including the ultimate proposition of the analysis, are fulfilled.[18]

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[14] I.R.C. § 302(b).

[15] Popp & Schlink, *JUDITH, a Computer Program to Advise Lawyers in Reasoning a Case,* 15 JURIMETRICS J. 303 (1975).

[16] Welch, *LAWGICAL: An Approach to Computer-Aided Legal Analysis,* 15 AKRON L. REV. 655 (1982).

[17] The permissive elements of a conclusion may be prefaced with an "if" and followed by a "then;" necessary elements should be preceded by the expression "if and only if" and followed by a "then."

[18] *See* Welch, *supra* note 16, for a simple illustration of this process involving a relatively small number of propositions. Obviously, the advantage in using a computer analysis is minimized when the propositional elements of the analysis are few and their relationships are clear. Consider, however, the computer's potential value respecting analyses that include hundreds, or even thousands, of propositions. A coded analysis of this scope could be built around a single section of the Internal Revenue Code — § 402, for example. *See infra* text accompanying notes 39-66.

A system designed along these lines would represent a "normalization" of a body of law built around particular statutory provisions, not just a normalization of the statutory provisions themselves. If we were able to accept a particular statute as a semantically unambiguous expression of a rule, normalization of the statute, if needed, would provide us with an expression that was also syntactically clear. In applying such a statute to cases, the user could make a direct and useful analysis, certainly without a need for assistance from a computer. The normalized text of the statute would serve as its own "program." The user of the normalized text would be able to supply "true" and "false" responses to the implicit questions raised as he reviews each proposition in the normalized text. Because the number of propositions on the face of even a complicated statute is comparatively limited and the relationships between the propositions of a normalized statute would be evident directly from the text, the user of a normalized statute with a low level of semantic ambiguity would in all likelihood be able to decide rather quickly whether the statute governed the case in question.[19]

Unfortunately, even when analyzing a normalized statute, the user often finds it difficult to determine whether his case meets a particular propositional element because the element is semantically ambiguous. For example, one might read a normalized version of section 166,[20] in which the propositions on the face of the statute that establish short-term capital loss treatment for nonbusiness bad debts are set forth with clarity and efficient organization, but still have doubts as to whether a particular debt in question is "nonbusiness" or is to be identified with a "trade or business" of the taxpayer. In practice we would say that the questions of what constitutes a trade or business, and whether a particular debt is so related for purposes of section 166 ordinary loss treatment, are questions "to be researched," meaning, of course, that resort must be made to authorities outside the statute itself if the semantic ambiguity is to be resolved.[21]

Simultaneous application of a normalization-like process to both a statute and its interpretive authorities would, in effect, provide us with a greatly expanded text of the statute. The interpretive authorities might serve as both additional primary elements in the chain of analysis and as the basis for detailed expansions of propositions contained directly in the

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[19] The analyst would apply these same thought processes in evaluating a non-normalized statute, but would find it difficult to reach a conclusion rapidly as to applicability of the statute because of its lack of syntactic clarity and poor organization.

[20] Edwards & Barber, *A Computer Method for Legal Drafting Using Propositional Logic,* 53 TEX. L. REV. 965, 992-94 (1975), sets out a normalized version of § 166.

[21] For example, we might refer to a case like United States v. Generes, 405 U.S. 93 (1972), which held that in determining whether a bad debt has a "proximate" relation to the taxpayer's trade or business, regard must be given to the "dominant motivation" of the taxpayer in incurring the debt, not just "significant motivation."

statute. To the degree that the statute is thus expanded (to the extent the statute needs interpretation and authorities are developed to meet the need for interpretation), incorporation of the comprehensively "normalized" text into a computer system becomes increasingly more important. After a certain point, the volume of propositions and syntactic relationships in such a deductive analysis becomes so unwieldy that it creates a substantial risk of error absent the computer's memory capacity and logical accuracy. Thus, a limited input deductive system of the type described, especially one which integrates computational functions like those developed in CORP-TAX, CHOOSE, and SEARCH, could be quite useful in tax analysis.

To be sure, even limited input deductive systems are not free from bothersome technical difficulties. The precision with which legal language can be converted into symbolic propositions structured through the use of logical connectors may fall somewhat short of mathematical certainty, and certain problems in this regard need to be explored.[22] But once these "translational" problems are resolved, minimized, or subjected to conventional treatment, only the inherent complexities of the legal material to be encoded will stand in the way of development toward more comprehensive and useful computer systems for legal analysis.

II. MAJOR COMPLEXITIES IN TAX ANALYSIS

A. *Efficient Establishment of the Indispensable Element*

Tax analyses of complex commercial transactions often involve a seriatim consideration of several potentially applicable provisions of the Internal Revenue Code. When certain facts from the information at hand suggest the possible applicability of a particular provision, it becomes desirable to attempt to "short circuit" a full analysis of that provision by finding its indispensable element that is most easily disproved. Once this element is identified, the general analysis may proceed to another potentially applicable provision.

For example, a transaction might involve a transfer of property from an entity to an individual, with the question to be analyzed the tax consequence of the transfer to the individual. Stated this broadly, the problem could involve any of several possible Code provisions. The analyst would want to match pertinent additional facts with corresponding indispensable elements of the various rules which might govern the result. In effect, the analyst would perform a process of elimination. Thus, if the entity is identified as *not* being a corporation, treatment of the transfer under section 301 is eliminated.[23] If the entity *is* a corporation but the transfer

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[22] *See* Finan, *LAWGICAL: Jurisprudential and Logical Considerations,* 15 AKRON L. REV. 675 (1982), for a discussion of some of these problems.

[23] This is because the analyst knows that § 301 begins Subchapter C of the Internal Revenue Code, which applies to *corporate* distributions and adjustments.

was not a distribution "with respect to its stock," treatment under section 301 is still eliminated.[24] Likewise, section 301 is inapplicable even though the entity is a corporation and there is a distribution "with respect to its stock," if the property transferred is stock of the distributing corporation (and certain other Code provisions do not apply).[25]

Obviously, if the analyst can quickly eliminate inapplicable rules without assistance as the facts are reviewed, or if, in the course of doing so, he can positively establish the applicability of other provisions, then the analyst's personal knowledge may be his own best "program." Unfortunately, identification of the indispensable element is often made difficult by a cloud of semantic ambiguity. Comparison of the facts at hand with some elements of the provision analyzed may produce a questionable result. For instance, the section 301 analysis may bog down when some doubt develops as to whether an entity designated as a corporation is really to be recognized as such for tax purposes,[26] or whether property designated as "stock" might really be a form of debt.[27] Of course, if the analyst quickly perceives the semantic ambiguity, he can attempt to disprove another element of the analysis. If unable to do so, he can return to the ambiguous element for further research and study. If the semantic ambiguity is not perceived at all, i.e., the analyst fails to "spot the issue," the analysis may lead to an erroneous conclusion. Regrettably, the complexity of the law of taxation makes "missing the issue" uniquely easy, especially for those whose experience with the subject is relatively limited.

This problem may never be satisfactorily resolved short of a drastic simplification of our entire system of federal taxation. Nevertheless, the use of limited input deductive coding could make the problem less acute for at least two reasons. First, such an encoded view of tax rules would afford a much quicker review of the rules' constituent elements, regardless of source. The user would have much less need to interrupt his analysis to haul out a series of research materials. Time spent on index-searching, page-finding, notetaking, and finding one's place in the original analysis following these activities could be greatly reduced. Indeed, these activities are what we might term "necessary" distractions. Reducing time spent in this regard would permit the analyst to better focus concentration on the overall thrust of the analysis.

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[24] I.R.C. § 301(a).

[25] I.R.C. § 301(a) refers to distributions of "property" as defined in § 317(a), which excludes stock in the corporation making the distribution from the definition. *But see supra* notes 32-35 and accompanying text respecting the exceptions to this definitional exclusion found in § 305.

[26] Treas. Reg. § 301.7701-2 sets forth criteria for an analysis of the proper classification of organizations as corporations for tax purposes.

[27] *See* § 385 and the extensive treasury regulations newly prescribed under it for the criteria for an analysis of reclassifications involving stock and debt.

Second, the analyst's issue-spotting ability would be enhanced by the syntactic clarity and logical organization with which the tax rules would be presented. The tax rules would appear as chains of discrete but expandable propositions properly linked with one another.[28] Such a system would draw the user's attention to the truly operative elements of a rule, regardless of whether a particular element emanated from an interpretive authority or from some parenthetical afterthought tucked away in a subclause of a clause of a subpara-graph of a paragraph of the final subsection of a potentially applicable Code section. If the element is critical to the application of the rule, it takes its place with the most prominent elements of the statute that may be central to the analysis. The system would permit us (or force us[29]) to view the body of law surrounding a particular rule as though it were an integrated statement —a view that ultimately would enhance our issue-spotting ability.

B. *The Problem of Cross-Referencing*

A logically organized, fully integrated view of a body of law like that of federal taxation would provide complete cross-referencing of related Code provisions and their accompanying expansions. It may be noted that Congress itself recognizes the importance of analyzing related Code sections together, sometimes adding a "Cross References" or "Special Rules" sub-section to the end of a Code section.[30] However, cross-referencing in the Internal Revenue Code as a whole is inadequate. To return to our previous example involving section 301, we would glean from the section 301(e) "Special Rules" that the applicability of the section may be influenced by section 302 (redemptions), sections 331-346 (complete or partial liquida-tions), sections 351-368 (corporate organizations and reorganizations), and section 116 (partial dividend exclusion).[31] Yet the "Special Rules" make no reference to section 305, even though section 301(a) would lead the unwary to believe that its reference to section 317(a) meant that any distribution of a corporation's stock with respect to its stock is not to be treated under section 301.[32] The treasury regulations for section 317,[33]

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[28] It should be noted that a syntactically clear linking of statutory propositions is not always possible because of ambiguities intended by the statutes' drafters or unintentional ambiguities that have not been resolved by authoritative interpretation. Courts sometimes read an "and" as an "or" and vice versa when viewing statutory language if doing so is deemed necessary to the statute's purposes. But not all statutory ambiguities are quickly subjected to judicial review. This creates a problem for the designer of a legal analysis.

[29] Programs like JUDITH and LAWGICAL permit the user some degree of discretion in responding to particular propositions from among all propositions programmed. Programs like CORPTAX, CHOOSE, and SEARCH operate by means of an ordered presentation of sequenced questions and comments.

[30] The treasury regulations contain similar provisions. *See, e.g.,* Treas. Reg. § 1.61-6(c).

[31] Economic Recovery Tax Act of 1981, P.L. 97-34, § 302, 95 Stat. 172, halved the available exclusion to $100 ($200 in the case of a joint return) for taxable years after 1981.

[32] I.R.C. § 305(b) expressly makes § 301 applicable to distributions by a corporation of its stock for the five categories of distributions set forth in § 305(b). The same effect is produced by § 305(c) for certain stock transactions that have the result but not the form of a stock distribution.

[33] Treas. Reg. § 1.317-1.

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like section 317 itself, fail to refer to section 305 and its impact on the definition of "property." The regulations for section 301[34] do make reference to section 305(b) but fail to refer directly to section 305(c), under which transactions that are not even distributions will be treated as distributions of property under section 301.[35]

True, the failure to cross-reference important elements or exceptions that affect the applicability of a particular Code section is only a minor problem from the point of view of one who is well experienced in dealing with the body of law in question.[36] Nonetheless, even the most experienced tax practitioners, when dealing with transactions that potentially involve several kinds of tax results,[37] might concede the utility of comprehensive cross-referencing. All who practice taxation, experienced and inexperienced alike, could benefit from an integrated, logically determined, and readily available statement of all the various tax rules that might bear upon a particular result.[38] Such a coded statement of law would set out all limiting elements, statutory and non-statutory, in their proper order as though the tax result being analyzed were governed by a comprehensive "master" Code provision.

In light of the body of related authorities that logically accompany it, one Code section which appears to be particularly in need of restatement in this respect is section 402, which is titled "Taxability of beneficiary of employees' trust." When viewed with reference *both* to section 402 and other potentially applicable Code provisions, a distribution from a qualified retirement trust, depending on a variety of possible circumstances, might involve any one (or a combination of some) of the following tax results:[39]

(1) imposition of the separate "ten-year averaging" tax of section 402(e), a tax determined independently of the taxpayer's marginal tax rate;[40]

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[34] Treas. Reg. § 1.301-1.

[35] Nor does Treas. Reg. § 1.301-1 refer to § 306(a)(2), which provides that the amount realized from a redemption of "Section 306" stock is treated as a distribution of property to which § 301 applies.

[36] One might question how efficiently a person can become "well experienced" in many areas of taxation when he is forced to deal with poorly cross-referenced rules that include non-normalized statutes.

[37] For example, integrated estate and business interest tax planning for individuals often requires simultaneous consideration of widely-separated provisions of the Internal Revenue Code.

[38] *See* part III, *infra* p. ...., for a discussion of existing commercial tax services in this respect.

[39] This list is not intended to be exhaustive.

[40] For example, in 1981, the separate tax imposed by § 401(e) on a $10,000 distribution is $700 regardless of the taxpayer's other taxable income.

(2) capital gains taxation respecting the portion of the distribution that relates to participation in the retirement plan prior to January 1, 1974;[41]

(3) no tax respecting portions of the distribution attributable to employee contributions to the retirement plan;[42]

(4) no tax respecting portions of the distribution deemed made from a qualified retirement plan that is also a qualifying accident or health plan;[43]

(5) reduction in tax otherwise applicable as a result of the taxpayer's qualifying for an "income in respect of a decedent" deduction for the distribution;[44]

(6) imposition of an estate tax is a result of inclusion of the distribution in the estate of the participant-decedent;[45]

(7) no tax at the time of distribution respecting portions of the distribution consisting of employer securities having "net unrealized appreciation,"[46] with later capital gains taxation for the unrealized appreciation upon disposition of the employer securities;[47]

(8) allowance of an ordinary loss for the distribution if the distribution cancels the participant's interest in the trust and does not exceed credited employee contributions;[48]

(9) no tax at the time of distribution respecting portions of the distribution consisting of annuity contracts,[49] later taxation of distributions from such contracts as annuity payments,[50] and an increase in the separate, "ten-year averaging" tax otherwise applicable to the non-annuity portion of the distribution;[51]

(10) no tax on as much as $5,000 of the distribution as a result of a death benefit exclusion;[52]

(11) no tax at the time of distribution respecting portions of the distribution consisting of a retirement income, endowment, or other life

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[41] I.R.C. § 402(a)(2).

[42] *Id.* §§ 72(b), 402(e)(4)(D).

[43] *Id.* § 105(b) & (c).

[44] *Id.* § 691(c)(5).

[45] *Id.* § 2039(c) & (f).

[46] *Id.* §§ 402(a)(1), 402(e)(4)(J).

[47] Treas. Reg. § 1.402(a)-1(b)(1).

[48] I.R.C. § 165(c); Rev. Rul. 72-305, 1972-1 C.B. 116.

[49] I.R.C. §§ 402(a)(1), 402(e)(2). The annuity contracts, if issued after 1962, must be nontransferable pursuant to Treas. Reg. § 1.402(a)-(a)(2).

[50] I.R.C. § 72.

[51] *Id.* § 402(e)(2).

[52] *Id.* § 105(b).

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insurance contract timely converted to a qualifying contract under which no part of the proceeds payable upon death would be excludable as life insurance proceeds under section 101(a);[53] later taxation of distributions from such contract as annuity payments;[54]

(12) ordinary income tax to the extent any portion of the distribution includes "accumulated deductible employee contributions,"[55] or to the extent any portion of the distribution otherwise fails to qualify for exclusion or more favorable taxation;[56]

(13) no tax respecting a portion of the distribution that includes excludable life insurance proceeds;[57]

(14) no tax at the time of distribution respecting the portion of the distribution consisting of United States Retirement Plan Bonds.[58] later taxation as ordinary income upon retirement of such bonds,[59] or ordinary income taxation upon distribution if proceeds from the prior sale of such bonds were a portion of the distribution;[60]

(15) no tax, or imposition of a favorable tax, according to any applicable rules that require the retirement plan to be qualified, but only with respect to the portion of the distribution representing the proportion of time the retirement plan was qualified, if the plan was *not* qualified at the time of distribution.[61]

The variety of potential tax results listed above derives from a consideration of not only the rather detailed provisions of section 402, but also from a consideration of at least seven other Code sections, certain regulations provisions under some of these sections, and, in the case of item (15) in the list, case law that is somewhat controversial.[62] The only other

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[53] Treas. Reg. § 1.402(a)-1(a)(2).

[54] I.R.C. § 72.

[55] "Accumulated deductible employee contributions" are defined in § 72(o)(5)(B) and excluded from more favorable taxation by § 402(e)(4)(A) and (J).

[56] Some reduction in the tax otherwise applicable might result from application of the income averaging provisions of §§ 1301-1305.

[57] I.R.C. § 72(m)(3)(c).

[58] Treas. Reg. § 1.405-3(a)(1).

[59] *Id.*

[60] Treas. Reg. § 1.402(a)-1(a)(6)(vi).

[61] Greenwald v. Commissioner, 366 F.2d 538 (2d Cir. 1966); Woodson v. Commissioner, 73 T.C. 779 (1980).

[62] The Internal Revenue Service takes a position contrary to that taken in *Greenwald* and *Woodson*. This position led to the appeal of *Woodson* to the Fifth Circuit Court of Appeals, which reversed the Tax Court, 651 F.2d 1094 (5th Cir. 1981). It remains to be seen whether the Tax Court would rule as it did in *Woodson* in a case that would be appealable to a court of appeals other than the Fifth Circuit. The Supreme Court may have to decide the issue of whether disqualification at the time of distribution prohibits any favorable results under § 402, irrespective of a plan's previous qualification.

Code provision directly mentioned in section 402 is section 72, which, along with its corresponding regulations, is at least as semantically and syntactically complex as section 402 and its regulations.[63]

As a solution to the compliance problem, the Internal Revenue Service attempts to make the taxation of distributions from employee benefit plans somewhat manageable by providing Form 4972 for our use.[64] This form itself serves as a kind of deductive "program." As virtually all IRS forms, Form 4972 asks the user to fill in information, usually pertinent to concepts and rules of which the user is partially or wholly unaware. The information thus provided is manipulated as required by (the IRS' perception of) the underlying Code provisions to achieve a numerical bottom line. Of course, the user must depart from the ordered structure of the form whenever: (1) consideration is to be given to the effect on the ultimate tax result of authorities or theories not officially recognized by the IRS; (2) consideration is to be given to recognized authorities that are not directly reflected in the form's structure for reasons of administrative convenience;[65] (3) the solicitation of information by the form is ambiguous, and the ambiguity cannot be resolved by reference to the form's instructions.[66]

Like that of the Internal Revenue Code itself, the implicit cross-referencing system of the IRS's tax forms fails to account for as wide a possible range of applicable related rules as might be useful for a particular analysis. But the usefulness of a comprehensively coded system respecting cross-referencing might exceed even the benefit to be derived from adequately accounting for a wide range of potentially applicable rules.

The system might serve a pedagogical function of sorts by fully cross-referencing all provisions in the tax rules, regardless of context, that fit a particular semantic expression in a particular rule. As a simple example, consider the definition of "Section 306 stock" contained in section 306 (c)(1)(C):

(C) STOCK HAVING TRANSFERRED OR SUBSTITUTED BASIS

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[63] According to a LEXIS search made at the time of this writing, the problem of interpreting § 402 alone has resulted in the issuance of more than 100 private letter rulings since 1975.

[64] Form 4972 and its instructions fail to account for all the tax ramifications even of these fifteen enumerated categories of § 402-related tax consequences. One would expect a controversial result like that in item (15) to be omitted, however.

[65] For example, Form 4972 asks the user to provide at line 1 the distribution's "Capital gain part from payer's statement (Form 1099R, box 2)." This is an administrative shortcut to replace the user's own analysis of the authorities to be applied in determining the "capital gain part."

[66] Line 13 of Form 4972 asks for the amount of "federal estate tax attributable to" the distribution. The form's instructions for line 13 simply indicate that the taxable part of the distribution is to be reduced by this amount, without indicating how the amount is to be determined.

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—Except as otherwise provided in subparagraph (B), stock the basis of which (in the hands of the shareholder selling or otherwise disposing of such stock) is determined by reference to the basis (in the hands of such shareholder or any other person) of section 306 stock.

This definition is scarcely meaningful to a reader who does not have a good grasp of the various rules and situations that produce a transferred or substituted basis in property. Such a person might benefit from a tax analysis system which cross-referenced, as an expansion of the section 306(c)(1)(C) definitional proposition, those provisions which do and those which do not create substituted or transferred bases.[67]

C. *Authoritative Interpretations and their Values*

Another feature that makes taxation uniquely complex is the volume and variety of promulgations which interpret statutory provisions. Final Treasury Regulations, Temporary Regulations, Proposed Regulations[68] Revenue Rulings, Revenue Procedures, and Private Letter Rulings[69] are the commonly consulted administrative promulgations. Of course, case law from the United States Tax Court, Federal District Courts, United States Court of Claims, Federal Circuit Courts of Appeal, United States Supreme Court, and even state courts[70] plays an important role in tax analysis. Not only is the volume and variety of existing tax authorities rather intimidating, but the rate at which new authorities are being promulgated makes it very difficult for practitioners to keep up with current developments.[71]

All tax information systems must be designed with the problems of comprehensiveness and updating in mind. In addition, any system that is deductively encoded must account for a "weight of authority" problem. Not only can the promulgators of case law and administrative rulings reverse or modify their own published positions, but they are also free to disregard

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[67] For example, an elaboration of the difference between the basis provision of § 1014 and that of § 1015 would illustrate the difference in value between a bequest of "Section 306 stock" and a gift of such stock.

[68] Proposed regulations may sometimes serve as informal interpretive guidelines but are not authoritative until made final, since until then they are subject to change, Treas. Reg. § 601.601. *But see* American Standard, Inc. v. United States, 602 F.2d 256 (Ct. Cl. 1979) (taxpayer's reliance on a proposed regulation was sufficient to excuse noncompliance with the final regulation).

[69] Treas. Reg. § 601.201(e)(1) clearly precludes a taxpayer from relying on an advance ruling issued to another taxpayer. However, since they have become available for public inspection, tax commentators cite them with surprising frequency. These rulings have taken on a "quasi-authoritative" value for tax practitioners.

[70] Federal courts in tax controversies must give due regard to the announcements of the highest court of a state in resolving underlying issues of state law. Commissioner v. Estate of Bosch, 387 U.S. 456 (1967).

[71] The West Publishing Company recently "tested the market" for a new single-source reference for primary tax materials set forth in their original full-text versions. The weekly publication "Federal Tax System" was terminated after only a few weeks. Perhaps potential subscribers found the prospect of reviewing upwards of 750 pages of primary materials per week generally unpalatable.

the interpretations of others, except for those which clearly emanate from
a source of higher authority. The bulk of interpretive expressions one en-
counters in tax analysis fits into the category of "disregardable" authority,
with some interpretations being much more susceptible to disregard than
others. For instance, Revenue Rulings are often meaningless in the face of
judicial litigation. Many of these rulings draw factual conclusions that
might easily involve jury determinations if the situations set forth in the
rulings were the subjects of refund claims litigated in federal district court.[72]
That interpretive promulgations may be disregarded by higher authorities
does not, of course, mean that such promulgations are useless, or even only
minimally useful. However, the problem with deductive coding is that the
computer views the propositional elements linked together with logical
operators as having equal value in the analysis. Thus, if a lower court case
or administrative ruling is used to supply an indispensable interpretive
element in a chain of reasoning, the ultimate outcome of the related analysis
depends upon a proposition which is highly conditional.

For example, item (15) listed above[73] illustrates the cross-referencing
difficulties of section 402. If an employee benefit plan distribution is to
receive favorable tax treatment under section 402(a)(2) (capital gain
treatment) or section 402(e)(1) (the separate "ten-year averaging" tax),
the Internal Revenue Service takes the position that the plan pursuant to
which the distribution is made must be "qualified" under section 401(a)
at the time of the distribution.[74] Nevertheless, the Tax Court in *Woodson
v. Commissioner*[75] and the Second Circuit in *Greenwald v. Commissioner*[76]
have each held that even though a plan is not qualified under section 401(a)
at the time of distribution, favorable tax consequences under section 402
will be granted respecting that portion of the distribution attributable to
contributions made to the plan's trust during the time the plan *was* qualified.

If the coded analysis of the favorable tax consequences under section
402 sets up qualification of the plan at the time of distribution as a necessary
element, then the analysis will ignore the potential for at least partially
favorable results pursuant to *Woodson* and *Greenwald*. If, on the other
hand, the analysis predicates at least partially favorable results upon quali-
fication of the plan at times other than the time of distribution, then it ig-
nores the possibility that the Internal Revenue Service's disagreement with
Woodson and *Greenwald* might culminate in litigation which could produce
a contrary or even overruling authority.[77] Clearly, the analysis, pending

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[72] A review of a "finding list" from a commercial tax service would show the great fre-
quency with which the IRS itself overrules or modifies its Revenue Rulings.

[73] *See supra* text accompanying note 61.

[74] *See supra* note 62.

[75] 73 T.C. 779 (1980).

[76] 366 F.2d 538 (2d Cir. 1966).

[77] *See supra* note 62.

final resolution of the issue, must frame the propositional element relating to qualification of the distributing plan in a disjunctive form which takes both possibilities into account. Similar coding would be necessary any time the systems analyst relies on interpretations whose authoritative value is something less than that of a treasury regulation or United States Supreme Court decision. At the very least, propositional elements derived from lesser authorities would have to be identified by source in the system, so that the user could make an independent evaluation of the element's stability in the analytical structure.

Another aspect of identifying authoritative instability is the problem of implicit obsolescence resulting from frequent statutory alterations. Beginning with the Tax Reform Act of 1969,[78] legislative tinkering with the Internal Revenue Code of 1954 has resulted in what appears to be an acceleration of statutory changes. Each major change leaves a body of interpretive authorities, issued before the change, that assumes questionable or limited value after the change. Thus, after the Pension Reform Act of 1974[79] was passed, a large number of cases and administrative rulings[80] which predated its enactment now must be viewed more carefully, even though many still may be valid interpretations because of their analytic consistency with the policies and purposes of the new legislation. Dealing with this kind of uncertainty in the coding of a deductive system that relies on the "black or white" establishment of constituent propositions may prove a worthy challenge.

Yet another problem with the selection of propositional elements based on interpretive authorities might arise with those authorities which establish and support broad doctrines derived from such concepts as "constructive" transactions, "form versus substance," and "tax avoidance purposes versus business purposes."[81] Propositions involving constructive designations could be readily incorporated into an analysis at the point where the system deals with corresponding actual designations. For example, an analysis of section 402 would have to incorporate the concept of a "distribution,"[82] which could easily be defined in the system as an actual (intended permanent) distribution or a "constructive" distribution. The latter could, in turn, be defined in terms of the various major categories of factual patterns ex-

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[78] Pub. L. No. 91-172, 83 Stat. 590.

[79] Pub. L. No. 93-406, 88 Stat. 913.

[80] These are listed at items 174.1-174.96 of IRS BULLETIN INDEX DIGEST SYSTEM, Basic Vol. 1953-1978.

[81] The special problems posed by such doctrines were considered by the developer of TAX-MAN. McCarty, *supra* note 10, at 846-50.

[82] As a result of an amendment to section 402(a)(1) made by the Economic Recovery Tax Act of 1981, Pub. L. No. 97-34, § 314(c), 95 Stat. 172, a "distribution" from a qualified retirement plan must involve an actual transfer of money or other property from the plan's trust and not the mere availability of such a transfer to the participant or beneficiary.

hibited in cases or rulings that deal with constructive distributions from qualified plans.[83]

Some judicial doctrines are so prominently associated with particular statutory provisions, such as the continuity of interest rule in corporate reorganizations,[84] that a coder would no doubt treat them in much the same manner as applicable Code section propositions. Other judicial doctrines, although associated with particular statutory provisions, are also applied to a variety of transactions involving a number of other tax rules. Examples might include the "step transaction" and "business purpose" doctrines.[85] These doctrines, like that of "form versus substance," would appear to have a nearly open-ended range of possible applications. Theoretically, therefore, a great many individual tax analyses would have to include a proposition to the effect that the preceding analysis is voided if subjected to a general doctrine in the context of a specific transaction. Such a proposition could be expanded to delineate the factors relied upon by courts in particular situations to invoke a particular doctrine of general application.

In this manner, the coded analysis would remind the user repeatedly of those authorities that promote tax "equity" over procedural trappings. If the "reminder" were deemed so repetitious as to lose effectiveness, "editing" would be the solution. Thus, the coder could choose to enter the general doctrines as elements only in particular tax analyses that involve a "history" of application for such doctrines as evidenced by case law and rulings.

III.   PROSPECTS FOR A COMPREHENSIVE COMPUTER TAX ANALYSIS SYSTEM

If the past proves to be a reliable guide, the law of taxation will continue to become increasingly more complex. The growth in complexity of our system of federal taxation reflects not only the increasing need for federal revenue but also the discovery by our legislators that tax laws could serve as convenient manifestations of social and economic policies.[86] Most would agree that tax simplification is desirable, and interesting proposals toward such end have been made and critiqued.[87] However, widespread political

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[83] For example, "loans" from a qualified plan may be deemed taxable distributions when the facts indicate that repayment is unlikely. *See* Rev. Rul. 67-258, 1967-2 C.B. 68.

[84] Pinellas Ice & Cold Storage Co. v. Commissioner, 287 U.S. 462 (1933).

[85] The "business purpose" doctrine for reorganizations comes from Gregory v. Helvering, 293 U.S. 465 (1935); the "step transaction" doctrine was first applied in Helvering v. Elkhorn Coal Co., 95 F.2d 732 (4th Cir. 1938), *cert. denied,* 305 U.S. 605 (1938). Both concepts are frequently applied to frustrate intended tax benefits from leveraged tax shelter transactions.

[86] Note the name given to the latest federal tax act - "The Economic Recovery Tax Act of 1981." Tax legislation has gone far beyond the idea of mere revenue raising.

[87] *See* U.S. DEPARTMENT OF TREASURY, BLUEPRINTS FOR BASIC TAX REFORM No. 048-004-01390-8 (1977); A.B.A. Special Committee on Simplification, *Evaluation of the Proposed Model Comprehensive Income Tax* 32 TAX LAWYER 563 (1979).

support of drastic changes for the sake of simplification alone has been slow to develop.[88] Accordingly, prospects are dim that, by legislative grace, the near future will include a wholesale simplification of federal tax laws. We might better focus our attention on the development of systems that at least offer some hope for better *management* of the seemingly boundless tax complexity with which we now struggle.

For the moment, persons who must deal with this complexity will continue to rely on the various commercial tax "services" that attempt to organize and explain the tax rules and their interpretations.[89] Naturally, the prospect of a comprehensive deductively coded computer system for tax analysis invites at least a general comparison between such a system and the commercial services. In this regard, certain observations may be made.

First, as already mentioned, the computer's physical advantages of speed, convenience of retrieval, and capacity for simultaneous verbal and numerical analysis are substantial. It is difficult to imagine that any degree of "computerphobia" will long survive to prevent the public at large from accepting these advantages. From the viewpoint of tax practitioners, learning to use and to feel comfortable with a computer should be no more troublesome a task than that of coping with the various tools of tax research analysis now in use.[90]

Secondly, although it is obvious that the editors of the various commercial tax services attempt, often with admirable success, to organize and develop their systems in a logical and useful fashion, it is also clear that they have not subjected themselves to any overriding mechanism of logical constraint.[91] The computer analyst, on the other hand, labors under the dictates of deductive logic. The data coded must be structured by means of common logical operators.[92] In effect, the computer becomes a taskmaster for disciplined thought and structured expression. These constraints make the development of a coded analysis quite difficult. Once a workable system is at the disposal of a user, however, the user is exposed not only to information but to the coder's responses to the constraints of deductive logic

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[88] For instance, the "Value Added Tax Bill," also designated "Tax Restructuring Act of 1979," appears to be slowly headed for nowhere. The bill's sponsor, Al Ullman, described the Value Added Tax as a "tax without loopholes." H. Rep. 5665, 125 CONG. REC. H5618 (daily ed. Oct. 22, 1979).

[89] Tax practitioners are familiar with the services published by Commerce Clearing House, Prentice-Hall, Research Institute of America, Bureau of National Affairs, and a few others.

[90] It should be noted that tax research has become something of an academic subject. Many graduate programs in taxation now offer tax research courses.

[91] Of course, a system that merely incorporates the "logical" structure of the Internal Revenue Code is one that follows a broken path. As previously noted, the very structure of the Internal Revenue Code contributes to tax complexity.

[92] *See supra* note 5.

as well. One would expect the user's own analytic abilities and modes of expression to be duly influenced.[93]

And finally, while existing commercial services tend to promote a dependency on secondary expressions of rules, a deductively coded tax system would begin most analyses directly with Code section propositions which would be clarified through expansions.[94] The computer system would permit virtually unlimited propositional expansions, yet would allow the user to switch instantaneously from a detailed expansion back to the basic propositions of the analysis. The flow from basic propositions through detailed expansions would generally reflect a shift from the primary sources of tax law to less authoritative interpretations, thus serving to stress the importance of the former in the overall analysis.

Regardless of the distinguishing features of computerized tax systems as compared with traditional commercial systems, the physical advantages of computer systems suggest some interesting possibilities for data bank cross-referencing. Perhaps the most useful of these possibilities is the area of coordination of verbal analyses with numerical computations. The integration of verbal functions as displayed in programs like JUDITH and LAWGICAL[95] with the computational abilities exemplified by programs like CORPTAX[96] might permit an analyst to determine simultaneously whether certain tax benefits or limitations are applicable in a given situation along with the precise or projected dollar consequences of such benefits or limitations.

Because the computer could instantaneously match the data input of a particular analysis with the propositional elements of any number of other analyses, it could presumably be designed to alert the user to the potential applicability of analyses that might otherwise escape notice. For instance, an analysis under section 402 indicating that a particular employee benefit plan distribution is subject to ordinary loss treatment[97] could be cross-referenced with an analysis of the fiduciary responsibility provisions of the Employee Retirement Income Security Act.[98] Likewise, the data

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[93] Similarly, one working extensively with normalized statutes and legal documents would be prone to write with less syntactic ambiguity.

[94] Code section propositions in a program should be accompanied with citations, since, as mentioned, propositions gleaned from authorities outside the Code may appear with Code section propositions at the same level of analysis.

[95] *See supra* text accompanying notes 14 and 15.

[96] *See supra* text accompanying note 13.

[97] *See supra* text accompanying note 48.

[98] Designated earlier as the Pension Reform Act of 1974. *See supra* note 79. The question under the fiduciary responsibility provisions might be whether the trustee made sufficiently prudent investments.

input in a section 402 analysis might serve as the starting point for several other indirectly related analyses.[99]

Another possibility for systems development is coordination of standard analyses with data bases containing sources of information that are commonly unpublished. The collection of data stemming from audit experiences, IRS administrative appeals, tax litigation dismissals, and unreported tax cases from the federal district courts[100] could create a rich source of ancillary interpretation of tax rules, if properly organized and referenced. Although the volume of regularly published tax authorities and interpretations is more than enough for most tax practitioners, the introduction of arcane sources of interpretive information at points in a comprehensive analysis where published sources are scarce would be decidedly beneficial.

Finally, the possibility exists for coordination of a general analysis program with drafting systems.[101] Thus, a user who analyzes tax rules pertaining to the qualification of pension plans, for example, could break the analysis at a particular point to view model plan clauses that purportedly embody the propositions expressed in the analysis.

CONCLUSION

Applications of computer technology to legal analysis have only just begun, and the most promising results of these applications may be systems for tax analysis. Systems which limit user input to positive and negative responses and numerical information offer the most immediate opportunities for practical use. Eventually, such systems may lead to the development of complete tax analysis systems which would replace commercial tax services as they now exist. Technical difficulties arising from the inherent complexities of our tax rules and general problems resulting from the application of deductive logic to verbal expressions will have to be identified and resolved. In addition, persons with tax expertise who wish to develop systems will have to understand at least the fundamental concepts of deductive logic and computer science. For the moment, these developmental difficulties do not seem insurmountable, and we will no doubt see an increasing number of attempted analyses and steady progress toward ever more useful tax analysis systems.

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[99] For example, cross-references might be made to analyses dealing with state and local taxes, employment taxes, income averaging, and the alternative minimum tax of § 55 (applicable, perhaps, to a § 402 analysis because § 402(a)(2) provides capital gain treatment for certain distributions).

[100] Many such cases are not appealed and the opinions, therefore are not published unless picked up by a commercial service.

[101] *See* Sprowl, *Automating the Legal Reasoning Process: A Computer that Uses Regulations and Statutes to Draft Legal Documents*, 1979 AM. B. FOUND. RESEARCH J. 3.