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Exploring Computer Aided Generation of Questions for Normalizing Legal Rules

Layman E. Allen
University of Michigan Law School
Charles S. Saxon
Eastern Michigan University

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ABSTRACT

The process of normalizing a legal rule requires a drafter to indicate where the intent is to be precise and where it is to be imprecise in expressing both the between-sentence and within-sentence logical structure of that rule. Three different versions of a legal rule are constructed in the process of normalizing it: (1) the logical structure of the present version, (2) the detailed marked version, and (3) the logical structure of the normalized version. In order to construct the third version the analyst must formulate and answer specific questions about the terms that are used to express the logical structure of the first version that relates the constituent sentences marked in the second version.

Questions about the two types of logical structure may be of two different kinds: (1) direct questions about the interpretation of terms that express each type of structure, and (2) indirect questions by means of hypothetical situations that indicate how the terms that express structure are intended to be interpreted.

Direct questions are generated from natural language terms that are used to express structure by a series of transformations that use progressively more detailed defined structural terms and that culminate in structure that is expressed entirely in the defined structural terms of the basic normalized form. Arrow diagrams accompany these direct questions to help teach normalization to those unfamiliar with it. Examples of such direct questions, as well as examples of indirect ones, are provided with respect to normalization of section 2-207 of the Uniform Commercial Code.

Indirect questions are generated about hypothe-

tical situations that involve various appropriate combinations of conditions expressed in the rule that lead to the various mentioned results. This kind of question may be easier for an expert to respond to and thus be a better vehicle for eliciting the expertise of such a person. It is possible that some computer assistance can be provided in generating direct questions, but less likely for indirect questions. Furthermore the number of indirect questions generated may be unmanageably large and require too much human assistance to be practical.

In this chapter the feasibility of such computer-aided question generation will be explored to determine to what extent it can facilitate the normalizing of legal rules.

The terms used to express legal rules can be divided into two classes: structural terms and other terms. The other-than-structural terms express the substantive content of the rules, and the structural terms express the logical relationships between the substantive terms. In the statement

Applicants shall register unless they are minors

the word "unless" is a between-sentence structural term that logically relates the sentence

Applicants shall register

to the sentence

they are minors.

The word "shall" is a within-sentence structural term that logically relates the sentence-part "Applicants" to the sentence-part "register." The remaining terms in the statement are other-than-structural terms that express the substantive content of the rule.

Frequently, such rules are inadvertently ambiguous because it is unclear which of various alternative structural interpretations it is appropriate to give to the natural language terms used to express the structure. The process of normalizing a legal rule requires a drafter to consider where it is appropriate to be precise in expressing the logical structure and where it is appropriate to be imprecise in expressing such structure.

In the example rule, there are at least the following four different interpretations of the term "unless." It can be interpreted "weakly" (weakly, in the sense that this interpretation of the entire statement says less than "stronger" interpretations say) as:

IF applicants are NOT minors, THEN they shall register.

The statement can also be interpreted more strongly as saying, not only the conditional that the weak interpretation says, but also an additional conditional that indicates a result when applicants are minors:

IF applicants are NOT minors THEN they shall register,
AND
IF applicants are minors THEN IT IS NOT SO THAT they
shall register.

The second conditional of this stronger interpretation
says that applicants who are minors need not register.
There is a third interpretation of "unless" that has a
second conditional that says that applicants who are minors
must not register. This is the strongest interpretation of the
three so far:

IF applicants are NOT minors THEN they shall register,
AND
IF applicants are minors THEN they shall NOT register.

Although there are additional interpretations of "unless"
the final one to be considered here is one in which the second
conditional says something other than that applicants must not
register or that they need not register:

IF applicants are NOT minors THEN they shall register,
AND
IF applicants are minors THEN ... (something else) ... .

An example of what that something else might be will be
considered in the next section.
In all four of these interpretations, the capitalization
of certain words is used as a signal that these terms are being
used in a defined sense. In the weakest interpretation the
"unless" is interpreted as saying merely:

IF ... NOT ... THEN ... .

In the second interpretation the "unless" is interpreted as
saying:

IF ... NOT ... THEN ...
AND
IF ... THEN IT IS NOT SO THAT ... .

In the strongest interpretation the "unless" is interpreted as
saying:

IF ... NOT ... THEN ...
AND
IF ... THEN ... NOT ... .

In the final interpretation the "unless" is interpreted as
saying:

IF ... NOT ... THEN ...
AND
IF ... THEN ... .

These interpretations are in what we call basic normalized form

because all of their between-sentence logical structure is expressed by combinations of the four basic defined structural terms. These four basic terms are: IF-THEN, AND, OR, and NOT.

These interpretations could also be expressed in what we call advanced normalized form by expressing their structure with advanced structural defined terms. In the case of these interpretations the advanced defined terms would be UNLESS, UNLESS.2, UNLESS.2+, AND UNLESS.2o, each of which is, in turn, defined in terms of combinations of the basic defined terms.

The weak interpretation could be expressed in advanced normalized form by:

Applicants shall register UNLESS they are minors.

The second interpretation could be expressed in advanced normalized form by:

Applicants shall register UNLESS.2 they are minors.

The strongest interpretation could be expressed in advanced normalized form by:[1]

Applicants shall register UNLESS.2+ they are minors.

The final interpretation could be expressed in advanced normalized form by:

Applicants shall register UNLESS.2o they are minors
(and what the "something else" is to be must be specified).

On the other hand, the drafter who deliberately intends to leave it ambiguous as to which of these four different logical relationships is intended can continue to use the natural language "unless" and write

Applicants shall register unless they are minors.[2]

Subsequent interpreters of the provision must then gain whatever guidance there is from the rest of the context in which the statement appears in order to decide which interpretation is most appropriate.

The process of normalizing the within-sentence logical structure has the same possibilities for clarifying the logical structure within the constituent sentences of the rule as the process of normalizing the between-sentence structure has for clarifying the between-sentence structure. The "shall" in "Applicants shall register" can be interpreted in at least three different ways:[3]

(1) Applicants SHALL.1 register
as expressing applicants' legal obligation to register but not saying anything about their legal power to register (e.g., being obligated to register in order to qualify for benefit programs but not saying anything about whether registrants actually qualify because alien or other status may disqualify them),

(2) Applicants SHALL.2 register
as expressing applicants' legal power to register and
their legal obligation to exercise that power (e.g.,
registering to vote where voting is compulsory), and

(3) Applicants SHALL.3 register
as expressing applicants' legal power to register and
their discretion about whether or not to exercise
that power (e.g., registering to vote where voting is
discretionary).

That there are at least these three interpretations of the
"shall" and also at least four interpretations of the "unless"
means that there will be 3x4, or a total of at least 12,
different structural interpretations of the seemingly simple
and clear seven-word sentence:

Applicants shall register unless they are minors.

This somewhat surprising structural richness and diversity
of possible interpretation when the usual natural language
terms are used to express logical structure places a heavy
burden upon the context in which the statement occurs to guide
readers to the appropriate interpretation. The use of the
defined structural terms, on the other hand, makes interpreta-
tion of the logical structure, in effect, context free. Natural
language can easily be enriched by adding defined structural
terms and using this enriched language to express legal rules.
Using defined structural terms to write legal rules enables
even a computer to interpret the logical structure of such
rules.

In order to transform a rule whose structure is expressed
in natural language terms to a normalized one whose structure
is expressed by defined structural terms, questions must be
formulated that will reveal the various possible interpreta-
tions of the rule to be transformed. These questions can be of
at least two different types:

(1)   direct questions about interpretation of terms that
express structure, and

(2)   indirect questions through hypotheticals that
indicate how terms that express structure are being
interpreted.

In addition to these direct or indirect questions that
indicate the various interpretations of the natural language
terms that express the logical structure, there must also be
formulated questions that indicate how the constituent senten-
ces are to be related to each other and also questions that
indicate how the various constituent parts within each constit-
uent sentence are related. This second kind of question is
similar to the kind of questions that would be asked in
determining where the parentheses go in an arithmetic or
algebraic expression.

The questions above about "unless" and "shall" are
actually the following examples of direct questions about

structural terms.

Q1   Which interpretation of the "unless" between the sentence "Applicants shall register" and the sentence "they are minors" is most appropriate?

    A)   Applicants shall register UNLESS they are minors

that is

    IF applicants are NOT minors, THEN they shall register.

    B)   Applicants shall register UNLESS.2 they are minors

that is

    IF applicants are NOT minors, THEN they shall register, BUT OTHERWISE, NOT

that is

    IF applicants are NOT minors THEN they shall register, AND IF applicants are minors THEN IT IS NOT SO THAT they shall register.

    C)   Applicants shall register UNLESS.2+ they are minors

that is

    IF applicants are NOT minors, THEN they shall register, BUT OTHERWISE, NOT.+

that is

    IF applicants are NOT minors THEN they shall register, AND IF applicants are minors THEN they shall NOT register.

    D)   Applicants shall register UNLESS.2o they are minors

that is

    IF applicants are NOT minors, THEN they shall register, BUT OTHERWISE, (something else)

that is

    IF applicants are NOT minors THEN they shall register, AND IF applicants are minors THEN (something else).

Q2   Which interpretation of the "shall" in the sentence "Applicants shall register" is most appropriate?

    A)   Applicants SHALL.1 register

that is

    Applicants must register
    (but not saying anything about their legal power to

register).

    B)   Applicants SHALL.2 register

that is

    Applicants have a legal power to register, and they must exercise it.

    C)   Applicants Shall.3 register

that is

    Applicants have a legal power to register, and they have discretion about whether or not to exercise it.

These same alternative interpretations can be disclosed by questions of the second type that involve hypothetical situations with questions about whether certain results occur in those situations, the answers to which indicate indirectly the structural interpretation of the "unless" and the "shall." The following hypothetical situation and question, when answered, would indicate how the two terms were being interpreted.

H1   Suppose that the applicants are minors.

Q1   Which of the following results occur by virtue of the appropriate interpretation of the rule: Applicants shall register unless they are minors?

    A)   Neither B) nor C).

    B)   The applicants need not register.

    C)   The applicants must not register.

    D)   (Something else).

H2   Suppose that the applicants are not minors.

Q2   Which of the following results occurs by virtue of the appropriate interpretation of the rule: Applicants shall register unless they are minors?

    A)   The applicants must register (with nothing being said about whether they have the legal power to register).

    B)   The applicants have the legal power to register and must exercise it.

    C)   The applicants have the legal power to register and discretion about whether or not to exercise it.

The interpretation indicated by the answers AA to the two direct questions corresponds to the interpretation indicated by the answers AA to the two indirect questions; the interpretation indicated by the AB answers to the direct questions

corresponds to the interpretation indicated by the AB answers to the indirect questions; and similarly for the AC answers to the direct questions and the AC answers to the indirect questions, and the other nine pairs as well.

The formulating of such questions is the fundamental part of normalizing a legal rule, and any computer assistance that can be provided to humans in helping them to formulate either type of question would facilitate the normalization process in an important way. It is the possibility of such computer assistance that is the principal topic addressed in this chapter.

TRANSFORMING LEGAL RULES INTO NORMALIZED FORM

Normalizing a legal rule enables a rule drafter or a rule interpreter to express precisely various interpretations of existing legal rules. A legal rule is fully normalized by expressing both its between-sentence and within-sentence logical structure by means of defined structural terms and indicating the relationships intended between its sentences and sentence parts. A rule can be partially normalized by expressing its between-sentence logical structure by defined structural terms along with the relationships intended. Such partial (between-sentence) normalization can be stated in any one of four different normalized forms: elementary normalized form, basic normalized form, clear normalized form, or advanced normalized form. Two computer programs, one called MARK AND CLASSIFY and the other called NORMALIZER, have been developed to assist analysts to draft legal rules in normalized form and to transform one normalized form to another automatically.

The sentence

Applicants shall register unless they are minors

will be used as an example to illustrate (1) some of the characteristics of normalization and (2) the process of transforming an existing legal rule into normalized form.

This rule consists of two constituent sentences that are related to each other by the following logical structure:

sentence-1 unless sentence-2.

The steps in the process of transforming the Present Version of a legal rule into its various Normalized Versions are the following:

Use the Present Version as input to the MARK AND CLASSIFY program to specify and name the constituent sentences of the Present Version, to classify them into conditions and results, and to construct the Marked Version and the representation of the between-sentence structure of the Present Version of the rule.

Use the Marked Version and the representation of the structure of the Present Version to construct the Detailed Marked Version by specifying the constituent sentences of the Normalized Versions and the parts of those sentences

to be named.

Use the Marked Version, the Structure of the Present Version, and the Detailed Marked Version to specify and construct the Structure of the Normalized Versions. To do so, questions about the Structure of the Present Version need to be formulated and answered.

Finally, the Detailed Marked Version and Structure of the Normalized Versions are used as inputs to the NORMALIZER program to automatically produce the various Normalized Versions.

This process is summarized in Figure 1.

Marking and Classifying

The first step in converting the Present Version of this statement into a normalized form is for the analyst to interact with the MARK AND CLASSIFY program to produce (A) the Marked Version of the rule, (B) the representation of the between-sentence structure of the Present Version, and (C) the classi-fication of the constituent sentences into conditions and results. There should be a high degree of agreement among native speakers of English in these three outputs. In this case, the Marked Version is:

(A) [a: applicants shall register] unless [b: they are minors]

The structure of the Present Version is:

(B)   a unless b

and the classification saved for later use is:

(C)   Conditions: b   Results: a

Constructing the Detailed Marked Version

The second step in transforming a rule into normalized form is to convert the Marked Version into a Detailed Marked Version. This step is the more difficult one; it is more artful and thus more subject to disagreement among different analysts. In the Detailed Marked Version the analyst must specify and name the constituent sentences of the various Normalized Versions and the constituent parts of those sentences that contain within-sentence structural terms. The generation of the Detailed Marked Version is much more likely to produce varied results than is the generation of the Marked Version where the constituent sentences of the Present Version were named and specified. The Detailed Marked Version is specified by editing the Marked Version, indicating additions by corner brackets < > and deletions by curly brackets { }. Such editing should be kept to an absolute minimum, however, because it is so easy to

SUMMARY OF PROCESS OF NORMALIZING A LEGAL RULE

Present Version

A.   [SPECIFY CONSTITUENT
       SENTENCES OF PRESENT
       VERSION]

       Marked Version ⟶   B.   [SPECIFY LOGICAL
                                                       STRUCTURE OF
                                                       PRESENT VERSION]

C.   [SPECIFY CONSTITUENT
       SENTENCES OF
       NORMALIZED VERSION]   Logical Structure
                                                       of Present Version

       Detailed Marked   D.   [SPECIFY LOGICAL
       Version ⟶   STRUCTURES OF
                                                       NORMALIZED VERSION]

                                                       Logical Structure
                                                       of Normalized Version

       [...] by Human Analyst

                                               E.   NORMALIZER

                                                       Normalized Versions
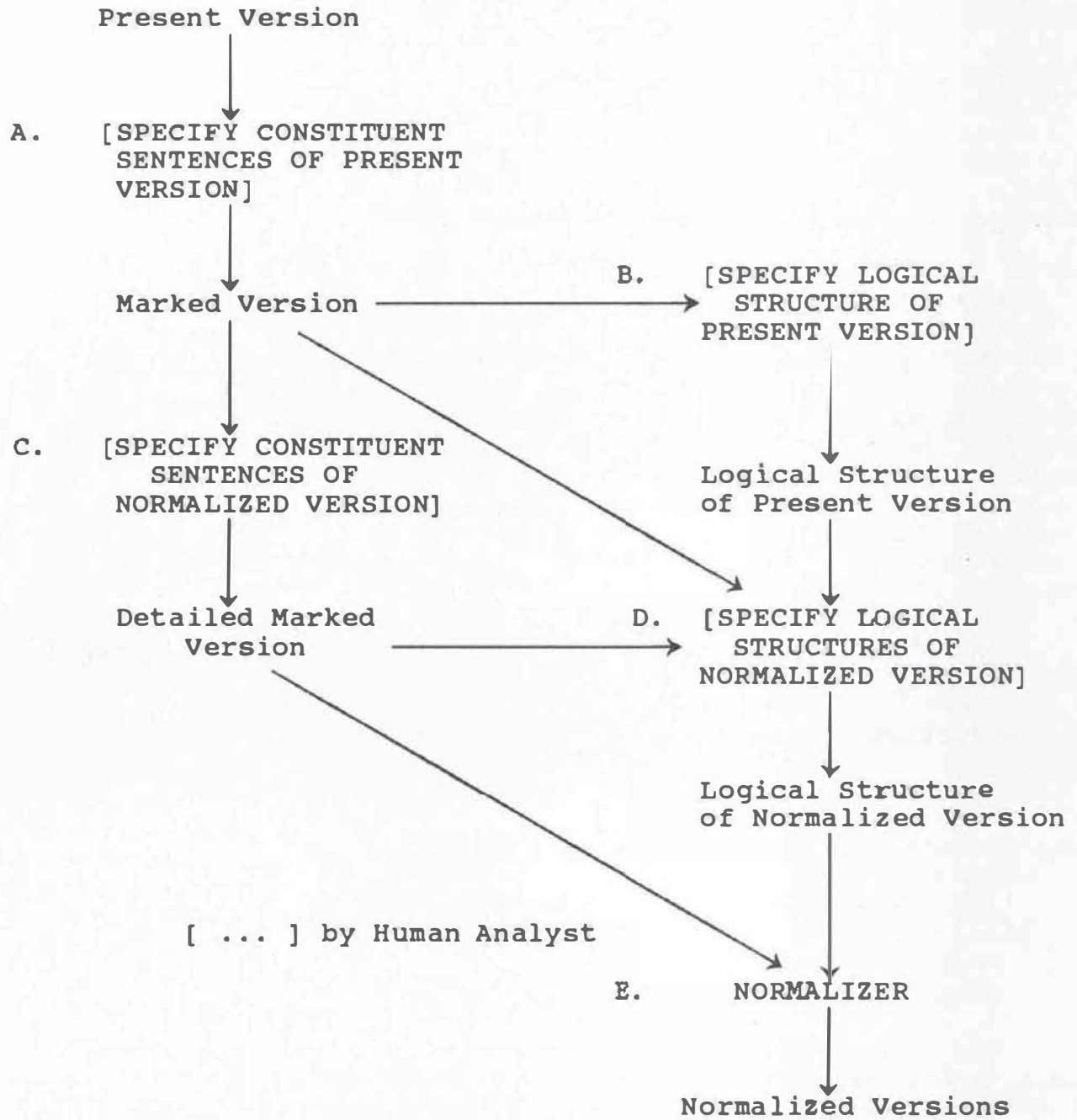
Figure 1

inadvertently change the meaning of a provision in an unwanted way. In specifying in the Detailed Marked Version, what the constituent sentences of the Normalized Versions shall be and what the parts of those sentences that are to be named shall be, the analyst needs to decide which sentence parts of the Present Version are related by within-sentence structural terms as well as those parts that need to be expanded into full constituent sentences so that (1) all questions about all ambiguities detected may be expressed in terms of those constituent sentences and those parts, and (2) all alternative structural interpretations may be expressed in terms of those sentences and those parts. Clearly, this is the difficult part of normalizing a rule that requires practice and experience to do well.

In making decisions about modifying the Marked Version, the analyst will want to examine carefully both the logical structure of the Present Version and the constituent sentences of the Present Version to decide just what the Present Version is asserting. Often, there is some ambiguity with respect to how parts of sentences should be interpreted as being related to each other, as well as how complete sentences should be interpreted as being related to each other.

DETAILED MARKED VERSION

[a.1: {applicants}<they>] SHALL [a.2:register] UNLESS [b1: {they}<applicants> are minors]

Constructing the Logical Structure of Normalized Versions

The third step in transforming a norm into normalized form is to specify the Logical Structures of the Normalized Versions that will relate the constituent sentences of the Normalized Versions. These are specified for each Normalized Version by what is here called the Parenthesized Logical Expression. In constructing the Parenthesized Logical Expression, the analyst uses as input the Detailed Marked Version (to get the constituent sentences of the Normalized Version and the named parts), the Marked Version (to get the constituent sentences of the Present Version), and the Logical Structure of the Present Version. The latter two are used to determine what the Present Version asserts so that the sentences of the Normalized Version can be related by the Logical Structure being constructed in such a way that the Normalized Version will assert the same set of ideas. In determining the logical structure of various Normalized Versions, explicit questions need to be formulated--questions whose answers describe different aspects of the alternative logical interpretations of the Present Version and distinguish between each interpretation and every other one. Each different sequence of answers to the questions will determine in normalized form a different structural interpretation of the rule being normalized.

Questions About the Logical Structure of the Rule

In general, the questions to be asked deal with two different kinds of logical structure. The first is the interpretation of terms that indicate between-sentence and within-sentence logical structure. The second is how various sentences and sentence-parts relate to each other, a matter that sometimes involves between-sentence structure, and other times involves within-sentence structure. For this simple example, only questions of the first kind occur. They are the questions described more fully in the previous section.

Q1   Which interpretation of the "unless" between the sentence "Applicants shall register" and the sentence "they are minors" is most appropriate?

A) Applicants shall register UNLESS they are minors

B) Applicants shall register UNLESS.2 they are minors

C) Applicants shall register UNLESS.2+ they are minors

D) Applicants shall register UNLESS.2o they are minors

Q2   Which interpretation of the "shall" in the sentence "Applicants shall register" is most appropriate?

A) Applicants SHALL.1 register

B) Applicants SHALL.2 register

C) Applicants SHALL.3 register

Generating such questions is what most requires skill and experience by the analyst performing the normalization. The quality of the questioning will determine the quality of the normalization. So, any assistance from a computer program that will help improve the questioning of analysts will significantly improve the process of normalizing legal rules.

Producing the Normalized Version with NORMALIZER

When the analyst has completed these three tasks, the NORMALIZER program can take over to produce the various Normalized Versions. In using NORMALIZER, a legal analyst must first specify the Parenthesized Logical Expression and Detailed Marked Version of the legal rule being normalized; then NORMALIZER can be used to generate the Outline and Normalized Version of the rule (labeled or unlabeled). Thus, the interpretation of the original text is a result of the expertise of the human analyst, while the formatting of the expression of that interpretation is done automatically by the program. The program can automatically generate equivalent Normalized Versions that are expressed in logically more basic form (and also the reverse).

The Parenthesized Logical Expression of a normalized rule is a statement that expresses the logical structure of the rule

in brief notation. The Detailed Marked Version of the Original
Text of a rule divides that text into constituent sentences and
(where appropriate) sentence parts, and associates a short name
with each of them. The short names of the sentences and parts
in the Detailed Marked Version are used in the Parenthesized
Logical Expression to represent those sentences and parts. In
the Parenthesized Logical Expression, the logical structure of
the normalized rule is presented in a single dimension--
horizontally. In the Outline of the normalized rule, the
logical structure is presented in two dimensions--both horizon-
tally and vertically. In the Outline, short names are used to
represent the constituent sentences and parts, but in the
Normalized Version the short names are replaced by the senten-
ces and parts themselves. In the Normalized Version, the
logical structure of the rule is presented in two dimensions--
horizontally and vertically--by means of defined (and signal-
led) structural terminology.

The current version of the NORMALIZER program transforms
legal rules as they are expressed initially into various
normalized forms. Doing such transformations manually is
extremely tedious. NORMALIZER is designed to free the analyst
from the routine housekeeping chores associated with the task
of normalizing statutes, regulations, and other legal materi-
als. To the extent that it succeeds, an analyst can devote his
or her efforts to more interesting and difficult judgmental
matters. Because NORMALIZER can generate alternative ways of
expressing a given statement in normalized form automatically
and quickly, an analyst can easily produce and select from many
alternative versions. This will provide a tremendous advantage
in tailoring the expression of a legal rule so that it appro-
priately fits each individual context. The capability to
generate easily various equivalent, but different, normalized
forms of legal rules introduced the possibility of drastic
change in both the production and use of legal documents.[4]

The answers given to the two questions determine interpre-
tation of the terms used to indicate the between-sentence and
within-sentence logical structure of the constituent sentences
and parts of the Detailed Marked Version. If an analyst selects
A and B as the appropriate answers to questions Q1 and Q2, then
the Parenthesized Logical Expression (PLE) is determined to be:

    nbl > (a.1 S2 a.2)

With this Parenthesized Logical Expression and the constituent
sentences and parts of the Detailed Marked Version as inputs,
the NORMALIZER program will produce the following Normalized
Version of the original text:

    IF
    1. applicants are NOT minors,
    THEN
    2. they have a POWER to register, AND
    3. they MUST exercise it.

If the answers selected for Q1 and Q2 are B and D, then
the PLE is determined to be:

```
        nb1 > (a.1 S3 a.2) BO na1
```

With this PLE and the constituent sentences and parts of the
Detailed Marked Version as inputs, the NORMALIZER program can
produce a Normalized Version of the original text that includes
the short names of all of the constituent sentences and parts:

```
IF
1. [nb1: the applicants are NOT minors],
THEN
2. [a.1: they] SHALL.3 [a.2: register],
BUT OTHERWISE,
3. [na1: they do NOT have a POWER to register]
```

where subsection 2 with its "SHALL.3" is defined to be the
conjunction of subsections 2 and 3 in:

```
IF
1. [nb1: the applicants are NOT minors],
THEN
2. [a1: they have a POWER to register], AND
3. [a2: they have DISCRETION about whether or NOT to
exercise it],
BUT OTHERWISE,
4. [na1: they do NOT have a POWER to register].
```

This interpretation helps to clarify, by giving one
example of it, what the "something else" of alternative
interpretation D to question Q1 might be. In this case, the
"something else" is the negation of the first conjunct of the
definition of the "SHALL.3" of interpretation D in this
context. In other words, the sentence "they SHALL.3 register"
by definition means "they have a POWER to register, AND they
have DISCRETION about whether or NOT to exercise it"; the
"something else" here is "they do NOT have a POWER to regis-
ter."

Alternatively, the NORMALIZER program can also produce the
following unlabeled Normalized Version of the rule:

```
IF
1. the applicants are NOT minors,
THEN
2. they have a POWER to register, AND
3. they have DISCRETION about whether or NOT to exercise
it,
BUT OTHERWISE,
4. they do NOT have a POWER to register.
```

In this description of the process of transforming an
existing legal rule into two of its Normalized Versions, the
four steps have been illustrated using the simple seven-word
sentence that expresses a hypothetical rule. The description
indicates the roles of the human analyst and the two computer
programs, MARK AND CLASSIFY and NORMALIZER, in carrying out the
transformation. It also shows how the questions that need to be
formulated in order to determine the appropriate structural
interpretation of the rule being normalized relate to the rest
of the process of normalizing the rule. We turn now to a

consideration of the first two steps of the process with respect to a more complicated example, section 2-207 of the Uniform Commercial Code that deals with additional terms in acceptance or confirmation of sales contracts.

PRESENT, MARKED, AND DETAILED MARKED VERSIONS OF UCC 2-207

Present Version of UCC 2-207

UNIFORM COMMERCIAL CODE, Section 2-207
ADDITIONAL TERMS IN ACCEPTANCE OR CONFIRMATION
(1) A definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance even though it states terms additional to or different from those offered or agreed upon, unless acceptance is expressly made conditional on assent to the additional or different terms.
(2) The additional terms are to be construed as proposals for addition to the contract. Between merchants such terms become part of the contract unless:
  (a) the offer expressly limits acceptance to the terms of the offer;
  (b) they materially alter it; or
  (c) notification of objection to them has already been given or is given within a reasonable time after notice of them is received.
(3) Conduct by both parties which recognizes the existence of a contract is sufficient to establish a contract for sale although the writings of the parties do not otherwise establish a contract. In such case the terms of the particular contract consist of those terms on which the writings of the particular contract consist of those terms on which the writings of the parties agree, together with any supplementary terms incorporated under any other provisions of the Act.

Generating the Marked Version of UCC 2-207

Using this Present Version of UCC 2-207 as input to the MARK AND CLASSIFY program and interacting with it by entering the responses that it requests, we can obtain as outputs: (A) the Marked Version of UCC 2-207, (B) the between-sentence structure of its Present Version, and (C) its constituent sentences classified into conditions and results. The program first puts brackets around the text that surrounds specified between-sentence connecting words and phrases such as: "and," "or," "even though," "unless," "although," or "in such case." The aim at this stage of the process is for each of the passages of text enclosed in brackets to be completed sentences. However, often the between-sentence connecting terms will be used to connect passages of text that are not complete sentences. Therefore, the brackets that have been inserted automatically by the MARK AND CLASSIFY program to enclose complete sentences will need to be checked by the human analyst and corrected, where necessary. The program facilitates this checking and correcting, and concurrently enables the analyst

to classify the sentences into those that express conditions and those that express results, in the following manner:

For the highlighted (italicized) part between brackets, press the E-key to edit that part or press a key of one of the other four letters (N C R or B) to classify the part.

PRESS   TO INDICATE

E   Edit this part.
N   This part is NOT a sentence.
C   This sentence expresses a condition.
R   This sentence expresses a result.
B   This sentence expresses a condition in one interpretation of the rule and a result in another interpretation.

(1) *[a definite]* and [seasonable expression of acceptance]or [a written confirmation which is sent within a reasonable time operates as an acceptance] even though [it states terms additional to] or [different from those offered] or [agreed upon], unless [acceptance is expressly made conditional on assent to the additional] or [different terms].

With the analyst's first response, "N," the display changes to:

(1) *[a definite and seasonable expression of acceptance]* or [a written confirmation which is sent within a reasonable time operates as an acceptance] even though [it states terms additional to] or [different from those offered] or [agreed upon], unless [acceptance is expressly made conditional on assent to the additional] or [different terms].

With the analyst's second response, "N," the display changes to:

(1) *[a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance]* even though [it states terms additional to] or [different from those offered] or [agreed upon], unless [acceptance is expressly made conditional on assent to the additional] or [different terms].

With the analyst's third response, "R," the display changes to:

(1) [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance] even though *[it states terms additional to]* or [different from those offered] or [agreed upon], unless [acceptance is expressly made conditional on assent to the additional] or [different terms].

With the analyst's fourth response, "N," the display changes to:

(1) [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance] even though *[it states terms additional to or different from those offered]* or [agreed upon], unless [acceptance is expressly made conditional on assent to the additional] or [different terms].

With the analyst's fifth response, "N," the display changes to:

(1) [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance] even though *[it states terms additional to or different from those offered or agreed upon]*, unless [acceptance is expressly made conditional on assent to the additional] or [different terms].

With the analyst's sixth response, "B," the display changes to:

(1) [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance] even though [b: it states terms additional to or different from those offered or agreed upon], unless *[acceptance is expressly made conditional on assent to the additional]* or [different terms].

With the analyst's seventh response, "N," the display changes to:

(1) [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance] even though [b: it states terms additional to or different from those offered or agreed upon], unless *[acceptance is expressly made conditional on assent to the additional or different terms]*.

With the analyst's eighth response, "C," the display changes to:

(1) [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance] even though [b: it states terms additional to or different from those offered or agreed upon], unless [c: acceptance is expressly made conditional on assent to the additional or different terms].

This same process continues with the remaining two subsections of UCC 2-207 and transforms (2) and (3) into the following version, where each passage of text enclosed in brackets is a complete sentence and is named:

(2) [d: the additional terms are to be construed as

proposals for addition to the contract]. [e: between merchants such terms become part of the contract] unless:

> (a) [f: the offer expressly limits acceptance to the terms of the offer]:
> (b) [g: they materially alter it]; or
> (c) [h: notification of objection to them has already been given or is given within a reasonable time after notice of them is received]

(3) [i: conduct by both parties which recognizes the existence of a contract is sufficient to establish a contract for sale] although [nj: the writings of the parties do not otherwise establish a contract]. In such case [k: the terms of the particular contract consist of those terms on which the writings of the parties agree, together with any supplementary terms incorporated under any other provisions of the Act].

These three subsections, with each constituent sentence bracketed and named, constitute the Marked Version of UCC 2-207, which is the first output of the MARK AND CLASSIFY program applied to UCC 2-207. The other two outputs of the program, the Present Version between-sentence structure and the classified constituent sentences, are:

PRESENT VERSION BETWEEN-SENTENCE STRUCTURE OF UCC 2-207

(1) a even though b, unless c.

(2) d. e unless:
    (a)   f;
    (b)   g; or
    (c)   h.

(3) i although nj. in such case k.

CLASSIFIED CONSTITUENT SENTENCES OF UCC 2-207

Conditions: b c f g h nj   Results: a b d e i k

Generating the Detailed Marked Version of UCC 2-207

The next step in the process of normalizing UCC 2-207 is to construct its Detailed Marked Version. This is carried out with the assistance of the part of the MARK AND CLASSIFY program that helps to analyze the within-sentence structure of the rule being normalized. In constructing the Detailed Marked Version the analyst must keep in mind its function, that is, to specify and name all of the constituent sentences of the various Normalized Versions. In order to do this, it will be necessary to analyze and name some of the parts of the constituent sentences of the Present Version. The parts of interest are those that surround terms such as: "may," "shall," "which," and "that."

In the case of the terms "may" and "shall" (and other terms similar to them) the occurrences that are of interest are those that are being used to express ideas of legal power, legal permission, and legal obligation. These occurrences will

almost always be in sentences that express results. They will be of the form: "x may y" and "x shall y." The purpose of normalizing these occurrences is to specify just which combination of legal powers, permissions, or obligations each occurrence is expressing.

The terms "which" and "that" (and other terms similar to them) probably occur more often in sentences that express conditions than "may" and "shall" do. The result sentences that contain a "which" or "that" often have an imbedded condition that masks a structural ambiguity--one that it is useful to detect and reveal in order to understand more precisely the rule in which the result occurs. Those occurrences that have such an imbedded condition are usually of the form: "x which y z" or "x that y z." Sometimes, but less frequently, they are of the form: "x y which z" or "x y that z." Such statements may be interpreted as asserting only the single conditional: IF xy THEN xz (where xy and xz are complete sentences). Alternatively, they may be interpreted as asserting the biconditional: IF xy THEN yz BUT OTHERWISE NOT (or some other biconditional). In any case, to represent either the single conditional or one of the biconditionals, it is necessary to specify the parts (x, y, and z) from which their sentences are built. The MARK AND CLASSIFY program can identify the x part (or the z part), but it needs assistance from the human analyst to determine where the y part ends and the z part begins (or where the x part ends and the y part begins). The parts of sentences will be given names that indicate that they are only part of a whole sentence (names that contain a decimal point, that is, names that are in some sense equivalent to fractional parts of a sentence). In sentence a, for example, that contains a "which" that masks an imbedded condition, the x part is named a.1, the y part is named a.2, and the z part is named a.3. Then, a.1 will be combined with a.2 to form sentence a1, and an abbreviation referring to a.1 will be combined with a.3 to form sentence a.2.

In the within-sentence analysis of the Marked Version of UCC 2-207 the MARK AND CLASSIFY program will start back at the beginning. The first sentence in which a within-sentence structural term is detected is sentence-a. What appears on the screen is:

> [a: a definite and seasonable expression of acceptance or a written confirmation *which* is sent within a reasonable time operates as an acceptance]

> IF sentence-a is of the form "a.1 which a.2 a.3" so that
>   "a.1 a.2" and "a.1 a.3" are complete sentences,
> THEN in the version of sentence-a below, put a"/" between
>   the appropriate words to indicate a.2 and a.3,
> BUT OTHERWISE, press N.[5]

> [a.1: a definite and seasonable expression of acceptance or a written confirmation] which [is sent within a reasonable time operates as an acceptance]

If the analyst puts a "/" between "time" and "operates" like this:

[a.1: a definite and seasonable expression of acceptance or a written confirmation] which [is sent within a reasonable time / operates as an acceptance]

what comes back on the screen is:

[a.1: a definite and seasonable expression of acceptance or a written confirmation] which [a.2: is sent within a reasonable time] [a.3: operates as an acceptance]

Please enter the term ("it," "they," "he," "she," or some other) that best fills in the blank to refer to:

[a.1: a definite and seasonable expression of acceptance or a written confirmation]

in the statement:

IF
a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time
THEN
_____ operates as an acceptance.

if the analyst enters "that expression or confirmation," the display changes to:

IF
[al: a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time]
THEN
[a2: that expression or confirmation operates as an acceptance].

OK? Y/N

If the analyst answers "N" here, the program repeats the cycle with respect to sentence-a; otherwise, it goes on to the next sentence that has some within-sentence structure to be analyzed.

In the Marked Version of UCC 2-207 the next sentence detected by MARK AND CLASSIFY with within-sentence structure to be analyzed is sentence-i.

[i: conduct by both parties *which* recognizes the existence of a contract is sufficient to establish a contract for sale]

Entries by the analyst of

(1) a "/" between "contract" and "is" and
(2) "that conduct" in the blank

result in the following statement to confirm that the entries are correct:

IF

[i1: conduct by both parties recognizes the existence of a contract]
THEN
i2: that conduct is sufficient to establish a contract of sale]

OK? Y/N

After the analyst has finished with all the sentences that the program detects as needing some within-sentence structural analysis, the program adds the new sentences generated to the list of ADDITIONAL SENTENCES NEEDED at the end of the Detailed Marked Version and then shifts into editing mode and prompts the analyst to modify any sentences that need to be changed. It prompts the analyst with:

Enter insertion by putting text in < > and deletions by adding { } around the text to be deleted.

For example, consider sentence-b.

[b: it states terms additional to or different from those offered or agreed upon]

If the analyst edits the text as follows (changing b to b1 to indicate that changes have been made):

[b1: {it}<the expression or confirmation>states terms additional to or different from those offered or agreed upon]

the modified sentence is:

the expression or confirmation states terms additional to or different from those offered or agreed upon

The analyst should continue to edit sentences to be edited until all are done. In the case of UCC 2-207 the following additional modifications need to be made:

[c1: acceptance is expressly made conditional on assent to {the additional or different} terms <additional to or different from those offered or agreed upon>].

[g1: {they}<the additional or different terms> materially alter {it}<the contract>][6]

After the necessary editing of sentences is finished, the analyst starts at the beginning again to consider which sentences can be negated with an imbedded "NOT" and creates such negations where they will be needed to represent at least one of the interpretations of the rule being normalized. This is done by moving the cursor to the position where the "NOT" is to be inserted and pressing the CONTROL-key and the N-key simultaneously. This will produce three results: (1) a new sentence is created that is the negation of the sentence being considered, (2) the short name of the new sentence is the same

as that of the original sentence except that it has the letter
"n" in front, and (3) that new sentence is added to the list of
ADDITIONAL SENTENCES NEEDED at the end of the Detailed marked
Version.

For example, consider sentence-c1.

> [c1: acceptance is expressly made conditional on assent
> to terms additional to or different from those offered or
> agreed upon].

If the analyst moves the cursor to the space between "is" and
"expressly" and presses the CONTROL-key and the N-key simultan-
eously, the program generates:

> [nc1: acceptance is NOT expressly made conditional on
> assent to terms additional to or different from those
> offered or agreed upon].

and adds it to the list of ADDITIONAL SENTENCES NEEDED at the
end of the Detailed Marked Version.

For UCC 2-207 the sentences to be negated with an imbedded
"NOT" are: b1, c1, f, g1, and i2. It should be noted that,
sometimes in generating negations by means of an imbedded
"NOT," some additional editing is required to make the senten-
ces grammatically correct (as in the cases of nf and ng1).

With all of this information supplied by the analyst, the
MARK AND CLASSIFY program produces the following Detailed
Marked Version of UCC 2-207:

DETAILED MARKED VERSION OF UCC 2-207

(1) [a: a definite and seasonable expression of acceptance
or a written confirmation which is sent within a reason-
able time operates as an acceptance] even though [b1:
{it}<the expression or confirmation>states terms addition-
al to or different from those offered or agreed upon],
unless [c1: acceptance is expressly made conditional on
assent to {the additional or different} terms<additional
to or different from those offered or agreed upon>].

(2) [d: the additional terms are to be construed as
proposals for addition to the contract]. [e: between
merchants such terms become part of the contract] unless:
> (a) [f: the offer expressly limits acceptance to the
> terms of the offer];
> (b) [g1: {they}<the additional or different terms>
> materially alter {it}<the contract>]
> (c) [h: notification of objection to them has already
> been given or is given within a reasonable time after
> notice of them is received]

(3) [i: conduct by both parties which recognizes the
existence of a contract is sufficient to establish a
contract for sale] although [nj: the writings of the
parties do not otherwise establish a contract]. In such
case [k: the terms of the particular contract consist of
those terms on which the writings of the parties agree,

together with any supplementary terms incorporated under any other provisions of the Act].

ADDITIONAL SENTENCES NEEDED

[a1: a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time]
[a2: that expression or confirmation operates as an acceptance]
[i1: conduct by both parties recognizes the existence of a contract]
[i2: that conduct is sufficient to establish a contract for sale]
[nb1: the expression or confirmation does NOT state terms additional to or different from those offered or agreed upon]
[nc1: acceptance is NOT expressly made conditional on assent to terms additional to or different from those offered or agreed upon]
[nf: the offer does NOT expressly limit acceptance to the terms of the offer]
ng1: the additional or different terms do NOT materially alter the contract]
[ni2: that conduct is NOT sufficient to establish a contract for sale]
[j: the writings of the parties do otherwise establish a contract]

DIRECT QUESTIONS ABOUT STRUCTURE (UCC 2-207)

Formulating questions about the structure of the Present Version of a rule being normalized occurs as part of the process of specifying the structure that relates the constituent sentences of the normalized interpretations of that rule. The direct questions about the Present Version structure will be (1) about the interpretation of the between-sentence terms that express such structure and the within-sentence terms that express it, and (2) about how sentences and parts are related to each other.

Each question is presented in successively simpler normalized versions, moving from advanced normalized versions to basic normalized versions with representations of clear normalized versions where appropriate. Each of these normalized versions is presented in three forms: in full text, in abbreviated text, and in arrow diagram notation.

In the case of normalizing UCC 2-207 the direct questions will be (1) about interpreting the between-sentence terms "even though," "unless," "although," and "in such case"[7] and the within-sentence term "which" and (2) about which other sentences of UCC 2-207 sentence-c is related to by the term "unless." The first five questions deal with interpreting the between-sentence terminology.

The Direct Questions Formulated

Q1   For the "even though" between sentence-a and sentence-b1,
       which interpretation is most appropriate: A or B?
       Alternative A--asserting the weaker "Whether or not b1 is
       true, a is true."
       Alternative B--asserting the stronger "a AND b1 are both
       true."

For all of the questions below, wherever possible, the alterna-
tive interpretations are listed in order of the strength from
weakest to strongest--from those that assert the least to those
that assert the most. Each alternative is transformed step-by-
step from its advanced normalized representation to its clear
normalized representation to its basic normalized representa-
tion, and at each step is accompanied by its abbreviated form
and its expression in notation.

The two alternative interpretations for this first
question can be indicated by replacing the ambiguous "even
though" with the defined structural terms "EVEN THOUGH" and
"EVEN THOUGH.2" as follows:

A)   [a: a definite and seasonable expression of acceptance or
       a written confirmation which is sent within a reasonable
       time operates as an acceptance] EVEN THOUGH
       [b1: the expression or confirmation states terms addition-
       al to or different from those offered or agreed upon].

       In abbreviated form: a EVEN THOUGH b1.

           In notation: a E1 b1

that is

           WHETHER OR NOT
           [b1: the expression or confirmation states terms
           additional to or different from those offered or
           agreed upon]
           [a: a definite and seasonable expression of accep-
           tance or a written confirmation which is sent within
           a reasonable time operates as an acceptance].

       In abbreviated form: WHETHER OR NOT b1,a.

       In notation: W1 b1 a

that is

           IF
           1) [b1: the expression or confirmation states terms
           additional to or different from those offered or
           agreed upon], OR
           2) [nb1: the expression or confirmation does NOT
           state terms additional to or different from those
           offered or agreed upon]
           THEN
           3) [a: a definite and seasonable expression of

acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance].

In abbreviated form: IF b1 OR nb1 THEN a.

In notation: >- $\begin{vmatrix} -\ b1\ -- \\ -\ nb1\ - \end{vmatrix}$ ---> a

where >-   indicates IF
       -->   indicates THEN
       $\begin{vmatrix} -\ \ \ - \\ \vdots \\ -\ \ \ - \end{vmatrix}$ indicates OR

B)   1. [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance], EVEN THOUGH.2
     2. [b1: it states terms additional to or different from those offered or agreed upon].

In abbreviated form: a EVEN THOUGH.2 b1.

In notation: a E2 b1

that is

1. [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance], AND
2. [b: it states terms additional to or different from those offered or agreed upon].

In abbreviated form: a AND b1.

In notation: - a
                    |
                    - b1

where   -
        | indicates AND
        -

Q2   For the "unless" that precedes sentence-c, which interpretation is most appropriate: A, B, or C?

This question asks whether UCC 2-207 asserts some result when the condition expressed by sentence-c is fulfilled:

    Alternative A--There is no result from c1.
    Alternatives B and C--there is a result from c1.

A)   [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance] ... UNLESS
     [c1: acceptance is expressly made conditional on assent to

terms additional to or different from those offered or agreed upon] ... .

In abbreviated form: a ... UNLESS c1 ... .

In notation: a ... UL c1 ...

that is

IF
1. [nc1: acceptance is NOT expressly made conditional on assent to terms additional to or different from those offered or agreed upon] ... .
THEN
2. [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance], ... AND
3. ... .

In abbreviated form: IF nc1 THEN (a ... AND ...).

In notation: >- nc1 --->   - a ...
                                       |
                                       - ...

B)   [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance] ... UNLESS. 2o
[c1: acceptance is expressly made conditional on assent to terms additional to or different from those offered or agreed upon] ... .

In abbreviated form: a ... UNLESS.2o c1 ... .

In notation: a ... UO c1 ...

that is

IF
1. [nc1: acceptance is NOT expressly made conditional on assent to terms additional to or different from those offered or agreed upon] ... .
THEN
2. [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance], ... AND
3. ... .
BUT OTHERWISE,
4. IT IS NOT SO THAT
        [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance], ...

In abbreviated form: IF nc1 THEN (a ... AND ...) BUT OTHERWISE Na ... .

In notation:

```
>- ncl --->   - a ...
         o    |
         |      - ...
         |
         '--> Na
```

that is

1.   IF
     A. [ncl: acceptance is NOT expressly made conditional
     on assent to terms additional to or different from
     those offered or agreed upon] ... .
     THEN
     B. [a: a definite and seasonable expression of
     acceptance or a written confirmation which is sent
     within a reasonable time operates as an acceptance],
     ... AND
     C. ..., AND
2.   IF
     A. [cl: acceptance is expressly made conditional on
     assent to terms additional to or different from those
     offered or agreed upon] ... .
     THEN
     B. IT IS NOT SO THAT
          [a: definite and seasonable expression of
          acceptance or a written confirmation which is
          sent within a reasonable time operates as an
          acceptance], ...

In abbreviated form: (IF ncl THEN (a ... AND ...)) AND (IF
cl THEN (Na)) ... .

In notation:

```
->- ncl --->   - a ...
|              |
|                - ...
|
- >- cl ---> Na
```

It should be noted that in Alternative C, the "UNLESS.2o"
states only that some result occurs when c is so; it does not
state what that result is. However, it is stated in the first
restatement of Alternative C what that result is; in this case,
NOT a.

C)   [a: a definite and seasonable expression of acceptance or
     a written confirmation which is sent within a reasonable
     time operates as an acceptance] ... UNLESS.2d
     [cl: acceptance is expressly made conditional on assent to
     terms additional to or different from those offered or
     agreed upon] ... .

     In abbreviated form: a ... UNLESS.2d cl ... .

     In notation: a ... UD cl ...

that is

IF
1. [ncl: acceptance is NOT expressly made conditional on
assent to terms additional to or different from those
offered or agreed upon] ... .
THEN
2. [a: a definite and seasonable expression of acceptance
or a written confirmation which is sent within a reason-
able time operates as an acceptance], ... AND
3. ...
BUT OTHERWISE,
4. IT IS NOT SO THAT
    [a:a definite and seasonable expression of acceptance
    or a written confirmation which is sent within a
    reasonable time operates as acceptance],
    AND
5. IT IS NOT SO THAT
                ... .

In abbreviated form: IF ncl THEN (a ... AND ...)
                    BUT OTHERWISE (Na AND N (...)) ... .

In notation: ->- ncl ---> - a ...
                          o |
                          | - ...
                          | - Na
                        --> |
                              - N ...

that is

    1.   IF
         A. [ncl: acceptance is NOT expressly made conditional
         on assent to terms additional to or different from
         those offered or agreed upon] ... .
         THEN
         B. [a: a definite and seasonable expression of
         acceptance or a written confirmation which is sent
         within a reasonable time operates as an acceptance],
         ... AND
         C. ..., AND
    2.   IF
         A. [cl: acceptance is expressly made conditional on
         assent to terms additional to or different from those
         offered or agreed upon] ... .
         THEN
         B. IT IS NOT SO THAT
             [a: a definite and seasonable expression of
             acceptance or a written confirmation which is
             sent within a reasonable time operates as an
             acceptance], AND
         C. IT IS NOT SO THAT
             ... .

In abbreviated form: (IF ncl THEN (a ... AND ...)) AND
                    (IF el THEN (Na AND N ...)) ... .

In notation:
```
          - >- ncl ---   - a ...
          |              |
          |               - ...
          |               - Na
          - >- cl  ---> |
                          - N ...
```

Q3   For the "unless" that is between sentence-e and sentence-f, which interpretation is most appropriate: A or B?

This question asks whether UCC 2-207 asserts some result when the condition expressed by sentence-f or sentence-g1 or sentence-h is fulfilled:

Alternative A--There is no result from f or g1 or h.
Alternative B--There is a result from f or g1 or h.

A)   [e: between merchants such terms become part of the contract]
UNLESS
[f: the offer expressly limits acceptance to the terms of the offer], OR
[g1: the additional or different terms materially alter the contract], OR
[h: notification of objection to them has already been given or is given within a reasonable time after notice of them is received]

In abbreviated form: ... e UNLESS f OR g1 OR h ... .

In notation:
```
                    ... e UL  |- f --|...
                              |
                              |- g1 -
                              |
                              |- h --|
```

that is

```
              ...
IF
1. [nf: the offer does NOT expressly limit acceptance to
the terms of the offer], AND
2. [ng1: the additional or different terms do NOT materi-
ally alter the contract], AND
3. IT IS NOT SO THAT
    [h: notification of objection to them has already
    been given or is given within a reasonable time after
    notice of them is received],
THEN
4. [e: between merchants such terms become part of the
contract]
              ... .
```

In abbreviated form: ... IF nf AND ng1 AND Nh THEN e ... .

In notation: ...>- nf - ng1 - Nh ---> e ...

B)   [e: between merchants such terms become part of the contract] UNLESS.2
[f: the offer expressly limits acceptance to the terms of the offer], OR
[gl: the additional or different terms materially alter the contract], OR
[h: notification of objection to them has already been given or is given within a reasonable time after notice of them is received]

In abbreviated form: ... e UNLESS.2 f OR gl OR h ... .

In notation: ... e U2 $\left|\begin{array}{l} - \text{ f} -- \\ - \text{ gl} - \\ - \text{ h} -- \end{array}\right|$ ...

that is

...
IF
1. [nf: the offer does NOT expressly limit acceptance to the terms of the offer], AND
2. [ngl: the additional or different terms do NOT materially alter the contract], AND
3. IT IS NOT SO THAT
      [h: notification of objection to them has already been given or is given within a reasonable time after notice of them is received],
THEN
4. [e: between merchants such terms become part of the contract],
BUT OTHERWISE, NOT
... .

In abbreviated form: ... IF nf AND ngl AND Nh THEN e
                         BUT OTHERWISE NOT ... .

In notation: ... >- nf - ngl - Nh ---> e
                                              o
                                              |
                                              --> N

            where - indicates AND (between conditions)

that is

...
1. IF
      A. [nf: the offer does NOT expressly limit acceptance to the terms of the offer], AND
      B. [ngl: the additional or different terms do NOT materially alter the contract], AND
      C. IT IS NOT SO THAT
          [h: notification of objection to them has already been given or is given within a reasonable time after notice of them is received],

```
               THEN
               D. [e: between merchants such terms become part of
               the contract], AND
          2. IF
               A) [f: the offer expressly limits acceptance to the
               terms of the offer], OR
               B) [g1: the additional or different terms materially
               alter the contract], OR
               C) [h: notification of objection to them has already
               been given or is given within a reasonable time after
               notice of them is received],
               THEN
               D) IT IS NOT SO THAT
                    [e: between merchants such terms become part of
                    the contract],
     ... .
```

In abbreviated form: (IF nf AND ng1 AND Nh THEN e) AND
                     (IF f OR g1 OR h THEN Ne) ... .

In notation: ...   - >- nf - ng1 - Nh ---> e
                            |
                            - >- |- f --| ---> Ne
                                  | |
                                  |- g1 - |
                                  | |
                                  |- h -- |

Q4   For the "although" between sentence-i and sentence-nj,
     which interpretation is most appropriate: A or B?

     Alternative A--asserting the weaker "Whether or not nj is
     true, i is true."
     Alternative B--asserting the stronger "i AND nj are both
     true."

The two alternative interpretation for this first questions can
be indicated by replacing the ambiguous "although" with the
defined structural terms "ALTHOUGH" and "ALTHOUGH.2" as
follows:

A)   [i: conduct by both parties which recognizes the existence
     of a contract is sufficient to establish a contract for
     sale]
     ALTHOUGH
     [nj: the writings of the parties do not otherwise estab-
     lish a contract]

     In abbreviated form: i ALTHOUGH nj

          In notation: a A1 nj

that is

     WHETHER OR NOT
     [j: the writings of the parties otherwise establish a
     contract],

[i: conduct by both parties which recognizes the existence of a contract is sufficient to establish a contract for sale]

In abbreviated form: WHETHER OR NOT j, i.

In notation: W1 j i

that is

IF
1) [j: the writings of the parties otherwise establish a contract], OR
2) [nj: the writings of the parties do not otherwise establish a contract]
THEN
3) [i: conduct by both parties which recognizes the existence of a contract is sufficient to establish a contract for sale]

In abbreviated form: IF j OR nj THEN i.

In notation:

$$ >- \ \left| \begin{matrix} - \ j \ -- \\ - \ nj \ - \end{matrix} \right| \ --> \ i $$

B)...
1. [i: conduct by both parties which recognizes the existence of a contract is sufficient to establish a contract for sale], ALTHOUGH.2
2. [nj: the writings of the parties do not otherwise establish a contract]
... .

In abbreviated form: i ALTHOUGH.2 nj.

In notation: i A2 nj

that is

...
1. [i: conduct by both parties which recognizes the existence of a contract is sufficient to establish a contract for sale], AND
2. [nj: the writings of the parties do not otherwise establish a contract]
... .

In abbreviated form: i AND nj.

In notation: - i
                |
                - nj

Q5' For the "in such case" that precedes sentence-k, which interpretation is most appropriate: A or B?

This question asks whether or not UCC 2-207 asserts some result

when the condition expressed by sentence-i1 is NOT fulfilled.
Why sentence-i1? Because we assume that the phrase "such case"
in the sentence "in such case K" refers to sentence-i1.[8]

Alternative A--There is no result from NOT i1.
Alternative B--There is a result from NOT i1.

A)   ... IN SUCH CASE ([i1: conduct by both parties recognizes
       the existence of a contract])
       [k: the terms of the particular contract consist of those
       terms on which the writings of the parties agree, together
       with any supplementary terms incorporated under any other
       provisions of the Act]

In abbreviated form: ... IN SUCH CASE (i1) k.

       In notation: ... IS (i1) k

that is

              ...
              IF
              1. [i1: conduct by both parties recognizes the
              existence of a contract],
              THEN
              2. [k: the terms of the particular contract consist
              of those terms on which the writings of the parties
              agree, together with any supplementary terms incor-
              porated under any other provisions of the Act.]

In abbreviated form: ... IF i1 THEN k.

In notation: ... >- i1 ---> k

B)   ... IN SUCH CASE.2 ([i1: conduct by both parties recogni-
       zes the existence of a contract])
       [k: the terms of the particular contract consist of those
       terms on which the writings of the parties agree, together
       with any supplementary terms incorporated under any other
       provisions of the Act]

In abbreviated form: ... IN SUCH CASE.2 (i1) k.

In notation: ... I2 (i1)k

that is

              ...
              IF
              1. [i1: conduct by both parties recognizes the existence
              of a contract],
              THEN
              2. [k: the terms of the particular contract consist of
              those terms on which the writings of the parties agree,
              together with any supplementary terms incorporated under
              any other provisions of the Act].
              BUT OTHERWISE, NOT.

In abbreviated form: ... IF i1 THEN k BUT OTHERWISE NOT.

In notation: ... >- i1 ---> k
                                  o
                                  |
                                   --> N

that is

...
1. IF
     A. [i1: conduct by both parties recognizes the
     existence of a contract],
     THEN
     B. [k: the terms of the particular contract consist
     of those terms on which the writings of the parties
     agree, together with any supplementary terms incor-
     porated under any other provisions of the Act], AND
2. IF
     A. [Ni1: IT IS NOT SO THAT conduct by both parties
     recognizes the existence of a contract],
     THEN
     B. [Nk: IT IS NOT SO THAT the terms of the particular
     contract consist of those terms on which the writings
     of the parties agree, together with any supplementary
     terms incorporated under any other provisions of the
     Act].

In abbreviated form: ... (IF i1 THEN k) AND (IF NOT i1
                          THEN NOT k).

In notation: ...   ->- i1   ---> k
                            |
                            ->- Ni1 ---> Nk

Questions 6 and 7 deal with the within-sentence structure
expressed by the term "which" in sentences a and i.

Q6   For the "which" that appears in sentence-a between part-
     a.1 and part-a.2, which interpretation is most appropri-
     ate: A,B, or C?

     This question asks whether UCC 2-207 asserts some result
when the condition expressed by sentence-a1 is NOT fulfilled--
and if so, what result is asserted?

     Alternative A--There is no result from NOT a1.

     Alternatives B and C--There is a result from NOT a1.

     Sentence-a is divided into three parts (a.1, a.2, and a.3)
in such a way that sentence-a1 can be formed from parts a.1 and
a.2 and sentence-a2 can be formed from an abbreviation of part
a.1 and part a.3.

     [a.1: a definite and seasonable expression of acceptance
     or a written confirmation] which

[a.2: is sent within a reasonable time] [a.3: operates as an acceptance]

[a1:a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time]

[a2: that expression or confirmation operates as an acceptance]

A)   [a.1:a definite and seasonable expression of acceptance or a written confirmation] WHICH [a.2: is sent within a reasonable time] [a.3: operates as an acceptance]...

In abbreviated form: a.1 WHICH a.2 a.3... .

In notation: a.1 WI a.2 a.3...

that is

IF
1. [a1: a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time]
THEN
2. [a2: that expression or confirmation operates as an acceptance],
AND
3.   ...
...

In abbreviated form: IF a1 THEN (a2 AND ...) ... .

In notation: >- a1 ---> - a2
                                  |
                                  - ...

B)   [a.1: a definite and seasonable expression of acceptance or a written confirmation] WHICH.2o [a.2: is sent within a reasonable time] [a.3: operates as an acceptance]...

In abbreviated form: a.1 WHICH.2o a.2 a.3 ... .

In notation: a.2 WO a.2 a.3 ...

that is

IF
1. [a1: a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time]
THEN
2. [a2: that expression or confirmation operates as an acceptance]
AND
3.   ...
BUT OTHERWISE,
4. IT IS NOT SO THAT

[a2: that expression or confirmation does operate as
an acceptance]... .

In abbreviated form: IF a1 THEN (a2 AND ...) BUT OTHERWISE
Na2 ... .

In notation: >- a1 ---> - a2
                    o |
                    | - ...
                    --> Na2

that is

1. IF
   A. [a1: a definite and seasonable expression of
   acceptance or a written confirmation is sent within a
   reasonable time]
   THEN
   B. [a2: that expression or confirmation operates as
   an acceptance], AND
   C. ...
2. IF
   A. IT IS NOT SO THAT
      [a1: a definite and seasonable expression of
      acceptance or a written confirmation is sent
      within a reasonable time]
   THEN
   B. IT IS NOT SO THAT
      [a2: that expression or confirmation does
      operate as an acceptance], ...

In abbreviated form: (IF a1 THEN (a2 AND...)) AND (IF NOT
                     a1 THEN Na2)... .

In notation: - >- a1 ---> - a2
                        | |
                        | - ...
                        - >- Na1 --> Na2

C) [a.1: a definite and seasonable expression of acceptance
    or a written confirmation] WHICH.2d [a.2: is sent within a
    reasonable time] [a.3: operates as an acceptance] ...

In abbreviated form: a.1 WHICH.2d a.2 a.3... .

In notation: a.1 WD a.2 a.3 ...

that is

IF
1. [a1: a definite and seasonable expression of acceptance
or a written confirmation is sent within a reasonable
time]
THEN
2. [a2: that expression or confirmation operates as an
acceptance]
AND
3. ...
BUT OTHERWISE, NOT.d

... .

In abbreviated form: IF a1 THEN (a2 AND...) BUT OTHERWISE
NOT... .

In notation: >- a1 --->   - a2
                         o |
                         | - ...
                         `---> N.d

that is

1. IF
   A. [a1: a definite and seasonable expression of
   acceptance or a written confirmation is sent within a
   reasonable time]
   THEN
   B. [a2: that expression or confirmation operates as
   an acceptance], AND
   C.   ...
2. IF
   A. IT IS NOT SO THAT
      [a1: a definite and seasonable expression of
      acceptance or a written confirmation is sent
      within a reasonable time]
   THEN
   B. IT IS NOT SO THAT
      [a2: that expression or confirmation operates as
      an acceptance], AND
   C. IT IS NOT SO THAT
      ...

... .

In abbreviated form: (IF a1 THEN (a2 AND ...)) AND (IF
NOT a1 THEN (NOT a2 AND NOT...)) ... .

In notation: - >- a1 --->   - a2
                   | |
                   | - ...
                   - >- Na1 -->   - Na2
                                   |
                                   - N(...)

Q7   For the "which" that appears in sentence-i between part-
     i.1 and part-i.2, which interpretation is most appropri-
     ate: A,B, or C?

     This question asks whether UCC 2-207 asserts some result
when the condition expressed by sentence-i1 is NOT fulfilled--
and if so, what result is asserted?

     Alternative A--There is no result from NOT i1.
     Alternative B--There is a result from NOT i1.

     Sentence-i is divided into three parts (i.1, i.2, and i.3)
in such a way that sentence-i1 can be formed by combining part-
i.1 with part-i.2 and sentence-i2 can be formed by combining an

abbreviation of part-i.1 with part-i.3.

[i.1: conduct by both parties] which [i.2: recognizes the existence of a contract] [i.3: is sufficient to establish a contract for sale].

[i1: conduct by both parties recognizes the existence of a contract]

[i2: that conduct is sufficient to establish a contract for sale]

A) [i.1: conduct by both parties] WHICH [i.2: recognizes the existence of a contract] [i.3: is sufficient to establish a contract for sale] ...

In abbreviated form: i.1 WHICH i.2 i.3 ... .

In notation: i.1 WI i.2 i.3 ...

that is

    IF
    1. [i1: conduct by both parties recognizes the existence of a contract]
    THEN
    2. [i2: that conduct is sufficient to establish a contract for sale], AND
    3. ...
    ... .

In abbreviated form: IF i1 THEN (i2 AND ...) ... .

In notation: >- i1 ---> | - i2
                         |
                         - ...

B) [i.1: conduct by both parties] WHICH.2 [i.2: recognizes the existence of a contract] [i.3: is sufficient to establish a contract for sale] ...

In abbreviated form: i.1 WHICH.2 i.2 i.3 ...

In notation: i.1 W2 i.2 i.3 ...

that is

    IF
    1. [i1: conduct by both parties recognizes the existence of a contract]
    THEN
    2. [i2: that conduct is sufficient to establish a contract for sale]
    BUT OTHERWISE, NOT
    ... .

In abbreviated form: IF i1 THEN i2 BUT OTHERWISE NOT ... .

In notation: >- i1 ---> i2
                                  o
                                  |
                                  --> N

that is

1. IF
    A. [i1: conduct by both parties recognizes the
    existence of a contract]
    THEN
    B. [i2: that conduct is sufficient to establish a
    contract for sale], AND
2. IF
    A. IT IS NOT SO THAT
        [i1: conduct by both parties recognizes the
        existence of a contract]
    THEN
    B. [ni2: that conduct is NOT sufficient to establish
    a contract for sale]
... .

In abbreviated form: (IF i1 THEN i2) AND (IF NOT i1 THEN
                     ni2)... .

In notation: - >- i1   --->   i2
                             |
                              - >- Nil -->   ni2

The eighth and final question deals with how sentence-c is
intended to be related to the other sentences of UCC 2-207--in
effect, where the parentheses should be placed to indicate the
intended relationships.

Q8   To indicate how "unless c" is related to the rest of the
     sentences in UCC 2-207, which interpretation is most
     appropriate: A or B or C?

     A) unless c (a...b and d...h and i...k)
     B) (unless c (a...b and d...h)) and i...k
     C) (unless c a...b) and d...h and i...k

In other words, how is the condition expressed by sentence-c,
namely that acceptance is made conditional, logically related
to the rest of the sentences in the section?

     Alternative A--by the term "unless" to sentences a through
     k.
     Alternative B--by the term "unless" to sentences a through
     h.
     Alternative C--by the term "unless" to sentences a and b.

     Is the content of sentences d...h and sentences i...k so
related to the content of sentences a...c that Alternative A is
the most appropriate interpretation?
     Or is only the content of d...h so related to the content
of a...c, and the content of i...k so independent of the

content of a...c that Alternative B is the most appropriate interpretation?

Or is the content of both d...h and i...k so independent of the content of a...c, as indicated by the subsectioning into (1), (2) and (3), that Alternative C is the most appropriate interpretation?

It may be helpful to consider the structure of each of the three groups of sentences in the three interpretations and then the contents of each of the sentences in deciding which interpretation is most appropriate. First, consider the structure of each of the three groups of sentences.

A) unless c,
    1. a even though b, and
    2. A. d, and
       B. e unless
          1) f, or
          2) g, or
          3) h, and
    3. A. i although nj, and
       B. in such case, k.

B) 1. unless c,
    A. a even though b, and
    B. 1. d, and
       2. e unless
         A) f, or
         B) g, or
         C) h and
    2. A. i although nj, and
       B. in such case, k.

C) 1. unless c, a even though b, and
    2. A. d, and
       B. e unless
          1) f, or
          2) g, or
          3) h, and
    3. A. i although nj, and
       B. in such case, k.

The selecting of the most appropriate interpretation for this question probably cannot be adequately done by considering structure alone. The contents of each of the constituent sentences must be considered.

A) unless
    [c: acceptance is expressly made conditional on assent to the additional or different terms],
    1.   [a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance]
         even though
       [b: it states terms additional to or different from those offered or agreed upon], and
    2.A. [d: the additional terms are to be construed as proposals for addition to the contract], and
      B. [e: between merchants such terms become part of the

contract]
  unless
    1) [f: the offer expressly limits acceptance to
    the terms of the offer], or
    2) [g: they materially alter it], or
    3) [h: notification of objection to them has
    already been given or is given within a reason-
    able time after notice of them is received], and
3.A. [i: conduct by both parties which recognizes the
existence of a contract is sufficient to establish a
contract for sale] although
    [nj: the writings of the parties do not other-
    wise establish a contract], and
  B. in such case, [k: the terms of the particular
contract consist of those terms on which the writings
of the parties agree, together with any supplementary
terms incorporated under any other provisions of the
Act].

B)1. unless
[c: acceptance is expressly made conditional on
assent to the additional or different terms],
A. [a: a definite and seasonable expression of
acceptance or a written confirmation which is sent
within a reasonable time operates as an acceptance]
even though
  [b: it states terms additional to or different
from those offered or agreed upon], and
B.1. [d: the additional terms are to be construed as
proposals for addition to the contract], and
  2. [e: between merchants such terms become part of
the contract]
  unless
    A) [f: the offer expressly limits acceptance to
    the terms of the offer], or
    B) [g: they materially alter it], or
    C) [h: notification of objection to them has
    already been given or is given within a reason-
    able time after notice of them is received], and
  2. A. [i: conduct by both parties which recognizes the
existence of a contract is sufficient to establish a
contract for sale]
although
  [nj: the writings of the parties do not otherwise
establish a contract], and
B. in such case, [k: the terms of the particular
contract consist of those terms on which the writings
of the parties agree, together with any supplementary
terms incorporated under any other provisions of the
Act].

C)1. unless
[c: acceptance is expressly made conditional on
assent to the additional or different terms],
[a: a definite and seasonable expression of accep-
tance or a written confirmation which is sent within
a reasonable time operates as an acceptance]

even though
[b: it states terms additional to or different from
those offered or agreed upon], and

2. A. [d: the additional terms are to be construed as
proposals for addition to the contract], and
   B. [e: between merchants such terms become part of
the contract]
      unless
      1) [f: the offer expressly limits acceptance to
      the terms of the offer], or
      2) [g: they materially alter it], or
      3) [h: notification of objection to them has
      already been given or is given within a reason-
      able time after notice of them is received], and

3. A. [i: conduct by both parties which recognizes the
existence of a contract is sufficient to establish a
contract for sale]
   although
      [nj: the writings of the parties do not other-
      wise establish a contract], and
   B. in such case, [k: the terms of the particular
contract consist of those terms on which the writings
of the parties agree, together with any supplementary
terms incorporated under any other provisions of the
Act].

Formulating Direct Questions with Computer Assistance

How much of this process of formulating direct questions
about the structure of the rule being normalized can be done
automatically by a computer program? The answer to this
question with respect to interpretation questions like Q1
through Q7 may differ from the answer with respect to relation-
ship questions like Q8. Even if there were a way of formulating
such interpretation questions entirely algorithmically, such
automatic generation would need to be audited by a knowledge-
able human to make judgments about which of the questions have
answers that are so obvious that it is redundant to ask the
question. At present, with respect to legal rules as compli-
cated as UCC 2-207 even the formulation of the interpretation
questions requires human judgment to supplement what can be
done automatically in generating such questions. One such
program (called GENERATE) for semi-automatic generation of
direct interpretation questions first detects the terms to be
interpreted. With the program there is stored a list of
possible interpretations of various structural terms that
GENERATE uses to formulate a question about each specific
occurrence. Then human aid is required to take into account the
semantic content of the constituent sentences in order to
specify which results are related to which conditions by the
Present Version of the rule. Some of the alternatives generated
from the related conditions and results will clearly be so
remote and unlikely as possibilities that it is inappropriate
to include them as part of the question. At present, and
perhaps for the foreseeable future, the criteria for making
such choices is such that human judgment will continue to be
required in doing such pruning.

Consider the occurrence of the term "unless" that precedes sentence-c; what relationship does it express between sentence-c and the other sentences and sentence-parts of UCC 2-207? There are at least ten different possible interpretations of "unless" that the GENERATE program will produce initially, and the human auditor must continuously be asking the additional question: Does this particular occurrence of the term being considered express an interpretation that is not yet on the existing list of alternatives. Those on the list at present are (expressed in defined between-sentence structural terms): UNLESS, UNLESS.2, UNLESS.2o,UNLESS.2d, UNLESS.2+, UNLESS.2d+, UNLESS.2-, UNLESS.2d-, UNLESS.2+-, and UNLESS.2d+-. Only the first four interpretations are appropriate possibilities, because the others involve placement of the term "NOT" in those other interpretations with respect to prescriptive terms (such as "shall," "may," and their equivalents) in the result-sentences related to the "unless," but the relevant result-sentences in this instance do not contain any such prescriptive terms. Human judgment is required in determining which are the relevant result-sentences and whether they contain such prescriptive terms. The second interpretation would be excluded on different grounds; it is such an unlikely possibility that it probably should not be included—another determination that requires human judgment.

To see how human judgment is inextricably intertwined with the help provided by the computer program, it is useful to examine the ten possible interpretations of "unless" in some detail. In general, statements involving between-sentence occurrences of "unless" are either of the form:

result(s) unless condition(s)   [i.e., r unless c]

or of the form:

unless condition(s), result(s)   [i.e., unless c, r]

The first "unless" in UCC 2-207 is of the form:

r unless c

The first interpretation is the only one that expresses a single conditional; each of the other nine expresses a different biconditional. The single-conditional interpretation is:

r UNLESS c.

Expressed in basic normalized form, it is:

IF NOT c THEN r.

Expressed by an arrow diagram, it is:

>- Nc ---> r

The second interpretation is the biconditional that the logicians call "material equivalence"; frequently it is expressed by the phrase "if and only if." This equivalence

interpretation is:

>   r UNLESS.2 c.

Expressed in basic normalized form it is:

>   (IF NOT c THEN r) AND (IF c THEN NOT r).

Its arrow diagram:

```
      - >- Nc ---->  r
      |
      - >- c   ----> Nr
```

When there are two results, this second interpretation of "unless" is:

>   (r1 AND r2) UNLESS.2 c.

In basic normalized form:

(IF c THEN (r1 AND r2)) AND (IF NOT c THEN (NOT r1 OR NOT r2)).

which is equivalent to:

(IF c THEN (r1 AND r2)) AND (IF NOT c THEN NOT (r1 AND r2)).

Its arrow diagram:

```
      - >- Nc --->   - r1
      |              |
      |              - r2
      |            |- Nr1 -|
      - >- c --->  |       |
                   |- Nr2 -|
```

which is equivalent to:

```
      - >- Nc --->   - r1
      |              |
      |              - r2
      |            N - r1
      - >- c --->   |
                     - r2
```

The third interpretation is a biconditional whose second conditional has a consequent that is something different than the negation of the consequent of the first conditional (as was the case with respect to the equivalence interpretation). In the third interpretation this consequent of the second conditional can be any result whatever. The equivalence interpretation of "unless" (the second interpretation) can be regarded as a special case of the third interpretation where the consequent of the second conditional just happens to be the negation of the consequent of the first conditional. The other seven interpretations (four through ten) can also be regarded as special cases of this third interpretation where the consequent of the second conditional happens to be related to the conse-

quent of the first conditional in some specific way. This third
interpretation is:

    r[r2] UNLESS.2o c.

where the bracketed expression indicates the consequent of the
second conditional. Expressed in basic normalized form it is:

    (IF NOT c THEN r) AND (IF c THEN r2).

Its arrow diagram:

    - >- Nc ---> r
    |
    - >- c ---> r2

Notice that "r [Nr] UNLESS.2o c" and "r UNLESS.2 c" express
equivalent propositions. They are expressed exactly the same
way in basic normalized form and have the same arrow diagrams
in that form.
    Their basic normalized form is:

    (IF NOT c THEN r) AND (IF c THEN NOT r).

Their arrow diagram is:

    - >- Nc ---> r
    |
    - >- c ---> Nr

    The fourth interpretation is a biconditional that is
stronger than the second interpretation when the candidate
being interpreted involves multiple results, but equivalent to
the second interpretation when only single results are involv-
ed. This fourth interpretation is:

    r UNLESS.2d c.

Thus, "r UNLESS.2c," "r[Nr] UNLESS.2o c," and "r UNLESS.2d c"
express equivalent propositions.
    Expressed in basic normalized form this fourth interpreta-
tion is:

    (IF NOT c THEN r) AND (IF c THEN NOT r).

Its arrow diagram:

    - >- Nc ---> r
    |
    - >- c ---> Nr

It is when two or more results are involved that this fourth
interpretation of "unless" begins to have some distinctive
characteristics. This forth interpretation seems to be much
more common in legal rules with multiple results than is the
second interpretation. In fact, the occurrences of "unless" in
rules with multiple results are virtually always most appropri-

ately interpreted as being interpretation four, rather than
being interpretation two. Similarly, with respect to multiple-
result rules, interpretations six, eight, and ten are almost
universally more appropriate interpretations for "unless" than
interpretations five, seven, or nine. With two results,
interpretation four is:

    (r1 AND r2) UNLESS.2d c.

In basic normalized form:

(IF NOT c THEN (r1 AND r2)) AND (IF c THEN (NOT r1 AND NOT r2))

Its arrow diagram:

```
    - >- Nc --->  - r1
    |             |
    |              - r2
    |             - Nr1
     - >- c --->  |
                  - Nr2
```

     The fifth interpretation is a biconditional that can occur
only when at least one of the results contains the term "shall"
or some equivalent term. Where the "shall" is being interpreted
as expressing an obligation, that part of the result that is
expressing the obligation ("x shall y") is being interpreted as
expressing IT IS OBLIGATORY THAT x DO y" (represented by "Or").
This fifth interpretation is:

    Or UNLESS.2 + c.

that is:

    x shall y UNLESS.2 + c.

Expressed in basic normalized form it is:

    (IF NOT c THEN x shall y) AND (IF c THEN x shall NOT y).

Its arrow diagram:

```
    - >- Nc ---> Or
    |
     - >- c ---> ONr
```

When there are two or more results and at least one of them
contains a "shall," this fifth interpretation of "unless" is"

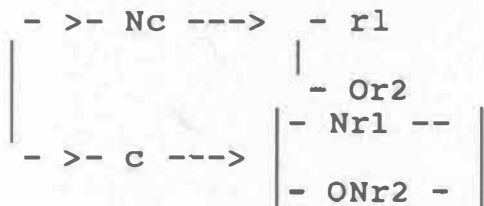   (r1 AND Or2) UNLESS.2 + c.

that is:

    (r1 AND x shall y) UNLESS.2 + c.

In basic normalized form:

    (IF NOT c THEN (r1 AND x shall y)) AND

(IF c THEN (NOT rl OR x shall NOT y)).

Its arrow diagram:

```
- >- Nc --->  - rl
|                |
|                 - Or2
|              |- Nrl --    |
 - >- c --->  |             |
              |- ONr2 -    |
```

The sixth interpretation is a biconditional that can occur only when there are two or more results and at least one of them contains the term "shall" or some equivalent term. This sixth interpretation is:
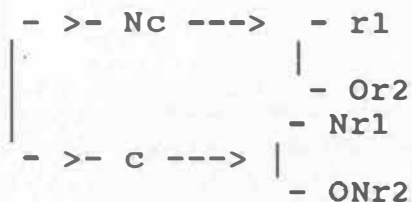
(rl AND Or2) UNLESS.2d + c.

that is:

(rl AND x shall y) UNLESS.2d + c.

In basic normalized form:

(IF NOT c THEN (rl AND x shall y)) AND
(IF c THEN (NOT rl AND x shall NOT y)).

Its arrow diagram:

```
- >- Nc --->  - rl
|                |
|                 - Or2
|               - Nrl
 - >- c --->  |
              - ONr2
```

Thus, "UNLESS.2d +" operates the way that a combination of "UNLESS.2 +" and "UNLESS.2d" operate; the negation is distributed over the obligation (as occurs with "UNLESS.2 + ") and the negation is distributed over the conjunction (as occurs with "UNLESS.2d").

The seventh interpretation is a biconditional that can occur only when at least one of the results contains the term "may" or some equivalent term. Where the "may" is being interpreted as expressing a permission, that part of the result that is expressing the permission ("x may y") is being interpreted as expressing "IT IS PERMITTED THAT x DO y" (represented by "Pr"). This seventh interpretation is:

Pr UNLESS.2- c.

that is:

x may y UNLESS.2- c.

Expressed in basic normalized form it is:

(IF NOT c THEN x may y) AND (IF c THEN x NEED NOT y).[9]

Its arrow diagram:

```
- >- Nc ---> Pr
|
 - >- c ---> PNr
```

When there are two or more results and at least one of them contains a "may," this seventh interpretation of "unless" is

(rl AND Pr2) UNLESS.2- c.

that is:

(rl AND x may y) UNLESS.2- c.

In basic normalized form:

(IF NOT c THEN (rl AND x may y)) AND
(IF c THEN (NOT rl OR x NEED NOT y)).

Its arrow diagram:

```
- >- Nc --->  - rl
|                 |
|                  - Pr2
|             |- Nrl --|
 - >- c --->  |
              |- PNr2 -|
```

The eighth interpretation is a biconditional that can occur only when there are two or more results and at least one of them contains the term "may" or some equivalent term. This eighth interpretation is:

(rl AND Pr2) UNLESS.2d- c.

that is:

(rl AND x may y) UNLESS.2d- c.

In basic normalized form:

(IF NOT c THEN (rl AND x may y)) AND
(IF c THEN (NOT rl AND x NEED NOT y)).

Its arrow diagram:

```
- >- Nc --->  - rl
|                 |
|                  - Pr2
|             - Nrl
 - >- c --->  |
                - PNr2
```

Thus, "UNLESS.2d-" operates the way that a combination of "UNLESS.2-" and "UNLESS.2d" operate; the negation is distribut-

ed over the permission (as occurs with "UNLESS.2-") and the negation is distributed over the conjunction (as occurs with "UNLESS.2d").

The ninth interpretation is also a biconditional that can occur only when there are two or more results and at least one of them contains the term "may" or some equivalent term and at least one of them contains the term "shall" or some equivalent term. Where the "may" and "shall" appear in results that are being represented by "Pr" and "Or," this ninth interpretation is:
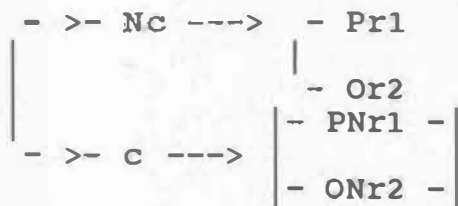
Pr1 AND Or2 UNLESS.2+- c.

that is:

(x may y AND w shall z) Unless.2+- c.

Expressed in basic normalized form it is:

(IF NOT c THEN (x may y AND w shall z)) AND
(IF c THEN (x NEED NOT y OR w shall NOT z)).

Its arrow diagram:

```
- >- Nc ---->   - Pr1
|                 |
|                 - Or2
|               |- PNr1 -|
  - >- c --->   |        |
                |- ONr2 -|
```

The tenth interpretation is a biconditional that can occur only when there are two or more results and at least one of them contains the term "may" or some equivalent term and at least one of them contains the term "shall" or some equivalent term. Where the "may" and "shall" appear in results that are being represented by "Pr" and "Or," this tenth interpretation is:
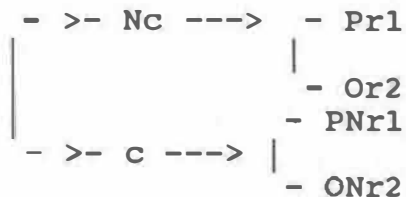
Pr1 AND Or2 UNLESS.2d+- c.

that is:

(x may y AND w shall z) UNLESS.2d+- c.

Expressed in basic normalized form it is:

(IF NOT c THEN (x may y AND w shall z)) AND
(IF c THEN (x NEED NOT y AND w shall NOT z)).

Its arrow diagram:

```
    - >- Nc --->   - Pr1
   |                |
   |                 - Or2
   |                - PNr1
    - >- c --->  |
                  - ONr2
```

The basic normalized forms and arrow diagrams of the ninth interpretation (UNLESS.2+-) and the tenth interpretation (UNLESS.2d+-) of the rule:

(x may y and w shall z) unless c.

have been presented above. By way of summary of the ten interpretations of "unless," it is useful to compare this pair with the different basic normalizations and arrow diagrams of the eight other interpretations of this same rule.
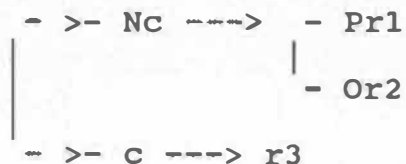
```
(x may y AND w shall z)
UNLESS c.

IF NOT c THEN (x may y
AND w shall z).

>- Nc --->   - Pr1
             |
              - Or2

(x may y AND w shall z)
[r3] UNLESS.2o c.

(IF NOT c THEN (x may y AND w
shall z)) AND (IF c then r3).

  - >- Nc --->   - Pr1
 |                |
 |                 - Or2
 |
  - >- c ---> r3
```

(x may y AND w shall z)   (x may y AND w shall z)
UNLESS.2 c.   UNLESS.2d c.

(IF NOT c THEN (x may y AND w   (IF NOT c THEN (x may y AND w
shall z)) AND (IF c THEN (x   shall z)) AND (IF c THEN (x
shall NOT y OR w NEED NOT z)).   shall NOT y AND w NEED NOT z)).

```
    - >- Nc --->   - Pr1              - >- Nc --->   - Pr1
   |                |                 |                |
   |                 - Or2            |                 - Or2
   |                |- ONr1 -|        |                - ONr1
    - >- c --->     |        |         - >- c --->  |
                    |- PNr2 -|                        - PNr2
```
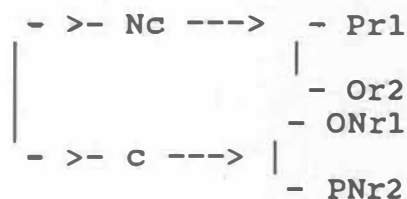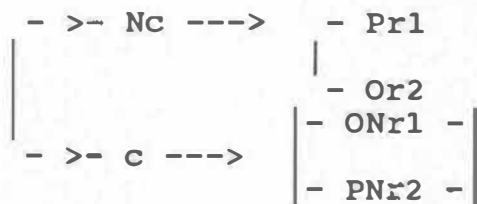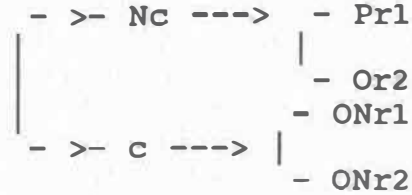
(x may y AND w shall z)
UNLESS.2+ c.

(IF NOT c THEN (x may y AND w
shall z)) AND (IF c THEN (x
shall NOT y OR w shall NOT z)).

```
    - >- Nc --->    - Pr1
    |               |
    |               - Or2
    |              |- ONr1 -|
    - >- c --->    |        |
                   |- ONr2 -|
```

(x may y AND w shall z)
UNLESS.2d+ c.

(IF NOT c THEN (x may y AND w
shall z)) AND (IF c THEN (x
shall NOT y AND w shall NOT z))
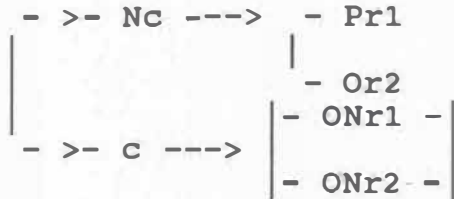
```
    - >- Nc --->    - Pr1
    |               |
    |               - Or2
    |               - ONr1
    - >- c --->    |
                    - ONr2
```
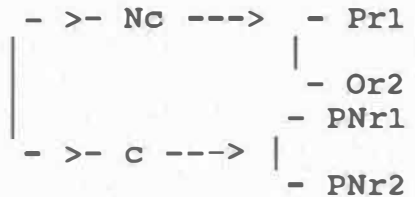
(x may y AND w shall z)
UNLESS.2- c.

(IF NOT c THEN (x may y AND w
shall z)) AND (IF c THEN x
NEED NOT y OR w NEED NOT z)).

```
    - >- Nc --->    - Pr1
    |               |
    |               - Or2
    |              |- PNr1 -|
    - >- c --->    |        |
                   |- PNr2 -|
```

(x may y AND w shall z)
UNLESS.2d- c.

(IF NOT c THEN (x may y AND w
shall z)) AND (IF c THEN (x
NEED NOT y AND w NEED NOT z)).
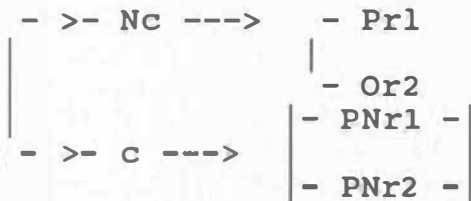
```
    - >- Nc --->    - Pr1
    |               |
    |               - Or2
    |               - PNr1
    - >- c --->    |
                    - PNr2
```
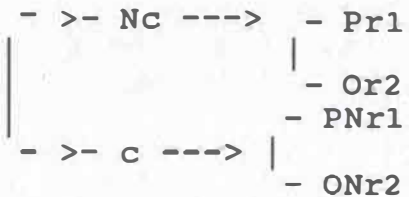
(x may y AND w shall z)
UNLESS.2+ - c.

(IF NOT c THEN (x may y AND w
shall z)) AND (IF c THEN (x
NEED NOT y OR w SHALL NOT z)).

```
    - >- Nc --->    - Pr1
    |               |
    |               - Or2
    |              |- PNr1 -|
    - >- c --->    |        |
                   |- ONr2 -|
```
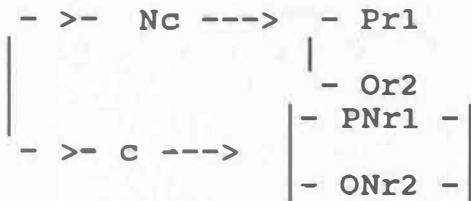
(x may y AND w shall z)
UNLESS.2d+ - c.

(IF NOT c THEN (x may y AND w
shall z)) AND (IF c THEN (x
NEED NOT y AND w SHALL NOT z)).

```
    - >- Nc --->    - Pr1
    |               |
    |               - Or2
    |               - PNr1
    - >- c --->    |
                    - ONr2
```

Choices That Require Human Judgment

In determining which of these ten interpretations are
appropriately included as alternatives in a question about
interpreting the "unless" that precedes sentence-c in UCC 2-
207, the judgement of a human analyst is required for five
things: (1) to ascertain which results are related to sentence-
c so that the program can formulate alternatives with those
results, (2) to ascertain whether any of those results contain
the term "may" or some equivalent of it (such as "is allowed
to," "is permitted to," or "is licensed to") so that if they
all do not, the program can exclude alternative interpretations
that involve "may," (3) to ascertain whether any of those
results contain the term "shall" or some equivalent of it (such

as "needs to," "must," "has a duty to," "it is obligatory that," "it is imperative that," "has a responsibility to," "is charged to," "is required to," "it is essential that," or "has a commitment to") so that if they all do not, the program can exclude alternative interpretations that involve "shall," (4) to ascertain whether any of the remaining alternatives are so improbable that they should be excluded from possible interpretations in the question formulated, and (5) to ascertain whether the present occurrence of "unless" is appropriately interpreted in some way other than the alternative interpretations that are on the present list.

In ascertaining which results of UCC 2-207 are related to sentence-c the human analyst will want to take into account not only the expressed structure of the Present Version but also the content of sentence-c and the various results. The present structure:

(1) a even though b, unless c.
(2) d. e unless:
    (a) f;
    (b) g; or
    (c) h.
(3) i although nj. in such case k.

indicates clearly that result-a that occurs in the same subsection and the same sentence as condition-c is clearly related to it by the structural term "unless." The fact that the other results (d, e, i, and k) appear in other sentences and even in other subsections points in the direction of their not being related to condition-c. However, examination of the content of these sentences:

[a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance]

[b: it states terms additional to or different from those offered or agreed upon]

[c: acceptance is expressly made conditional on assent to the additional or different terms]

[d: the additional terms are to be construed as proposals for addition to the contract]

[e: between merchants such terms become part of the contract]

[i: conduct by both parties which recognizes the existence of a contract is sufficient to establish a contract for sale]

[k: the terms of the particular contract consist of those terms on which the writings of the parties agree, together with any supplementary terms incorporated under any other provisions of the Act]

makes it clear that the "additional terms" of result-d and the

"such terms" of result-e refer to the "additional or different terms" of condition-c, and so these two results are related to it even though they appear in a separate subsection of UCC 2-207. But there is no such relationship in the content of result-i or result-k that links either of them to the content of condition-c. The "those terms on which the writings of the parties agree" of result-k clearly are not necessarily the same terms as those referred to in condition-c, because the terms in condition-c may well be ones that are in an expression of acceptance that is, in fact, not in writing. Thus, results d and e are related to condition-c, and results i and k are not by a judgment of such subtlety that it is difficult to imagine that it would be done adequately algorithmically. Human perception, bringing to bear the influencing power of the full context, seems likely to remain essential for making such choices satisfactorily.

None of the results a, d, and e that are related to condition-c contain occurrences of "shall" or "may" or their equivalents, but it requires a close human reading of these three results to determine the absence of any language that may represent such equivalents. Should the ". . . operates as an acceptance" language of result-a be as "IT IS OBLIGATORY THAT . . . operate as an acceptance" and thus implicitly contain a "shall" equivalent? Should the "the additional terms are to be construed as . . ." language of result-d be read as "IT IS OBLIGATORY THAT the additional terms be construed as . . ." and thus also implicitly contain a "shall" equivalent? And similarly, should the ". . . such terms become part of the contract" language of result-e be read as "IT IS OBLIGATORY THAT . . . such terms become part of the contract" and treated as containing a "shall" equivalent? A human can recognize that the crucial case is when negation is related to the language of these results and their possible readings, and further that it is not going to make any difference whether they are read as implicitly containing a "shall" equivalent. The following pairs of statements in the context of UCC 2-207 have the same legal effect; so it does not matter whether or not these results are interpreted as implicitly containing "shall" equivalents:

... does NOT operate as an acceptance
IT IS OBLIGATORY THAT ... does NOT operate as an acceptance

... the additional terms are NOT to be construed as ...
IT IS OBLIGATORY THAT ... the additional terms NOT be construed as ...

... such terms do NOT become part of the contract
IT IS OBLIGATORY THAT ... such terms do NOT become part of the contract

Treating results a, d, and e as not containing any "may"s or "shall"s or their equivalents greatly reduces the number of alternative interpretations that need to be considered in formulating the question about the structural interpretation of the "unless" that precedes sentence-c. The last six alternative interpretations are eliminated, and only the first four remain.

When these remaining four are examined to ascertain
whether any of them are so improbable that they should be
excluded from the possible interpretations in the question
formulated, the third alternative sticks out as a likely
candidate. In basic normalized form, it is expressed as
follows:

1. IF
   A. [ncl: acceptance is NOT expressly made conditional on
   assent to terms additional to or different from those
   offered or agreed upon] ... .
   THEN
   B. [a: a definite and seasonable expression of acceptance
   or a written confirmation which is sent within a reason-
   able time operates as an acceptance],... AND
   C. ..., AND
2. IF
   A) [cl: acceptance is expressly made conditional on assent
   to terms additional to or different from those offered or
   agreed upon] ... .
   THEN
   B) IT IS NOT SO THAT
      [a: a definite and seasonable expression of accep-
      tance or a written confirmation which is sent within
      a reasonable time operates as an acceptance], OR
   C) IT IS NOT SO THAT
      ... .

In abbreviated form: (IF ncl THEN (a ... AND ...)) AND (IF cl
THEN (Na OR ...)) ... .

In notation: - >- ncl --->   - a ...
                 | |
                 | - ...
                 | |- Na ----|
                 - >- cl ---> |- N ... -|

Thus, this third interpretation of the "unless" says that when
condition-cl is fulfilled, either result-Na or the negation of
some other result occurs (where the "or" is being used in the
inclusive disjunction sense that at least one of the two
occurs, but it is not specified just which). Whether such an
indefinite result is so improbable that the alternative should
be excluded is so difficult to specify algorithmic criteria for
that this also is likely to remain a choice that needs to be
made by a human analyst. In this case, we have judged alterna-
tive three to be so improbable that it deserves exclusion.

   Finally, the human analyst must take responsibility for
deciding that there are no additional alternative interpreta-
tions for the term(s) being interpreted that should be added to
the present list of alternative interpretations for those
term(s). In this case, we did not think of any others.

   Thus, of the ten interpretations of the "unless" that
precedes sentence-c that were generated automatically by the
GENERATE program, seven were eliminated by human judgment. The
three that remained were the first, third, and fourth alterna-
tives, which appeared as alternative interpretations A, B, and

C of Question 2.

It is difficult to say just how representative this one example is of semiautomatically formulating a question about the logical structure expressed by a between-sentence logical term. It is probably on the low side with respect to the number of alternative interpretations that will be already on the list that the GENERATE program uses to produce the initial set. There may well be a great deal of variation in the extent to which the initial list will be pared down to a more manageable number by the judgments made by the human analyst. The two things most clear are (1) that for purposes of doing anything that even approaches a comprehensive analysis in formulating such questions, the contribution of the GENERATE program, even in its present limited form, will facilitate users cumulating past experience to an extent that is otherwise unlikely, and (2) that human judgment is essential now in formulating such questions and is likely to remain so in the future.

INDIRECT QUESTIONS ABOUT STRUCTURE BY HYPOTHETICALS (UCC 2-207)

One of the purposes of normalizing a legal rule is to capture the opinion of various subject matter experts about which interpretation of the logical structure of it is the most appropriate one. The questions about the logical structure are the means of doing that. There is some limited experience to suggest that direct questions about structure like those discussed in the previous section may not be the best way to communicate with some legal experts to elicit their opinions. An alternative type of question may be more effective--one that seeks the same information indirectly by means of responses about the effect of the rules in hypothetical situations.

A set of indirect questions has been constructed for UCC 2-207 that seeks to elicit the same information about the logical structure of this section that the direct questions do. Unhappily, the formulation of these indirect questions also requires considerable human judgment; in fact, none of the process of producing the hypothetical situations involved in the question is, at present, algorithmic. There are three steps involved in the process: (1) specifying the weakest normalized version of each subsection (or other manageable subunit) of the rule being normalized, (2) synthesizing the normalized subsections to form the weakest normalized version of the entire section by determining whether any of the conditions not explicitly specified to be required (including those of other subsections) are implicitly meant to be required in order to reach any of the results, and (3) formulating hypothetical situations hypothetical situations and questions about those situations that will test for all discernible stronger interpretations that are reasonably possible for various parts of that weakest normalized version. Whatever an analyst has learned from previously formulating the direct questions for UCC 2-207 will be helpful in pointing to such situations and questions.

To illustrate this process for formulating indirect questions, we start by specifying the weakest normalized version of subsections (1), (2) and (3) of UCC 2-207. The

between-sentence structure of subsection (1) is:

a even though b, unless c.

The order of sentence-a and the clause "even though b" can be switched without any change in meaning, and the structure becomes:

(even though b, a) unless c.

With the within-sentence structure of sentence-a involving the term "which" transformed into between-sentence structure and sentences b and c slightly modified, the structure becomes:

(even though b1, if a1 then a2) unless c1.

where the abbreviations for each of the sentences in subsection (1) are:

[a: a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance]

[a1: a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time]

[a2: that expression or confirmation operates as an acceptance]

[b1: the expression or confirmation states terms additional to or different from those offered or agreed upon]

[c1: acceptance is expressly made conditional on assent to terms additional to or different from those offered or agreed upon]

[nc1:acceptance is NOT expressly made conditional on assent to terms additional to or different from those offered or agreed upon]

Without any change in meaning, this structure can be modified to become:

unless c1, even though b1, if a1 then a2.

From our experience in formulating the direct questions of UCC 2-207 we know that the weakest interpretation of this is:

IF NOT c1 THEN IF b1 OR NOT b1 THEN IF a1 THEN a2.

i.e., >- nc1 ---> >- $\begin{vmatrix} - \text{b1} -- \\ - \text{Nb1} - \end{vmatrix}$ --> >- a1 ---> a2

The between-sentence structure of subsection (2) of UCC 2-207 is:

d. e unless (f or g or h).

Without any change in meaning and with slight changes in the wording of sentence g, this can be modified to become:

    d and (unless (f or g1 or h), e).

where the abbreviations for each of the sentences in subsection (2) are:

    [d: the additional terms are to be construed as proposals for addition to the contract]

    [e: between merchants such terms become part of the contract]

    [f: the offer expressly limits acceptance to the terms of the offer]

    [g1: the additional or different terms materially alter the contract]

    [h:notification of objection to them has already been given or is given within a reasonable time after notice of them is received]

    From our experience in formulating the direct questions for UCC 2-207 we know that the weakest interpretation of this is:

    d AND (IF nf AND ng1 AND Nh THEN e).

i.e.,
```
                        - d
                        |
                        - >- nf - ng1 - Nh ---> e
```

The between-sentence structure of subsection (3) of UCC 2-207 is:

    i although nj. In such case k.

The order of sentence-i and the clause "although nj" can be switched without any change in meaning, and the structure becomes:

    although nj, i. In such case k.

The within-sentence structure of sentence-i involving the term "which" can be transformed into between-sentence structure between sentences i1 and i2, and the structure becomes:

    although nj, if i1 then i2. In such case, k.

The between-sentence structural term "in such case" can be transformed into its if-then form along with clarifying that its "such case" part refers to sentence-i, and the structure becomes:

(although nj, if i1 then i2) and (if i1 then k).

where the abbreviations for each of the sentences in subsection (3) are:

[i1: conduct by both parties recognizes the existence of a contract]

[i2: that conduct is sufficient to establish a contract for sale]

[nj: the writings of the parties do NOT otherwise establish a contract]

[k: the terms of the particular contract consist of those terms on which the writings of the parties agree, together with any supplementary terms incorporated under any other provisions of the Act].

From our experience in formulating the direct questions for UCC 2-207 we know that the weakest interpretation of this is:

(IF j OR NOT j THEN IF i1 THEN i2) AND (IF i1 THEN k).

i.e.,

```
                     |- j --|
         - >-        |      |  ---> >- i1 ---> i2
         |           |- nj -|
         |
         - >-i1 ---> k
```

This completes the first step of specifying the weakest normalized version of each of the subsections of UCC 2-207.

The second step is to determine whether any of the conditions not explicitly specified to be required (including those of other subsections) are nevertheless implicitly meant to be required in order to reach any of the results, and by doing so, to permit the synthesis of the normalized subsections to form the weakest normalized version of the section as a whole. This is done by formulating and answering questions about the relationships between such conditions and such results. To determine whether there are any such required conditions, the content of each constituent sentence that expresses a result must be compared with the content of each constituent sentence that expresses a condition to see whether there are any contents so related that any of those conditions could be required for any of those results. If there is sufficient relationship between the contents of a condition and a result, then an indirect question involving a hypothetical situation must be formulated and answered to determine whether that condition is required for that result. When this is done for the results and conditions of UCC 2-207, it is only the contents of results d and e of subsection (2), the conditions a1, b, and nc1 of subsection (1), and result-k and condition-nj of subsection (3) that appear to be sufficiently related to raise a question about whether any of these conditions are required for any of these results. The hypothetical situations and questions formulated to determine whether any of these conditions are required for any of these results are:

HYPOTHETICAL 1

Assume that:

    d   the additional terms are to be construed as proposals
        for addition to the contract

Q1A Which one of the following answers is most appropriate in
     HYPOTHETICAL 1 by your interpretation of section UCC 2-
     207? (Circle one.)

    a1   a definite and seasonable expression of acceptance or
        a written confirmation is sent within a reasonable
        time

    ?   section 2-207 does NOT in this situation lead to any
        conclusion about whether or not a definite and
        seasonable expression of acceptance or a written
        confirmation is sent within a reasonable time

Q1B Which one of the following answers is most appropriate in
     HYPOTHETICAL 1 by your interpretation of section UCC 2-
     207? (Circle one.)

    b1   the expression or confirmation states terms addition-
        al to or different from those offered or agreed upon

    ?   section 2-207 does NOT in this situation lead to any
        conclusion about whether or not the expression or
        confirmation states terms additional to or different
        from those offered or agreed upon

Q1C Which one of the following answers is most appropriate in
     HYPOTHETICAL 1 by your interpretation of section UCC 2-
     207? (Circle one.)

    c1   acceptance is expressly made conditional on assent to
        terms additional to or different from those offered
        or agreed upon

    ?   section 2-207 does NOT in this situation lead to any
        conclusion about whether or not acceptance is
        expressly made conditional on assent to terms
        additional to or different from those offered or
        agreed upon

Q1D Which one of the following answers is most appropriate in
     HYPOTHETICAL 1 by your interpretation of section UCC 2-
     207? (Circle one.)

    nc1 acceptance is NOT expressly made conditional on
        assent to terms additional to or different from those
        offered or agreed upon

    ?   section 2-207 does NOT in this situation lead to any
        conclusion about whether or not acceptance is

expressly made conditional on assent to terms additional to or different from those offered or agreed upon

HYPOTHETICAL 2

Assume that:

e   between merchants such terms become part of the contract

Q2A Which one of the following answers is most appropriate in HYPOTHETICAL 2 by your interpretation of section UCC 2-207? (Circle one.)

a1   a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time

?   section 2-207 does NOT in this situation lead to any conclusion about whether or not a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time

Q2B Which one of the following answers is most appropriate in HYPOTHETICAL 2 by your interpretation of section UCC 2-207? (Circle one.)

b1   the expression or confirmation states terms additional to or different from those offered or agreed upon

?   section 2-207 does NOT in this situation lead to any conclusion about whether or not the expression or confirmation states terms additional to or different from those offered or agreed upon

Q2C Which one of the following answers is most appropriate in HYPOTHETICAL 2 by your interpretation of section UCC 2-207? (Circle one.)

c1   acceptance is expressly made conditional on assent to terms additional to or different from those offered or agreed upon

?   section 2-207 does NOT in this situation lead to any conclusion about whether or not acceptance is expressly made conditional on assent to terms additional to or different from those offered or agreed upon

Q2D Which one of the following answers is most appropriate in HYPOTHETICAL 2 by your interpretation of section UCC 2-207? (Circle one.)

nc1 acceptance is NOT expressly made conditional on assent to terms additional to or different from those offered or agreed upon

?   section 2-207 does NOT in this situation lead to any
        conclusion about whether or not acceptance is
        expressly made conditional on assent to terms
        additional to or different from those offered or
        agreed upon

HYPOTHETICAL 3

Assume that:

k   the terms of the particular contract consist of those
        terms on which the writings of the parties agree,
        together with any supplementary terms incorporated
        under any other provisions of the Act

Q3   Which one of the following answers is most appropriate in
        HYPOTHETICAL 3 by your interpretation of section UCC 2-
        207? (Circle one.)

nj   the writings of the parties do NOT otherwise estab-
        lish a contract

?   section 2-207 does NOT in this situation lead to any
        conclusion about whether or not the writings of the
        parties do NOT otherwise establish a contract

The answers to the questions formulated have the potenti-
ality of modifying one or more of the structures of the
normalized versions of the weakest interpretations of the
various subsections. In this case, only the structures of
subsections (2) and (3) can be affected, because only the
results of those subsections were involved in the questions
about possible implicitly required conditions. We believe that
the appropriate answers to the four questions of the first
hypothetical involving result-d are:

al bl ? ?

that the appropriate answers to the four questions of the
second hypothetical involving result-e are also:

al bl ? ?

and that the appropriate answer to the question of the third
hypothetical involving result-k is:

nj[10]

If we assume that these are the nine answers given to the
questions, then the structures of the normalized versions of
the weakest interpretations of subsections (2) and (3) are
modified. That structure for subsection (2) becomes:

IF al AND bl THEN (d AND (IF nf AND ngl AND Nh THEN e)).

```
i.e.,      >- a1 - b1  --->  - d
                               |
                               - >- nf - ng1 - Nh ---> e
```

Similarly, the structure of the normalized version of the weakest interpretation of subsection (3) is modified to become:

IF i1 THEN ((IF j OR NOT j THEN i2) AND (IF nj THEN k)

```
                              |- j --|
i.e.,      >- i1 --->  - >-   |      | ---> i2
                        |     |- nj -|
                        |
                        - >- nj  ---> k
```

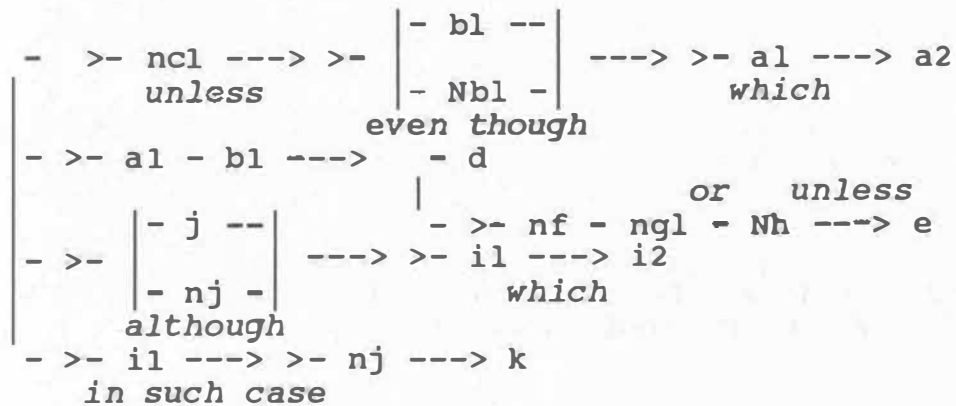and the synthesized structure of the entire section becomes:

(1) IF NOT c1 THEN IF b1 OR NOT b1 THEN IF a1 THEN a2
AND
(2) IF a1 AND b1 THEN (d AND (IF nf AND ng1 AND Nh THEN e))
AND
(3) IF i1 THEN ((IF j OR NOT j THEN i2) AND (IF nj THEN k)).

```
                             |- b1 --|
i.e.,    - >- nc1 ---> >-    |       | ---> >- a1 ---> a2
       |                     |- Nb1 -|
       |
       | - >- a1 - b1 --->  - d
       |                      |
       |                      - >- nf - ng1 - Nh ---> e
       |      |- j --|
       | - >- |      |---> >- i1 ---> i2
       |      |- nj -|
       |
       - >- i1 ---> >- nj ---> k
```

This completes the second step of determining whether there are any required conditions in other subsections in order to synthesize the normalized subsections into the normalized version of the weakest interpretation of the section as a whole.

The third step is to formulate hypothetical situations and questions about those situations that will elicit from subject-matter experts any discernible stronger interpretations that are reasonably possible for various parts of the normalized version of the weakest interpretation of the entire section. The questions formulated in this step are about possible stronger interpretations of the structural terms (both between-sentence and within-sentence) that occur in the rule being normalized. The representation of each of these structural terms in the arrow diagram of the weakest interpretation of UCC 2-207 needs to be identified in order to insure that possible stronger alternatives are not overlooked. The between-sentence structural terms identified in using the MARK and CLASSIFY PROGRAM on UCC 2-207 were: "even though," "unless," "unless," "or," "although," and "in such case." The within-sentence structural terms were: "which" and "which." Their representations on the arrow diagram for the normalization of the weakest

interpretation of UCC 2-207 are identified by labeling the representations by the terms that they represent as follows:

```
                          |- bl --|
    -   >- ncl ---> >-    |       |  ---> >- al ---> a2
            unless        |- Nbl -|              which
                        even though
    - >- al - bl --->    - d
         |             |
         |- j --|        - >- nf - ngl - Nh ---> e
    - >- |      | ---> >- il ---> i2      or   unless
         |- nj -|            which
         although
    - >- il ---> >- nj ---> k
        in such case
```

These identify places on the arrow diagram where hypotheticals and questions need to be formulated.[11]

The hypothetical and question prompted by the possible stronger interpretation of the first "unless" is:

HYPOTHETICAL 4

Assume that:

c   acceptance is expressly made conditional on assent to the additional or different terms

Q4   Which one of the following answers is most appropriate in HYPOTHETICAL 4 by your interpretation of section UCC 2-207? (Circle one).

Na   IT IS NOT SO THAT a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance

N (a even though b)
IT IS NOT SO THAT (a definite and seasonable expression of acceptance or a written confirmation which is sent within a reasonable time operates as an acceptance even though it states terms additional to those offered or agreed upon)

?   section 2-207 does NOT in this situation lead to either one of the two previous answers

The answer "Na" given to this question indicates that the appropriate interpretation of the first "unless" is:

IF NOT cl THEN (IF bl OR NOT bl THEN IF al THEN a2) BUT OTHERWISE NOT a.

i.e.,   >- nc1 ---> >- $\begin{vmatrix} - \text{ b1 } -- \\ - \text{ Nb1 } - \end{vmatrix}$ ---> >- a1 ---> a2
          o
          |
          --> Na

which is equivalent to the UNLESS.2o interpretation of the corresponding direct question. On the other hand, the answer "N(a even though b)" indicates that the appropriate interpretation is:

IF NOT c1 THEN (IF b1 OR NOT b1 THEN IF a1 THEN a2) BUT OTHERWISE NOT (a even though b).

i.e.,   >- nc1 ---> >- $\begin{vmatrix} - \text{ b1 } -- \\ - \text{ Nb1 } - \end{vmatrix}$ ---> >- a1 ---> a2
         o
         |
         --> N(a et b)

which is equivalent to the UNLESS.2d interpretation of the corresponding direct question.

And finally, the answer "?" indicates that the appropriate interpretation of the first "unless" is the weaker interpretation given originally, which is equivalent to the UNLESS interpretation of the corresponding direct question.

The hypothetical and questions prompted by the possible stronger interpretation of "even though" is:

HYPOTHETICAL 5

Assume that:

a1   a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time, AND

nc1   acceptance is NOT expressly made conditional on assent to the additional or different terms

Q5A Which one of the following answers is most appropriate for HYPOTHETICAL 5 by your interpretation of section UCC 2-207? (Circle one.)

b1   the expression or confirmation states terms additional to or different from those offered or agreed upon

?   section 2-207 does NOT in this situation lead to any conclusion about whether or not the expression or confirmation states terms additional to or different from those offered or agreed upon

Q5B Which one of the following answers is most appropriate for HYPOTHETICAL 5 by your interpretation of section UCC 2-207? (Circle one.)

Wb1, a2
        WHETHER OR NOT the expression or confirmation

states terms additional to or different from
those offered or agreed upon, that expression or
confirmation operates as an acceptance

?   section 2-207 does NOT in this situation lead to
the first answer above

The answers "b1" and "?" given to questions Q5A and Q5B
indicate that the appropriate interpretation of "even though"
is:

IF NOT c1 THEN (b1 AND IF a1 THEN a2).

i.e.,   >- nc1 --->   - b1
                      |
                      - >- a1 ---> a2

which is equivalent to the EVEN THOUGH.2 interpretation of the
corresponding direct question.
    On the other hand, the answers "?" and "Wb1, a2" indicate
that the appropriate interpretation is the weaker interpreta-
tion given originally, which is equivalent to the EVEN THOUGH
interpretation of the corresponding direct question.
    The other two pairs of answers indicate interpretations
for which there are no corresponding direct question equiva-
lents. Such alternatives could easily enough be added to the
present list of alternative interpretations of "even though"
used in the MARK AND CLASSIFY program, but for the present we
have declined to do so, because we have not yet been able to
imagine a context in which either of these others would be
appropriate interpretations.
    The pair "b1" and "Wb1, a2" indicate that the most
appropriate interpretation of "even though" is:

IF NOT c1 THEN
(b1 AND IF a1 THEN a2 AND IF b1 OR NOT b1 THEN IF a1 THEN
a2).

i.e.,   >- nc1 --->   - b1
                      |
                      |- >- a1 ---> a2
                      |
                      | |- b1 --|
                      - >- | | ---> >- a1 ---> a2
                               |- Nb1 -|

This interpretation says that the fulfillment of condition nc1
leads to the combination of three results: (1) b1, (2) IF a1
THEN a2, and (3) IF b1 OR NOT b1 THEN IF a1 THEN a2. Although
(2) and (3) are logically equivalent to each other (which, in
turn, makes this interpretation equivalent to the combination
of (1) and (2), which is the EVEN THOUGH interpretation above),
they are not legally equivalent. The (3) result precludes the
possibility that either b1 or Nb1 will be added to (2) as an
implied condition. Thus (3) is a "stronger" interpretation than
(2) is from a legal viewpoint; it cannot be weakened by
implication in the way that (2) can be. When interpreted from a

legal viewpoint this three-result interpretation is logically equivalent to the interpretation that has (1) and (3) as results. There well may be an occurrence of "even though" in some legal rule where this interpretation is the most appropriate one; we have not yet encountered one, and so we have not yet added such an interpretation to the list.

The pair "?" and "?" indicate that the most appropriate interpretation of "even though" is that the clause "even though b" adds nothing to subsection (1)--in other words, that to delete the clause would not alter the meaning of subsection (1). While it is true that such a deletion would result in a statement that is logically equivalent to the present subsection (1), the resulting statement would be a legally weaker statement for the reason indicated above. To interpret "even though" so that "even though b" adds no meaning to subsection (1) would inappropriately weaken subsection (1) from a legal point of view.

The hypothetical and question prompted by the possible stronger interpretation of the first "which" is:

HYPOTHETICAL 6

Assume that:

Na1   IT IS NOT SO THAT a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time, AND

nc1   acceptance is NOT expressly made conditional on assent to the additional or different terms

Q6   Which one of the following answers is most appropriate for HYPOTHETICAL 6 by your interpretation of section UCC 2-207? (Circle one.)

na2   that expression or confirmation does NOT operate as an acceptance

?   section 2-207 does NOT in this situation lead to any conclusion about whether or not the expression or confirmation operates as an acceptance

The answer "na2" given to this question indicates that the appropriate interpretation of the first "which" is:

IF NOT c1 THEN (IF b1 OR NOT b1 THEN IF a1 THEN a2 BUT OTHERWISE NOT a2).

```
                         | - b1 -- |
  i.e., >- nc1 ---> >-   |         |  ---> >- a1 --- a2
                         | - Nb1 - |              o
                                                  |
                                                  --> Na2
```

which is equivalent to the WHICH.2o interpretation of the corresponding direct question.

On the other hand, the answer "?" indicates that the appropriate interpretation of the first "which" is the weaker

interpretation given originally, which is equivalent to the WHICH interpretation of the corresponding direct question.

The hypothetical and question prompted by the possible stronger interpretation of the second "unless" is:

HYPOTHETICAL 7

Assume that:

> a1   a definite and seasonable expression of acceptance or a written confirmation is sent within a reasonable time, AND

> b1   the expression or confirmation states terms additional to or different from those offered or agreed upon, AND

> c   acceptance is expressly made conditional on assent to the addition or different terms, AND

> Nx

where x is the "chunked"[12] conjunction of the negations of the following three constituent sentences:

> f   the offer expressly limits acceptance to the terms of the offer

> g1   the additional or different terms materially alter the contract

> h   notification of objection to the additional or different terms has already been given or is given within a reasonable time after notice of them is received

so that Nx is the three-sentence disjunction such that at least one disjunct is one of the above three sentences and the remaining disjuncts are negations of the others. One example of Nx is:

> f   the offer expressly limits acceptance to the terms of the offer, OR

> ng1   the additional or different terms do NOT materially alter the contract, OR

> Nh   IT IS NOT SO THAT notification of objection to the additional or different terms has already been given or is given within a reasonable time after notice of them is received

Q7   Which one of the following answers is most appropriate for HYPOTHETICAL 7 by your interpretation of section UCC 2-207? (Circle one.)

> ne   between merchants such terms do NOT become part of

the contract

?   section 2-207 does NOT in this situation lead to any
       conclusion about whether or not between merchants
       such terms become part of the contract because in
       this situation there is not contract

The answer "ne" given to this question indicates that the
appropriate interpretation of the second "unless" is:

IF a1 AND b1 THEN (d AND IF nf AND ng1 AND Nh THEN e BUT
OTHERWISE NOT e).

i.e,   >- a1 - b1 ---> - d
                          |
                          - >- nf - ng1 - Nh ---> e
                                            o
                                            |
                                            --> N

which is equivalent to the UNLESS.2 interpretation of the
corresponding direct question.
       On the other hand, the answer "?" indicates that the
appropriate interpretation of the second "unless" is the weaker
interpretation given originally, which is equivalent to the
UNLESS interpretation of the corresponding direct question.
       The hypothetical and question prompted by the possible
stronger interpretation of the second "which" is:

HYPOTHETICAL 8

Assume that:

Ni1   IT IS NOT SO THAT conduct by both parties recognizes
       the existence of a contract

Q8   Which one of the following answers is most appropriate for
       HYPOTHETICAL 8 by your interpretation of section UCC 2-
       207? (Circle one.)

ni2   that conduct is NOT sufficient to establish a
       contract of sale

?   section 2-207 does NOT in this situation lead to any
       conclusion about whether or not that conduct is
       sufficient to establish a contract of sale

The answer "ni2" given to this question indicates that the
appropriate interpretation of the second "which" is:

(IF i1 THEN i2)AND (IF Ni1 THEN ni2)

- >- i1 ---> i2
|
- >- Ni1 ---> ni2

which is equivalent to the WHICH.2 interpretation of the
corresponding direct question.

On the other hand, the answer "?" indicates that the appropriate interpretation of the second "which" is the weaker interpretation given originally, which is equivalent to the WHICH interpretation of the corresponding direct question.

The hypothetical and question prompted by the possible stronger interpretation of the "although" is:

HYPOTHETICAL 9

Assume that:

i1   conduct by both parties recognizes the existence of a contract

Q9A Which one of the following answers is most appropriate for HYPOTHETICAL 9 by your interpretation of section UCC 2-207? (Circle one.)

nj   the writings of the parties do NOT otherwise create a contract

?   section 2-207 does NOT in this situation lead to any conclusion about whether or not the writings of the parties do otherwise establish a contract

Q9B Which one of the following answers is most appropriate for HYPOTHETICAL 9 by your interpretation of section UCC 2-207? (Circle one.)

Wj,i2 WHETHER OR NOT the writings of the parties do otherwise establish a contract, that conduct is sufficient to establish a contract of sale

?   section 2-207 does NOT in this situation lead to the preceding answer

The answers "nj" and "?" given to questions Q9A and Q9B indicate that the appropriate interpretation of "although" is:

nj AND IF i1 THEN i2

i.e.,   - nj
         |
         - >- i1 ---> i2

which is equivalent to the ALTHOUGH.2 interpretation of the corresponding direct question.

On the other hand, the answers "?" and "Wj, i2" indicate that the appropriate interpretation is the weaker interpretation given originally, which is equivalent to the ALTHOUGH interpretation of the corresponding direct question.

The other two pairs of answers, "nj" with Wj" and "?" with "?," are like the corresponding pair of answers for questions 5A and 5B; they indicate interpretations for which there are no corresponding direct question equivalents. Such alternatives could easily be added to the present list of alternative interpretations of "although" used in the GENERATE program, but

for the present we have declined to do so because, as with the corresponding pair of interpretations for "even though," we have not yet been able to imagine a context in which either of these others would be appropriate interpretations.

The hypothetical and question prompted by the possible stronger interpretation of the "in such case" is:

HYPOTHETICAL 10

Assume that:

Ni1   IT IS NOT SO THAT conduct by both parties recognizes the existence of a contract

Q10   Which one of the following answers is most appropriate for HYPOTHETICAL 10 by your interpretation of section UCC 2-207? (Circle one.)

Nk   IT IS NOT SO THAT the terms of the particular contract consist of those terms on which the writings of the parties agree, together with any supplementary terms incorporated under any other provisions of the Act

?   section 2-207 does NOT in this situation lead to any conclusion about whether or not the terms of the particular contract consist of those terms on which the writings of the parties agree, together with any supplementary terms incorporated under any other provisions of the Act

The answer "Nk" given to this question indicates that the appropriate interpretation of "in such case" is:

(IF i1 THEN k) AND (IF Ni1 THEN Nk)

- >- i1 ---> k
|
- >- Ni2 ---> Nk

which is equivalent to the IN SUCH CASE.2 interpretation of the corresponding direct question.

On the other hand, the answer "?" indicates that the appropriate interpretation of "in such case" is the weaker interpretation given originally, which is equivalent to the IN SUCH CASE interpretation of the corresponding direct question.

From this limited experience of formulating indirect questions for UCC 2-207, it seems that more human judgment is involved with producing them than is the case with formulating direct questions. It also seems that the process of determining the normalized version from the answers to indirect questions is more complex for the human analysis to do that it is from the answers to direct questions.

CONCLUSION

In current legal literature annotated codes can be viewed as one kind of expert system. The collection of excerpts from judicial opinions in appellate court cases are the views of the judicial experts of how the annotated provision should be interpreted. Similarly, a collection of the normalized versions of a statutory provision by different legal experts can be viewed as an expert system dealing with various possible logical structures of the provision and how they affect its meaning. The questions that need to be formulated as part of the process of normalizing a legal rule can also be used in obtaining an expert's opinion about how that rule should be interpreted--interpreted in the sense of what the logical structure of the rule is. Direct questions about which is the most appropriate structural interpretation of a legal rule among several alternatives listed may be more difficult for legal experts to respond to than indirect questions that ask their opinion about what legal results occur by applying the rule in specified hypothetical situations. There is need for empirical research to determine the extent to which this is so. The questions formulated (both direct and indirect) for UCC 2-207 provide one vehicle for doing such research as well as for beginning the task of assembling an expert system on the logical structure of UCC 2-207.

The formulation of such questions (either direct or indirect) is the most demanding aspect of normalizing a legal rule. The computer programs MARK AND CLASSIFY and GENERATE assist a human analyst in formulating such questions by performing some of the more routine and repetitive tasks. The significant choices in the question formulation process, however, must still be made by human analysts. The help provided by such programs is significant, but they alone are still not sufficient to do the entire job adequately. For purposes of beginning to build such normalized expert opinion files, the current versions of these programs along with the NORMALIZER program furnish sufficient help to make the task manageable for individual researchers. Because such normalized files themselves are in a form that permits logical deduction by algorithmic processes that otherwise would be inordinately difficult or even impossible, such files will become resources for exploring further the fundamental structure of legal rules, human-machine collaboration, and the design and study of more powerful and flexible expert legal systems.

NOTES

1. There is also an intermediate normalized form for the three stronger interpretations called clear normalized form. They are:

IF applicants are NOT minors, THEN they shall register,
BUT OTHERWISE, NOT.
IF applicants are NOT minors, THEN they shall register,
BUT OTHERWISE, NOT.+.

> IF applicants are NOT minors, THEN they shall register,
> BUT OTHERWISE, . . . (something else) . . . .

Rules expressed in clear normalized form contain at least one occurrence of the basic defined term IF-exTHEN, at least one occurrence of one of the many variations of BUT OTHERWISE NOT that are clearly defined terms, and may contain one or more occurrences of any of the other three basic defined terms.

2. Of course, this is also the way that the statement is frequently written by drafters who intend and believe that such statements are unambiguous, but are unaware that they are not and unaware that there are easy ways of making them unambiguous.

3. See L. E. Allen and C. S. Saxon, *One Use of Computerized Instructional Gaming in Legal Education: To Better Understand the Rich Logical Structure of Legal Rules and Improve Legal Writing*, University of Michigan Journal of Law Reform (1985).

4. For a more detailed account of the features of the NORMALIZER program, see L. E. Allen and C. S. Saxon, *Computer Aided Normalizing and Unpacking: Some Interesting Machine-Processable Transformations of Legal Rules*, in C. Walter, ed., *COMPUTING POWER AND LEGAL REASONING*, 495-572 (West Publishing, St. Paul, Minn.) (1985). The prototype version of the NORMALIZER program is now available and can be tried by anyone who has access to an IBM Personal Computer. The program may be obtained by sending a formatted floppy disk to Layman E. Allen, University of Michigan Law School, Ann Arbor, MI 48109.

5. Sometimes, but less often, the sentence that contains the word "which" will be of the form "a.1 a.2 which a.3"; in which case, the analyst will need to put the "/" between a.1 and a.2.

6. In the first change made here in sentence-g, the "they" is changed to "the additional or different terms" rather than only to "additional terms." In the original text the first mention of such terms is in sentence-b where they are referred to as "terms additional to or different from those offered or agreed upon," and the next mention in sentence-c is also to "additional or different terms." However, in sentence-d only the "additional terms" are explicitly mentioned, and these are what are being referred to by "such terms" in sentence-e, by "they" in sentence-g, and by "them" in sentence-h. However, it is clear from the rest of the context and Comment 3 of the Official Comment to section 2-207 that the effects upon "additional terms" by provisions of sentences d, e, g, and h are also intended to be accompanied by corresponding effects upon "different terms." In other words, the use of "additional terms" in sentence-d (and thus, in sentences e, g, and h, also) is intended to refer to both "additional terms and different terms."

7. The term "in such case" is being treated here as a between-sentence structural term in the following sense. The term expresses an if-then relationship between (A) some other

sentence or combination of sentences to which the "such case" in "In such case" refers and (B) the sentence or combination of sentences that immediately follows "In such case" (in this example, sentence-k). Thus, "In such case" is a between-sentence structural term that relates the (A) sentence(s) to (B) sentence(s). Between-sentence structural terms are what their name implies--namely, structural terms that relate complete sentences to other complete sentences. On the other hand, within-sentence structural terms relate sentence-parts either to other sentence-parts or to complete sentences.

8. This assumption is certainly open to question; there seems to be little grounds for preferring our choice to having "such case" refer to sentence-i alone. Our reason for choosing as we did is that it simplified some of the analysis in considering the formulation of the indirect question for determining the structural interpretation of this term. It should perhaps be noted that the uncertainty of the term "In such case" in this respect is not a matter of structure but rather a matter of semantics. The ambiguity about just which sentence or combination of sentences it is appropriate to interpret the term as referring is a question of semantic ambiguity. Thus, it is occurrence in UCC 2-207, the term "in such case" is both structurally and semantically ambiguous. In formulating question Q5 about its structural ambiguity the semantic question is resolved by assumption. This example makes it apparent, however, that matters of semantics (both questions of ambiguity and vagueness) are not always neatly separate and distinct from questions of structure. Semantic interpretation overlaps and is intertwined with the structural interpretation of legal rules. In any comprehensive approach to interpretation both must be pursued in depth and in relation to each other. In this instance, the choice between the two alternatives considered as the semantic reference of "such case" there does not appear to be much practical significance to choosing one rather than the other. There is but a tiny difference between the two in terms of the relationships expressed by each, which for most analysts, is likely to be entirely unnoticed.

9. The defined term "NEED NOT" is used here instead of the ambiguous term "may NOT"; it is used in the sense of "being PERMITTED NOT to do something," rather than "may NOT" in its more frequently used sense of "being NOT PERMITTED to do something."

10. However, whether this is so clearly defined depends upon whether the phrase "any of the other provisions of this Act" refers to provisions other than UCC 2-207 or to provisions other than UCC 2-207(3). In particular, if UCC 2-207 subsections (1) and (2) qualify as "other provisions," then there can be a clear-cut counter-example to result-k (terms of contract consist of terms on which writings of parties agree) if condition-j (writings establish a contract) is fulfilled, because under appropriate circumstances result-e (between merchants addition or different terms become part of the contract) can occur with respect to terms on which the parties have not agreed.

11. The "or" in "e unless (f or f1 or h)" has been transformed into:
    IF NOT (f or g1 or h) THEN e.
    that is
    IF NOT f AND NOT g1 AND NOT h THEN e.
    that is
    >- nf - ng1 - Nh ---> e
and so the "or shows up on the arrow diagram as an "AND."

12. See L. E. Allen and C. S. Saxon, *Computer Aided Normalizing and Unpacking: Some Interesting Machine-Processable Transformations of Legal Rules*, in C. Walter, ed., *COMPUTING POWER AND LEGAL REASONING*, 495-572 (West Publishing, St. Paul, Minn.) (1985).