University of Michigan Law School
University of Michigan Law School Scholarship Repository

Book Chapters | Faculty Scholarship

1980

Language, Law, and Logic: Plain Legal Drafting for the Electronic Age

Layman E. Allen
University of Michigan Law School, laymanal@umich.edu

Follow this and additional works at: http://repository.law.umich.edu/book_chapters

Part of the Legal Writing and Research Commons, and the Public Law and Legal Theory Commons

Publication Information & Recommended Citation

Allen, Layman E. "Language, Law, and Logic: Plain Legal Drafting for the Electronic Age." In Computer Science and Law, edited by B. Niblett. Cambridge: Cambridge Univ. Press, 1980.

This Book Chapter 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 Book Chapters by an authorized administrator of University of Michigan Law School Scholarship Repository. For more information, please contact mlaw.repository@umich.edu.

CHAPTER 5

LANGUAGE, LAW AND LOGIC: PLAIN LEGAL DRAFTING FOR THE ELECTRONIC AGE

Layman E. Allen

University of Michigan

1 INTRODUCTION

The achievement of current demands for clearer legal drafting in the United States (New York, 1978 and President's Executive Order, 1978) and Great Britain (Renton Report, 1975) can be aided by applying modern logic to improve the language of the law. In considering how the expression of legal norms can be clarified by using some formal language techniques, particular attention will be given to alternatives for dealing with problems of inadvertent imprecision in current legal drafting, alternatives that facilitate human understanding as well as enhance the possibilities for analysis by computer. A brief sketch of the imprecision of the expression of legal norms will help place in context the discussion of this L-trio: language, law, and logic. This imprecision can be categorized into two types of uncertainty: the uncertainty that results from what is omitted in the writing and the uncertainty that results from what is written. Both of these types of uncertainty may be deliberate by the drafter of the document, or they may occur inadvertently. Here, attention is being focused on the inadvertent written uncertainties. This and further detail is summarized in Figure 1 on the next page.

There are two kinds of written uncertainty that may be deliberate, and the same two kinds may also be inadvertent. These are the uncertainty stemming from ambiguity and the uncertainty stemming from vagueness and generality. In legal writing, the uncertainty from vagueness and generality tends to be more deliberate than inadvertent, but the uncertainty from ambiguity tends to be more inadvertent than deliberate. It is the inadvertent ambiguity problems that are of concern here, because they are the ones to which modern logic techniques can be usefully applied. The ambiguity problems are of two types: semantic and syntactic. And the syntactic ambiguities occur both within sentences and between sentences. These syntactic uncertainties within and between sentences are regarded as being the structural problems of legal drafting. For the most part, the discussion that follows is on the structural aspects between sentences. The logic that deals with relationships

between sentences is far simpler than the logic that deals with relationships within sentences. Much more will need to be said about the latter. It is enough to get started on constructive alternatives for dealing with the simpler problem of between-sentence syntax.

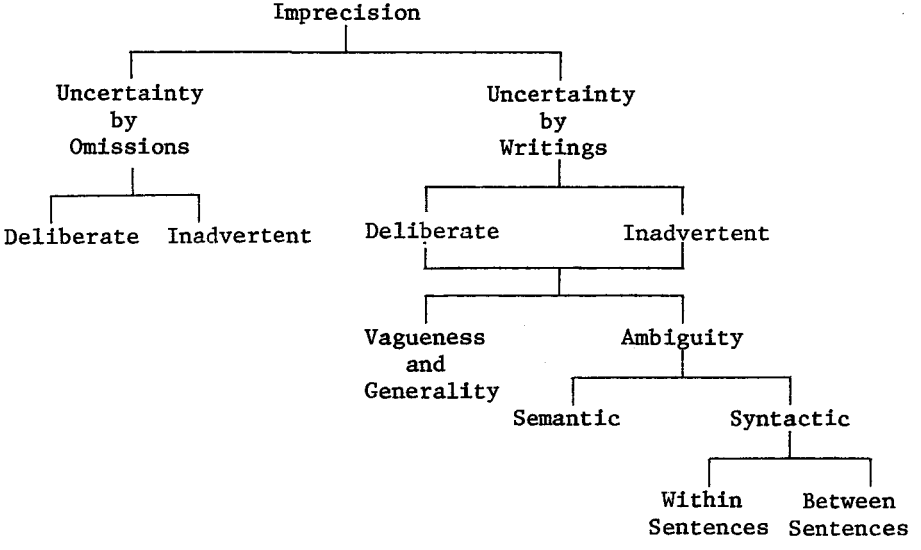


Figure 1

Taxonomy of Imprecision in Legal Drafting

In focusing on the between-sentence structure of legal drafting, a brief example from the American patent statute is considered first. Then some aspects of the definitions of structural terms are discussed and some "lowest common denominators" of between-sentence structure are defined. Third, there is a detailed examination on the awesome ambiguity of the term 'unless' with its potentialities for being interpreted in more than 4,000 different logical ways. This is followed by a discussion of the normalized expression of legal norms and some simple diagrammatic techniques for expressing their structure. Fifth, some criteria are considered for characterizing the semantics, the structure, the expression, and the drafting adequacy in legal documents. Finally, some brief conclusory remarks appear at the end.

2 AN EXAMPLE OF UNNECESSARY STRUCTURAL COMPLEXITY AND AMBIGUITY

A brief example of some of the kinds of unnecessary structural ambiguity and unnecessary structural complexity that attention is being called to in this paper appears in the American patent

statute. It reads, in part, as follows:

> Section 102. Conditions for patentability; novelty and loss of right to patent
>
> A person shall be entitled to a patent unless -
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
>
> (c) ..., or
> :
> (g) ...

The first question about section 102 deals with its between-sentence structure and revolves around interpretation of the word 'unless'. This structure is emphasized when section 102 is rewritten in the following form:

> S1 unless -
> (a) S2, or
> (b) S3, or
> (c) ..., or
> :
> (g) ...
>
> where S1 = A person shall be entitled to a patent
> S2 = the invention was known ... patent
> S3 = the invention was patented ... States

Is Section 102 more appropriately interpreted as asserting merely:

> If not S2 and not S3 and ..., then S1?

Or is it more appropriately interpreted as asserting both:

> If not S2 and not S3 and ..., then S1, and
>
> If S2 or S3 (or any of the other conditions of (c) through (g)), then not S1?

In other words, is the occurrence of 'unless' in this section better interpreted as a weak 'unless' that asserts merely a conditional statement or as a strong 'unless' that asserts a biconditional statement?

The second question is also about between-sentence structure and 'unless'. Is the strong 'unless' interpretation one for which the meaning of 'not S1' in it is:

It is not so that a person shall be entitled to a patent?

Or is it one for which the meaning of 'not S1' is:

A person shall not be entitled to a patent?

In the first, it is merely permitted that the person not be entitled, but in the second it is obligatory that the person not be entitled.

The third question looks like it might be a within-sentence structural matter, but when analysed from the viewpoint of the logic involving quantifiers (sometimes called predicate logic, or first-order functional logic) it is seen to involve structure that is both within and between sentences. This question also involves 'unless' through the S1 that occurs as the first constituent of the 'S1 unless S2...' statement. The question is whether the 'A person shall' of S1 is intended in the sense

Some person(s) shall ...

or in the sense

Every person shall ....

Other sections of the statute make it clear that the first is what is intended, but also that a qualified version of the second is also intended. Section 101 provides:

Section 101. Inventions patentable

Whosoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

And Section 103 provides:

Section 103. Conditions for patentability; non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in Section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

From the context in which Section 102 appears, it is clear that it is only those persons who meet the requirements of Section 101 and 103 who "shall be entitled" under Section 102. So, when the requirements of Section 102 are met, it is intended that "some persons shall be entitled ...," and who those are can be clarified as

"every person (who meets the requirements of the other sections) shall be entitled ...."

The fourth question is clearly a matter of within-sentence structure. It involves the phrase 'in this country' in subsection (b). Does this phrase qualify only the 'on sale' that immediately precedes it, or does it qualify both 'on sale' and the phrase 'in public use' as well? If it qualifies only 'on sale', then one of the sufficient conditions for non-entitlement under Section 102 is:

> the invention was ... in public use (anywhere at all) more than one year prior to the date of the application for patent in the United States

But if 'in this country' qualifies both, then there is more to this particular sufficient condition for non-entitlement, namely:

> the invention was ... in public use in this country more than one year prior to the date of the application for patent in the United States.

It is a somewhat trickier and more complex matter to control the clarity of within-sentence structure than the between-sentence structure, as is perhaps evidenced by the very title of this subsection. Does it signal:

1) Ambiguity (in general) and unnecessary structural complexity, or
2) Unnecessary ambiguity and unnecessary structural complexity, or
3) Unnecessary structural ambiguity and unnecessary structural complexity?

The ambiguities of the within-sentence structure of a statement can often be detected by attempting to convert the statement into an equivalent alternative in which relationships expressed by within-sentence structure are replaced by relationships expressed by between-sentence structure. Various alternative interpretations of the original statement turn out to have different between-sentence structure. For example, strong 'unless's have different (they have more) structure than weak 'unless's. There are other types of within-sentence ambiguities in a statement that can be detected by converting the statement into an equivalent alternative that continues to express relationships by within-sentence structure in which the ambiguous parts are replaced by disambiguating replacements. For example, the ambiguous 'W's may not Y' has two (disambiguated) interpretations:

> W's are obligated to not Y.
>
> W's are permitted to not Y.

Another example is 'No W shall Y', which has at least the following two interpretations:

Every W is obligated to not Y.

There is no W that is obligated to Y.
(That is, every W is permitted to not Y).

These examples illustrate one of the pervasive subtleties of within-sentence structure: how the placement of the negation operator in the sequence of words in a statement affects the meaning of the statement. It is a subtlety that haunts legal discourse embarrassingly.

3 DEFINITIONS OF STRUCTURAL TERMS

To achieve clearer structure the use of definitions in legal drafting needs improvement. One of the leading contemporary authorities on legal drafting explains that in part legal definitions "...are currently in dispute ... because many are inaccurate descriptions of how the draftsman has actually used his terms ..." and counsels users that the "...first thing to remember about legal definitions is that they should be used only where necessary."

One area where significant improvements can be achieved by using definitions in legal drafting is in the terms used to indicate structural relationships. Furthermore, some typographical devices can also be used to help remind drafters about whether given occurrences of defined terms are intended in their defined senses. At the very least, a drafter should have available tools that permit a clear indication of when a defined term is intended in its defined sense and when it is intended in its ordinary language sense. One such device that would work almost all of the time is to capitalize the initial letter(s) of a Defined Term when used in its defined sense and just print the defined term in its usual uncapitalized way when used in its ordinary language sense. Capitalizing initial letters as a signal of a defined use would only run into difficulty when the term appeared as the first word of a sentence or for some other reason was to be capitalized. Then, a reader would not know whether the term was capitalized because used in the defined sense or capitalized for the other reason. An alternative that would be completely unambiguous all of the time is to capitalize all of the letters in the DEFINED TERM to indicate its usage in the defined sense. There are many other completely unambiguous alternatives (dEfined tErm, Defined terM, *defined term*, :defined term:, $_d$defined term$_d$, d.efined t.erm, d*efined t*erm, etc.), but full capitalization seems as good as any of the others on all other grounds and preferable to them in being the least unconventional and less in need of explanation.

Having available a clear way of indicating use of a term in its defined sense would be a distinct improvement over present practice, but it would still leave some problems. The occurrence of a defined term in its uncapitalized form might mean that the drafter

thought about it and intended the term in its ordinary language sense. On the other hand, it might also represent only the fact that the drafter did not think about the problem at all, but just wrote the term in its ordinary form. It would be helpful to be able to make this distinction clearly, also. This, too, is an easily-solved problem by a simple subscripting convention. Add a subscript 'o' to the end of the DEFINED TERM$_o$ to indicate use in the (o)rdinary language sense and let the ordinary uncapitalized use signal an occurrence where the drafter has not thought about the problem.

These three alternatives would probably enable a drafter to deal with most cases likely to be encountered. But occasionally, there may be situations in which the drafter has thought about the problem, but for some good reason (political or other) does not wish to make a clear choice between the defined sense and the ordinary language sense. The drafter's intent after careful thought is to be ambiguous about which is appropriate and to postpone that choice for some interpreter to make later. Furthermore, that may be exactly what the drafter wishes to communicate to the intended audience -- that the passage has been drafted in an ambiguous form deliberately. On the other hand, although the ambiguity may be intentional, the drafter may wish to refrain from telling the audience so. This, the drafter could always achieve by the mere expedient of leaving the occurrence of the term uncapitalized. The deliberate (a)mbiguity, intended to be communicated, can be signalled by adding a subscript 'a' to the end of the DEFINED TERM$_a$.

In summary, five different kinds of occurrences of defined terms in legal drafting are described in Table 1, and four ways of representing those that can be usefully distinguished.

Representations	Kinds of Occurrences
DEFINED TERM	1. Intended in the defined sense.
DEFINED TERM$_o$	2. Intended in the ordinary language sense.
DEFINED TERM$_a$	3. Intended to be ambiguous about whether occurrence is in defined sense or ordinary language sense.
defined term	4. (a) Drafter thought about problem, intended to be ambiguous about whether this occurrence is in defined sense or ordinary language sense, but does not wish to tell audience about the deliberate choice to be ambiguous, OR (b) Drafter did not think about the problem of whether this occurrence is in the defined sense or ordinary language sense.

Table 1

Kinds of Occurrences of Defined Terms and Their Representations

Using these conventions to indicate defined terms, it is easy to clearly define a set of terms for use in indicating unambiguously the structural relationships between sentences in legal documents by specifying the necessary and sufficient conditions for the truth of statements using these terms. These defined terms can, in turn, be used as "lowest common denominators" in terms of which other structural terms can be defined. The terms to be defined are the customary ones of propositional logic:

AND, OR, NOT, IF ... THEN ---, and IF AND ONLY IF ... THEN ---.

1. The statement 'Sentence 1 AND Sentence 2' expresses a conjunction. It is true when both Sentence 1 and Sentence 2 are true, but not otherwise.

2. The statement 'Sentence 1 OR Sentence 2' expresses an inclusive disjunction. It is true when at least one of the two sentences (Sentence 1 or Sentence 2) is true, but not otherwise.

3. The statement 'NOT Sentence 1' expresses a negation. It is true when Sentence 1 is false, but not otherwise. (If an actual sentence were substituted for 'Sentence 1', the 'NOT' would be imbedded in it or be replaced by the phrase 'IT IS NOT SO THAT'. Hence, if 'Sentence 1' is 'The pot is hot', then 'Not Sentence 1' would be either 'The pot is NOT hot' or 'IT IS NOT SO THAT the pot is hot'.)

4. The statement 'IF Sentence 1, THEN Sentence 2' expresses a conditional. It is true when both Sentence 1 and Sentence 2 are true; it is false when Sentence 1 is true and Sentence 2 is false; and it is sometimes true and sometimes false when Sentence 1 is false.

   (Warning: The definition of IF ... THEN --- given here is not the material implication of classical two-valued logic. It is in its present form incomplete; it needs to be developed formally to closely parallel the concept of IF ... THEN --- that Anderson and Belnap (1974) have specified and that they call 'relevant implication'.

5. The statement 'IF AND ONLY IF Sentence 1, THEN Sentence 2' expresses a biconditional. It is true when both Sentence 1 and Sentence 2 are true; it is false when either Sentence 1 or Sentence 2 (but not both) is false; and it is sometimes true and sometimes false when both Sentence 1 and Sentence 2 are false. (The same warning that goes with the IF ... THEN --- definition above applies to this IF AND ONLY IF ... THEN --- as well.)

Alternatively, it would have been possible to formally define #5 contextually in terms of #4 and #1 as follows:

IF AND ONLY		IF Sentence 1, THEN Sentence 2,
IF Sentence 1,	=df	AND
THEN SENTENCE 2.		IF Sentence 2, THEN Sentence 1.

Similarly, it is possible to formally define other structural terms that relate sentences to each other and specify unambiguously the many alternative senses of their ordinary language usages. For example, two senses of 'if' can be clearly distinguished:

Sentence 1,		
IF_1	=df	IF Sentence 2, THEN Sentence 1.
Sentence 2.		
Sentence 1,		IF Sentence 2, THEN Sentence 1,
IF_2	=df	AND
Sentence 2.		IF Sentence 1, THEN Sentence 2.

two senses of 'only if':

Sentence 1,		
ONLY IF_1	=df	IF NOT Sentence 2, THEN NOT Sentence 1.
Sentence 2.		
Sentence 1,		IF NOT Sentence 2, THEN NOT Sentence 1,
ONLY IF_2	=df	AND
Sentence 2.		IF NOT Sentence 1, THEN NOT Sentence 2.

and samples of the more than 4,000 senses of 'unless':

Sentence 1,		
$UNLESS_1$	=df	IF NOT Sentence 2, THEN Sentence 1.
Sentence 2.		
Sentence 1,		IF NOT Sentence 2, THEN Sentence 1,
$UNLESS_2$	=df	AND
Sentence 2.		IF Sentence 2, THEN NOT Sentence 1
X shall Y,		IF NOT Sentence 2, THEN X shall Y,
$UNLESS_3$	=df	AND
Sentence 2.		IF Sentence 2, THEN X shall NOT Y.
X shall Y,		IF NOT Sentence 2, THEN X shall Y,
$UNLESS_4$	=df	AND
Sentence 2.		IF Sentence 2, THEN IT IS NOT SO THAT X shall Y.

With these structural terms defined, the drafter is armed with precise tools for relating the sentence constituents of her messages and thereby achieving a form of "plain language" that is not only more understandable by human audiences, but also is compatible with having computers do more analysis than they would otherwise be able to do.

4 THE AWESOME AMBIGUITY OF 'UNLESS'

The need for legal drafters to have available tools for more careful expression of between-sentence structure can perhaps be made glaringly apparent by considering one of the most ambiguous terms now in general use -- the seemingly innocent little 'unless'. What is truly alarming, however, is that 'unless' may be only

symptomatic of a hundred or more similar seemingly innocent little between-sentence connectors that are similarly astonishingly ambiguous. Consider a statement of the form:

a, unless b. (where a and b are subsidiary sentences) (1)

There are two interpretations of (1):

S. IF NOT b, THEN a. (a single IF-THEN interpretation)

D. IF NOT b, THEN a, AND IF b, THEN NOT a. (a double IF-THEN interpretation)

Additional interpretations of statements like (1) are apparent when the structure of a is examined. Look first at some of its possible within-sentence structure and then at some possible between-sentence structure. Consider a statement of the form:

W's shall Y, unless b. (a = W's shall Y.) (2)

There are at least 18 different interpretations possible of (2), where x is the first IF-THEN part and y is the second IF-THEN part of an interpretation, x/y:

AOC/AOCN AOC/AOM AOC/SOCN AOC/APCN AOC/SOM AOC/APM AOC/SPCN AOC/SPM AOC/---
SOC/AOCN SOC/AOM SOC/SOCN SOC/APCN SOC/SOM SOC/APM SOC/SPCN SOC/SPM SOC/---

AOC/ IF NOT b, THEN all W's are obligated to do Y, AND
AOCN IF b, THEN all W's are obligated to do NOT Y.
(NOT a = all W's are obligated to do NOT Y.)

AOC/ IF NOT b, THEN all W's are obligated to do Y, AND
AOM IF b, THEN all W's are obligated NOT to do Y.
(NOT a = all W's are obligated NOT to do Y.)

AOC/ IF NOT b, THEN all W's are obligated to do Y, AND
SOCN IF b, THEN some W's (in the sense that there is at least one W) are obligated to do NOT Y.
(NOT a = some W's are obligated to do NOT Y, i.e., IT IS NOT SO THAT all W's are NOT obligated to do NOT Y.)

AOC/ IF NOT b, THEN all W's are obligated to do Y, AND
APCN IF b, THEN all W's are permitted to do NOT Y.
(NOT a = all W's are permitted to do NOT Y, i.e., all W's are NOT obligated NOT to do NOT Y.)

AOC/ IF NOT b, THEN all W's are obligated to do Y, AND
SOM IF b, THEN some W's are obligated NOT to do Y.
(NOT a = some W's are obligated NOT to do Y.)

AOC/ IF NOT b, THEN all W's are obligated to do Y, AND
APM IF b, THEN all W's are permitted NOT to do Y.
(NOT a = all W's are permitted NOT to do Y, i.e., all W's are NOT obligated to do Y.)

AOC/ IF NOT b, THEN all W's are obligated to do Y, AND
SPCN IF b, THEN some W's are permitted to do NOT Y.

(NOT a = some W's are permitted to do NOT Y.)
AOC/ IF NOT b, THEN all W's are obligated to do Y, AND
SPM IF b, THEN some W's are permitted NOT to do Y.
(NOT a = some W's are permitted NOT to do Y, i.e., IT IS NOT SO THAT all W's are obligated to do Y.)
AOC/ IF NOT b, THEN all W's are obligated to do Y.

Each of the second nine interpretations is exactly like one of the first nine interpretations but with the following SOC part replacing the AOC part as the first IF-THEN part of the interpretation:

SOC IF NOT b, THEN some W's are obligated to do Y.

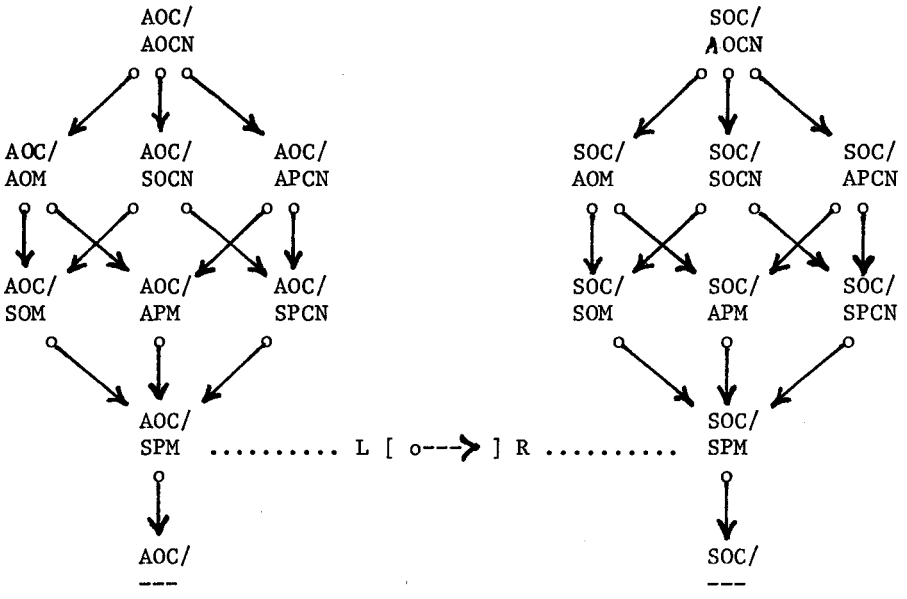
The capital letters used in the names of the interpretations indicate properties of the results of the IF-THEN parts of the interpretations:

- A Indicates that the result of the IF-THEN part is an (A)LL statement.
- S Indicates that the result of the IF-THEN part is a (S)OME statement.
- O Indicates that the result of the IF-THEN part is an (O)BLIGATION statement.
- P Indicates that the result of the IF-THEN part is a (P)ERMISSION statement.
- C Indicates that the result of the IF-THEN part is a (C)OMMISSION statement.
- M Indicates that the result of the IF-THEN part is an O(M)ISSION statement.
- N Indicates (N)egations (NOT or IT IS NOT SO THAT).

Hence, AOCN indicates that the result of the IF-THEN part is an (A)ll-(O)bligation-(C)ommission statement. (For example: All X-persons are obligated to do NOT Y.)

The logical relationships among these 18 different interpretations of (2) are summarized in Figure 2. The logical relationship indicated by 'v o--->w' is that w can be logically inferred from v, but not vice versa. In other words, v is (logically) "stronger" than w, and w is "weaker" than v. With this notation for indicating logical relationships, every logical relationship in Figure 2 can be summarized as:

...A ...o---> ... S ...
...O ...o---> ... P ...
...CN ...o---> ... M ...
where (1) ... ... indicates the rest of the statement, and
(2) the rest of the left statement is never weaker than the rest of the right statement.



where 'L [o--->] R' indicates that each statement on the (R)ight side of Figure 2 is deducible from the corresponding statement on the (L)eft side, but not vice-versa. Hence, AOC/AOCN o---> SOC/AOCN, AOC/SPM o---> SOC/SPM, etc.

Figure 2

Logical Relationships Among 18 Different Interpretations of the Statement: W's Shall Y, Unless b.

The strongest interpretation of (2) is AOC/AOCN, and the weakest is SOC/---. All 17 other interpretations can be deduced from the strongest. However, none of the other interpretations is deducible from the weakest, but it is deducible from every one of them. This is apparent from Figure 2.

When the a of (1) is a permission-type statement, rather than an obligation-type, there is a parallel set of 18 different interpretations. Consider a statement of the form:

W's may Y, unless b. (a = W's may Y.) (3)

Interpretations: APC/AOCN APC/AOM APC/SOCN APC/APCN APC/SOM
APC/APM APC/SPCN APC/SPM APC/---
SPC/AOCN SPC/AOM SPC/SOCN SPC/APCN SPC/SOM
SPC/APM SPC/SPCN SPC/SPM SPC/---

APC/AOCN IF NOT b, THEN all W's are permitted to do Y, AND IF b, THEN all W's are obligated to do NOT Y.

APC/AOM IF NOT b, THEN all W's are permitted to do Y, AND IF b, THEN all W's are obligated NOT to do Y.

:

:

SPC/--- IF NOT b, THEN some W's are permitted to do Y.

The 18 interpretations of (3) are the same as the 18 interpretations of (2) except that everywhere that AOC or SOC appear in the first IF-THEN part of an interpretation of (2) they are replaced by APC and SPC, respectively, in the corresponding interpretation of (3).

The logical relationships among the 18 interpretations of (3) are the same as those among the 18 of (2). The strongest and weakest of the 18 are the APC/AOCN and SPC/--- shown above. The other 16 interpretations of (3) are, in terms of their logical force, in between these two.

When the a of (1) has the form of a negation of an obligation-type statement, the ambiguity reaches its peak. There are 36 different logical interpretations of 'unless' possible. Consider a statement of the form:

No W shall Y, unless b. (a = No W shall Y.) (4)

Interpretations:

a1 a2 a3 a4 a5 a6 a7 a8 a9 b1 b2 b3 b4 b5 b6 b7 b8 b9
c1 c2 c3 c4 c5 c6 c7 c8 c9 d1 d2 d3 d4 d5 d6 d7 d8 d9

There are four interpretations of the result of the first IF-THEN part (i.e., 'No W shall Y.'):

a AOCN/ IF NOT b, THEN all W's are obligated to do NOT Y.
b APCN/ ... all W's are permitted to do NOT Y.
c AOM/ ... all W's are obligated NOT to do Y.
d APM/ ... all W's are permitted NOT to do Y.

There are nine interpretations of the result of the second IF-THEN part (i.e., 'NOT (no W shall Y).'):

1 /AOC IF b, THEN all W's are obligated to do Y (i.e., ... all W's are obligated to do NOT NOT Y).
2 /AOMN ... all W's are obligated NOT to do NOT Y.

3 /APC ... all W's are permitted to do Y.
4 /(AN)PCN ... for all persons, IT IS NOT SO THAT IF a person is a W, THEN that person is permitted to do NOT Y.
5 /SOMN ... some W's are obligated NOT to do NOT Y (i.e., IT IS NOT SO THAT all W's are permitted to do NOT Y).
6 /APMN ... all W's are permitted NOT to do NOT Y.
7 /(AN)OCN ... for all persons, IT IS NOT SO THAT IF a person is a W, THEN that person is obligated to do NOT Y.
8 /SPMN ... some persons are permitted NOT to do NOT Y,

(i.e., IT IS NOT SO THAT all W's are obligated to do NOT Y).

9 /--- (There is no second IF-THEN part to the interpretation.)

Each of the four first IF-THEN parts combines with each of the nine second IF-THEN parts to form the 36 different interpretations of (4) as follows:

a1 AOCN/ IF NOT b, THEN all W's are obligated to do NOT Y,
AOC AND IF b, THEN all W's are obligated to do Y.

a2 AOCN/ IF NOT b, THEN all W's are obligated to do NOT Y,
AOMN AND IF b, THEN all W's are obligated NOT to do NOT Y.

:
:

d9 APM/ IF NOT b, THEN all W's are permitted NOT to do Y.

The logical relationships among the 36 interpretations of (4) are summarized in Figure 3. A given interpretation, x/y, is deducible from a second interpretation, v/w, IF AND ONLY IF (A) x is deducible from v, and (B) y is deducible from w.

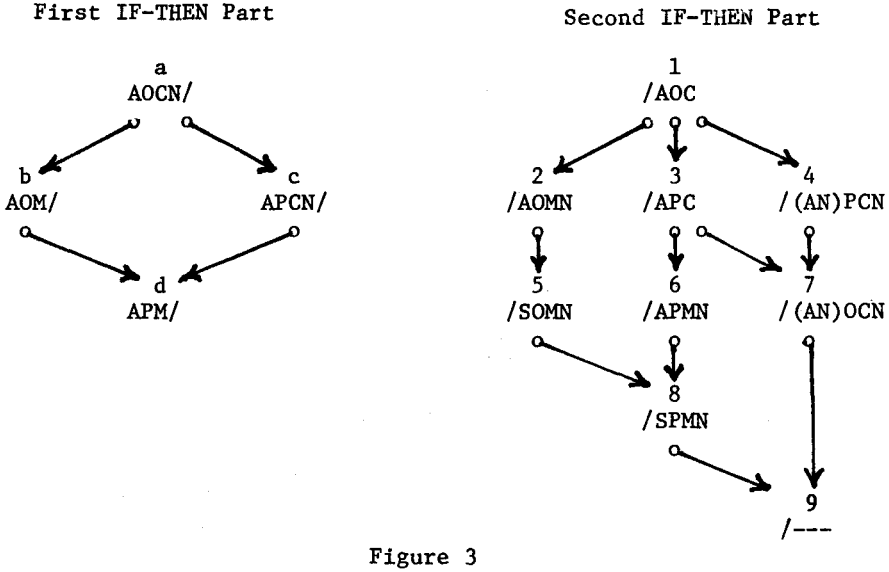


Figure 3

Logical Relationships Among 36 Different Interpretations of the Statement: No W Shall Y, Unless b.

But do statements of the form of (4) occur in statutes or regulations? They do in American legal text. See, for example, Section 505(a) of the Federal Food, Drug and Cosmetic Act, 21 U.S.C. Sec. 355:

> (a) No person shall introduce or deliver for introduction into interstate commerce any new drug, unless an approval of an application filed pursuant to subsection (b) of the section is in effect with respect to such drug.

When a of (1) is in the form of a negation of a permission-type statement, the b and d interpretations of the first IF-THEN part of (4), along with the full interpretations that they are part of, are no longer reasonable interpretations. The number of different interpretations is reduced to 18. The omitted 18 are not strong enough to be reasonable interpretations. They can be logically inferred from the included 18, but not vice versa. The excluded ones merely permit where the included ones obligate, but the first IF-THEN parts of (5) definitely must be interpreted as imposing obligations.

No W may Y, Unless b. (a = No W may Y.) (5)

Interpretations: a1 a2 a3 a4 a5 a6 a7 a8 a9
c1 c2 c3 c4 c5 c6 c7 c8 c9

The logical relationships among these are as shown in Figure 3 above.

Along with the within-sentence ambiguity illustrated in (1) through (5), there may also be between-sentence ambiguity when the 'a' of 'a unless b' is either 'a1 and a2' or 'a1 or a2'.

a1 and a2, unless b. (a = a1 and a2.) (6)

Interpretations: f/S f/W f/---

f/S IF NOT b, THEN a1 AND a2, AND
IF b, THEN NOT a1 and NOT a2.
(NOT a = NOT a1 AND NOT a2.)

f/W IF NOT b, THEN a1 AND a2, AND
IF b, THEN NOT a1 OR NOT a2.
(NOT a = NOT a1 OR NOT a2.)

f/--- IF NOT b, THEN a1 AND a2.

If the a1 and a2 of (6) are each of the form of the a in (4) -- i.e., in the form 'No V shall W' and 'No X shall Y' -- then there will be the following 68 interpretations of the 'unless' of (6):

fa/S1	fb/S1	fc/S1	fd/S1	4
:	:	:	:	24
fa/S8	fb/S8	fc/S8	fd/S8	4
fa/W1	fb/W1	fc/W1	fd/W1	4
:	:	:	:	24
fa/W8	fb/W8	fc/W8	fd/W8	4
fa/---	fb/---	fc/---	fd/---	4
				68 Total

This narrow view of the possible interpretations of the 'unless of (6), of course, assumes that a1 and a2 have the same sub-interpretations from among the 36 possibilities of (4). But, is this assumption realistic? Is it beyond the pale of reason that a court might decide to interpret 'unless' with differing a1 and a2 sub-interpretations? If the courts are free to so behave, it enriches the interpretative possibilities immensely -- more than 30-fold. The number of possible interpretations of 'unless' zooms from 68 to 2064. Summarized briefly:

a1		a2	
((fa) (S1))		((fa) (S1))	
((:)/(:))	x	((:)/(:))	1024
((fd) (S8))		((fd) (S8))	
((fa) (W1))		((fa) (W1))	
((:)/(:))	x	((:)/(:))	1024
((fd) (W8))		((fd) (W8))	
(fa/---)		(fa/---)	
(:)	x	(:)	16
(fd/---)		(fd/---)	
			2064 Total

a1 or a2, unless b. (a = a1 or a2.) (7)

Interpretations: g/S g/W g/---

The 'unless' of (7) adds another 68 possible interpretations of this monstrously ambiguous little word -- or another 2064 -- depending upon whether the courts are found to be narrow or venturesome in their interpretation. A near gross of 'unless's is entirely troublesome enough, but more than 28 gross is just utterly gross.

If the plain language movement for the improvement of legal drafting is to realize its full potential, it must deal with such structural problems. To achieve clarity, awesomely multi-faceted structural terms like 'unless' -- and there may be a hundred or more of them -- must give way to the lowest common denominators of structure in legal discourse: the defined AND, OR, NOT, IF ... THEN---, and IF AND ONLY IF... THEN--- of normalized drafting. Getting these little-in-size but big-in-significance words under

control will permit a giant stride forward in improving the clarity of between-sentence structure. The stage will then be set for the more formidable task of upgrading the within-sentence structure.

5 NORMALIZED STATEMENTS AND DIAGRAMS

If, to qualify as plain, a language must have clear structure, then the achievement of plain language will be benefited by having available some clear language to discuss structure. In particular, to discuss the structure of legal norms it will be helpful to have some clear terms with which to discuss normative language. Specifying a series of definitions in this section is directed toward that end, as well as toward defining what is meant by legal drafting that is NORMALIZED. What follows are the definitions of the following terms:

SINGULAR	DEONTIC
CONJUNCTION	CONDITIONAL NORMAL FORM
DISJUNCTION	NORMALIZED
CONDITIONAL	LEGAL NORM
ANTECEDENT	SIMPLE LEGAL NORM
CONSEQUENT	COMPLEX LEGAL NORM
NORMATIVE	SINGLE-RESULT COMPLEX LEGAL NORM
RESULT	MULTIPLE-RESULT COMPLEX LEGAL NORM

A statement is SINGULAR IF AND ONLY IF
it consists of just one constituent sentence.
A statement is a CONJUNCTION IF AND ONLY IF
it consists of two constituent sentences joined by 'AND'.
A statement is a DISJUNCTION IF AND ONLY IF
it consists of two constituent sentences joined by 'OR'.
A statement is a CONDITIONAL IF AND ONLY IF
it consists of two constituent sentences joined by 'IF ... THEN ---'.
The ANTECEDENT of a CONDITIONAL is the set of sentences between the 'IF' and the 'THEN'.
The CONSEQUENT of a CONDITIONAL is the set of sentences after the 'THEN'.
A statement is NORMATIVE IF AND ONLY IF it includes some DEONTIC terminology.
A statement includes some DEONTIC terminology IF AND ONLY IF it includes some form of the term 'obligated', some form of the term 'permitted', or some form of the term 'forbidden'.

(Note that a statement may be NORMATIVE$_o$ (that is, 'normative' in the ordinary language sense) without being NORMATIVE, and it is possible that the NORMATIVE$_o$ version of a statement will express a proposition that is semantically equivalent to its NORMATIVE counter-part. For example, the NORMATIVE$_o$ statement, 'Twenty-one-year-old males shall register for the draft' is semantically equivalent to its NORMATIVE counter-parts, 'Twenty-one-year-old males

are obligated to register for the draft' and 'It is obligatory that twenty-one-year-old males register for the draft'.)

A statement is a RESULT IF AND ONLY IF it is a NORMATIVE statement in the CONSEQUENT.

A statement is in CONDITIONAL NORMAL FORM IF AND ONLY IF

1. it is an IF ... THEN --- statement, AND
2. its ANTECEDENT is either SINGULAR or a CONJUNCTION or a DISJUNCTION, AND
3. its CONSEQUENT is either SINGULAR or a CONJUNCTION or in CONDITIONAL NORMAL FORM.

A statement is NORMALIZED IF AND ONLY IF

1) A. it is in CONDITIONAL NORMAL FORM, AND
   B. its CONSEQUENT is NORMATIVE (that is, it is a RESULT), OR
2) it is a CONJUNCTION OF NORMALIZED statements (or logically equivalent to such a CONJUNCTION).

Thus, a statement is NORMALIZED IF AND ONLY IF

1) A. it is an IF ... THEN --- statement, AND
   B. the set of sentences between the 'IF' and the 'THEN' is either SINGULAR or a CONJUNCTION or a DISJUNCTION, AND
   C. the set of sentences after the 'THEN' is a RESULT that is either SINGULAR or a CONJUNCTION or in CONDITIONAL NORMAL FORM, OR
2) it is a CONJUNCTION of NORMALIZED statements (or logically equivalent to such a CONJUNCTION).

A statement is a LEGAL NORM IF AND ONLY IF it is a SIMPLE LEGAL NORM or a COMPLEX LEGAL NORM.

A statement is a SIMPLE LEGAL NORM IF AND ONLY IF

1. it is in NORMALIZED form, AND
2. its ANTECEDENT is either SINGULAR or a CONJUNCTION, AND
3. its RESULT is SINGULAR.

A statement is a COMPLEX LEGAL NORM IF AND ONLY IF it is a SINGLE-RESULT COMPLEX LEGAL NORM or a MULTIPLE-RESULT COMPLEX LEGAL NORM

A statement is a SINGLE-RESULT COMPLEX LEGAL NORM IF AND ONLY IF it is a CONJUNCTION (or its logical equivalent) of SIMPLE LEGAL NORMS each of which has the same RESULT.

A statement is a MULTIPLE-RESULT COMPLEX LEGAL NORM IF AND ONLY IF it is a CONJUNCTION (or its logical equivalent) of SIMPLE LEGAL NORMS such that at least two of them have different RESULTS.

In these definitions, use has been made of the defined term 'IF AND ONLY IF'. It is handy for use with SINGLE-RESULT COMPLEX LEGAL NORMS as well as with definitions. It is defined as follows:

a IF AND ONLY IF b =df IF AND ONLY IF b, THEN a.

It is also handy to have for use with SINGLE-RESULT COMPLEX LEGAL NORMS the following definition of 'IF':

a IF b =df IF b, THEN a.

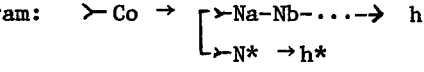
To represent NORMALIZED statements in a form that makes the logical relationships between the parts of such statements stand out, it is also handy to have diagrams of such statements that emphasize the logical relationships. One such set of diagrams, here called 'arrow diagrams', is the following:

Name of Statement	Text of Statement	Diagram of Statement
Antecedent CONJUNCTION	a AND b.	a-b
Consequent CONJUNCTION	a AND b.	[a [b
DISJUNCTION	a OR b.	[a] [b]
CONDITIONAL	IF a, THEN b.	>-a-> b
NEGATION	NOT a.	Na
BICONDITIONAL	IF AND ONLY IF a, THEN b.	>-< a --> b
CONDITIONAL(SR)	a IF b.	a<-- b-•
BICONDITIONAL(SR)	a IF AND ONLY IF b.	a <----> b-•

With these definitions and arrow diagrams, one NORMALIZED version of the excerpt from the American patent statute in section 2 can be constructed and represented diagrammatically as follows:

IF
1. all other relevant conditions are fulfilled, Co
THEN
2. IF
   A. the invention was NOT known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, AND Na
   B. the invention was NOT patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent, AND Nb
   .
   .
   .
   G. ... Ng
THEN
   H. it is obligatory that the applicant is granted a patent, AND h

3. IF
   A. otherwise N*
   THEN
   B. it is forbidden that the applicant is granted a patent. h*

The arrow diagram: 

In this arrow diagram 'Co' represents all other relevant conditions in other sections of the patent statute and elsewhere, and 'Na', 'Nb', and 'h' represent the sentences in the NORMALIZED statement to their left above. The 'N*' represents 'otherwise', which in this case is the negation of 'Na AND Nb AND ... Ng', which is logically equivalent to 'a OR b OR ... g'. The 'h*' represents a statement that is DEONTICALLY related to 'h'. Examination of the within-sentence and DEONTIC structure of 'h' and 'h*' is necessary to show what this relationship is. Assume that 'h' is an abbreviation for 'OD4gx' and 'h*' is an abbreviation for 'FD4gx', which is logically equivalent to 'OND4gx'. These, in turn, represent the following statements:

OD4gx: It is obligatory that the granting of a patent is done for the applicant x.

FD4gx: It is forbidden that the granting of a patent is done for the applicant x.

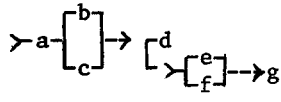
OND4gx: It is obligatory that IT IS NOT SO THAT the granting of a patent is done for applicant x.

Note that the last two statements are subtly different from:

OD4Ngx: It is obligatory that the NOT granting of a patent is done for the applicant x.

The text that follows 'OD4gx' (and the others, too) is a somewhat more formal way of stating what might more informally be expressed, 'The applicant shall be granted a patent.' But the more formal statement itself should be understood to be a short version of the more complete statement, 'It is obligatory that some unnamed legal person see to it that (that is, that person is the one legally responsible, if it is not so) the state of affairs described by the statement 'The applicant is granted a patent' is so for the benefit of the applicant.

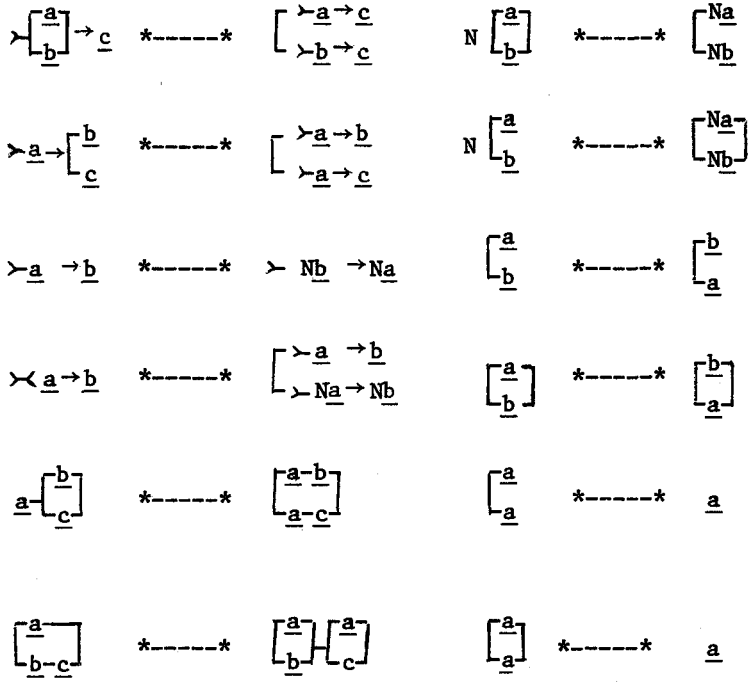
With such arrow diagrams it is possible to clearly represent the logical relations between RESULTS and ANTECEDENT conditions. In this diagram:



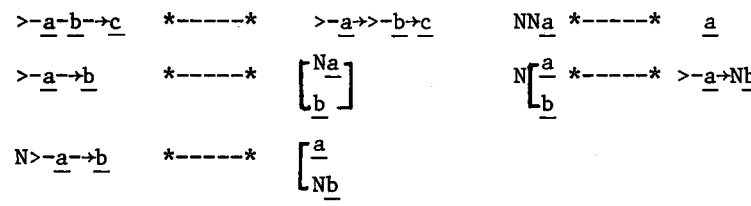
there are two "pathways" to RESULT d (ab and ac) and four "pathways" to RESULT g (abe, ace, abd, and acf). Each "pathway" represents a sufficient set of conditions for reaching that RESULT. A "pathway" is the set of conditions expressed by the sentence abbreviations between the tail (≻) and the head (--▶) of an arrow. No matter how complex the NORMALIZED statements become, their arrow diagrams show clearly the "pathways" (sufficient sets of conditions) for each RESULT.

Another distinguishing feature of the arrow diagrams is that they are a parenthesis-free notation for representing logical relationships, similar to the so-called "Polish" notation of Jan Lukasiewicz (Copi, 1973) in some respects, but different in others.

The arrow diagrams also provide a brief way to summarize some important logical relationships. In what follows, each of the statements represented by the diagrams on either side of the '*-----*' is logically inferrable from the one represented on the other side; so, they are logically equivalent.



Also logically equivalent in classical two-valued propositional logic, but questionable in other systems of propositional logic, are:



The definition of NORMALIZED statements in this paper (as it has been developed to date) deals with sentential and DEONTIC operators. To be more adequate in attaining its intended goal, this definition will need to be extended to include consideration of the relations between the ideas expressed by parts of sentences and consideration of Hohfeldian ideas (Allen, 1974). The concept of NORMALIZED legal drafting has evolved recently and is still in process of change (Allen, 1957, 1968, 1974).

6 CRITERIA FOR CLARITY OF LEGAL DOCUMENTS AND ADEQUACY OF DRAFTING

To more rigorously assess the clarity of expression in legal documents at present and the adequacy of their drafting, it will be helpful to have available more precisely defined criteria for characterising the clarity of expression and the intent of the drafter. Given such criteria, it will be possible to test with a sample of legal documents, impressions like those of the author that, for example, semantic uncertainties in legal documents tend to be deliberately included by drafters, while structural uncertainties tend to be inadvertently included. The discussion in this section is meant to be a start toward the development of such criteria; it is a set of tentative suggestions about which constructive supplementation is most welcome.

Whether a legal document is well-drafted or ill-drafted is not a simple matter of whether or not its ideas are expressed clearly. A reader might be uncertain about what the drafter intended to assert, because the drafter intended just that. There are a variety of legitimate reasons why a drafter might deliberately write unclearly (to achieve political compromise, to provide flexibility in the legal decision-making process, to delegate decision-making power to another decision-maker, or to postpone a decision, for example), and if an unclear document precisely achieves its intended purposes, would it be appropriate to characterise that document as ill-drafted? Here, it is proposed that the adequacy of the drafting should be regarded as a function of both the clarity of the document and the intent of the drafter. But even the matter of clear expression has its complexities; it has two aspects -- the semantic and the structural. If a statement is uncertain in either respect, the expression of the writer's ideas is uncertain.

Answering the following four questions and proceeding through a document on a sentence-by-sentence basis, it is possible to characterise both the clarity of expression of the document (part-by-part and as a whole) and the adequacy of its drafting:

Does this statement in its structure contain uncertainty to the intended audience that could have been avoided?

Does this statement in its semantics contain uncertainty to the intended audience that could have been avoided?

Is it more probable than not that the uncertainty in the structure of this statement was deliberately included by the drafter?

Is it more probable than not that the uncertainty in the semantics of this statement was deliberately included by the drafter?

Given an analyst's best judgment on whether a document contains structural or semantic uncertainties and whether the drafter deliberately included them, it is possible to use the following contextual definitions to characterise the document in terms of whether it is CLEARLY STATED or UNCLEARLY STATED, whether it is CLEARLY WORDED or UNCLEARLY WORDED, whether it is CLEARLY EXPRESSED or UNCLEARLY EXPRESSED, and whether it is WELL-DRAFTED or ILL-DRAFTED, and if ILL-DRAFTED, whether ILL-DRAFTED semantically, ILL-DRAFTED structurally, or ILL-DRAFTED both semantically and structurally.

IF a statement contains uncertainty in its structure that could have been avoided, THEN it is UNCLEARLY STATED: otherwise, it is CLEARLY STATED.

IF a statement contains uncertainty in its semantics that could have been avoided, THEN it is UNCLEARLY WORDED; otherwise, it is CLEARLY WORDED.

IF a statement is both CLEARLY STATED and CLEARLY WORDED, THEN it is CLEARLY EXPRESSED; otherwise, it is UNCLEARLY EXPRESSED.

IF a statement is CLEARLY EXPRESSED or the uncertainty was deliberately included, THEN the statement is WELL-DRAFTED; otherwise, it is ILL-DRAFTED.

With these definitions, legal documents are categorised into nine cases and into four types with respect to their clarity of expression and four types with respect to their drafting adequacy. There are four cases that are WELL-DRAFTED:

(1) those that are CLEARLY EXPRESSED,

(2) those that are CLEARLY STATED and deliberately UNCLEARLY WORDED,

(3) those that are CLEARLY WORDED and deliberately UNCLEARLY STATED, and

(4) those that are deliberately UNCLEARLY STATED and deliberately UNCLEARLY WORDED.

There are two cases that are ILL-DRAFTED structurally:

(1) those that are CLEARLY WORDED and inadvertently UNCLEARLY STATED and

(2) those that are deliberately UNCLEARLY WORDED and inadvertently UNCLEARLY STATED.

There are also two cases that are ILL-DRAFTED semantically:

(1) those that are CLEARLY STATED and inadvertently UNCLEARLY WORDED and

(2) those that are deliberately UNCLEARLY STATED and inadvertently UNCLEARLY WORDED.

Finally, there is just one case that is ILL-DRAFTED both structurally and semantically: the one that is inadvertently UNCLEARLY STATED and inadvertently UNCLEARLY WORDED.

If 90 percent of the sentences of a legal document are ILL-DRAFTED by these criteria, it says rather strongly something about the adequacy of the drafting of that document. On the other hand, if 90 percent of the sentences of a document are WELL-DRAFTED, it says something else rather strongly. Most documents will probably fall between these extremes. The significant point is that such criteria permit the construction of a scale for measuring the adequacy of a document's drafting -- a much-needed scale that takes into account aspects of a statement that are more significant than mere sentence-length or word-length.

7 CONCLUSION

The theme of this paper is simple. It is: to be plain, language must have clear structure. Having clear structure is also a simple matter. But recognizing that structure is complex is a different thing entirely. Many readers and writers are unaware of the awesome ambiguity that is embodied in seemingly clear little connecting words such as 'unless'. And unawareness breeds contentment. Reformers bent on achieving plain language that can be understood by intended audiences tend to ignore structure and focus their efforts virtually entirely upon getting short sentences and short words. There is peril in ignoring structure, and not merely

professional reputations are at stake. Brethren of the bar may soon be exposed to the transforming thrusts of malpractice suits for imprecision where precision is demanded in legal language. But to a profession that holds itself out to the public as expert in the art of communication, surely the inspiration for change should arise from a more noble source. How long can the reformers themselves continue to ignore that language has a structural dimension that affects meaning, as well as a semantic dimension? Lawyers do at least as well as any professional group around in skillfully handling the semantic dimension of written communication, but in handling structure, we are no better than rank amateurs -- and sometimes worse! Should the "plain language" to be achieved by current reform efforts leave us no better off? Short sentences will help, but they are no panacea. Imposed in a muddleheaded fashion, they could strangle more sophisticated reform efforts. As utilized by untutored heads, they frequently result in merely structural trade-off, rather than the definite improvement that is possible: inadvertent within-sentence ambiguity being traded for inadvertent between-sentence ambiguity.

The enlightened way is to profit from the experience of others. It is still no less a measure of wisdom today to be aware that a dwarf on the shoulders of a giant can see further than the giant. Modern logicians have devised tools of exquisite deftness for the very problem that legal drafters confront. We should be aware of them and use them. We do use definitions -- but clumsily. We do use normative language -- but clumsily. It is NORMATIVE_0 where it should be NORMATIVE. We continue to construct sentences that are cluttered with astonishingly ambiguous terms like 'unless'. When drafters mean to be clear, all such maskers of meaning should be replaced by the lowest common denominators of structural discourse: AND, OR, NOT, IF ... THEN ---, and IF AND ONLY IF ... THEN ---. Only then will the between-sentence structure of the legal drafter's house begin to take on the semblance of order that is demanded by computer-servants if they are to do fully their work in such establishments. The NORMALIZED "plain language" of the 1980's can succeed where the "ruly" English of the 1950's did not. Getting clear between-sentence structure can set the stage for the more formidable task of getting a process started for learning to deftly manage the within-sentence structure.

But how shall all of this wonderful structural clarity in legal drafting through NORMALIZATION come into being? Perhaps there would be no more effective way than for it to become a presumption of drafter negligence for terms like 'unless' to appear in a will or a contract or a statute unaccompanied by a subscript to indicate in what logical sense it is intended: UNLESS_1, UNLESS_2, ... UNLESS_{4128}, etc. That just might get the job done!

REFERENCES

Allen, L.E. (1957). Symbolic Logic: A Razor-Edged Tool for Drafting and Interpreting Legal Documents. Yale Law J., 66.

(September 1968). A Language-Normalization Approach to Information Retrieval in Law. Jurimetrics J.

(1974). Formalizing Hohfeldian Analysis to Clarify the Multiple Senses of 'Legal Right': A Powerful Lens for the Electronic Age. S. Calif. Law Rev. 48.

Allen, L.E. & Engholm, C.R. (1978). Normalized Legal Drafting and the Query Method. J. of Legal Ed. 29. References to 18 other articles on normalized drafting are available from the author.

Anderson, A.R. & Belnap, N.D. Jr. (1974). Entailment: The Logic of Relevance and Necessity, pp. 17-23. Princeton.

Copi, I.M. (1973). Symbolic Logic 4th Ed. at page 231. Macmillan, New York.

Federal Food, Drug and Cosmetic Act, Title 21, United States Code, Section 355.

New York General Obligations Law, Section 5-701b (McKinney 1978).

Patents Title 35, United States Code, Sections 101-103.

President's Executive Order No. 12044, 43 Federal Register 12,661 (1978).

Renton Report, Committee on Preparation of Legislation (London, 1975