

1968

A Language-Normalization Approach to Information Retrieval in Law

Layman E. Allen

University of Michigan Law School, laymanal@umich.edu

Available at: <https://repository.law.umich.edu/articles/32>

Follow this and additional works at: <https://repository.law.umich.edu/articles>



Part of the [Computer Law Commons](#), and the [Legal Writing and Research Commons](#)

Recommended Citation

Allen, Layman E. "A Language-Normalization Approach to Information Retrieval in Law." *Jurimetrics* 9 (1968): 41-56.

This Article is brought to you for free and open access by the Faculty Scholarship at University of Michigan Law School Scholarship Repository. It has been accepted for inclusion in Articles by an authorized administrator of University of Michigan Law School Scholarship Repository. For more information, please contact mlaw.repository@umich.edu.

A LANGUAGE-NORMALIZATION APPROACH TO INFORMATION RETRIEVAL IN LAW*

Layman E. Allen
University of Michigan

Abstract

An information retrieval system (as distinguished from a document retrieval system) is described for handling statute-oriented legal literature. The Normalized Sentence-Index Matrix (N-SIM) system suggested differs from more traditional retrieval systems for legal literature in three respects:

- (1) the categories used for classification are normalized versions of sentences from statutes, regulations, treaties, constitutions, case opinions, legal treatises, law review articles, and other documents in legal literature,
- (2) the classification system is hierarchial and open-ended to evolve with the literature through time, and
- (3) the organization of the file facilitates some analysis of the literature by computer.

A sentence is expressed in *implicative normal form* (INF) when three specified conditions are fulfilled. Statutory norms are converted into INF before being stored in the N-SIM file. *Negative implicative normal form* (NINF) is also defined, and all assertions in legal literature about aspects of the statutory norms are converted into either INF or NINF for storage in the N-SIM file.

The N-SIM file is designed so that it can be used manually as a loose-leaf service or in a system of automatic data processing by machine. It is hypothesized that statutes expressed in this normalized form will be understood by various audiences of readers both more quickly and more accurately than statutes expressed in their current form. A method for empirically testing this hypothesis is suggested.

INTRODUCTION

This paper is in the nature of a progress report on the development of an information retrieval system for legal literature that was first suggested at the 1965 Congress of the International Federation for Documentation in Washington, D. C.¹ Further elaboration of a "language normalization" approach

*Presented to the American Bar Association Special Committee on Electronic Data Retrieval, August 6, 1967, in Honolulu, Hawaii.

1. Layman E. Allen, *Sketch of a Proposed Semi-Automatic, Hierarchical, Open-Ended Storage and Retrieval System for Statute-Oriented Legal Literature*, Proceedings of the 1965 Congress of FID (International Federation for Documentation), Washington, D.C., October 10-15, 1965 Area IV, INFORMATION NEEDS OF SOCIETY, Symposium B, Specific Knowledge Areas.

to information retrieval in law is presented in the course of illustrating the suggested system with respect to a section of the Internal Revenue Code and selected literature about that section. This application to one of the code provisions dealing with corporate reorganizations, because it is representative of how to handle other provisions and other statutes, is a significant step further in development of the proposed semi-automatic, hierarchical, open-ended storage and retrieval system for statute-oriented legal literature.

If there is a sufficient similarity between this statute-oriented portion of legal literature and the social science literature most of interest to you to make such a system of storage and retrieval of information useful in your work, I will have to rely upon you to recognize it. I have not been considering nor designing this system from the viewpoint of its application to all social science literature, but rather for its use with respect to one rapidly-growing segment of legal literature. The justification for this may bear repeating².

Law impinges intimately and profoundly upon matters of primary concern to man. The authorized community decision processes that we refer to as law strongly influence—among other things—who shall have what voice in the determination of community policy, how material resources shall be used and apportioned to meet human needs, the extent of physical and mental well-being assured each individual, the closest of human relations both within the family setting and outside it, the opportunities for the acquisition and practice of socially useful skills, freedom to use and to have access to modern communication media for the ventilation of ideas, the extent to which persons are treated according to their acts rather than their origins, and the minimum wall of privacy that is appropriate to accord to each person in respect of the fact that he is human. In affecting such important values of man, law plays no small part in determining to what extent a community succeeds in promoting human dignity.

The expectations of individual human beings are of central significance in legal decision making. The effects that a judge expects his decision to have upon the immediate parties in a dispute before him, as well as its ramifications wider in the community, are certainly influential in the reaching of decisions. The expectations of parties to a dispute are no less influential—perhaps what they reasonably ought to have expected in the context, as much as what they actually did expect. A judge's sense of what is fair and just will certainly reflect his perception of what the parties reasonably ought to have expected, and that, in turn, will be reflected in his decision. The expectations of counsel will, indeed, affect the advice that he gives to a client on how to act and whether to litigate, affect the argument that he makes to persuade a judge on behalf of his client if the choice is to litigate, and affect the recommendations that he makes to legislators and other public officials for the changing of legal norms. All of these expectations affect and alter the courts of law.

But all such expectations are dependent upon the fund of information available to the expectant. What he knows affects what he believes and expects. Because an individual can only know what he somehow has access to, the modes of expressing ideas, the techniques for storing such expressions and retrieving them, and the methods for processing such data,

2. *Ibid.*

all have a profound effect upon the aspects of human life touched by law. The route of that effect is by way of influencing human expectations, and these, in turn, play a crucial role in law. To the extent that the accelerated evolution of information technology we are currently witnessing provides wider access to what is known, perhaps its result will be in more realistic expectations about what is achievable and what is desirable. That is certainly to be hoped—even if not expected. The idea suggested in this paper for improving information technology in the handling of some legal literature—perhaps better described now as just a gleam in the eye of an observer—is based on both the hope and expectation that improved expression of ideas and more effective handling of data by humans, as well as machines, will result in more realistic expectations—in turn, more reasonable ones—and better law.

A NORMALIZED SENTENCE-INDEX MATRIX (N-SIM) FILE

Summarized briefly, the proposed system for storage and retrieval of statute-oriented legal literature has three characteristics which tend to distinguish it from more traditional retrieval systems for law:

- (1) the categories used for classification are normalized versions of complete sentences from statutes, regulations, treaties, constitutions, case opinions, legal treaties, law review articles, and other documents in legal literature;
- (2) The classification system is hierarchical and open-ended to evolve with the literature through time; and
- (3) the organization of the file facilitates some analysis of the literature by computer.

Appropriately, enough, it is called a normalized sentence-index matrix (N-SIM) system. It is designed for both manual use in the form of a loose-leaf service and machine use in an automatic data processing system.

The storage file of an N-SIM system consists of normalized versions of the ideas expressed in the legal literature. The beginning entries are the norms expressed by the statute that the literature is about—cast into what is called *implicative normal form* (INF). By stipulation, a sentence will be regarded as in implicative normal form if and only if each of the following three conditions is fulfilled:

- (1) the expression is an implication;
- (2) the number of occurrences of subsidiary elementary sentences in the sentence is minimized; and
- (3) all negations in the sentence are negations of elementary subsidiary sentences.

Representations of sentences will also be in implicative normal form if and only if the three specified conditions are fulfilled.

After the norms expressed by the statute are converted into INF and stored, the ideas expressed in other literature about various aspects of those norms are converted into either (1) INF or, (2) a second normalized form called negative implicative normal form (NINF). So converted, the ideas are explicitly related to some idea expressed by a sentence already stored in the file. A sentence (or an expression that represents it) is in negative implicative normal form if and only if it is the negation of a sentence (or an expression that

represents it) that is in implicative normal form. All sentences (or representations of them) in an N-SIM file are expressed in normal form—either in INF or else in NINF.

The ideas expressed in the new literature being added to the file will be related to ideas expressed by sentences already in the file in one of four possible ways. The relation indicated will be:

- (1) that certain specified circumstances result in fulfillment of the condition expressed by a given sentence in the file;

$$\text{S3a} \longrightarrow \text{S3}$$

- (2) that it is not so that certain specified circumstances result in fulfillment of the condition expressed by a given sentence in the file;

$$\text{N} \text{S3a} \longrightarrow \text{S3}$$

- (3) that certain specified circumstances result in the nonfulfillment of the condition expressed by a given sentence in the file;

$$\text{S3a} \longrightarrow \text{NS3} \quad \text{or,}$$

- (4) that it is not so that certain specified circumstances result in the nonfulfillment of the condition expressed by a given sentence in the file.

$$\text{N} \text{S3a} \longrightarrow \text{NS3}$$

The set of categories for classifying documents is completely open-ended. Each time a new document contains an assertion about new circumstances not yet discussed in the literature that either result or do not result in fulfillment or nonfulfillment of conditions expressed by sentences already included in the set of categories, the analyst can make that assertion the basis for a new category to be added to the system. Hence the categories evolve with the literature, and there is no need to attempt to guess in 1966 what categories are going to be appropriate for classifying literature that will be produced in 1986. Whatever categories are appropriate can easily be added to the system at that time as the need arises. Each new category added is related to the existing set of categories in an interesting way—in a way that makes retrieval of data involving that category relatively easy, whether done by machine or manual methods. Each new category is the antecedent of an implication that has one of the existing categories as its consequent; and that existing category will, in turn, be related to the other existing categories in the same interesting way.

The effectiveness of such a system for retrieving wanted materials will depend crucially upon the analysis and classification of documents as they are added to the document file. For each document, entries will be made in the N-SIM file that depend upon what the analyst(s) interpret the contents of the document to be asserting. A spectrum of alternative modes of processing such incoming documents can be imagined, varying in degree of thoroughness. The competence of personnel and familiarity with the subject matter required to do such analysis adequately must be ascertained and reckoned with. Experience will largely determine how the process of analysis should be organized and the features that it should incorporate; resources available will help provide strong guides as to what is appropriate. Some care will need to be taken to organize matters so that informed judgment is provided where it is needed, and also so that highly qualified personnel are relieved of routine tasks that can be performed by clerical personnel or machines.

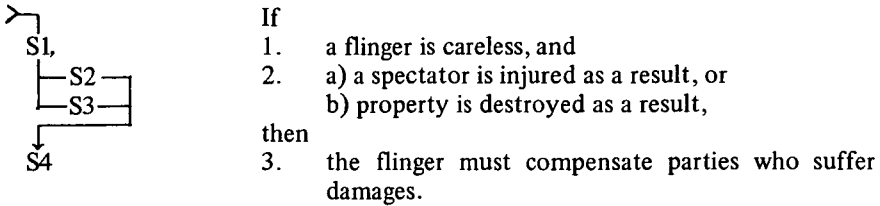
A brief example may serve to help clarify the nature of an N-SIM system before undertaking to illustrate it with respect to a representative provision of the Internal Revenue Code. Suppose that a statute provides:

- (1) Careless flingers who injure spectators or destroy equipment must compensate parties who suffer damages.

And suppose further that a distinguished authority recommends as a standard:

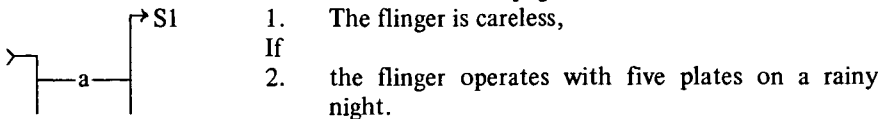
- (2) Flingers who operate with five plates on rainy nights are careless, but not those who operate with only four.

How would this statute and the idea from the distinguished authority's book appear in the N-SIM file? The statutory provision would first be converted into implicative normal form and stored. It would appear like this:

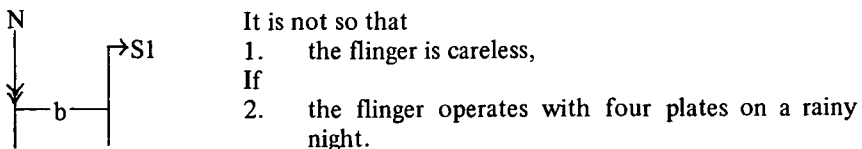


The arrow-diagram to the left of this normalized version of the statutory norm is a representation of the sentence that expresses the norm. 'S1' represents 'a flinger is careless'; 'S2' represents 'a spectator is injured as a result'; etc. The norm states that a given legal consequence follows if certain sets of antecedent conditions are fulfilled. In the arrow diagram, if a complete path is traced from the tail of the arrow to the head of the arrow, the set of conditions expressed by the sentences represented along that pathway lead to the consequence expressed by the sentence (or sentences, as the case may be) represented below the arrowhead. In the example, there are two pathways: S1-S2 and S1-S3. They both lead to S4.

The ideas expressed by the distinguished authority would appear on separate pages in the file. Normalized versions of sentences expressing these ideas would appear in a set of pages dealing with S1. There would be four subsets of pages in the set dealing with S1—one subset each to indicate fulfillment, lack of fulfillment, nonfulfillment, and lack of non-fulfillment of S1. The first idea of the D.A. would be normalized and listed on a page in the first subset as follows:



The second idea of the D.A. would be normalized and listed on a page in the second subset as follows:



On each of the two pages, the diagram to the left of the normalized sentence extends up and down the full length of the page to permit additional entries from documents that indicate other circumstances that either lead to a

(b) Exception. —

- (1) In General.— Subsection (a) shall not apply to an exchange in pursuance of a plan of reorganization within the meaning of section 368 (a) (1) (D), unless —
 - (A) the corporation to which the assets are transferred acquires substantially all of the assets of the transferor of such assets; and;
 - (B) the stock, securities, and other properties received by such transferor, as well as the other properties of such transferor, are distributed in pursuance of the plan of reorganization.
- (2) Cross Reference.—
For special rules for certain exchanges in pursuance of plans of reorganization within the meaning of section 368 (a) (1) (D), see section 355.

- (c) Certain Railroad Reorganizations.— Notwithstanding any other provisions of the subchapter, subsection (a) (1) (and so much of section 356 as relates to this section) shall apply with respect to a plan of reorganization (whether or not a reorganization within the meaning of section 368 (a) for a railroad approved by the Interstate Commerce Commission under section 77 of the Bankruptcy Act, or under section 20b of the Interstate Commerce Act, as being in the public interest.

Proceeding in the manner described in Figure 1,

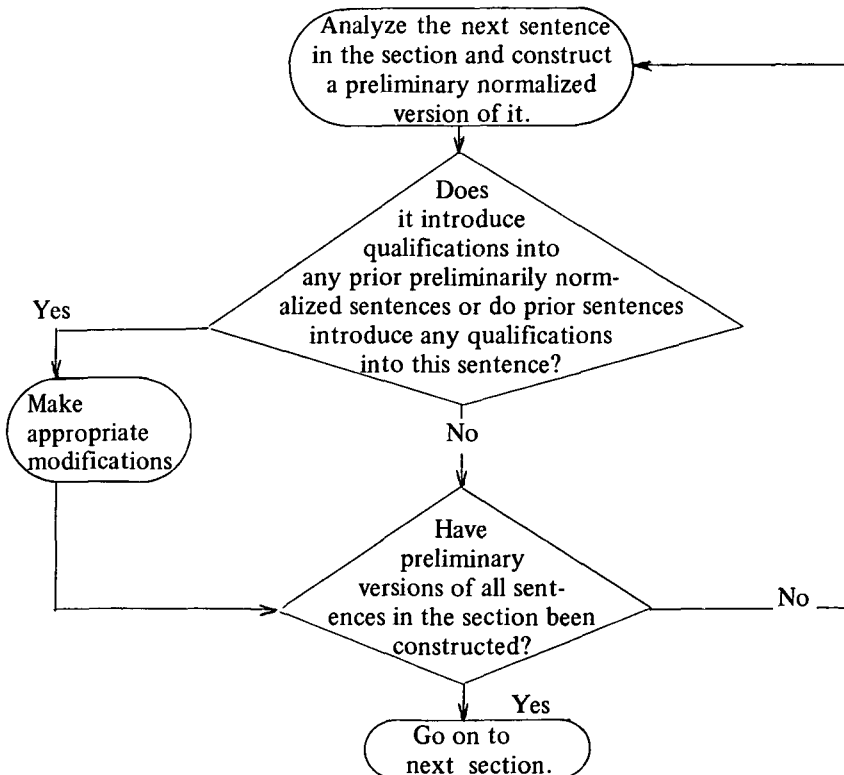
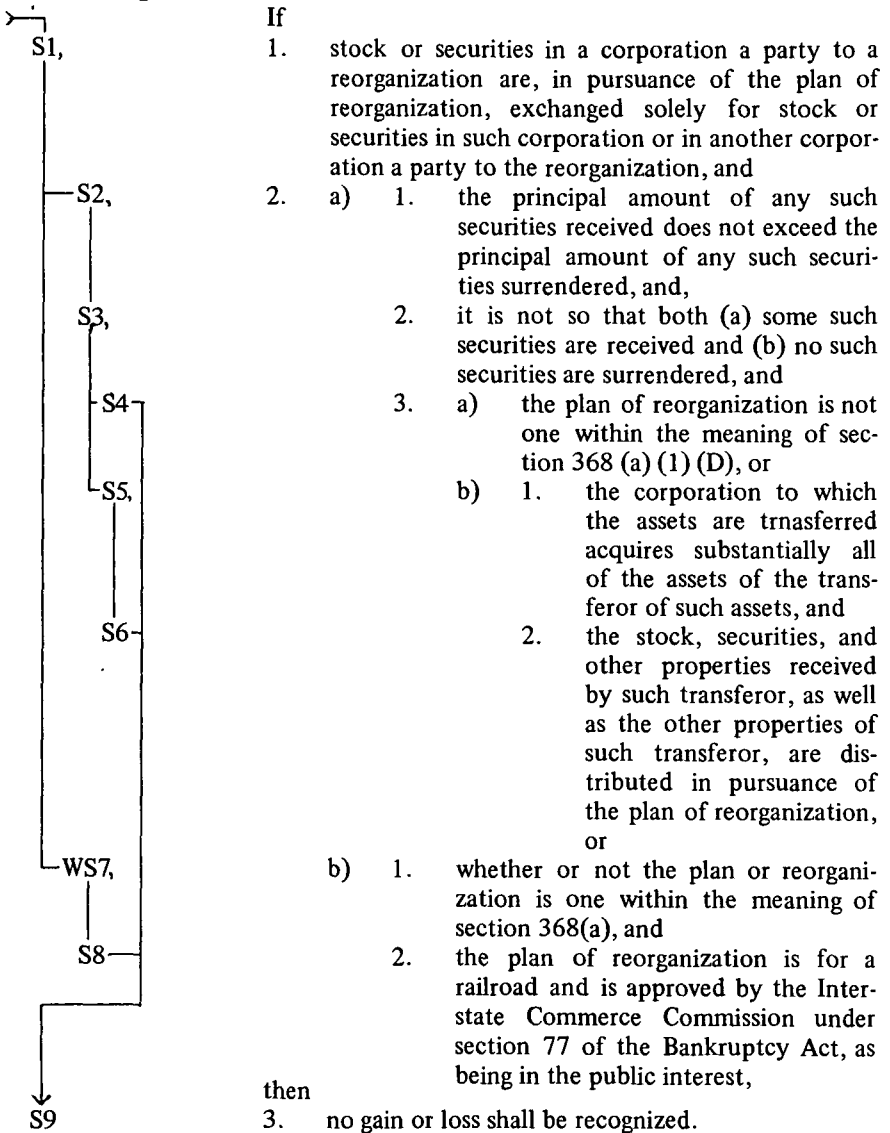


FIGURE 1

the following normalized version of section 354 can be constructed.*



The subsection of the current version of section 354 from which the subsidiary sentences of the normalized version are derived are indicated in the following tabulation:

S1	(a) (1)	S4	(b) (1)	WS7	(c)
S2	(a) (2) (A)	S5	(b) (1) (A)	S8	(c)
S3	(a) (2) (B)	S6	(b) (1) (B)	S9	(a) (1)

The progressive modification of the preliminary normalizations can be more easily accomplished and summarized if the representations of the

*The cross references are omitted in normalized form because the information in them about relation to other sections is otherwise conveyed in normalized form.

normalized sentences are used, rather than writing out the full text of each sentence. The following is a summary of the steps in arriving at the normalized version of section 354.

Representation of Normalized Version	Source	Needs Qualification, See
1. $\text{>S1} \longrightarrow \text{S9}$	(a) (1)	2.
2. $\text{>S1} \text{---} \text{S2} \text{---} \text{S3} \longrightarrow \text{S9}$	1. qualified by (a)(2)	3.
3. $\text{>S1} \text{---} \text{S2} \text{---} \text{S3} \left\{ \begin{array}{l} \text{S4} \\ \text{S5-S6} \end{array} \right\} \text{>S9}$	2. qualified by (b)	
4. $\text{>WS7} \longrightarrow \text{S8} \quad \text{>S1} \longrightarrow \text{S9}$	(c)	
5. $\text{>S1} \left\{ \begin{array}{l} \text{S2-S3} \left\{ \begin{array}{l} \text{S4} \\ \text{S5-S6} \end{array} \right\} \\ \text{WS7-S8} \end{array} \right\} \text{>S9}$	combining 3. & 4.	

The normalized version of section 354 is constructed to express exactly the same ideas as those expressed by the current version in the following sense: the normalized version is consequentially equivalent to the current version. Two statements are stipulated to be consequentially equivalent if and only if every situation (various combinations of conditions fulfilled) that leads to a given set of consequences by virtue of the first statement also leads to the same set of consequences by virtue of the second.

For two statements that express exactly the same set of ideas, there is a striking difference between the normalized version and the current version: the normalized version seems (to this reader, at least) so much simpler and easier to understand. The relations between the various constituent parts of the overall section are more apparent and comprehensible as expressed in normalized form. It would be interesting to experimentally test this hypothesis regarding relative simplicity of the two versions with respect to audiences of varying degrees of familiarity with the Internal Revenue Code. Some measure of relative speed and accuracy of various readers in dealing with each of the versions could be obtained by posing the ten problems involved in the following question: which of the following situations (A through J) lead to the consequence (S9) that no loss or gain shall be recognized?

	SITUATIONS									
	A	B	C	D	E	F	G	H	I	J
SUBSIDIARY	S1	S2	S1	S1	S1	S1	S1	S1	S1	S1
SENTENCES	S2	S3	S8	S2	S2	NS4	S2	S2	NS2	S2
THAT	S3	S4		S3	S3	NS5	S5	S3	S4	S3
CHARACTERIZE	S5	S5		S5	S6	S6	S6	S4	S5	NS7
THE	S6	S6		S7		S8			S6	S8
SITUATION		S8								

Note that NS4 indicates that the condition expressed by S4 is not fulfilled. Similarly for the others.

After constructing the normalized version of the statute, documents that contain assertions about various aspects of the statute can be categorized in terms of the subsidiary sentences of the N-SIM file as it then stands. With further development in the N-SIM file, there will be additional categories available.

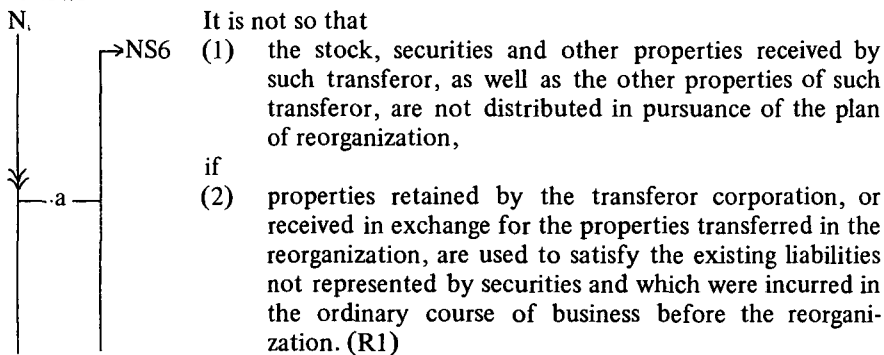
Selected examples from the literature about section 354 will illustrate how an N-SIM will evolve and grow with the literature. Those that follow are drawn from regulations of the Treasury Department, court decisions, and revenue rulings.

Regulation 1.354-1(a)(2) states:

... Section 354 does not apply to exchanges pursuant to a reorganization described in section 368(a)(1)(D) unless the transferor corporation—

- (1) ... , and
- (2) Distributes all of its remaining properties (if any) and the stock, securities and other properties received in the exchange to its shareholders or security holders in pursuance of the plan of reorganization. The fact that properties retained by the transferor corporation, or received in exchange for the properties transferred in the reorganization, are used to satisfy existing liabilities not represented by securities and which were incurred in the ordinary course of business before the reorganization does not prevent the application of section 354 to an exchange pursuant to a plan of reorganization defined in section 368(a)(1)(D).

This provides an entry to the fourth subset of pages dealing with the condition expressed by S6—namely, a denial that certain circumstances lead to the nonfulfillment of S6. In the loose-leaf service containing the N-SIM file the text which led the analyst to insert the entry in the N-SIM file would appear adjacent to the entry so that users of the N-SIM system would be able to check the analyst's judgments for themselves. The entry and its source would appear as follows:



(R1) Reg. 1.354-1(a)(2)

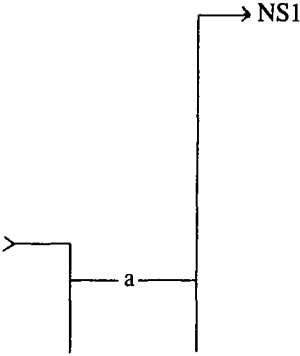
... Section 354 does not apply to exchanges pursuant to a reorganization described in section 368(a)(1)(D) unless the transferor corporation—

1. ... , and
2. Distributes all of its remaining properties (if any) and the stock, securities and other properties received in the exchange to its shareholders or security holders in pursuance of the plan of reorganization. The fact that properties retained by the transferor corporation, or received in exchange for the properties transferred in the

reorganization, are used to satisfy existing liabilities not represented by securities and which were in the ordinary course of business before the reorganization does not prevent the application of section 354 to an exchange pursuant to a plan of reorganization defined in section 368(a)(1)(D).

The second example, also drawn from the Treasury Regulations, illustrates the nonfulfillment of a condition. In this case the nonfulfilled condition is an essential one for the fulfillment of a specified set of antecedent conditions; so the legal consequence of section 354 does not follow from the circumstances that lead to nonfulfillment of the condition.

Sec. 354 NS1



- 1) Stock or securities in a corporation a party to a reorganization or not; in pursuance of the plan of reorganization, exchanged solely for stock or securities in such corporation or in another corporation a party to the reorganization,
- If
- 2) There is received property other than stock or securities.
- (R1)

(R1) Reg. 1.354-1(c)

An exchange of stock or securities shall be subject to section 354(a)(1) even though—

- (1) Such exchange is not pursuant to a plan of reorganization described in section 368(a), and
- (2) The principal amount of the securities received exceeds the principal amount of the securities surrendered or if securities are received and no securities are surrendered—if such exchange is pursuant to a plan of reorganization for a railroad corporation as defined in section 77(m) of the Bankruptcy Act (11 U.S.C. 205(m)) and is approved by the Interstate Commerce Commission under section 77 of such Act or under section 20(b) of the Interstate Commerce Act (49U.S.C. 20(b)) as being in the public interest. Section 354 is not applicable to such exchanges if there is received property other than stock or securities.

As a matter of logic, it is clear that

$$\neg \text{NS1} \longrightarrow \text{N}(\text{S1} - \text{WS7} - \text{S8})$$

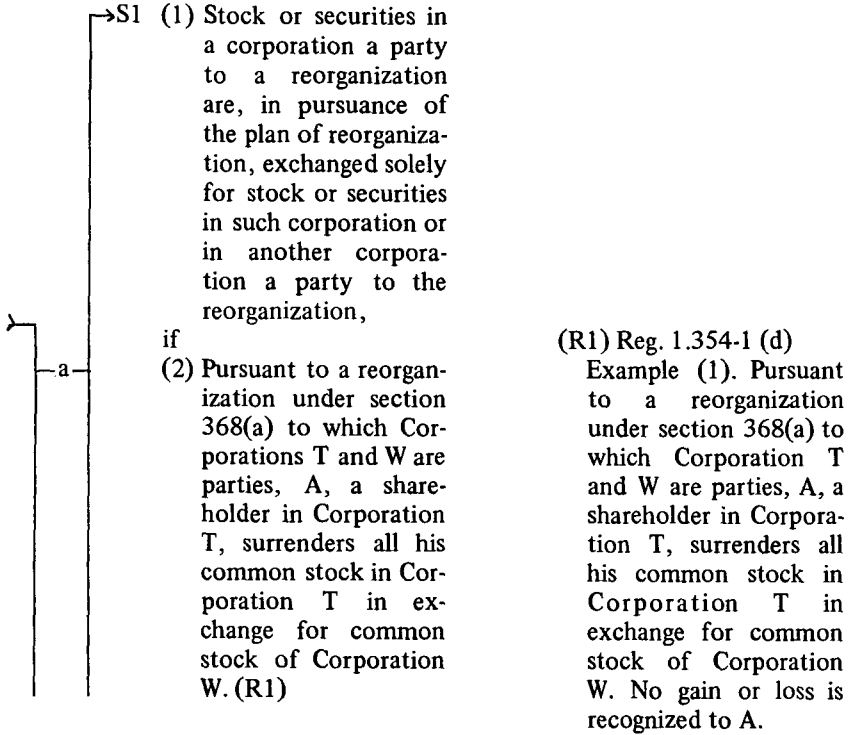
in other words, that when other property is received, the set of antecedent conditions leading to no gain or loss when the plan of reorganization is for a railroad corporation is not fulfilled. And also as a matter of logic,

$$\text{N} \longrightarrow \text{O} \longrightarrow \text{S1} - \text{WS7} - \text{S8} \longrightarrow \text{S9} \longrightarrow \text{N}(\text{S1} - \text{WS7} - \text{S8}) \longrightarrow \text{S9}$$

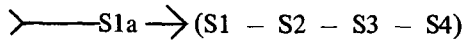
namely, that it is not so that a part of section 354 and one set of its antecedent conditions being unfulfilled leads to the legal consequence expressed by S9. These logical relations are left submerged and unexpressed in a statement like "Section 354 is not applicable to such exchanges." They are apparently felt to be so obvious that there is no need to state them explicitly.

The Regulations set forth examples of situations that lead to various consequences under applicable sections of the Internal Revenue Code. The Third example of an entry to an N-SIM file for section 354 is drawn from the first example set forth in the Regulations for section 354.

Sec. 354 S1



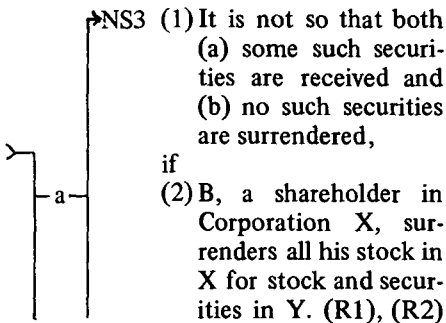
There would be similar entries in the N-SIM file on pages for S2, S3, and S4 because



and it is by virtue of (S1-S2-S3-S4) that the legal consequence S9 follows (that is, that no gain or loss is recognized to A).

The fourth and fifth examples give two references for the same entry in the N-SIM file on the page for NS3.

Sec. 354 NS3



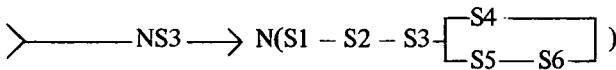
(R1) Reg. 1.354-1(d)

Example (2). Pursuant to a reorganization under section 368(a) to which Corporations X and Y (which are not railroad corporations) are parties, B, a shareholder in Corporation X, surrenders all his stock in X for stock and securities in Y. Section 354 does not apply to this exchange.

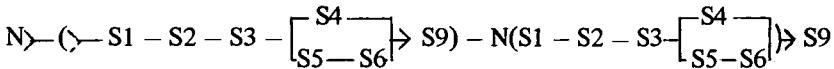
(R2) William H. Bateman, 40 T.C. 408, 414 (1963).

We think that respondent's regulations correctly interpret section 354(a)(2)(B) as making section 354(a)(1) inapplicable if only stock is surrendered and stock and securities are received. There is nothing in section 354(a)(2)(B) which limits its application to principal amount securities as petitioner contends. Since petitioner in the instant case surrendered only stock, if the warrants he received are considered not to be stock but to be securities, section 354(a)(1) is inapplicable to the exchange except to the extent provided in section 356(a).

Unexpressed, but nevertheless true as a matter of logic with respect to this example, are the following:

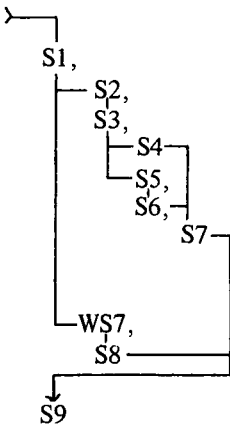


and

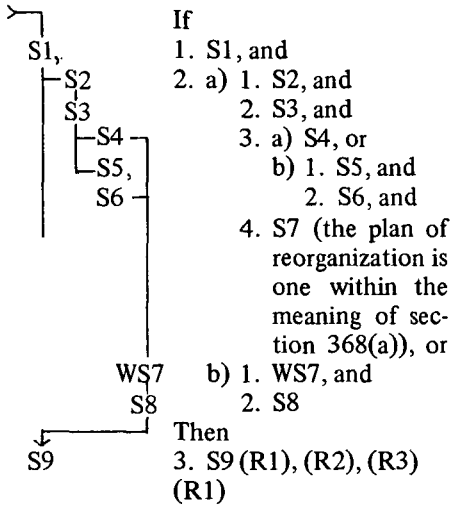


The sixth example is somewhat different from those considered so far; it involves a further qualification of the normalized version of section 354. A subsequent section of the Internal Revenue Code makes clear that the present preliminary version of section 354 needs modification, and this is confirmed by the Treasury Regulations. Section 368(a) requires the introduction of S7 into one branch of the antecedent of the normalized 354.

Sec. 354



- If
1. S1, and
 2. a) 1. S2, and
 2. S3, and
 3. a) S4, or
 - b) 1. S5, and
 2. S6, and
 4. S7 (the plan of reorganization is one within the meaning of section 368(a)), or
 - b) 1. WS7, and
 2. S8,
- then
3. S9.
- (R1), (R2), (R3)



(R1) Sec. 368 (a).

(a) Reorganization. —

(1) In general.— For purposes of parts I and II of this part, the term “reorganization” means . . .

(R2) Reg. 1-354.1 (a)

. . . The exchanges to which section 354 must be pursuant to a plan of reorganization as provided in section 368(a) . . .

(R3) Reg. 1-354.1 (c)

An exchange of stock or securities shall be subject to section 354(a)(1) even though —

(1) Such exchange is not pursuant to a plan of reorganization described in section 368(a), and

(2) . . . if such exchange is pursuant to a plan of reorganization for a railroad corporation as defined in section 77(m) of the Bankruptcy Act (11 U.S.C. 205(m). and is approved by the Interstate Commerce Commission under section 77 of such Act or under sections 20(b) of the Interstate Commerce Act (49 U.S.C. 20(b)) as being in the public interest.

The final example is a second entry to the page for assertions about circumstances fulfilling the condition expressed by S1 of section 354. It appears as item S1b-S1c from reference R2 as follows:

S1 1) Stock or securities in a corporation a party to a reorganization are, in pursuance of the plan of reorganization, exchanged solely for stock or securities in such corporation or in another corporation a party to the reorganization,

If

2) Pursuant to a reorganization under section 368(a) to which Corporations T and W are parties, A, a shareholder in Corporation T, surrenders all his common stock in Corporation T in exchange for common stock of Corporation W, (R1) or

3) a. the bondholders of a corporation, by voluntary agreement, surrender their old bonds and claims for past due for new bonds in the same face amount as the old bonds, and

b. the preferred and common shareholders surrender their old preferred and common stock for new common stock. (R2)

(R1) Reg. 1.354-1 (d)

Example (1). Pursuant to a reorganization under section 368(a) to which Corporations T and W are parties, A, a shareholder in Corporation T, surrenders all his common stock in Corporation T in exchange for common stock of Corporation W. No gain or loss is recognized to A.

(R2) Rev. Rul. 58-546, CB 1958-2, p. 143

Where the bondholders of a corporation, by voluntary agreement, surrender their old bonds and claims for past due interest for new bonds in the same face amount as the old bonds, and the preferred and common shareholders surrendered their old preferred and common stock for new common stock, the transaction constitutes a nontaxable recapitalization (reorganization) within the purview of section 368(a)(1)(E) and section 354 of the Internal Revenue Code of 1954.

CONCLUDING REMARKS

For others who may be interested in trying the N-SIM system out with respect to some segment of legal literature, it has been sketched and illustrated in sufficient detail to enable them to do so. In conclusion, the tentativeness of all

aspects of this proposal for a semi-automatic, hierarchical, open-ended storage and retrieval system for statute-oriented legal literature should be emphasized. There are several things about such a system that may or may not be evident at first—and perhaps deserve express mention. First, the system is not merely a document retrieval system; it is an information retrieval system. It does not merely provide documents which the user must then read and analyze: whether by loose-leaf file and done manually or by computer in an automatic processing system, assistance is provided to the user in the system by performing part of the analysis. Second, the availability of such a system will facilitate making the efforts of researchers in a given field cumulative. The relations between authors' ideas will be organized in such a way as to make these relations more obvious. Thirdly, it is likely that the most significant unanswered question at this time about such an N-SIM system is just how highly skilled the analysts who classify the incoming literature and convert it into normal form will need to be. The economic viability of such a system will probably hinge upon just that. Even if the demands are great, however, if the system does (as hypothesized) save the time and effort of high-powered legal talent (that of the users), perhaps existing commercial services will find the necessary incentive to devote the required resources to produce such a system. Finally, one of the most intriguing aspects of getting such an N-SIM system started is what might result from providing some models of legal drafting that communicate effectively. The availability of normalized versions of statutes might well foster improvement in legal draftsmanship. Ironic, perhaps, but nevertheless true—that putting messages into a form that enables machines to work with them better will, in this instance, put them into a form that humans can also cope with better.

Whether such a system for the storage and retrieval of information can be generalized for use with other social science literature is an open and interesting question—perhaps a good question with which to conclude this paper.