1985

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ONE USE OF COMPUTERIZED INSTRUCTIONAL GAMING IN LEGAL EDUCATION: TO BETTER UNDERSTAND THE RICH LOGICAL STRUCTURE OF LEGAL RULES AND IMPROVE LEGAL WRITING†

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This article describes an innovation in legal education and speculates about its importance and effectiveness as an educational tool. The speculations about its potential use, however, are ones that each legal educator will be able to test individually to determine the effectiveness of this use of microcomputers to improve legal education. The computer software that permits the innovation to be used will be available to interested persons by the time that this article is published.

There should be little question that any innovation in legal education that has a significant impact upon the quality of legal writing truly deepens legal education. Adequate writing is the very core of legal craftsmanship. We begin with that assumption and will say no more about it.

The innovation that we propose does not deal with the aspects of writing that do receive some attention in the typical legal curriculum today; it deals with a relatively ignored aspect. The types of training in legal writing that are typically available to law students include research papers for seminars, preparation of appellate briefs, drafting of various legal documents, and the writing of notes, comments, and articles for the student edited law journals and reviews. Usually, because of the scarcity of faculty time, only the first of these is under direct faculty supervision. The others are under the guidance of various others: local attorneys, recent graduates who are exploring legal education as a career, graduate students, upper-year law students, and library and clinical personnel. Very little, if any, of the training in writing available in law schools today deals with the logical structure of legal writing in general or the logical structure of legal rules in particular; this aspect is almost totally ignored. The logical dimension of writing has an important impact upon meaning and needs to be studied and understood by lawyers, if they are to be skillful at (1) drafting precisely what they intend and (2) detecting the multiplicity of interpretations of what others have written. We are developing some tools that will help facilitate such understanding of the logical structure of legal rules without creating excessive costs or demands upon the teaching faculty.

The current state of the typical lawyer's knowledge of logical syntax is well illustrated in a continuing discussion that the senior author has had over the past two decades with F. Reed Dickerson, the most widely published author in English on legal writing. We are in agreement that frequently lawyers intend to be clear in what they write. We also agree that, unlike most other fields, there are occasions when a lawyer writes in a way that is intended to be unclear—unclear in the sense of containing uncertainty. Frequently lawyers do so deliberately, and it is the course of wisdom to be unclear. Political compromise in legislation and other rule drafting is achieved by intentionally including a term like "substantial" harm, delegation of decision-making power is accomplished by using "seasonable" notice, providing flexibility for adapting to societal changes is built in by a requirement of "due" process. A host of different and legitimate functions are achieved by deliberately including in the text what the linguists call "vague" terms. We agree that deliberately incorporating uncertainty into a statement by means of vague semantic terms is appropriate for lawyers to do. It is functional. But uncertainty can also be built into a statement by way of the logical structure, and this is where there is a parting of the

ways—difference in approach at least, maybe even disagreement. Dickerson's position as articulated in these verbal discussions has been that for a lawyer to deliberately use ambiguous syntax in a legal document is unethical. He agrees that vagueness in the semantics is okay and sometimes desirable, but argues that using terms that intentionally introduce ambiguity in the syntax is putting one over on a brethren. In a gentle way, Dickerson says that the legal profession is so innocent in the handling of logical syntax (his polite way of saying "ignorant") that deliberately incorporating syntactic ambiguity in a legal document smacks of entrapment. Admittedly, there is thrust to his position. But there is also an embarrassing question: for a profession that holds itself out to the public as expert in the art of communication, how much of our innocence do we have to lose before it is no longer unethical to deliberately incorporate uncertainty into a message by way of ambiguity in the logical syntax, just as we wisely and appropriately do by way of vagueness in the semantic terms? The software that we are developing is aimed at reducing such innocence. It seeks to do so by helping lawyers to understand more fully the logical structure of legal writing.

I. RICHNESS OF THE LOGICAL STRUCTURE OF LEGAL RULES

We think that the logical structure of legal rules is far richer than most in the legal profession believe—richer in the sense that there are a multitude of different structural interpretations of the terms used to express structure and also richer in the sense of the vast number of different legal rules that can be expressed by combining a small number of constituent sentences in different ways. It is essential to understand this richness to fully appreciate and respect the complexity of the natural language that lawyers use almost exclusively as their means of communication.

A. Multiplicity of Interpretations of Structural Terminology

Every legal rule can be written in the form of an IF_THEN[1] statement like this:

1. Throughout this article, we have used the single underscore mark '_' to link together two or more terms when they are intended to indicate a single term.

IF a specified set of conditions is fulfilled,
THEN a specified set of results occur.

The most simple kind of legal rule is one that has a single condition and a single result. This could be a relatively unambiguous rule, such as:

No child shall be admitted to the Apollo theater.

which can be expressed in IF_THEN form as:

IF a person is a child,
THEN that person shall not be admitted to the Apollo theater.

We say "relatively" unambiguous, because there is some question as to whether the statement says anything about nonchildren being admitted. It seems relatively clear, however, that this rule is only saying something about children's nonadmissibility and not saying anything about admissibility in general.

1. Structural ambiguity and semantic vagueness— But this relative lack of structural ambiguity does not mean that there is no uncertainty in the rule. It clearly does contain some semantic vagueness. For example, how old does a person have to be in order to no longer be a child for purposes of the Apollo theater admissibility rule? Further, what does it mean to be "admitted to the Apollo theater"? Can one buy a drink of liquor at intermission, use the lavatory facilities, or view the performance of the play without being "admitted"? These are semantic uncertainties; they are questions of vagueness, not matters of syntactic ambiguity. (We are using the terms 'syntax' and 'structure' interchangeably.) All rules will contain some degree of semantic vagueness, but some may be completely free of structural ambiguity. It should be said, however, that in our experience the uncertainties in legal rules that are there by way of semantic vagueness frequently seem to be ones that are deliberately put there, while the uncertainties that are introduced by structural ambiguity appear to be almost always inadvertent, rather than intentional. It is removal of these inadvertent uncertainties in legal writing that we are seeking to achieve by improving legal education so that lawyers are sensitive to the problems involving such uncertainties and how to deal with them. The program of instruction involving a microcomputer that we are developing is aimed at helping law students and lawyers to deal competently

with matters of logical structure in expressing and interpreting legal rules.

2. *Structural ambiguity between sentences: descriptive*— While some simple rules can be relatively unambiguous, other simple rules involve extensive structural ambiguity. For example:

> A child shall not be admitted to the Apollo theater unless the child is accompanied by an adult.

which could be interpreted as saying:

> (1) IF a child is not accompanied by an adult,
> THEN the child shall not be admitted to the Apollo theater
> (and this interpretation of the rule does not say anything about what happens when an adult does accompany the child).

or as saying:

> (2) IF a child is not accompanied by an adult,
> THEN the child shall not be admitted to the Apollo theater,
> AND
> IF the child is accompanied by an adult,
> THEN the child may be admitted to the Apollo theater.

or as saying:

> (3) IF a child is not accompanied by an adult,
> THEN the child shall not be admitted to the Apollo theater,
> AND
> IF the child is accompanied by an adult,
> THEN the child shall be admitted to the Apollo theater.

The structural ambiguity that permits each of these three different interpretations as possibilities for what the rule says is an ambiguity about the logical relationship intended to be expressed by the term 'unless' between the two complete sentences:

> No child shall be admitted to the Apollo theater

and

the child is accompanied by an adult.

Hence, we refer to such ambiguity as a "between-sentence" structural ambiguity in contrast to "within-sentence" structural ambiguity, which will be exemplified later.

The first ambiguity about the term 'unless' is whether it is meant to express a single conditional (a single IF_THEN statement) or to express a biconditional (a pair of IF_THEN statements). Interpretation (1) is the only single conditional interpretation; both (2) and (3) are biconditional interpretations.

The second ambiguity involves the implied 'not' that is imbedded in the 'unless'. The question is whether it is meant to precede the entire first sentence or to be distributed within that sentence. If the implied 'not' is interpreted as preceding the entire sentence, then the result is:

it is not so that the child shall not be admitted to the Apollo theater

which is the same as:

it is not so that the child must not be admitted to the Apollo theater

which is the same as:

the child may be admitted to the Apollo theater

which results in interpretation (2).
On the other hand, if the implied 'not' is distributed within that first sentence to produce:

the child shall not not be admitted to the Apollo theater

which is the same as:

the child shall be admitted to the Apollo theater

the result is interpretation (3).

3. *Structural ambiguity within sentences: deontic*— In addition to the simple rules that are relatively unambiguous and those that involve extensive structural ambiguity, there are other simple ones that involve even more extensive ambiguity; they involve within-sentence ambiguity in addition to between-sentence ambiguity. The following simple rule is one that in-

volves such within-sentence ambiguity:

> The ushers (who take tickets) shall not admit a child to the Apollo theater unless the child is accompanied by an adult.

There are three between-sentence structural interpretations that are similar to the (1), (2), and (3) interpretations of the second simple rule above:

(4) IF a child is not accompanied by an adult,
THEN the ushers shall not admit the child to the Apollo theater
(and this interpretation of the rule does not say anything about what happens when an adult does accompany the child).

(5) IF a child is not accompanied by an adult,
THEN the ushers shall not admit the child to the Apollo theater
AND
IF the child is accompanied by an adult,
THEN the ushers may admit the child to the Apollo theater.

(6) IF a child is not accompanied by an adult,
THEN ushers shall not admit the child to the Apollo theater
AND
IF the child is accompanied by an adult,
THEN the ushers shall admit the child to the Apollo theater.

4. Structural ambiguity within sentences: Hohfeldian— There are also multiple interpretations due to the within-sentence structural ambiguity of the term 'shall' in the last sentence of interpretation (6) of this third rule, of the term 'shall not' in interpretations (4), (5), and (6), and of the term 'may' in (5).

For an example of a within-sentence structural ambiguity, consider first the 'shall' that occurs in the last sentence of (6):

> the ushers shall admit the child to the Apollo theater.

The sentence is of the form, 'y shall b', that is 'person_y shall do act_b'. There are at least eleven different interpretations of the logical structure of sentences of this form. For this particular instance of a sentence of such form, five of the possible interpreta-

tions are clearly so improbable that they are not worthy of consideration beyond a brief description of each of them. The six ways of interpreting the sentence in question that seem to be reasonable alternative interpretations of the term 'shall' are:

a. The term 'shall' indicates that the ushers have the power to admit the child to the Apollo theater (and nothing is said by this interpretation of 'shall', or otherwise presumed, about whether or not the ushers have a duty or a privilege to exercise that power).
Here the term 'power' is being used in its Hohfeldian sense of the capacity to change the legal status of the child from being a nonadmitted person to being an admitted person. The terms 'duty' and 'privilege' are also being used in their Hohfeldian senses. To say that the ushers have a 'duty' to exercise their power to admit the child indicates that the ushers have an obligation to somebody (for example, to the theater owner, to the child's guardian, or to society's legal representative) to do some act that would constitute exercise of the ushers' power to admit the child. On the other hand, to say that the ushers have a 'privilege' with respect to the theater owner to exercise their power to admit the child indicates that the ushers do not have a duty to the theater owner (by virtue of this rule) to refrain from doing any act that would constitute exercise of the ushers' power to admit the child.[2]

b. The term 'shall' indicates that the ushers have the power to admit the child to the Apollo theater (and nothing is said about whether or not the ushers have a duty or a privilege to exercise that power), but there is a general default rule in the legal system that raises a presumption in the absence of an expressly stated or implied duty to exercise or not to exercise the power that the ushers have discretion about whether or not to exercise the power, that is, that the ushers have a privilege to exercise it and a privilege not to exercise it.

c. The term 'shall' indicates that the ushers have a power to admit the child to the Apollo theater and a duty to somebody to exercise that power.

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2. For the original statement of the Hohfeldian system of fundamental legal conceptions, see Hohfeld, *Some Fundamental Legal Conceptions as Applied in Judicial Reasoning*, 23 YALE L.J. 16 (1913).

d. The term 'shall' indicates that the ushers have a duty to somebody to do an act that would constitute an exercise of the ushers' power to admit if such power existed, but nothing is said by this interpretation of 'shall', or otherwise presumed, about whether or not the ushers have such power.

The kind of situation in which there is a duty unaccompanied by a particular power, although perhaps somewhat unusual, is certainly imaginable. The power involved in alternative c that accompanies a duty to admit could be a power to admit for purposes of viewing the play, that is, a power to create (by admitting) a right of the child to view the play without interference by others. But just because the child is intended to be "admitted" for purposes of viewing the play does not necessarily mean that the child is intended to be admitted for all purposes. In fact, the most probable intent is that the ushers do not have, by virtue of the rule under consideration, the power to admit the child in the sense of creating a power of the child to purchase a drink of liquor at intermission, a power that would be created with respect to adults admitted to a theater that sells liquor. With respect to the power to admit in this latter sense, the term 'shall' is being interpreted as not saying anything and not implying any presumption.

e. The term 'shall' indicates that the ushers have a duty to somebody to do an act that would constitute an exercise of the ushers' power to admit (to allow the child accompanied by an adult to enter) if such power existed, but nothing is said by this interpretation of 'shall' about whether or not the ushers have such power. But there is a general default rule in the legal system that raises a presumption, in the absence of an express creation of a power, that no such power exists. In other words, there is a disability. In this case, the ushers have a disability to create a power of the child to purchase liquor either by allowing the child to enter or by not allowing the child to enter, unless such a power to purchase is expressly created.

f. The term 'shall' indicates that the ushers have a duty to somebody to do an act that would constitute an exercise of the ushers' power to admit if such power existed, but nothing is said by this interpretation of 'shall' about

> whether or not the ushers have such power. But it is presumed, in the case of admission for purposes of purchasing a drink of liquor at intermission, that the ushers do not have the power to create such a power to purchase in the child unless such power to create the power to purchase is expressly created. So, the 'shall' indicates a duty of the ushers to allow the child to enter, and a disability of the ushers to create a power of the child to purchase a drink of liquor at intermission by allowing the child to enter.

It seems to us that of the six alternative interpretations of the rule being considered, first, the most likely one to be chosen with respect to admission for purposes of the child's right to view the play without interference by others is interpretation c, namely, that the 'shall' expresses both a power and a duty, and second the most likely one to be chosen with respect to admission for purposes of the child's power to purchase a drink of liquor at intermission is interpretation f, namely, that the 'shall' expresses the ushers' duty to somebody to allow the child to enter and the ushers' disability to thereby create a power in the child to purchase a drink of liquor at intermission.

The remaining five alternatives so improbable as to deserve only brief mention, are:

g. The 'shall' in this rule indicates nothing about the presence or absence of a power and nothing about the presence or absence of a duty. 'Shall' is being used in its descriptive sense only, not in any normative sense. The 'shall' in the following statement is an example of such a descriptive 'shall':

> If any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station, the licensee must afford equal opportunities to all other such candidates for that office in the use of such broadcasting station.

h. The 'shall' indicates only a power of the ushers and nothing about the presence or absence of a duty of the ushers, and the power is exercised by not allowing the child to enter. This is farfetched for the rule being considered, but a plausible interpretation of a rule like the following:

> The registrar shall be deemed to have accepted the application, if she does not timely notify the applicant of its rejection.

i. The 'shall' indicates a power of the ushers that can be exercised by allowing the child to enter and a duty of the ushers to somebody to not allow the child to enter. This interpretation involving a power with a duty not to exercise it is another farfetched interpretation of the rule being considered, but a plausible one for a statement such as:

> The unauthorized agent shall bind her principal by making deals with third parties with whom there has been a history of past dealing.

j. The 'shall' indicates a duty of the ushers to somebody to allow the child to enter and a disability of the ushers by not allowing the child to enter to confer the status of being admitted upon the child for purposes of viewing the play.

k. The 'shall' indicates a power of the ushers by not allowing the child to enter to confer the status of being admitted upon the child for purposes of viewing the play, and a duty of the ushers to somebody to allow the child to enter. This is another farfetched interpretation for the rule being considered, but a plausible one for:

> The registrar shall timely notify applicants of rejection of their applications and be deemed to have accepted an application if she fails to do so.

The richness of the between-sentence structural term 'unless' and the within-sentence structural term 'shall' in the sense of the multitude of structural interpretations of such terms is well illustrated by the examples above. In the case of the term 'shall' the eleven alternatives discussed are a subset of thirty-six different possible interpretations, which are different combinations of duties-privileges and power-disabilities. These thirty-six possibilities are summarized in Table 1.

TABLE 1

VARIOUS COMBINATIONS OF LEGAL RELATIONS STATED BY THE RESULTS OF LEGAL RULES

DISABILITY & POWER / PRIVILEGE & DUTY	0 NONE	1 DISABILITY (Nb, LR, y) & DISABILITY (b,LR,y)	2 DISABILITY (Nb,LR,y)	3 DISABILITY (b,LR,y)	4 POWER (Nb,LR,y)	5 POWER (b,LR,y)
0 NONE	0.0	0.1	0.2	0.3	0.4	0.5
1 PRIVILEGE (Nb,x,y) & PRIVILEGE (b,x,y)	1.0	1.1	1.2	1.3	1.4	1.5
2 PRIVILEGE (Nb,x,y)	2.0	2.1	2.2	2.3	2.4	2.5
3 PRIVILEGE (b,x,y)	3.0	3.1	3.2	3.3	3.4	3.5
4 DUTY (Nb,x,y)	4.0	4.1	4.2	4.3	4.4	4.5
5 DUTY (b,x,y)	5.0	5.1	5.2	5.3	5.4	5.5

Abbreviations (examples)

DISABILITY (b,x,y)	Person_y has a PRIVILEGE with respect to person_x to do act_b.
DUTY (Nb,x,y)	Person_y has the DUTY to person_x to do act_NOT_b.
DISABILITY (b,LR,y)	Person_y has a DISABILITY to create LEGAL_RELATION_LR by doing act_b.
POWER (b,LR,y)	Person_y has a POWER to create legal_relation_LR by doing act_b.

The eleven alternative interpretations of statements of the form 'y shall b' can be briefly summarized in terms of the Table 1 matrix as follows:

Table 1a

a. y shall b.

	0	1	2	3	4	5
0	a				a	a
1						a
2						
3						
4						a
5	a	a	a	a	a	a

We believe that there are at least the eleven interpretations summarized above for statements of such form. We believe, further, but much more tentatively, that a similar analysis for statements of the form 'y shall not b' (like the examples in (4), (5), and (6) above), of the form 'y may b' (like the example in (5) above), and of the form 'y may not b' would show at least the thirteen alternative interpretations, the sixteen alternative interpretations, and the twenty-two alternative interpretations shown in the brief summaries below.

TYPICAL LEGAL LANGUAGE USED (AMBIGUOUSLY) TO STATE THE RESULTS OF LEGAL RULES

Table 1b

b. y shall not b.

	0	1	2	3	4	5
0	b	b	b	b		
1				b		
2				b		
3				b		
4	b	b	b	b	b	b
5						

Table 1c

c. y may b.

	0	1	2	3	4	5
0	c					c
1	c	c	c	c	c	c
2						c
3	c	c	c	c	c	c
4						c
5						

Table 1d

d. y may not b.

	0	1	2	3	4	5
0	d	d		d		
1	d	d	d	d	d	d
2	d	d	d	d	d	d
3				d		
4	d	d	d	d	d	d
5						

The richness of natural English in the sense of the many different interpretations that are possible for the structural terms used, both between-sentence structural terms and within-sentence structural terms, has been well illustrated in the discussion and examples above. Now, we turn to the richness in the other sense—the surprisingly many different legal rules that can be expressed by combining a small number of conditions and results in different ways.

B. Number of Possible Legal Rules with Same Conditions and Results

1. Single condition rules— For the most simple rule of all, a statement consisting of a single condition and a single result, the number of different rules that it is possible to express depends upon the type of structure being analyzed. The number of different rules possible for the same conditions and the same results in rules of greater complexity also depends upon the three types of structure: descriptive structure, deontic structure, and Hohfeldian structure. For the descriptive structure, the results

are analyzed as whole sentences without any breakdown into deontic or Hohfeldian elements. To illustrate these three types of structure, consider the Rule (4) discussed above. Rule (4) analyzed descriptively is merely two sentences connected by the descriptive structural term IF_THEN:

> IF a child is not accompanied by an adult,
> THEN the ushers shall not admit the child to the Apollo theater.

For the deontic type of structural analysis the result

> the ushers shall not admit the child to the Apollo theater

is transformed into a different but equivalent statement that is separated into its deontic and descriptive components

> IT IS OBLIGATORY THAT the ushers do not admit the child to the Apollo theater.

and then Rule (4) is:

> IF a child is not accompanied by an adult,
> THEN IT IS OBLIGATORY THAT the ushers do not admit the child to the Apollo theater.

In order to analyze the result in terms of Hohfeldian structure it is necessary to add some information, namely, to whom the obligation is owed. The resulting statement could be, among others, one of the following:

> The USHERS have a DUTY to the OWNER to not admit the child to the Apollo theater.
>
> The USHERS have a DUTY to the PUBLIC to not admit the child to the Apollo theater.
>
> The USHERS have a DUTY to the GUARDIAN to not admit the child to the Apollo theater.

and Rule (4) would be the IF_THEN statement with whichever result was appropriate.

2. *Single condition rules: descriptive structure*— The number of different rules of the descriptive type with the condition

> a child is accompanied by an adult

and the result

the ushers shall admit the child to the Apollo theater

is nine. The number of different rules of the deontic type is thirty-six, and the number of different rules of the Hohfeldian type is 1,296. The nine different possible descriptive rules are:

v0 WHETHER OR NOT a child is accompanied by an adult is irrelevant for purposes of determining whether the ushers shall or shall NOT admit the child to the Apollo theater.

v1 IF a child is NOT accompanied by an adult,
THEN the ushers shall NOT admit the child to the Apollo theater.

v2 IF a child is accompanied by an adult,
THEN the ushers shall NOT admit the child to the Apollo theater.

v3 IF a child is NOT accompanied by an adult,
THEN the ushers shall admit the child to the Apollo theater.

v4 WHETHER OR NOT a child is accompanied by an adult,
the ushers shall NOT admit the child to the Apollo theater.

v5 IF a child is accompanied by an adult,
THEN the ushers shall NOT admit the child to the Apollo theater,
BUT OTHERWISE, NOT.
(The 'BUT OTHERWISE, NOT' in this context is an abbreviated way of stating, 'IF a child is NOT accompanied by an adult, THEN IT IS NOT SO THAT the ushers shall NOT admit the child to the Apollo theater' which, in turn, is just another way of stating, 'IF a child is NOT accompanied by an adult, THEN the ushers may admit the child to the Apollo theater'.)

v6 IF a child is accompanied by an adult,
THEN the ushers shall admit the child to the Apollo theater.

v7 IF a child is accompanied by an adult,
THEN the ushers shall admit the child to the Apollo theater,
BUT OTHERWISE, NOT.

v8 WHETHER OR NOT a child is accompanied by an adult, the ushers shall admit the child to the Apollo theater.

For rules having only one condition and one result, the number of different rules for each type of result depends upon two things:

the number of possible values of the condition

and

the number of possible values of the result.

There are just two possible values of a specified condition:

It is fulfilled.
It is not fulfilled.

Descriptive results have three possible values:

A specified outcome is indeterminate.
A specified outcome does not occur.
A specified outcome does occur.

The combinations of these possible values are summarized in Table 2.

TABLE 2

THE NINE DIFFERENT DESCRIPTIVE-STRUCTURAL RULES OF A SINGLE CONDITION AND A SINGLE RESULT

Values of Conditions	Values of Results								
fulfilled	0	0	0	1	1	1	2	2	2
not fulfilled	0	1	2	0	1	2	0	1	2
	v0	v1	v2	v3	v4	v5	v6	v7	v8
	Rules								

0 Indeterminate
1 Does NOT occur
2 Does occur

Thus, in the case of one condition and one result the number of different descriptive rules is equal to the number of values of the result raised to the power of the number of values of the condition. In other words,

$$V = R^C = 3^2 = 9$$

where V is the number of different descriptive rules,
R is the number of possible values of the result, and
C is the number of possible values of the condition.

3. Single condition rules: deontic structure— Deontic results, on the other hand, have six possible values, while the number of values of the conditions remains the same. The six possible deontic values are:

0 A specified outcome is indeterminate.
1 IT IS PERMITTED THAT a specified outcome does NOT occur, AND
IT IS PERMITTED THAT a specified outcome does occur.
2 IT IS PERMITTED THAT a specified outcome does NOT occur.
3 IT IS PERMITTED THAT a specified outcome does occur.
4 IT IS OBLIGATORY THAT a specified outcome does NOT occur.
5 IT IS OBLIGATORY THAT a specified outcome does occur.

The combinations of these possible deontic values are summarized in Table 3.

TABLE 3

THE 36 DIFFERENT DEONTIC-STRUCTURAL RULES OF A SINGLE CONDITION AND A SINGLE RESULT

Values of Conditions	Values of Results											
fulfilled	0	0	0	0	0	0	1	1	1	1	1	1
not fulfilled	0	1	2	3	4	5	0	1	2	3	4	5
	d0	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
	Rules											
fulfilled	2	2	2	2	2	2	3	3	3	3	3	3
not fulfilled	0	1	2	3	4	5	0	1	2	3	4	5
	d12	d13	d14	d15	d16	d17	d18	d19	d20	d21	d22	d23
fulfilled	4	4	4	4	4	4	5	5	5	5	5	5
not fulfilled	0	1	2	3	4	5	0	1	2	3	4	5
	d24	d25	d26	d27	d28	d29	d30	d31	d32	d33	d34	d35

Because the number of deontic-type rules is so large, only a few examples of the thirty-six possible rules are shown below:

d2 IF a child is NOT accompanied by an adult,
THEN IT IS PERMITTED THAT the ushers NOT admit the child,

d7 WHETHER OR NOT a child is accompanied by an adult,
IT IS PERMITTED THAT the ushers NOT admit the child, AND
IT IS PERMITTED THAT the ushers admit the child.

d18 IF a child is accompanied by an adult,
THEN IT IS PERMITTED THAT the ushers admit the child.

d29 IF a child is accompanied by an adult,
THEN IT IS OBLIGATORY THAT the ushers NOT admit the child,
BUT OTHERWISE, IT IS OBLIGATORY THAT the ushers admit the child.

The other thirty-two can be generated from Table 3 in a straightforward manner.

The same formula applies to determine the possible number of one-condition, one-result deontic rules as applied to determine the possible number of corresponding descriptive rules:

$$D = R^C = 6^2 = 36$$

where D is the number of different deontic rules.

4. Single condition rules: Hohfeldian structure— Finally, for Hohfeldian results the number of values of conditions remains at two, but the number of values of results is thirty-six. These thirty-six values, which are set forth in Table 1, are conveniently represented as the intersections of a 6 x 6 matrix whose rows are Hohfeldian privilege-duty relations and whose columns are Hohfeldian disability-power relations. The six privilege-duty relations of the rows of Table 1 are:

0 NONE	None of the five that follow
1 PR(Nb,x,y) &PR(b,x,y)	Person_y has the PRIVILEGE with respect to person_x to do NOT_b, AND person_y has the PRIVILEGE with respect to person_x to do b.
2 PR(Nb,x,y)	Person_y has the PRIVILEGE with respect to person_x to do NOT_b.
3 PR(b,x,y)	Person_y has the PRIVILEGE with respect to person_x to do b.
4 DU(Nb,x,y)	Person_y has the DUTY to person_x to do NOT_b.
5 DU(b,x,y)	Person_y has the DUTY to person_x to do b.

The six disability-power relations of the columns of Table 1 are:

0 NONE	None of the five that follow
1 DI(Nb,LR,y) &DI(b,LR,y)	Person_y has a DISABILITY to create LEGAL_RELATION_LR by doing NOT_b, AND person_y has a DISABILITY to create LEGAL_RELATION_LR by doing b.
2 DI(Nb,LR,y)	Person_y has a DISABILITY to create LEGAL_RELATION_LR by doing NOT_b.
3 DI(b,LR,y)	Person_y has a DISABILITY to create LEGAL_RELATION_LR by doing b.
4 PO(Nb,LR,y)	Person_y has a POWER to create LEGAL_RELATION_LR by doing NOT_b.
5 PO(b,LR,y)	Person_y has a POWER to create LEGAL_RELATION_LR by doing b.

Abbreviations

PR PRIVILEGE DU DUTY DI DISABILITY PO POWER

TABLE 4

THE 1296 DIFFERENT HOHFELDIAN-STRUCTURAL RULES OF A SINGLE CONDITION AND A SINGLE RESULT

Values of Conditions	Values of Results																			
fulfilled	0.0	0.0	0.0	...	0.0	0.0				0.1	0.1	0.1	...	0.1	0.1					
not fulfilled	0.0	0.1	0.2	...	5.4	5.5				0.0	0.1	0.2	...	5.4	5.5					
	h	h	h		h	h				h	h	h		h	h					
	0	1	2		3	3				3	3	3		7	7					
					4	5				6	7	8		0	1					
	Rules																			
fulfilled	0.2	0.2	0.2	...	0.2	0.2	...			5.5	5.5	5.5	...	5.5	5.5					
not fulfilled	0.0	0.1	0.2	...	5.4	5.5	...			0.0	0.1	0.2	...	5.4	5.5					
	h	h	h		h	h				h	h	h		h	h					
	7	7	7		1	1				1	1	1		1	1					
	2	3	4		0	0				2	2	2		2	2					
					6	7				2	2	2		9	9					
										4	5	6		4	5					

The number of different Hohfeldian-type rules for one-condition and one-result is obviously too large to list an example of each of them. Here is a small sample of the many alternatives expressed in Hohfeldian form to give the flavor of some of them:

h1 IF a child is NOT accompanied by an adult,
THEN the USHERS have a DISABILITY to confer admitted status on the child for purposes of purchasing an alcoholic drink at intermission by NOT allowing the child to enter the Apollo theater, AND
the USHERS have a DISABILITY to confer admitted status on the child for purposes of purchasing an alcoholic drink at intermission by allowing the child to enter.

h71 IF a child is accompanied by an adult,

THEN the USHERS have a DISABILITY to confer admitted status on the child for purposes of insuring the child's safety during the performance by NOT allowing the child to enter the Apollo theater, AND
the USHERS have a DISABILITY to confer admitted status on the child for purposes of insuring the child's safety during the performance by allowing the child to enter the Apollo theater, AND
IF a child is NOT accompanied by an adult,
THEN the USHERS have a DUTY to the OWNER to allow the child to enter the Apollo theater, AND the USHERS have a POWER to confer admitted status on the child for purposes of insuring the child's safety during the performance by allowing the child to enter the Apollo theater.

(This rule does not say what happens with respect to the USHERS' POWER or DISABILITY to confer admitted status on the child for purposes of insuring the child's safety by NOT allowing the unaccompanied child to enter.)

h106 IF a child is accompanied by an adult,
THEN the USHERS have a DISABILITY to confer admitted status on the child for purposes of insuring the child's safety during the performance by NOT allowing the child to enter the Apollo theater, AND
IF a child is NOT accompanied by an adult,
THEN the USHERS have a DUTY to the OWNER to allow the child to enter the Apollo theater, AND the USHERS have a POWER to confer admitted status on the child for purposes of insuring the child's safety during the performance by NOT allowing the child to enter the Apollo theater.

(This rule says that, in the same way that theater owners may have liability for the safety of children who are admitted to the theater during the time that they are in the theater, the owners may have a similar liability for children who are wrongfully denied admission during the time that they would have been in the

theater—a reasonable rule, perhaps, for a children's Saturday matinee performance where there is a well known and accepted practice of parents driving children to the theater and dropping them off.)

h1295 WHETHER OR NOT a child is accompanied by an adult, the USHERS have a DUTY to the OWNER to allow the child to enter the Apollo theater, AND
the USHERS have a POWER to confer admitted status on the child for purposes of viewing the performance by allowing the child to enter the Apollo theater.

There are 1292 more examples of different one-condition, one-result Hohfeldian rules that can be generated from Table 4 in a straightforward manner. Whether content can be imagined that will make each of them a sensible rule is an interesting question.

The same formula applies to determine the possible number of one-condition, one-result Hohfeldian rules as determined the possible number of corresponding deontic and descriptive rules:

$$H = R^C = 36^2 = 1296$$

where H is the number of different Hohfeldian rules.

5. Multiple condition rules— When there is more than one condition or more than one result, however, a more complex formula is required. The formula must be extended in two ways: to take into account the increased number of conditions and results, and to take into account higher-level rules made possible by the increased number of conditions. This extended formula is required for multiple conditions and multiple results for all three types of rules: descriptive, deontic, and Hohfeldian. Higher-level rules are those that contain nested IF_THEN statements, such as:

IF sentence_a THEN IF sentence_b THEN sentence_c.

This rule, with two IF_THENs, one nested within the other, is an example of a Level 2 rule. In general, the level number of the rule will be determined by the number of IF_THENs involved in the nesting.

In addition to the possible numbers of rules for the various types of structure at Level 1, there are more rules at higher levels. For rules with two conditions and one result, for example,

there are 81 possible rules of the descriptive type at Level 1 and 162 possible rules of the same type at Level 2. For the same number of conditions and results, there are 1,296 possible rules of the deontic type at Level 1 and 2,592 of the same type at Level 2, and there are 1,679,616 possible rules of the Hohfeldian type at Level 1 and 3,359,332 of the same type at Level 2. In general, there will be twice the number of possible rules at Level 2 as there are at Level 1; there will be 18 times the number at Level 3 as there are at Level 1; there will be 156 times as many at Level 4 as there are at Level 1; and the number at higher levels continues to escalate sharply. With each added condition there is added another level with the associated possible rules at that level.

6. Multiple condition rules: Level 1— First, consider the extension to take into account the increased number of conditions and results. The following formulas specify the number of possible rules at the first level (Level 1) for two conditions and three results:

$$Pv = (Rv*r)*(C*c) = (3*r)*(2*c) = (3*3)*(2*2) = 27*4 = 531.441$$

$$Pd = (Rd*r)*(C*c) = (6*r)*(2*c) = (6*3)*(2*2) = 216*4 = 2.1x10*9$$

$$Ph = (Rh*r)*(C*c) = (36*r)*(2*c) = (36*3)*(2*2) = 46,656*4 = 4.7x10*18$$

where

Pv is the possible number of descriptive rules,

Pd is the possible number of deontic rules,

Ph is the possible number of Hohfeldian rules,

Rv is the number of possible values of descriptive results, which is 3,

Rd is the number of possible values of deontic results, which is 6,

Rh is the number of possible values of Hohfeldian results, which is 36,

r is the number of results,

C is the number of possible values of conditions, which is 2,

c is the number of conditions, and

* represents the exponentiation operation.

More generally, the number of possible rules is a function of the type of logical structure, the number of results, and the number of conditions, that is:

$$P(t,r,c) = (Rt*r)*(C*c)$$

where P is the possible number of rules, a function of t, r, and c, and

t is the type of logical structure.

Notice that this more general formula also works for the case where there is a single condition and a single result. The R and the C values are, in that case, merely raised to the first power, and so their values are not changed.

In addition to the increased number of rules possible by virtue of the increase in the number of conditions or results in accord with the formula above, there is another set of possible rules for each added condition. Each additional set is referred to as being at a different level. The formula will need to be extended to take into account the additional rules possible at each of these added levels.

To see how rapidly the number of possible rules increases with increases in the number of conditions, consider a rule that has two conditions (a and b) and one result (c). At Level 1 there will be (by the formula):

$$Pv = (Rv*r)*(C*c) = (3*1)*(2*2) = 3*4 = 81$$

possible rules of the descriptive type. These eighty-one different rules are summarized in Table 5.

TABLE 5

NUMBER OF POSSIBLE DESCRIPTIVE-TYPE RULES WITH TWO CONDITIONS AND ONE RESULT FOR LEVEL 1

Conditions a b	Results c																												
f f	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
f n	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
n f	0	0	0	1	1	1	2	2	2	0	0	0	1	1	1	2	2	2	0	0	0	1	1	1	2	2	2	2	2
n n	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	0	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
											0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8
	Rules																												
f f	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
f n	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
n f	0	0	0	1	1	1	2	2	2	0	0	0	1	1	1	2	2	2	0	0	0	1	1	1	2	2	2	2	2
n n	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	2	2	2	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5
	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
f f	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
f n	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
n f	0	0	0	1	1	1	2	2	2	0	0	0	1	1	1	2	2	2	0	0	0	1	1	1	2	2	2	2	2
n n	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	8	8	8	8
	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2

Values of Conditions: f Fulfilled
n NOT fulfilled

Values of Results: 0 Indeterminate
1 Does NOT occur
2 Does occur

7. Multiple condition rules: Level 2— To understand why there are twice as many rules at Level 2 as there are at Level 1, it will be helpful to understand what some of the rules at Level 1 assert and to compare them with what rules at Level 2 assert.

Rule v54 states: IF condition_a is fulfilled AND condition_b is fulfilled, THEN result_c occurs.
More briefly: IF a AND b THEN c.

This can be written as an arrow diagram as follows:

```
        >-a-b---> c
where   >-   indicates IF,
        -    indicates AND, and
        --->  indicates THEN.
```

Rule v67 states: (IF a AND b THEN c) AND (IF NOT a OR NOT b THEN NOT c).
Its arrow diagram is:

```
        - >-a-b---> c
        |
        |    -Na-
        - >-|    |---> Nc
             -Nb-

where   -
        |       indicates AND,
        -

        N       indicates NOT, and

        -   -
        |   |   indicates OR.
        -   -
```

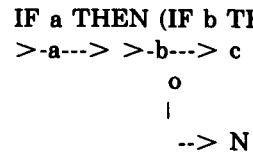
This rule can be stated and diagrammed more briefly by abbreviating its second part as follows:

```
IF a AND b THEN c BUT OTHERWISE NOT.

>-a-b---> c
      o
      |
       --> N
where  o
       |
        --> N  indicates BUT OTHERWISE NOT.
```

It is important to notice that a rule that contains a BUT OTHERWISE NOT with respect to its final condition expresses a rule that is already included in the set of possible rules for Level 1. For example, the rule stated and diagrammed:

IF a THEN (IF b THEN c BUT OTHERWISE NOT).

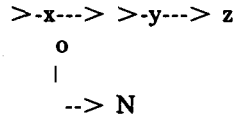


is v63. This rule is different from a rule that contains a BUT OTHERWISE NOT with respect to a condition other than the final one. As we shall see below, the latter kind of rule is one that is not already included in the set of possible rules for Level 1.

It is helpful to examine the rules for Level 2 in terms of two different sets. The first eighty-one rules for Level 2 are of the following form:

IF x THEN (IF y THEN z) BUT OTHERWISE NOT
where x may be a or Na,
y may be b or Nb, and
z may be c or Nc or Indeterminate.

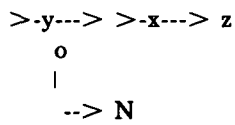
This is a rule schema for eighty-one different rules generated from it when the appropriate values are assigned to x, y, and z. Their arrow diagram schema is of the form:



The second eighty-one rules at Level 2 are of the following form:

IF y THEN (IF x THEN z) BUT OTHERWISE NOT.
where again x may be a or Na,
y may be b or Nb, and
z may be c or Nc or Indeterminate.

Their arrow diagram schema is of the form:



The number of possible rules for this first and second set of eighty-one for Level 2 is determined by the same formula that determined the number of possible rules for Level 1, namely:

$$Pv = (R*r)*(C*c) = (3*1)*(2*2) = 3*4 = 81$$

The number of possible rules for Level 2 is twice the number for Level 1, because the conditions can be written in a different order and a different set of possible rules determined. For the first eighty-one rules the conditions are written in the order xy, and for the second eighty-one rules they are written in the order yx. Thus, there are two different permutations of the conditions between levels, so there are twice the number of rules for Level 2 as for Level 1. Some provision will need to be added to the formula for computing the total number of different possible rules to account for the additional rules made possible by the different permutations of the conditions between levels that produce different possible rules. The number of different possible rules generated by the number of conditions and results and the number of values of the conditions and results will need to be multiplied by the number of different permutations of the conditions between levels.

If the number of levels is L, then the number of permutations of conditions between levels is L factorial. In this case L = 2, so the number of permutations of L is equal to L!, which is 2.

In this two-condition one-result kind of rule the number of possible rules for Level 2 is equal to the number of possible rules for Level 1 times the number of permutations of the conditions between levels.

$$Pv(\text{Level 2}) = Pv(\text{Level 1}) \times (\text{Number of permutations of levels})$$

The total number of possible rules for c conditions and r results will be the sum of the number of possible rules for Level 1 plus the number of possible rules for higher levels (in this case, Level 2), that is:

$$Pv(\text{Total}) = Pv(\text{Level 1}) + Pv(\text{Level 2})$$

The more general formula being used so far to compute both the total number of possible descriptive-type structure rules and the number of possible descriptive-type rules for Level 1

$$P(v,r,c) = (Rv*r)*(C*c)$$

will, for this two-condition kind of rule, need to be modified for computing the number of possible rules for Level 2 to account for the number of permutations of conditions between levels. Adding a parameter L to specify the level, the more general formula will become:

$$P(v,r,c,L) = (Rv*r)*(C*c) \times L!$$

With this addition of the L parameter to specify the level involved, for computing the total number of possible descriptive-type rules the formula for two-condition rule schemas will become:

$$P\_total(v,r,2,2) = P(v,r,2,1) + P(v,r,2,2)$$

Although these formulas for two-condition rule schemas also work for one-condition rule schemas, they are not satisfactory for rule schemas with more than two conditions. Using these formulas for computing the number of possible descriptive-type rules for specific levels and the total number of possible descriptive-type rules, we can compute and summarize the number of possible descriptive-type rules for each level and the total possible number of descriptive-type rules for rules with one and two results and one and two conditions.

$P(v,1,1,1) = (3*1)*(2*1) \times 1! = 9 \times 1 = 9$

$P\_total(v,1,1,1) = P(v,1,1,1) = 9$ (one result)

$P(v,2,1,1) = (3*2)*(2*1) \times 1! = 81 \times 1 = 81$

$P\_total(v,2,1,1) = P(v,2,1,1) = 81$ (two results)

$P(v,1,2,1) = (3*1)*(2*2) \times 1! = 81 \times 1 = 81$

$P(v,1,2,2) = (3*1)*(2*2) \times 2! = 81 \times 2 = 162$

$P\_total(v,1,2,2) = P(v,1,2,1) + P(v,1,2,2)$
$= 81 + 162 = 243$ (one condition)

$P(v,2,2,1) = (3*2)*(2*2) \times 1! = 6{,}561 \times 1 = 6{,}561$

$P(v,2,2,2) = (3*2)*(2*2) \times 2! = 6{,}561 \times 2 = 13{,}122$

$P\_total(v,2,2,2) = P(v,2,2,1) + P(v,2,2,2)$
$= 6{,}561 + 13{,}122$
$= 19{,}683$ (two conditions)

There are similar formulas for computing the possible number of rules for each level and the total possible number of rules for the deontic-type rules and the Hohfeldian-type rules for one- and two-condition rules. The general formulas for rules of all three types of structure with one or two conditions are:

$$P(t,r,c,L) = (Rt*r)*(C*c) \times L!$$

and

$$P\_total(t,r,c,L) = P(t,r,c,1) + \ldots + P(t,r,c,c)$$

The number at each level and the total number of possible deontic-type rules for one and two results and one and two conditions as computed by these formulas are as follows:

$P(d,1,1,1) = (6*1)*(2*1) \times 1! = 36 \times 1 = 36$

$P\_total(d,1,1,1) = P(d,1,1,1) = 36$

$P(d,2,1,1) = (6*2)*(2*1) \times 1! = 1,296 \times 1 = 1,296$

$P\_total(d,2,1,1) = P(d,2,1,1) = 1,296$

$P(d,1,2,1) = (6*1)*(2*2) \times 1! = 1,296 \times 1 = 1,296$

$P(d,1,2,2) = (6*1)*(2*2) \times 2! = 1,296 \times 2 = 2,592$

$P\_total(d,1,2,2) = P(d,1,2,1) + P(d,1,2,2)$
$= 1,296 + 2,592$
$= 3,888$

$P(d,2,2,1) = (6*2)*(2*2) \times 1! = 1,679,616 \times 1 = 1,679,616$

$P(d,2,2,2) = (6*2)*(2*2) \times 2! = 1,679,616 \times 2 = 3,359,232$

$P\_total(d,2,2,2) = P(d,2,2,1) + P(d,2,2,2)$
$= 1,679,616 + 3,359,232$
$= 5,038,848$

The number at each level and the total number of possible Hohfeldian-type rules for one and two results and one and two conditions as computed by these formulas are as follows:

$P(h,1,1,1) = (36*1)*(2*1) \times 1! = 1,296 \times 1 = 1,296$

$P\_total(h,1,1,1) = P(h,1,1,1) = 1,296$

$P(h,2,1,1) = (36*2)*(2*1) \times 1! = 1,679,616 \times 1 = 1,679,616$

$P\_total(h,2,1,1) = P(h,2,1,1) = 1,679,616$

$P(h,1,2,1) = (36*1)*(2*2) \times 1! = 1,679,616 \times 1 = 1,679,616$

$P(h,1,2,2) = (36*1)*(2*2) \times 2! = 1,679,616 \times 2 = 3,359,232$

$P\_total(h,1,2,2) = P(h,1,2,1) + P(h,1,2,2)$
$= 1,679,616 + 3,359,232$
$= 5,038,848$

$P(h,2,2,1) = (36*2)*(2*2) \times 1! = (2.8 \times 10*12) \times 1 = 2.8 \times 10*12$

$P(h,2,2,2) = (36*2)*(2*2) \times 2! = (2.8 \times 10*12) \times 2 = 5.6 \times 10*12$

$P\_total(d,2,2,2) = P(d,2,2,1) + P(d,2,2,2)$
$= (2.8 \times 10*12) + (5.6 \times 10*12)$
$= 8.4 \times 10*12$

8. Number of possible rules: summary— These figures show rather pointedly that for even the most simple legal rules—those that have two or fewer conditions and two or fewer results—the number of possible different rules for the same conditions and results is surprisingly large. There are thousands of different rules with descriptive-type structure, millions of different rules with deontic-type structure, and trillions of different rules with Hohfeldian-type structure with these minimal conditions and results. As startling as this may be for the most simple rules, the numbers increase at increasing rates with rules that have more than two conditions. The formulas for computing the possible numbers of rules must have yet another factor included, which will multiply the results still further.

C. Implications of the Rich Logical Structure of Legal Rules

Far beyond what anyone has hitherto imagined, the logical structure of legal rules is rich in this second sense of the large number of different rules that can be written from the same conditions and results. The logical structure of legal rules is equally rich, and almost as seldom recognized to be so, in the first sense of the multiplicity of interpretations possible for the natural language terms ordinarily used to express such structure. As the logical structure is specified in greater detail in moving from descriptive analysis to deontic analysis to Hohfeldian analysis, the number of different, precisely specifiable rules increases dramatically. What is expressed by ordinary natural language rather poetically, in a global manner that is highly dependent upon context to ascertain meaning, can be made considerably more precise by enriching the natural language with some defined descriptive-type structural terminology. This, in turn, can be still further enriched to achieve a language capable of even greater precision by adding some defined deontic-type structural terminology. Finally, a gigantic enhancement of precision results when Hohfeldian-type structural terminology becomes part of the language used by lawyers to express legal rules in communicating with each other and with computers. In fact, it may only be possible to communicate extensively with computers in sophisticated ways about legal rules in such an enriched language. The use of an enriched language will also result in more effective communication with computers, enhancing their usefulness to lawyers.

What are the implications of recognizing this richness of the

logical structure of legal rules and of having available precise language tools for dealing with it? The very quality of thinking about legal rules is likely to be profoundly affected by having a realistic sense of the complexity of what is involved and having an adequate language in which to do such thinking. Wherever legal drafters intend to be clear about the logical relationships involved in legal rules, there will be more adequate tools to achieve such clarity. Wherever interpreters of existing legal rules are faced with such rules written entirely in natural language not enriched by defined structural terminology, detection of alternative logical interpretations will be greatly enhanced. Anyone confronted with the vast number of different possibilities will be more likely to appreciate the usefulness of a language rich enough to distinguish precisely among those possibilities. Regulations can be more informative; contracts can better achieve what parties want; statutes can more adequately serve the intended purposes; wherever better writing can enhance the quality of legal life, this is a means for approaching that goal.

II. 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 normalized by expressing its between-sentence logical structure using defined structural terms. It can be stated in any one of four different normalized forms: elementary normalized form, basic normalized form, clear normalized form, or advanced normalized form. A computer program called NORMALIZER has been developed to assist analysts to draft legal rules in normalized form and to transform one normalized form to another automatically. The deontic and Hohfeldian structure within sentences can also be expressed by other defined structural terminology in the same four normalized forms. The discussion of normalization and the game presented in this article deal only with descriptive-type structure. Normalization of and games involving deontic-type structure and Hohfeldian-type structure will be dealt with in a subsequent article.

The first sentence of section 315(a) of the Federal Communications Act,[3] dealing with facilities for candidates for public office, will be used as an example to illustrate (1) some of the characteristics of normalization and (2) the process of trans-

3. 47 U.S.C. § 315(a) (1982).

forming an existing legal rule into normalized form.

The federal rule that requires that rival political candidates get equal air time, the first sentence of section 315(a) consists of three constituent sentences that are related to each other by the following logical structure:

If sentence_1, sentence_2: Provided, That sentence_3.

The complete text of the sentence is:

EQUAL-TIME RULE: PRESENT VERSION

CANDIDATES FOR PUBLIC OFFICE; FACILITIES; RULES

(a) If any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station, he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station: *Provided,* That such licensee shall have no power of censorship over the material broadcast under the provisions of this section.[4]

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

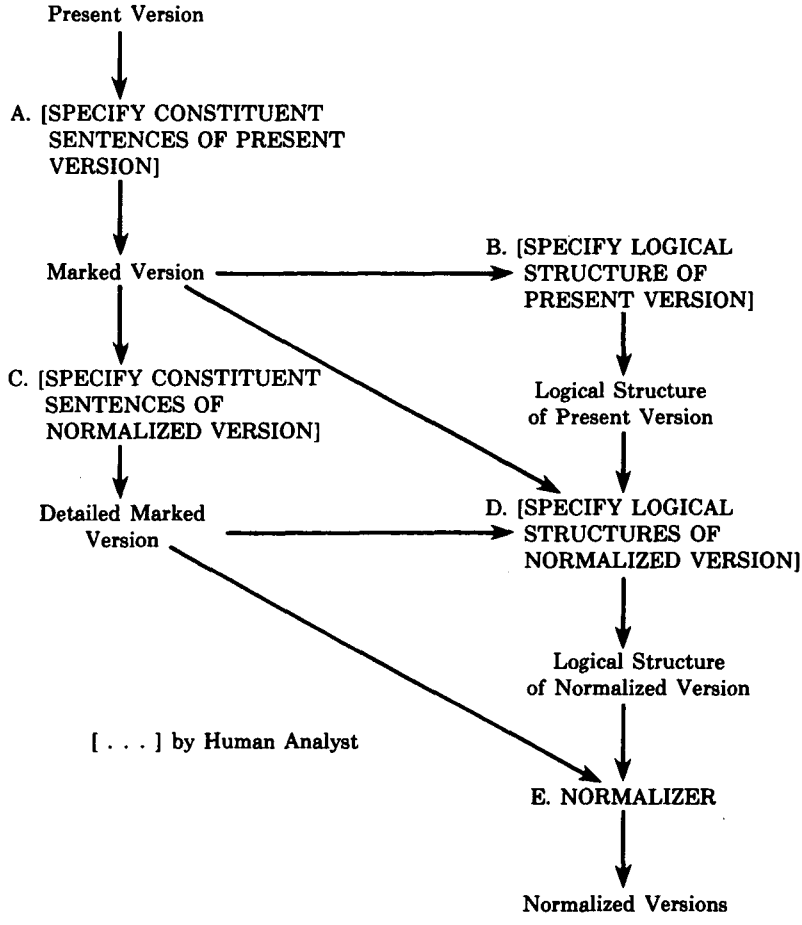
1. Use the Present Version to specify the constituent sentences of the Present Version to construct the Marked Version.
2. Use the Marked Version to construct the Structure of the Present Version by replacing the constituent sentences with their abbreviations.
3. Use the Marked Version to specify the constituent sentences of the Normalized Versions and make the Detailed Marked Version.
4. 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.
5. 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.

4. *Id.*

Figure 1

SUMMARY OF PROCESS OF NORMALIZING A LEGAL RULE



A. Constructing the Marked Version

The first step in converting the Present Version of this statement into a normalized form is for the analyst to identify and name the constituent sentences of the Present Version. At the same time, the analyst also identifies the structural terminology used in the Present Version to relate the constituent sentences to each other logically. The analyst edits the Present Version to produce the Marked Version of the statement by marking the boundaries of the constituent sentences with square brackets and giving each of them a short name that is placed at the beginning of the sentence and followed by a colon. There should be a high degree of agreement among native speakers of English in arriving at the Marked Version of a statement. In this case, the Marked Version of the first sentence of section 315(a) is:

THE EQUAL-TIME RULE: MARKED VERSION

> (a) If [a: any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station], [b: he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station]: Provided, That [nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section]. ...

The abbreviation 'nc' is chosen for the third sentence, because that sentence asserts a negation.

B. Constructing the Logical Structure of the Present Version

The second step in the process of transforming a legal rule into normalized form is to specify the Logical Structure of the Present Version of the norm (the Present Version in abbreviated form). Examination of the above Marked Version to separate it into complete sentences that are connected by structural terminology indicates that the Logical Structure of the Present Version is as follows:

THE EQUAL-TIME RULE: LOGICAL STRUCTURE OF THE PRESENT VERSION

If a, b: Provided, That nc. (Abbreviated Version)

C. Constructing the Detailed Marked Version

The third 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 between different analysts. In the Detailed Marked Version the analyst must specify and name the constituent sentences of the various Normalized Versions. This is in contrast to 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 inadvertently change the meaning of a provision in an unwanted way. In specifying in the Detailed Marked Version what shall be the constituent sentences of the Normalized Versions, the analyst needs to decide which sentence parts of the Present Version need to be expanded into full sentences so that (1) all questions about all ambiguities detected may be expressed in terms of those constituent sentences, and (2) all alternative structural interpretations may be expressed in terms of those sentences. Clearly, this is the difficult part that requires practice and experience to do well. This part must be done by a human analyst. There is little hope that NORMALIZER (or, we think, any other such program) will ever make these kinds of judgments satisfactorily.

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.

THE EQUAL-TIME RULE: DETAILED MARKED VERSION

(a) If [a1: any licensee { shall } permit<s> any person who is a legally qualified candidate for any public office to use a broadcasting station], then [b: he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station]: Provided,

> That [nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section]. ...

D. Constructing the Logical Structure of the Normalized Versions

The fourth 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), 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 that describe different aspects of the alternative logical interpretations.

QUESTIONS ABOUT LOGICAL STRUCTURE OF THE EQUAL-TIME RULE

The questions below deal with three different kinds of logical structure. The first is the interpretation of terms that indicate between-sentence logical structure. The second is the interpretation of terms that indicate within-sentence logical structure. The third 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. The first two questions deal with the interpretation of the conditional/conjunctive terms, 'if' and 'Provided, That', which occur in the provision. These are questions about the between-sentence logical structure. The next three questions deal with the normative (deontic and Hohfeldian) and descriptive interpretation of the three 'shall' terms that occur in the provision. They

concern the interpretation of sentence-parts—matters of within-sentence logical structure. The final question has to do with how the sentence-parts of the overall provision relate to each other—in effect, where the parentheses are to be put.

Q1 Which interpretation of the term 'If' that precedes sentence_a is most appropriate?

(A) IF a THEN ... .
(B) IF a THEN ... BUT OTHERWISE NOT ... .
(C) IF a THEN ... BUT OTHERWISE NOT.+... .

(In these questions, the ellipses '...' represent the parts of the provision not being focused on in this particular question. In some cases, it may empty.)

(A) IF
[a: any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station],
THEN
... .

(B) IF
[a: any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station],
THEN
...,
BUT OTHERWISE, NOT ... .

that is

1. IF
[a: any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station],
THEN
..., AND
2. IF
IT IS NOT SO THAT
[a1: a licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station],
THEN
... IT IS NOT SO THAT ... shall ... .

(C) IF
[a: any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station],

THEN
...,
BUT OTHERWISE, NOT.+... .

that is

1. IF
   [a: any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station],
   THEN
   ..., AND
2. IF
   IT IS NOT SO THAT
   [a1: a licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station],
   THEN
   ... shall NOT ... .

Q2 Which interpretation of the term 'Provided, That' that precedes sentence_nc is most appropriate?

(A) ... PROVIDED THAT nc.
IF nc THEN ... .
(B) ... PROVIDED THAT.2 nc.
IF nc THEN ... BUT OTHERWISE NOT ... .
(C) ... PROVIDED THAT.+ nc.
IF nc THEN ... BUT OTHERWISE NOT.+... .
(D) ... PROVIDED THAT.& nc.
... AND nc.

(A) IF
[nc: such licensee shall have no power of censorship over the material broadcast under the provision of this section],
THEN
... .

(B) IF
[nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section],
THEN
...,
BUT OTHERWISE, NOT ... .

that is

1. IF
   [nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section],

THEN
..., AND
2. IF
[c: such licensee shall have power of censorship over the material broadcast under the provisions of this section],
THEN
... IT IS NOT SO THAT ... shall ... .

(C) IF
[nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section],
THEN
...,
BUT OTHERWISE, NOT.+... .

that is

1. IF
[nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section],
THEN
..., AND
2. IF
[c: such licensee shall have power of censorship over the material broadcast under the provisions of this section],
THEN
... shall NOT ... .

(D) ..., AND
[nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section].

Q3 Which interpretation of the term 'shall' in sentence_a is most appropriate?

(A) [a: ... SHALL(0.0) ...].
(B) [a: ... SHALL(5.0) ...].
(C) (A) OR (B).

Nine additional Hohfeldian-type structural interpretations of 'shall' also exist, namely: SHALL(0.4), SHALL(0.5), SHALL(1.5), SHALL(4.5), SHALL(5.1), SHALL(5.2), SHALL(5.3), SHALL(5.4), and SHALL(5.5), but these are all such improbable interpretations of the 'shall' in sentence_a that they are not worth discussing in detail here. (See Table 1a and the text that follows it.)

(A) [a: any licensee SHALL(0.0) permit any person who is a legally qualified candidate for any public office to use a broadcasting station].

that is

any licensee permits a person who is a legally qualified candidate for any public office to use a broadcasting station.

(B) [a: any licensee SHALL(5.0) permit any person who is a legally qualified candidate for any public office to use a broadcasting station].

that is

any licensee has a DUTY to anyone to permit a person who is a legally qualified candidate for any public office to use a broadcasting station.

(C) [a: any licensee SHALL(0.0) permit any person who is a legally qualified candidate for any public office to use a broadcasting station, OR
any licensee SHALL(5.0) permit any person who is a legally qualified candidate for any public office to use a broadcasting station].

(This alternative, in effect, says that the licensee fulfills this condition Either (1) by permitting a candidate to use the broadcast station or (2) by contracting to permit a candidate to use it or (3) by doing both.)

Q4 Which interpretation of the term 'shall' in sentence_b is most appropriate?

(A) [b: ... SHALL(0.0) ...].
(B) [b: ... SHALL(5.0) ...].

Similar to question Q3, nine additional Hohfeldian-type interpretations of the 'shall' in sentence_b exist, but they are so improbable that nothing more will be said about them here.

(A) [b: he SHALL(0.0) afford equal opportunities to all other such candidates for that office in the use of such broadcasting station].

that is

he affords equal opportunities to all other such candidates for that office in the use of such broadcasting station.

(B) [b: he SHALL(5.0) afford equal opportunities to all other such candidates for that office in the use of such broadcasting station].

that is

he has a DUTY to afford equal opportunities to all other such candidates for that office in the use of such broadcasting station.

Q5 Which interpretation of the phrase 'shall have no power' in sentence_nc is most appropriate?

(A) [nc: ... SHALL_NOT(0.3) ...].
(B) [nc: ... SHALL_NOT(1.0) ...].
(C) [nc: ... SHALL_NOT(1.3) ...].
(D) [nc: ... SHALL_NOT(2.0) ...].
(E) [nc: ... SHALL_NOT(2.3) ...].
(F) [nc: ... SHALL_NOT(4.0) ...].
(G) [nc: ... SHALL_NOT(4.3) ...].

There are eight other Hohfeldian-type structural interpretations of 'shall not', namely: SHALL_NOT(0.0), SHALL_NOT(0.1), SHALL_NOT(0.2), SHALL_NOT(3.3), SHALL_NOT(4.1), SHALL_NOT(4.2), SHALL_NOT(4.4), and SHALL(4.5), but these are all such improbable interpretations of the 'shall have no power' in sentence_a that they are not worth discussing in detail here. (See Table 1b.) Notice also in the original Table 1b, there were no entries shown for 1.0 or 2.0. This emphasizes just how tentative the suggested entries in Table 1b were meant to be. In this example, subsequently considered, it is apparent that these two entries should be added to the thirteen already listed in Table 1b.

(A) [nc: such licensee SHALL_NOT(0.3) censor the material broadcast under the provisions of this section].

that is

such licensee has a DISABILITY (has no POWER) to censor the material broadcast under the provisions of this section.

(B) [nc: such licensee SHALL_NOT(1.0) censor the material broadcast under the provisions of this section].

that is

such licensee has both
(a) a PRIVILEGE to censor
(b) a PRIVILEGE to NOT censor
the material broadcast under the provisions of this section.

that is

to the extent that licensees by other federal statutes have a DUTY to NOT utter obscene, indecent, or profane language by means of radio communications (DUTY to censor), this provision relieves the licensees of that DUTY to censor, but does not go so far as to impose upon the broadcaster the DUTY to NOT censor.

(C) [nc: such licensee SHALL_NOT(1.3) censor the material broadcast under the provisions of this section].

that is

such licensee has
(a) a PRIVILEGE to censor and
(b) a PRIVILEGE to NOT censor and
(c) a DISABILITY to censor
the material broadcast under the provisions of this section.

(D) [nc: such licensee SHALL_NOT(2.0) censor the material broadcast under the provisions of this section].

that is

such licensee has a PRIVILEGE to NOT censor the material broadcast under the provisions of this section.

(And by this interpretation, the provision says that the licensee has been relieved of the DUTY to NOT utter prohibited language (to censor it) and now has a PRIVILEGE to NOT censor it, but it does not say anything about whether he now has a PRIVILEGE to censor prohibited language.)

(E) [nc: such licensee SHALL_NOT(2.3) censor the material broadcast under the provisions of this section].

that is

such licensee has both
(a) a PRIVILEGE to NOT censor
(b) has a DISABILITY to censor
the material broadcast under the provisions of this section.

(F) [nc: such licensee SHALL_NOT(4.0) censor the material broadcast under the provisions of this section].

that is

such licensee has a DUTY to NOT censor the material broadcast under the provisions of this section.

(G) [nc: such licensee SHALL_NOT(4.3) censor the material broadcast under the provisions of this section].

that is

such licensee has both
(a) a DUTY to NOT censor
(b) a DISABILITY to censor
the material broadcast under the provisions of this section.

Q6 Which interpretation of how the constituent sentences are to be grouped in relationship to each other is most appropriate?

(A) If a1, (b: Provided, That nc).
(B) (If a1, b): Provided, That nc.

(C) Provided, That (nc if a1), b.

(A) If
[a1: any licensee permits any person who is a legally qualified candidate for any public office to use a broadcasting station],
then
([b: he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station:]
Provided, That
[nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section]).

(B) (If
[a1: any licensee permits any person who is a legally qualified candidate for any public office to use a broadcasting station],
then
[b: he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station]):
Provided, That
[nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section].

(C) Provided, That
([nc: such licensee shall have no power of censorship over the material broadcast under the provisions of this section]
if
[a1: any licensee permits any person who is a legally qualified candidate for any public office to use a broadcasting station]),
[b: he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station].

E. Producing the Normalized Version Automatically by NORMALIZER

When the analyst has completed these four tasks, NORMALIZER can take over to produce the various Normalized Versions. Thus, the process of normalizing a rule is not as easy as A B C. It is, however, from the analyst's point of view as easy as A B C D, where the D part is a worthy challenge.

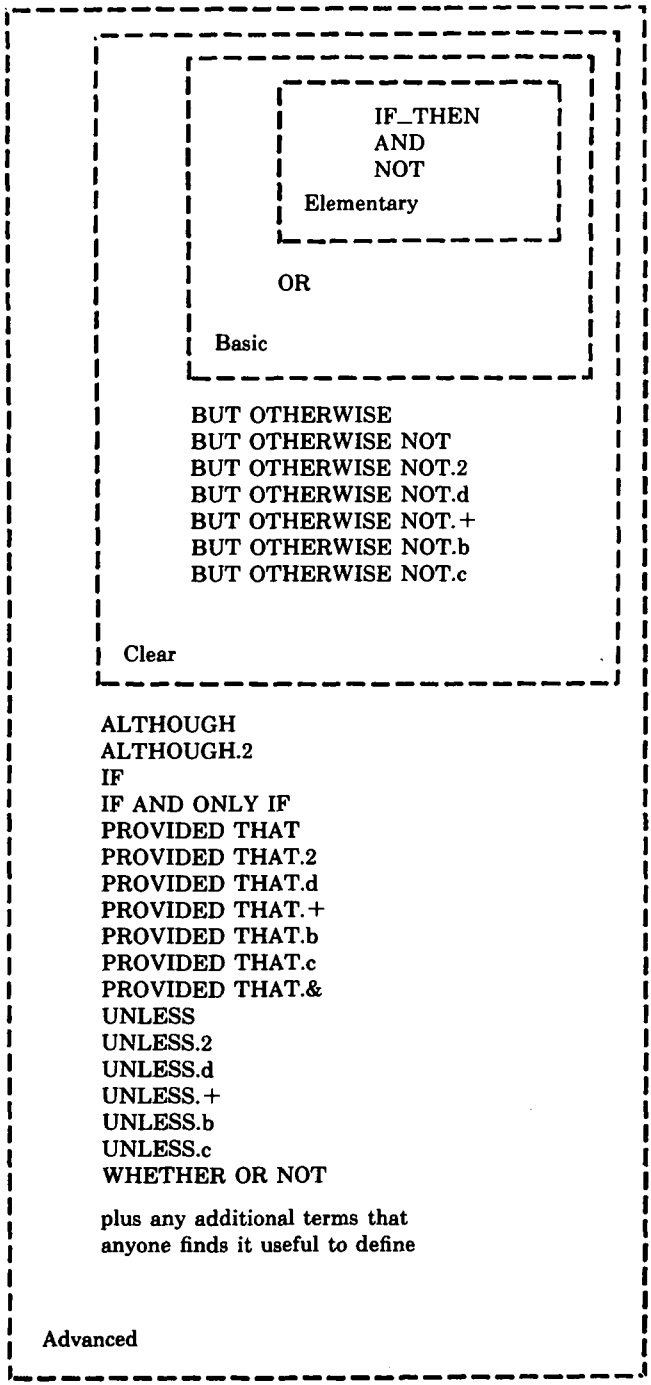
In using NORMALIZER, a legal analyst must first specify the Parenthesized Logical Expression and Detailed Marked Version of the legal rule being normalized; then NORMALIZER can be used to generate the Outline and Normalized Version of the rule. Thus, the interpretation of the Original Text is a result 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 associates a short name with each of them. The short names of the sentences in the Detailed Marked Version are used in the Parenthesized Logical Expression to represent those sentences. 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 horizontally and vertically. In the Outline, short names are used to represent the constituent sentences, but in the Normalized Version the short names are replaced by the sentences themselves. In the Normalized Version, the logical structure of the rule is presented in two dimensions—horizontally and vertically—by means of defined (and signalled) structural terminology.

Unpacking the logical structure of a normalized rule into progressively more basic structural terms is done automatically by part of NORMALIZER. A completely unpacked rule (an elementary normalized one) will be expressed in terms of three of the four basic structural terms (AND, OR, NOT, and IF_THEN) and will be in the form of a conjunction of elementary norms. Although some drafters may prefer to use advanced Normalized Versions, probably the most frequently used ones will be clear Normalized Versions and basic Normalized Versions. The four forms of normalization of between-sentence logical structure are summarized in Figure 2.

Figure 2

THE FOUR LEVELS OF NORMALIZING BETWEEN-SENTENCE LOGICAL STRUCTURE



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 materials. 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 appropriately fits each individual context.

Having legal materials expressed in such form will permit an even more profound change from a reader's point of view. It will enable individual readers to each choose that form of the expression of a set of ideas that each prefers and can most easily understand. Those readers who are thoroughly familiar with the defined structural language of normalization will likely prefer a condensed normalized form that uses definitions extensively. On the other hand, those just becoming familiar with defined structural terminology will likely prefer a more expanded version that uses only more basic structural terminology. The condensed versions will not be abstracts of the more expanded versions. Each will express the complete set of ideas involved. A reader will be able to choose the versions that s/he can read and understand most easily. Over time, each reader will be learning and moving in the direction of coping effectively with the more condensed versions.

The capability to generate easily various equivalent, but different, normalized forms of legal rules introduces the possibility of drastic change in both the production and use of legal documents.[5]

The answers given to the six questions determine the content and parenthesization of the parenthesized Logical Expression,

5. For a more detailed account of the features of the NORMALIZER program, see Allen & Saxon, *Computer Aided Normalizing and Unpacking: Some Interesting Machine-Processable Transformations of Legal Rules*, in Proceedings of the University of Houston Annual Conference of Law and Technology, August 13-22, 1984, and in COMPUTING POWER AND LEGAL REASONING 495 (C. Walter ed. 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.

which specifies (1) the between-sentence structure of the Present Version and (2) the interpretation of the terms used to indicate the between-sentence and within-sentence logical structure of the constituent sentences of the Detailed Marked Version. If an analyst selects A D ___ ___ ___ A as the appropriate answers to questions Q1, Q2, and Q6, then the Parenthesized Logical Expression is determined to be: a > (b&nc). If the answers ___ ___ A B G ___ are selected as the appropriate ones for questions Q3, Q4, and Q5, then the within-sentence logical structures of sentences a, b, and nc are interpreted so that those sentences are determined to be:

[a: any licensee permits a person who is a legally qualified candidate for any public office to use a broadcasting station].
[b: he has a DUTY to afford equal opportunities to all other such candidates for that office in the use of such broadcasting station].
[nc: such licensee has both
(a) a DUTY to NOT censor
(b) a DISABILITY to censor
the material broadcast under the provisions of this section].

With this Parenthesized Logical Expression and these constituent sentences as inputs, the NORMALIZER program will produce the following Normalized Version of the EQUAL-TIME RULE:

IF
1. [a: any licensee permits a person who is a legally qualified candidate for any public office to use a broadcasting station],
THEN
2. [b: he has a DUTY to afford equal opportunities to all other such candidates for that office in the use of such broadcasting station], AND
3. [nc: such licensee has both
(a) a DUTY to NOT censor and
(b) a DISABILITY to censor
the material broadcast under the provisions of this section].

Alternatively, the NORMALIZER program can also produce the following unlabeled Normalized Version of the EQUAL-TIME

RULE:

IF
1. any licensee permits a person who is a legally qualified candidate for any public office to use a broadcasting station,
THEN
2. he has a DUTY to afford equal opportunities to all other such candidates for that office in the use of such broadcasting station, AND
3. such licensee has both
   (a) a DUTY to NOT censor
   (b) a DISABILITY to censor
   the material broadcast under the provisions of this section.

In this description of the process of transforming an existing legal rule into one of its Normalized Versions, the five steps have been illustrated using the EQUAL-TIME RULE of Section 315(a) of the Federal Communications Act.[6] The description indicates the roles of the human analyst and the NORMALIZER computer program in carrying out the transformation. We turn now to the game that familiarizes players with both (a) how to construct normalized legal rules and (b) the content of the legal rules involved in each match that is played.

III. THE CLEAR LEGAL LANGUAGE GAME

This game about legal language deals with the logical structure of legal rules. It is designed to provide practice in the use of defined structural terms in order to be clear in expressing and interpreting the logical relationships between and within sentences used in legal rules. The dominant theme of the present version of this instructional tool is that in order to be clear, language should be well structured. When a statement is well structured, the relationships between its constituent sentences are expressed by defined structural terms. Later versions of the game will deal with the clarity of the logical structure within sentences.

The rest of this section describes and sets forth the rules that defined the CLEAR LEGAL LANGUAGE Game and describes

6. 47 U.S.C. § 315(a) (1982).

the computer program that serves as a source of information about the sample legal rules considered in playing the game. The object of playing the CLEAR LEGAL LANGUAGE Game is to enable legal drafters and interpreters to develop skill in expressing and recognizing clear legal rules. The skill developed is three-edged in the sense that it can also be used for purposes of interpreting unclear legal rules and expressing intentionally vague or ambiguous ones. The legal drafter or interpreter, of course, needs to be adept at all three.

The CLEAR LEGAL LANGUAGE Game is a resource-allocation game similar to WFF 'N PROOF, EQUATIONS, and ON-SETS;[7] the resources being allocated are ideas. Those familiar with any one of these games will recognize a similar pattern in the CLEAR LEGAL LANGUAGE Game (hereafter referred to as the CLL Game). Different aspects of each of these three games are present in the CLL Game, along with aspects of yet another game called QUERIES 'N THEORIES.

The players of the CLL Game seek to construct well structured statements of legal rules and get considerable opportunity to deal with problems of constructing complex examples of such statements. Recall that statements that are in normalized form are either conditionals (IF_THEN statements) or denials of conditionals (IT IS NOT SO THAT IF_THEN). For example, the following statement is in normalized form:

> IF certain specified conditions are met,
> THEN certain specified legal results occur.

as is the following statement:

> IT IS NOT SO THAT
> IF certain other conditions are met
> THEN certain other specified results occur.

The CLL Game is designed such that each player plays each match only once. In addition to providing learners an opportunity to practice constructing complex normalized legal rules, the CLL Game familiarizes participants with the content of the statute, rule, or regulation being considered in that particular match. Teachers who want their students to become familiar

7. WFF 'N PROOF: The Game of Modern Logic (1961), EQUATIONS: The Game of Creative Mathematics (1964), ON-SETS: The Game of Set Theory (1966), and QUERIES 'N THEORIES: The Game of Science and Language (1968). All of these are published by Autotelic Instructional Materials Publishers, 1490 South Boulevard, Ann Arbor, MI 48104.

with particular statutory or other provisions can construct matches of the CLL Game by specifying (a) the list of constituent sentences in the statement of the provision and (b) how the sentences are structurally related—that is, the normalized form of the teacher's interpretation of the provision.

During each match, participants may ask questions about the normalized rule being sought. Some means of answering those questions must be provided. There are at least three options: (1) the teacher can provide the answers, (2) answers can be made available from a computer program, or (3) a student-referee can be supplied with information to provide answers. In many situations the second or third will be the most practical alternative. The role of referee provides a useful learning opportunity.

A. Sketch of the CLEAR LEGAL LANGUAGE Game

We begin the description of the CLL Game by a brief overview—a sketch of the game. This sketch is summarized in Figure 3.

(A) The first player starts the process of setting the GOAL(S) by setting one result as (part of) the GOAL(S).

(B) The players take turns making plays, which consist of:

1. optionally seeking information about the normalized rule by asking the ANSWER SOURCE a question, and
2. moving RESOURCES either to one of the LIMITATIONS sections or to the GOAL(S) until somebody
   a) challenges, or
   b) declares force-out.

The challenge or force-out declaration ends the moving of RESOURCES. It puts the burden of proof on somebody to show:

1. what the normalized rule is, and
2. that a SOLUTION is still possible from the RESOURCES in PERMITTED and REQUIRED and the unmoved RESOURCES that are allowed.

(C) The sustaining of the burden of proof (or failure to do so) determines the scoring and ends the match.

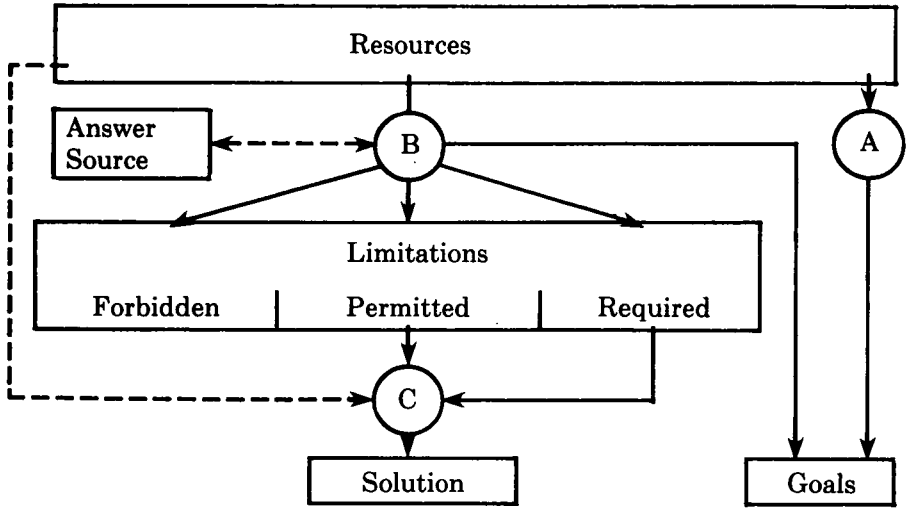
IF the burden of proof to show the normalized rule is sustained,
THEN the match ends immediately,
BUT OTHERWISE, the optional asking of questions continues (but the moving of RE-

SOURCES stops) until somebody can show what the normalized rule is, and then the match ends.

From this brief sketch of the CLL Game it is unlikely that anyone yet has a sufficient understanding of it to play. At this point a sample match of the CLL Game will be described to enable readers to get a little of the flavor of an actual match before the game itself is described in more detail.

Figure 3

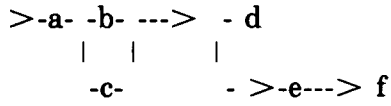
SKETCH OF THE CLEAR LEGAL LANGUAGE GAME



B. Sample Match of the CLEAR LEGAL LANGUAGE Game

This first sample match will be presented without any content associated with the six lower-case letters that represent sentences that are contained in the legal rule that the players are seeking to construct. Although in an actual match the sentences will always be available, they are omitted from this sample match in order to focus attention upon how the play proceeds, rather than upon the content of the rule.

The six sentences that appear in the rule that the players are seeking are represented by the letters: a b c d e f. The logical relationships among these sentences in the rule are represented by the following arrow diagram:



These logical relationships are unknown by the players. By their questions to the ANSWER SOURCE, they seek to find out how the sentences are related to each other. The content of the sentences will be of some help. The sentences themselves are omitted in this example because we wish to focus attention on how the players gain information about the logical structure of the rule being sought by the questions that they ask.

This set of logical relationships among the six sentences in this match can be expressed in another way, by a Parenthesized Logical Expression, as follows:

(a&(bVc)) > (d&(e>f)).

And finally, they can also be expressed by a statement that uses the defined between-sentence terms with parentheses where needed:

IF a AND (b OR c) THEN (d AND IF e THEN f).

With some representation of the logical structure of the rule, the ANSWER SOURCE will be able to answer the players' questions.

Suppose that Player 1 (P1) starts the match by setting f as the GOAL. The situation in the match can then be summarized

as follows:

Play	Player	Questions	Answers	Move F P R	GOAL(S)
1	P1				f

It is now P2's turn. Both he and P3 analyze P1's choice and conclude that it is not a flub and is not a force-out. P3 also concludes that she should not challenge, while P2 concludes that he should neither challenge nor declare force-out. So, it is safe for him to move, and he has the option of asking questions. P2 asks:

abc > def

to which the ANSWER SOURCE responds:

N N ?

The questions asked are:

1. Do a, b, and c each represent a sentence that expresses a condition, and are all of the conditions of the rule expressed by these sentences?
2. Do d, e, and f each represent a sentence that expresses a result, and are all of the results of the rule expressed by these sentences?
3. If the conditions a, b, and c are fulfilled, do the results d, e, and f occur by virtue of the rule of this match? (In other words, is there a pathway in the arrow diagram of the rule to reach each of the results?)

The answers given are:

1. No, because e represents a condition.
2. No, because e does not represent a result.
3. The question is not meaningful, because it makes the unwarranted assumption that e represents a result.

After obtaining the answers, P2 moves the a to PERMITTED. The situation now is:

Play	Player	Questions	Answers	Move F P R	GOAL(S)
1	P1				f
2	P2	abc>def	N N ?	a	

It is now P3's turn. Both she and P1 analyze P2's choice. They both conclude that it is not a flub and is not a force-out so neither challenges P2's move, and P3 does not declare force-out. P3 concludes that it is safe for her to move or to add a result to the GOAL(S). P3 asks the questions:

.abc > .d

to which the ANSWER SOURCE responds:

Y Y Y

The questions asked are:

1. Do a, b, and c each represent a sentence that expresses a condition? (The period that precedes the abc in .abc indicates that there is no second part to this question, that is, it does not ask whether all of the conditions are expressed by these sentences.)
2. Does d represent a sentence that expresses a result? (The period that precedes the d in .d indicates that there is no second part to this question either.)
3. If the conditions a, b, and c are fulfilled, does the result d occur by virtue of the rule of this match? (In other words, is there a pathway in the arrow diagram of the rule to reach the result d?)

The answers given are:

1. Yes.
2. Yes.
3. Yes.

Then P3 adds d to the GOAL(S). The situation now is:

Play	Player	Questions	Answers	Move F P R	GOAL(S)
1	P1				f
2	P2	abc>def	N N ?	a	
3	P3	.abc>.d	Y Y Y		d

It is now P1's turn again. He and P2 analyze P3's choice to add d to the GOAL(S). They both conclude that it is not a flub. P1 asks the question:

abce > df

to which the ANSWER SOURCE responds:

Y Y Y

and then P1 moves the c to PERMITTED. The situation now is:

Play	Player	Questions	Answers	Move F P R	GOAL(S)
1	P1				f
2	P2	abc>def	N N ?	a	
3	P3	.abc>.d	Y Y Y		d
4	P1	abce>df	Y Y Y	c	

It is now P2's turn again. He concludes that moving c to PERMITTED is an A-flub, because he believes that the rule is

((aVB)&c) > (d&(e>f))

so that with one more RESOURCE (namely the e) there is a sufficient set of conditions a c e (a SOLUTION) to reach the results d and f (the GOAL(S)) by application of the rule. So, he makes an A-flub challenge. P3, who believes that the rule is

(a&(bVc)) > (d&(e>f))

also concludes that permitting the c allows the same SOLUTION with one more RESOURCE, so she joins P2. Both have two parts to their burden of proof. Both write the SOLUTION a c e and the OK ALTERNATIVE MOVE Fb. The situation now is:

Play	Player	Questions	Answers	Move F P R	GOAL(S)
1	P1				f
2	P2	abc>def	N N ?	a	
3	P3	.abc>.d	Y Y Y		d
4	P1	abce>df	Y Y Y	c	

		Action	SOLUTION	OK Move
5	P2	CH A	a c e	Fb
	P3	joins P2	a c e	Fb

The phase of the CLL Game in which the players move RESOURCES and add to the GOAL(S) has now ended in this match. All that remains is for at least one of the players to determine how the sentences of the match are structurally related to form the rule. The players now enter a phase of only asking questions that will continue until at least one of the players writes the rule by asking an ultimate question. The correctness of the SOLUTIONS and OK ALTERNATIVE MOVES written by P2 and P3 cannot be evaluated until one of the players writes the rule. After those with the burden of proof have written their SOLUTIONS and OK ALTERNATIVE MOVES, all of the players have the opportunity to write an ultimate question. The three players write the following rules as the ultimate question:

P1 ((aVb)&c) > (d&(e>f))
P2 Same as P1's
P3 (a&(bVc)) > (d&(e>f))

to which the ANSWER SOURCE responds:

MORE AND LESS
MORE AND LESS
CONGRATULATIONS

The responses of the ANSWER SOURCE to the ultimate questions asked by the three players indicate

(1) that the candidate rule in P1's question says both more than the actual rule says and less than the actual rule says,
(2) that the candidate rule in P2's question also says both more and less than the actual rule says, and
(3) that the candidate rule in P3's question is the actual rule.

P3's question ends the match. The situation now is:

Play	Player	Questions	Answers	Move F P R	GOAL(S)
1	P1				f
2	P2	abc>def	N N ?	a	
3	P3	.abc>.d	Y Y Y		d
4	P1	abce>df	Y Y Y	c	

		Action	SOLUTION	OK Move
5	P2	CH A	a c e	Fb
	P3	joins P2	a c e	Fb

		Ultimate Question	Answer
6	P1	((aVb)&c) > (d&(e>f))	MORE AND LESS
	P2	Same as P1's	MORE AND LESS
	P3	(a&(bVc)) > (d&(e>f))	CONGRATULATIONS

The match is over and P3, the winner of the match, gets the most points in the scoring.

SCORING

Player	P1	P2	P3
Rule	0	0	25
Solution	6	10	8
Total	6	10	33

An entire match can be briefly summarized, as this one is, by the account of the six plays and SCORING.

The brief sketch of the CLL Game and this sample match, hopefully, provide enough of an introduction to the game that the more complete descriptions that follow will be meaningful. First, a concise summary will be presented, then, a state diagram account with a more detailed description.

C. *Concise Summary of the CLEAR LEGAL LANGUAGE Game*

The concise summary consists of three parts: (1) starting, (2) playing and ending, and (3) winning.

1. Starting— In the CLL Game the first player starts the process of setting the GOAL(S) by setting one result as (part of) the GOAL(S).

1. The GOAL(S) is/are a set of one or more lower-case letters that represent sentences that express some or all of

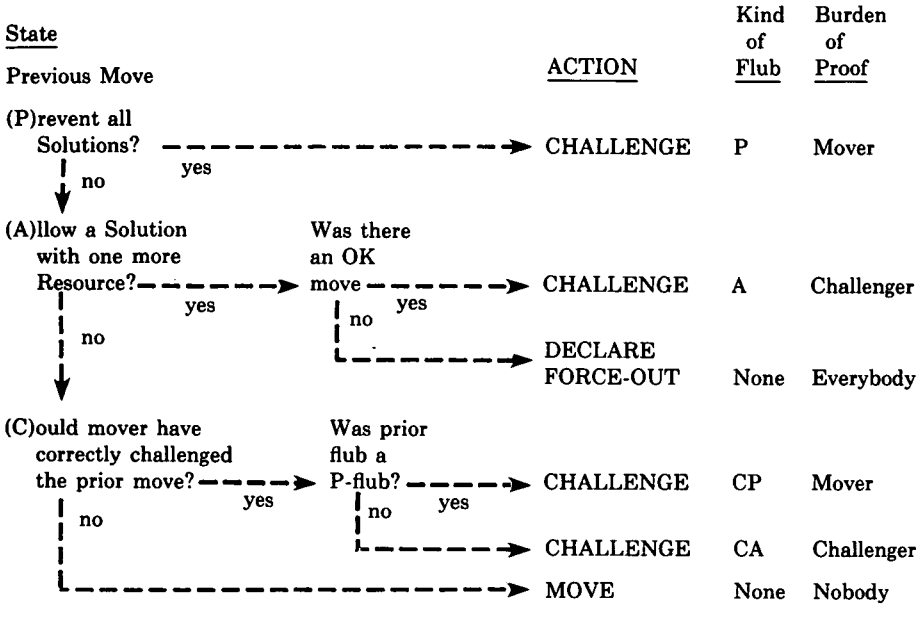
the legal results of the rule.

2. A SOLUTION to the GOAL(S) is a set of one or more lower-case letters that represent sentences that express a set of conditions that, when fulfilled, are sufficient, by application of the rule to reach the GOAL(S) specified.
3. The conditions of a rule are expressed by the sentences that follow the 'IF' and precede the 'THEN'.
4. The results of a rule are expressed by the sentences that follow the 'THEN'.

2. Playing and ending— After the first part of the GOAL(S) is set, the players take turns making plays. On a play it is optional for a player to seek information about the rule by asking the ANSWER SOURCE a question. On every play a player moves a RESOURCE either to one of the LIMITATIONS sections of the Playing Mat or to the GOAL(S) until somebody challenges or declares force-out. On her turn, after asking (or not asking) a question, a player can either move, challenge, or declare force-out. To select among these three, the player will need to be familiar with the material summarized in Figure 4, ANALYSIS OF PREVIOUS MOVE: CRITERIA FOR ACTION, on the following page.

Figure 4

ANALYSIS OF PREVIOUS MOVE: CRITERIA FOR ACTION



Capsule summary of strategy: IF answers are no AND no AND no, THEN move, BUT OTHERWISE, challenge or declare force-out.

1. If a player moves, he is claiming that three things are true.
   a. The mover is claiming about the situation in which he moves and after the move:

      C-claim: Because the previous play of a RESOURCE is not a flub, I (C)annot correctly challenge on this turn.

      P-claim: It is still (P)ossible for the remaining RESOURCES to be so played that a SOLUTION can be built.

      A-claim: If I can, I am (A)voiding by this move allowing a SOLUTION to be built by moving just one more RESOURCE to the PERMITTED section.

      To the extent that a player remembers and understands these three claims, she will know what to do when others are moving and what is appropriate when it is her turn. A convenient pair of mnemonics for players who are just beginning are the word, CAP, and the sentence:

That's right;	(C-claim)
it can be done,	(P-claim)
but ... not with one.	(A-claim)

   b. If any of the mover's claims are false, then the mover has flubbed—a C-flub for a false C-claim, a P-flub for a false P-claim, or an A-flub for a false A-claim. By challenging, the challenger is saying to the mover:

      C-flub. You could have (C)orrectly challenged (and should have) instead of moving.

      P-flub. Your move has (P)revented all SOLUTIONS.

      A-flub. Your move has (A)llowed a SOLUTION with one more unmoved RESOURCE when you were not forced to do so.

   c. When a RESOURCE is moved to the LIMITATIONS section of the playing mat, the effect upon the use of that RESOURCE as part of an expression offered as a SOLUTION is exactly what the label of the section says. That RESOURCE is either FORBIDDEN, PERMITTED, or REQUIRED. The Playing Mat is divided into the following three sections:

      FORBIDDEN: The RESOURCES played here MUST NOT be used in the expression offered as a SOLUTION.

PERMITTED: The RESOURCES played here MAY be used in the expression offered as a SOLUTION, but they NEED NOT be so used.

REQUIRED: The RESOURCES played here MUST be used in the expression offered as a SOLUTION.

2. If a player challenges, he is declaring that the mover has flubbed. After a challenge, either the challenger or the mover will have the burden of proving that there is a SOLUTION.

   a. Who has the burden of proof depends on the kind of challenge that is made: the mover has the burden on a P-flub or a C-flub that stems from a P-flub (that is, a CP-flub), and the challenger has the burden on the other kinds of challenges. In general, the player who claims that there is a SOLUTION in the situation has the burden of proof.

   b. Any player except the one who has just moved can challenge at any time; a player does not have to wait until it is his or her turn to challenge.

   c. After the challenger has specified the kind of flub, the third player must join either the mover or the challenger. If the one that she joins has the burden of proof, then the joiner also has the burden; otherwise, not.

   d. Upon declaration of a C-flub stemming from an A-flub (a CA-flub) or a C-flub stemming from a P-flub (a CP-flub), those with the burden of proof must show that there was a SOLUTION with the LIMITATIONS imposed by the moves that had been made when the prior A-flub or P-flub occurred. Upon declaration of any other kind of flub (P or A), those with the burden of proof must show that there is a SOLUTION with the LIMITATIONS imposed by the moves that have been made on the Playing Mat at the time that the challenge is made. With A-flub or CA-flub challenges, only one of the unmoved RESOURCES can be used in the SOLUTION; however with P-flub or CP-flub challenges, those with the burden of proof can use as many of the unmoved RESOURCES as they like. On A-flub and CA-flub challenges, those with the burden of proof must also show that the mover who made the alleged A-flub was not forced to do so—that he had an alternative move that neither prevented all SOLUTIONS nor allowed a SOLUTION with one more of the unmoved RESOURCES (an OK ALTERNATIVE MOVE).

3. If a player declares force-out, he is saying that a SOLUTION is possible with one more RESOURCE, but there is no flub. The effect of a force-out declaration is to put the burden of proof upon all of the players (including the declarer).

3. Winning— A Player wins (or ties for winning) a match if she scores the highest number of points in that match. A player scores 25 points if she is among the first to construct the rule. A player scores 8 or 10 points on the attempt to construct a SOLUTION if

1) he has the burden of proof and sustains it, or
2) he does not have the burden of proof, and nobody who has the burden of proof sustains it;

otherwise, a player scores 6 or 0 points. For complete details on the scoring, see the SCORING CHART in Figure 6.

Most players will probably learn enough from this concise summary to start playing the CLL Game but the detailed account of the game presented in the diagrammatic summary that follows will be useful for resolving questions that arise in playing.

D. Detailed State Diagram Account of the CLEAR LEGAL LANGUAGE Game

The play of a match of the CLL Game will follow one of two possible courses: (1) the moving of RESOURCES will be terminated by a challenge or force-out declaration first and then the rule will be detected in the questioning, or (2) the rule will be detected first and then a challenge or a force-out declaration will occur. Both of these courses of play are summarized in Figure 5. The following abbreviations are used in the diagram.

Abbreviations

all	All the players in the match, usually three players.
c	[C]hallenger, the player who challenges. (She is either n or o; and never m.)
g	[G]oal-setter, the player whose turn it is to set the initial GOAL.
j	[J]oiner, the player who joins. (He is neither m nor c.)

m ..... [M]over, the player who has just made a move (includes the goal-setter).
m' ..... [M]over', the player who has just asked a question and whose turn it is to move.
n ..... [N]ext player, the one whose turn it is to play next—the one to the left of the mover or to the left of the player who asked the previous classification-relational question when moves have ended.
o ..... [O]ther player, the one to the right of the mover.
n,o ..... n or o.
t ..... The teacher of the class in which the CLEAR LEGAL LANGUAGE Game is used.
t,all ..... t or all the players in the match.

The numbers of the statements that follow refer to the arcs of the state diagram in Figure 5; they represent the actions of the various persons involved. Who is eligible to engage in the action is indicated by the abbreviation that follows the slash that occurs after each number.

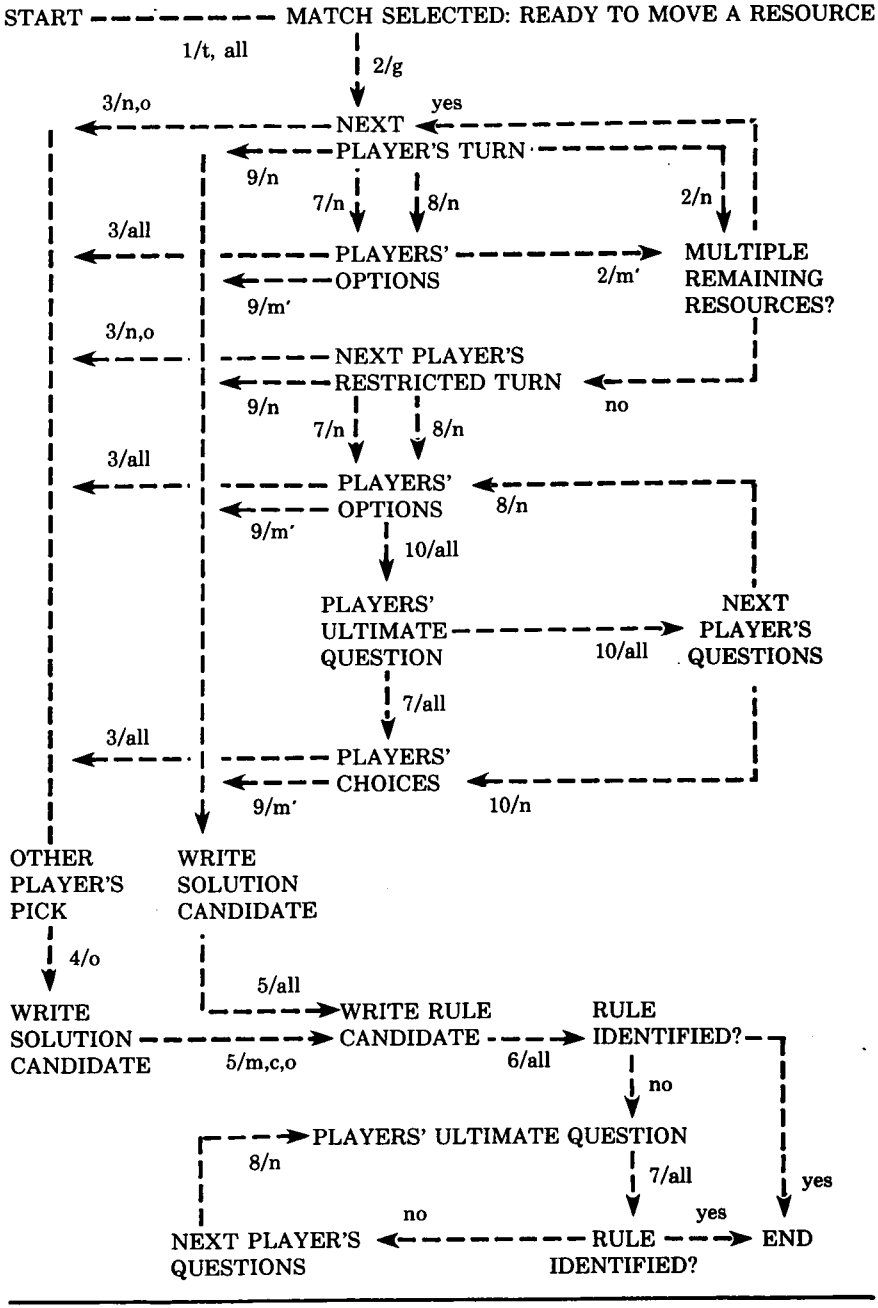
ABBREVIATIONS

all	all the players
c	challenger
g	goal-setter
j	joiner
m	mover
m'	mover who has just asked a question
n	next player
o	other player
n,o	next or other player
t,all	teacher or all the players

1	Select the Match
2	Move a Resource
3	Challenge
4	Join the Mover or Challenger
5	Write a Solution
6	Write the Rule
7	Ask an Ultimate Question
8	Ask Both Classification and Relational Questions
9	Declare Force-Out
10	Default: Nobody Does What They Are Authorized to Do

Figure 5

STATE DIAGRAM REPRESENTATION OF THE CLEAR LEGAL LANGUAGE GAME



1 SELECT THE MATCH.

Either the teacher of the class or the group of players SELECT THE MATCH that they are going to play. Each match will deal with a different provision—a statute, a regulation, a legal rule, a constitutional provision, or some other statement of a set of legal propositions. Players will usually play a given match only one time. Each match has a unique name to identify it. A match consists of a list of sentences and data to be used by the ANSWER SOURCE and may or may not include the Present Version of the legal rule. If the IBM PC or some other micro-computer is to serve as the ANSWER SOURCE to answer players' questions about the structure of the statement in normalized form, the data about that structure will be recorded on a diskette. If the instructor or a student-referee is to serve as the ANSWER SOURCE, the data will be expressed in the form of an arrow diagram to be used by the instructor or student.

2 MOVE A RESOURCE.

After the match to be played has been selected, the first player, the goal-setter (g), starts the match by making a limited move. He sets the first part of the GOAL(S) by naming a letter that he believes represents a sentence on the list of sentences for the match that expresses a result in the rule. Other players (including the goal-setter) may add other letters in later play that they believe also represent sentences that express results.

After the first part of the GOAL(S) is set, the players take turns making plays. At the beginning of each play everybody except the most recent mover can challenge the most recent move. Players do not have to wait until it is their turn in order to challenge. On each play the player whose turn it is (1) may ask questions, and (2) must challenge, declare force-out, or make a move, whether or not questions are asked. In making a move, RESOURCES are either added to the GOAL(S) or put in FORBIDDEN, PERMITTED, or REQUIRED.

If a RESOURCE is put in FORBIDDEN, then it must not appear in any expression offered as a SOLUTION. IF a RESOURCE is put in REQUIRED,

then it must appear in any expression offered as a SOLUTION. If a RESOURCE is put in PERMITTED, then it may be used in any expression offered as a SOLUTION, but it need not be.

After a RESOURCE is moved, the mover's play is over and the state of the match depends upon how many RESOURCES remain. If there are two or more remaining RESOURCES, then the state of the match is the NEXT PLAYER'S TURN; otherwise, it is the NEXT PLAYER'S RESTRICTED TURN.

If the state of the match is the NEXT PLAYER'S TURN, then the options are: (1) either the next player (n) or the other player (o) may challenge (see step 3), or (2) the next player may declare force-out (see step 9), or (3) the next player may ask a question (see steps 7 and 8), or (4) the next player may move a RESOURCE (see step 2), and either 1, 2, or 4 must occur.

If the state of the match is the NEXT PLAYER'S RESTRICTED TURN, then only 1, 2, or 3 may occur, and 1 or 2 must occur. The last remaining RESOURCE can never be moved.

The questions asked may either be of the ultimate type described in step 7 or of the classification-relational type described in step 8. The ANSWER SOURCE will provide the kind of answers described in steps 7 and 8. If a player asks a correct ultimate question, then no more questions will be asked. After a question is asked, the player who asked it (now called the mover and labeled m' on the diagram) must complete his turn by making a move.

Play will cycle through a series of moves or questions and moves until somebody ends the moving by (1) challenging (see step 3), or (2) declaring force-out (see step 9), or (3) moving the next to the last remaining RESOURCE.

3 CHALLENGE.

A challenge by either the next player or the other player sets the ending of the match in motion; there will be no more moves. Only the questioning will continue, until somebody identifies the rule by asking an appropriate ultimate question. Players other than the mover (m) may make any one of the four following types of

challenge:

A) P-challenge — A challenge that the mover has made a P-flub (that he has (P)revented the last of the possible SOLUTIONS so that no matter how the remaining RESOURCES are played, it will not be possible to write a SOLUTION).

B) A-challenge — A challenge that the mover has made an A-flub (that he has (A)llowed a SOLUTION to be written with at most one more of the remaining RESOURCES in circumstances where he was not forced to do so).

C) CP-challenge — A challenge that the mover has made a CP-flub (that he has made a C-flub stemming from a prior P-flub by failing to (C)hallenge that prior P-flub or a prior CP-flub when he could have done so correctly).

D) CA-challenge — A challenge that the mover has made a CA-flub (that he has made a C-flub stemming from a prior A-flub by failing to (C)hallenge that prior A-flub or a prior CA-flub when he could have done so correctly).

A challenge may be made by players other than the mover immediately after a move is completed and, unless somebody has challenged or declared force-out previously, anybody can challenge after somebody asks a question. The challenger (c) must specify what kind of challenge she is making. The kind of challenge will determine whether there are one or two parts to the burden of proof and whether the mover or the challenger shall have that burden.

4 JOIN WITH MOVER OR CHALLENGER.

The joiner (j) must join with either the challenger or the mover. If the player that he joins has the burden of proof, then the joiner has the same burden of proof but he must sustain it independently. If the player that he joins does not have the burden of proof, then neither does the joiner.

5 WRITE A SOLUTION.

A. If the challenge made is that the move is a P-FLUB or a CP-FLUB, then the burden of proof is upon the mover, and there is only one part to that burden: to WRITE A SOLUTION—that is, a list of letters that uses all of the RESOURCES that have been moved to the REQUIRED section (the required RESOURCES), none of the forbidden RESOURCES (those moved to the FORBIDDEN section), and as many of the permitted RESOURCES (those moved to the PERMITTED section) and of the remaining RESOURCES (those not moved anywhere yet) as the player with the burden wishes. To sustain the burden of proof the list of letters that the mover writes (and the list that the joiner writes if he has joined the mover on this kind of challenge) must represent a sufficient set of conditions to reach the GOAL(S) by the rule.

B. If the challenge made is that the move is an A-flub or a CA-flub, then the burden of proof is upon the challenger, and there are two parts to that burden.

The first part is to WRITE A SOLUTION—that is, a list of letters that uses all of the required RESOURCES, none of the forbidden RESOURCES, as many of the permitted RESOURCES as the player with the burden wishes, and at most one of the remaining RESOURCES. For A-flub challenges the SOLUTION must be written in the situation that prevailed immediately after the move claimed to be the A-flub. For CA-flub challenges the SOLUTION must be written in the situation that prevailed immediately after the move claimed to be the A-flub from which the claimed CA-flub stems. To sustain the first part of the burden of proof the list of letters written must represent a sufficient set of conditions to reach the GOAL(S) by the rule.

The second part of the challenger's burden of proof is to write an OK ALTERNATIVE MOVE (a move that does not make a P-FLUB and that also does not allow a SOLUTION with at most one more of the remaining RESOURCES) that the mover could

have made in the situation. For A-flub challenges the OK ALTERNATIVE MOVE must be written in the situation that prevailed immediately before the move from which the claimed CA-flub stems.

C. In force-outs, there is only one part to the burden of proof: to show that a SOLUTION can be written in the situation. To sustain the burden of proof the list of letters written must represent a sufficient set of conditions to reach the GOAL(S) by the rule.

6 WRITE THE RULE.

To determine whether the SOLUTION candidates written by those who have the burden of proof (see step 5) are in fact SOLUTIONS, it is necessary to identify the rule. By definition a SOLUTION is any set of RESOURCES that represent conditions which, when met, are sufficient by the rule to reach the result(s) designated as the GOAL(S). After a challenge is made or a force-out declared and those with the burden of proof have attempted to write a SOLUTION, any of the players may attempt to write the rule. The rule that the players are seeking will contain the sentences for the match in the order in which they are listed in the rule. This attempt to write the rule is optional for each of the players, but each attempt will elicit information about the relationship of the candidate written to the actual rule for this match.

7 ASK AN ULTIMATE QUESTION.

Each attempt to write the rule will pose the following question to the ANSWER SOURCE: Is this the rule? This type of question is called an ultimate question. An ultimate question can be asked in either of two situations: (1) by the next player when it is her turn to play, and (2) by all of the players after a challenge or force-out declaration when those with the burden of proof have finished writing their SOLUTION candidates and rule candidates or when the next player has finished asking his classification-relational question.

The ANSWER SOURCE will provide four kinds of answers to the ultimate questions posed by such attempts to identify the rule:

A) CONGRATULATIONS	Your candidate is the rule or a statement equivalent to it. You have written in normalized form the statement that is being sought for purposes of this match or a statement that says the same things.
B) MORE	Your candidate is stronger than the rule. It says more than the rule says.
C) LESS	Your candidate is weaker than the rule. It says less than the rule says.
D) MORE AND LESS	Your candidate is stronger in some respects and weaker in other respects than the rule. If a challenge has been made or force-out declared and the answer given to at least one of the ultimate questions is CONGRATULATIONS, then the match ends and scores are determined by the SCORING CHART (See Figure 6); otherwise, the questioning continues (see step 8).

Figure 6

SCORING CHART: Summary of Scoring at End of Match

	Yes	No
Construct statement of the rule?	25	0

Type of Ending	Role of Player			
	Challenger C	Mover M	Joiner With C	Joiner With M
Challenge				
Has burden of Proof				
Sustains it	10	10	8	10
Does not sustain it	6	6	6	6
Does not have burden				
Somebody sustains it	6	6	6	6
Nobody sustains it	10	10	8	10

Force-Out	Declarer	Others
Sustains burden of proof	8	8
Does not sustain it	0	6

If there has not yet been a challenge or force-out declaration, and there is a CONGRATULATIONS answer to an ultimate question, then the

questioning ceases and the moves in the match continue until somebody challenges or declares force-out (see steps 3 and 9). All of the players have the option of challenging immediately after the CONGRATULATIONS answer.

8 ASK BOTH CLASSIFICATION AND RELATIONAL QUESTIONS.

This type of question is called a classification-relational question. A question of this type can be asked in either of two situations: (1) it can be asked by the next player when it is her turn to play, and (2) it can be asked by the next player when it is his turn after a challenge or force-out declaration and the ultimate questions asked by any of the players have been answered or could have been asked but were not.

When a classification-relational question is asked before a challenge or force-out, the player who asked the question must make a move after receiving her answer. When a classification-relational question is asked after a challenge or force-out, the play loops back to the state, PLAYERS' ULTIMATE QUESTION, where each of the players has a chance to try to write the rule again, and the play continues until somebody correctly identifies the rule to end the match.

When none of the attempts to identify the rule are successful by an ultimate question after a challenge or force-out declaration occurs, the next player must ask a classification-relational question and get three answers from the ANSWER SOURCE. The answers provide additional information about the rule to all the players. Each classification-relational question actually asks three different kinds of questions:

A. CONDITIONS QUESTIONS. (preceding the >)

WITH DECIMAL POINT. (.acd > ...)

Do a, c, and d each express a condition?

WITHOUT DECIMAL POINT. (acdf > ...)

Do a, c, d, and f each express a condition, and are all of the conditions of the rule expressed by the sentences

that this set of letters represents?

B. RESULTS QUESTIONS. (following the >)

WITH DECIMAL POINT. (... > .ef)

Do e and f each express a result?

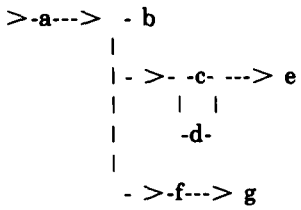
WITHOUT DECIMAL POINT. (... > beg)

Do b, e, and g each express a result, and are all of the results of the rule expressed by the sentences that this set of letters represents?

C. RELATIONAL QUESTIONS.

The letters both before and after the > sign in the statement of the classification-relational question determine the relational question included in it. The relational question asks: Are the conditions stated, when met, sufficient by virtue of the rule to reach all of the results stated?

The answers to the first two types of questions will be either YES (Y) or NO (N), and the answer to the third type will be Y, N, or ?, where ? indicates that the question is not meaningful in the sense that it makes an assumption that is not true and, therefore, cannot be answered. Thus, for example, the following classification-relational questions should elicit the answers shown from the ANSWER SOURCE with respect to the following rule:



IF a, THEN [b AND (IF c OR d THEN e) AND (IF f, THEN g)].

QUESTIONS		ANSWERS		
		1	2	3
Q1.	abc > .de	N	N	?
Q2.	.acd >	Y	N	Y
Q3.	.a > .b	Y	Y	Y
Q4.	.ac > .e	Y	Y	Y
Q5.	.ad > .e	Y	Y	Y
Q6.	.ad > .g	Y	Y	N
Q7.	.adf > .g	Y	Y	Y
Q8.	.af > .g	Y	Y	Y
Q9.	acdf >	Y	N	Y
Q10.	acdf > .e	Y	Y	Y
Q11.	.> beg	Y	Y	N
Q12.	acdf > beg	Y	Y	Y

Question Q1 asks the following three questions:

Q1A. Do the letters a, b, and c each express a condition, and are all of the conditions of the rule expressed by those three letters?

The answer is N (under 1) because of each of two different aspects of the rule:

1. The letter b does not express a condition in the rule.
2. All of the conditions of the rule are not expressed by the three letters a, b, and c.

Q1B. Do the letters d and e each express a result?

The answer is N (under 2), because d does not express a result in the rule.

Q1C. Do a, b, and c express a sufficient set of conditions for reaching results d and e by virtue of the rule?

The answer is ? (under 3). Although a and c express sufficient conditions for reaching result e, the question is not meaningful, because d does not express a result; therefore, the question cannot be answered.

Each of the other eleven questions, similarly, asks three questions, and the ANSWER SOURCE should give the answers specified.

9 DECLARE FORCE-OUT.

The only player who can declare force-out is the next

player (n). He may do so when it is his turn after a move has been made or he has asked a question. When a player chooses to declare force-out, the ending of the match is set in motion; there will be no more moves. Only the questioning will continue, until somebody identifies what the rule is by asking an appropriate ultimate question. Declaring force-out puts the burden of proof on each of the players to show that a SOLUTION can be written—that is, a list of letters that uses all of the required RESOURCES, none of the forbidden RESOURCES, as many of the permitted RESOURCES as the player with the burden wishes, and at most one of the remaining RESOURCES (see step 5C).

10 DEFAULT BY THE RULES.

The rules that define the CLEAR LEGAL LANGUAGE Game specify defaults that occur when all of the players choose to be inactive, and none of them elects to do any of the other alternatives that they are authorized to do. These defaults occur only when there is but one remaining RESOURCE and have the effect of authorizing the players to alternate asking classification-relational questions and optionally asking ultimate questions just as they are authorized to do after somebody challenges or declares force-out.

The match ends when both the rule has been identified and either a challenge has been made or a force-out has been declared. Some of the players will be, or will have been, called upon to write rule candidates, SOLUTIONS, and, possibly, OK ALTERNATIVE MOVES.

When the ANSWER SOURCE indicates that one of the rule candidates written is the same as the rule, then each of the other rule candidates written on that turn is evaluated. If a rule candidate is the same as the rule, then the player who wrote it gets 25 points as indicated by the SCORING CHART. If a rule candidate does not match the rule, then the player who wrote it gets 0 points.

If the list of letters written sustains the burden of proof for writing a SOLUTION and, where appropriate, sustains the burden of proof for indicating an OK ALTERNATIVE MOVE, then the writer gets either 10 or 8 points, and the player who did not have the burden gets 6 points as indicated by the SCORING

CHART. If the list of letters written fails to sustain some part of the burden of proof, then the writer gets either 6 or 0 points.

Thus, in the scoring at the end of the match each player gets two scores: one as a result of the rule candidate written and a second one as a result of the list of letters written to sustain the burdens of proof for writing a SOLUTION and an OK ALTERNATIVE MOVE. A player's total score for the match is the sum of these two scores.

E. Complexity Levels of Matches of the CLEAR LEGAL LANGUAGE Game

The CLEAR LEGAL LANGUAGE Game can be played at different levels of complexity—at least the twenty-four different levels summarized in Table 6.

TABLE 6

COMPLEXITY LEVELS OF MATCHES OF THE CLEAR LEGAL LANGUAGE GAME

CONSTITUENT SENTENCES OF NORMALIZED VERSION OF LEGAL RULE	FORMS OF NORMALIZATION		
	Basic	Basic Clear	Basic Clear Advanced
Listed Sentences (LS)	1	2	3
Negations of LS	4	5	6
Descriptive Parts (DP)	7	8	9
Negations of DP	10	11	12

Corresponding complexity levels of matches without the Present Version of the legal rule available are 1′, 2′, . . . 12′.

The twelve entries in Table 6 that indicate the various levels of complexity of matches of the CLL Game can be described in more detail as follows:

1. With listed sentences only at basic level
2. With listed sentences only at basic or clear level
3. With listed sentences only at basic or clear or advanced level
4. With listed sentences and/or their negations at basic level
5. With listed sentences and/or their negations at either basic or clear level

6. With listed sentences and/or their negations at either basic or clear or advanced level
7. With listed sentences and/or their negations and/or the descriptive parts of results at basic level
8. With listed sentences and/or their negations and/or the descriptive parts of results at either basic or clear level
9. With listed sentences and/or their negations and/or the descriptive parts of results at either basic or clear or advanced level
10. With listed sentences and/or their negations and/or the descriptive parts of results and/or the negations of those descriptive parts at basic level
11. With listed sentences and/or their negations and/or the descriptive parts of results and/or the negations of those descriptive parts at either basic or clear level
12. With listed sentences and/or their negations and/or the descriptive parts of results and/or the negations of those descriptive parts at either basic or clear or advanced level

There are three factors of the CLL Game that determine the complexity of a match:

1. the availability of the Present Version of the legal rule
2. the number of different forms of normalization that can be used to express the normalized legal rule
3. the number of different kinds of constituent sentences that can be used to express the normalized legal rule

The matches become more complex when the Present Version is unavailable and the number of forms of normalization and kinds of constituents get larger.

The first sample match was a variation of a Complexity Level_1' match. It did not have the Present Version of the legal rule available, and only the listed sentences were to be used in expressing the basic normalized rule. In fact, only the abbreviations of those sentences were available, and that is why it is a variation of a Complexity Level_1' match.

The second sample match will be a moderately complex one; it will be a Level_5 match. This means that the Present Version of the legal rule will be available, the normalized legal rule can be

in either basic or clear form, and either the listed sentences or their negations can be used in expressing it. Each negation of a listed sentence becomes available as a permitted RESOURCE when the letter representing the corresponding listed sentence of that negation is moved to FORBIDDEN, PERMITTED, or REQUIRED, or to GOAL(S).

F. Second Sample Match: Complexity Level_5 Using Section 361 of the Internal Revenue Code

We have stored in the ANSWER SOURCE of the computer program of the CLL Game both basic and clear Normalized Versions of our interpretation of section 361 of the United States Internal Revenue Code.[8] To construct either of these Normalized Versions in playing this match, the players should use:

(1) the Present Version of section 361 of the Internal Revenue Code,
(2) the listed sentences derived from it,
(3) the negations of those listed sentences, and
(4) whatever other information they can obtain from the ANSWER SOURCE by asking it ultimate questions or classification and relational questions.

26 U.S.C. § 361 PRESENT VERSION

Nonrecognition of Gain or Loss to Corporations

(a) General rule

No gain or loss shall be recognized if a corporation a party to a reorganization exchanges property, in pursuance of the plan of reorganization, solely for stock or securities in another corporation a party to the reorganization.

(b) Exchanges not solely in kind

(1) Gain.

If subsection (a) would apply to an exchange but for the fact that the property received in exchange consists not only of stock or securities permitted by subsection (a) to be received without the recognition of gain, but also of other property or money, then—

(A) if the corporation receiving such other property or money distributes it in pursuance of the plan of reorganization, no gain to the corporation shall be recognized from the ex-

8. I.R.C. § 361 (1982).

change, but

(B) if the corporation receiving such other property or money does not distribute it in pursuance of the plan of reorganization, the gain, if any, to the corporation shall be recognized, but in an amount not in excess of the sum of such money and the fair market value of such other property so received, which is not so distributed.

(2) Loss.

If subsection (a) would apply to an exchange but for the fact that the property received in exchange consists not only of property permitted by subsection (a) to be received without the recognition of gain or loss, but also of other property or money, then no loss from the exchange shall be recognized.[9]

List of Sentences Derived from Present Version

[a: a corporation a party to a reorganization exchanges property, in pursuance of the plan of reorganization, for stock or securities in another corporation a party to the reorganization]

[b: the exchange is solely for such stock or securities]

[c: no gain or loss shall be recognized]

[d: the property received in exchange consists not only of stock or securities permitted by item (2) to be received without the recognition of gain, but also of other property or money]

[e: the corporation receiving such other property or money distributes it in pursuance of the plan of reorganization]

[f: no gain to the corporation shall be recognized from the exchange]

[g: the gain, if any, to the corporation shall be recognized, but in an amount not in excess of the sum of such money and the fair market value of such other property so received, which is not so distributed]

[h: the property received in exchange consists not only of property permitted by item (2) to be received without the recognition of gain or loss, but also of other property or money]

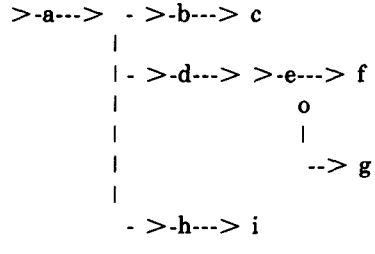
9. *Id.*

[i: no loss from the exchange shall be recognized]

The logical structure of our interpretation of this provision can be expressed by the parenthesized statement:

IF a THEN [(IF b THEN c) AND
(IF d THEN { IF e THEN f BUT OTHERWISE g } AND
(IF h THEN i)].

This same logical structure can also be expressed by the following ARROW DIAGRAM:



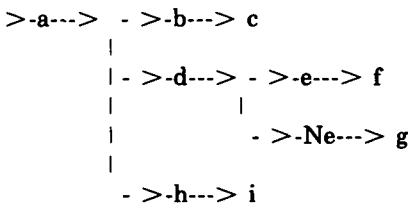
It can also be expressed by the Parenthesized Logical Expression:

a > ((b>c) & (d>((e>fBOg)) & (h>i))

These three representations of the logical structure of a Normalized Version of section 361 are representations of the clear form of normalization. The corresponding representations of the basic form are:

IF a THEN [(IF b THEN c) AND
(IF d THEN { [IF e THEN f] AND
[IF NOT e THEN g] }) AND
(IF h THEN i)].

This same logical structure can also be expressed by the following ARROW DIAGRAM:



It can also be expressed by the Parenthesized Logical Expression:

a > ((b>c) & (d>((e>f) & (Ne>g))) & (h>i))

In the basic form the 'BUT OTHERWISE g' of the clear form is transformed into its logically equivalent 'IF NOT e THEN g', and corresponding changes occur in the arrow diagram and the Parenthesized Logical Expression.

The clear normalized version of this interpretation of section 361 written out fully is:

IF
1. a corporation a party to a reorganization exchanges property, in pursuance of the plan or reorganization, for stock or securities in another corporation a party to the reorganization,

THEN
2. IF
   A. the exchange is solely for such stock or securities,
   THEN
   B. no gain or loss shall be recognized, AND
3. IF
   A. the property received in exchange consists not only of stock or securities permitted by item (2) to be received without the recognition of gain, but also of other property or money,
   THEN
   B. IF
      1. the corporation receiving such other property or money distributes it in pursuance of the plan of reorganization,

THEN

2. no gain to the corporation shall be recognized from the exchange,

BUT OTHERWISE,

3. the gain, if any, to the corporation shall be recognized, but in an amount not in excess of the sum of such money and the fair market value of such other property so received, which is not so distributed, AND

4. IF

A. the property received in exchange consists not only of property permitted by item (2) to be received without recognition of gain or loss, but also of other property or money,

THEN

B. no loss from the exchange shall be recognized.

The basic normalized version is:

IF

1. a corporation a party to a reorganization exchanges property, in pursuance of the plan of reorganization, for stock or securities in another corporation a party to the reorganization,

THEN

2. IF

A. the exchange is solely for such stock or securities,

THEN

B. no gain or loss shall be recognized, AND

3. IF

A. the property received in exchange consists not only of stock or securities permitted by item (2) to be received without the recognition of gain, but also of other property or money,

THEN

B. IF

1. the corporation receiving such other property or money distributes it in pursuance of the plan of reorganization,

THEN

2. no gain to the corporation shall be recognized from the exchange, AND

C. IF

1. IT IS NOT SO THAT
   the corporation receiving such other property or money distributes it in pursuance of the plan of reorganization,
   THEN
2. the gain, if any, to the corporation shall be recognized, but in an amount not in excess of the sum of such money and the fair market value of such other property so received, which is not so distributed, AND

4. IF
   A. the property received in exchange consists not only of property permitted by item (2) to be received without recognition of gain or loss, but also of other property or money,
   THEN
   B. no loss from the exchange shall be recognized.

The players, of course, do not have available any of the representations of the logical structure of the interpretation of section 361 that they are seeking, nor do they have the Normalized Versions. But with the Present Version of section 361, the list of sentences derived from it, and the knowledge that they are playing a match of Complexity Level_5, they are ready to begin play.

P1 starts the match by setting the i as GOAL.

P2 asks: abdeh > cfgi (to which the answer is N Y N) and then adds g to the GOAL(S).

P3 then asks: .aNeh > .i (to which the answer is Y Y Y) and moves the h to the REQUIRED section.

The situation at this stage is:

Play	Player	Questions	Answers	Move F	Move P	Move R	GOAL(S)
1	P1						i
2	P2	abdeh>cfgi	N Y N				g
3	P3	.aNeh>.i	Y Y Y			h	

The Y answer to the ... > cfgi part of P2's question indicates that all four letters represent results, and that these four letters represent all the results in the normalized rule, that is, no other letters than c f g i represent results. Thus, the remaining letters, a b d e h or their negations all must represent conditions and

they must represent all the conditions. The N answer to the abdeh > ... part of P2's question indicates either (1) that not all five letters represent conditions or (2) that the five letters do not represent all of the conditions in the normalized rule. When combined with the Y answer to the ... > cfgi part, this information should alert all of the players that (2) is true and that (1) may or may not be true. For each of the five letters and its negation, at least one of the two must be a condition of the normalized rule, and perhaps both of them are.

The Y answer to the .aNeh > ... part of P3's question determines that Ne (NOT e) represents one of the conditions not represented by a b d e h and, in addition, this answer determines that a and h represent conditions. The Y answer to the ... > .i part of P3's question yields no new information. The third Y answer, which indicates the relationship between the specified conditions and the specified results, determines that the fulfillment of condition_a, condition_Ne, and condition_h is sufficient to reach result_i by the normalized rule.

P1 continues the match by asking: .dNe > .g (to which the answer is Y Y N) and then moving the a to the PERMITTED section.

P2 then asks: .a > .c (to which the answer is Y Y N) and then moves the d to the FORBIDDEN section.

P1 (out of turn) challenges P2, saying that forbidding the d is a P-flub.

P3, believing that in the normalized rule, condition d must be fulfilled in order to reach result g, sees no SOLUTION and, so, joins the challenger.

The mover P2 has the burden of proof and offers the set of conditions, abcNeh, as a SOLUTION.

At this stage the moving ends, and questioning will continue until somebody identifies the normalized rule.

Play	Player	Questions	Answers	Move F	Move P	Move R	GOAL(S)
1	P1						i
2	P2	abdeh>cfgi	N Y N				g
3	P3	.aNeh>.i	Y Y Y			h	
4		.dNe>.g	Y Y N		a		
5	P2	.a>.c	Y Y N	d			

		Action	SOLUTION	OK MOVE
6	P1	CH P		
	P3	Joins		
	P2		abcNeh	

When the players are given the opportunity to ask ultimate questions, P1 asks: ((a&b)>(c&(d>((e>f) & (Ne>g))))) & (h>i) (to which the answer is MORE AND LESS).

P2 asks: ((a&b)>c) & ((d&e)>f) & (Ne>g) & (h>i) (to which the answer is MORE).

P3 does not have a theory yet about the normalized rule and asks no ultimate question.

It is then P1's turn to play, because he is the next player after P3, whose turn it was when P1 interrupted the play with his P-flub challenge. So, P1 asks the classification-relational question, .ade > .f (to which the answer is Y Y Y). This questioning part of the play can be summarized by:

Play	Player	Questions	Answers	Move F	P	R	GOAL(S)
. . .							
							Ultimate Question: ((a&b) > (c&(d>((e>f)&(Ne>g))))) & (h>i) — Answer: MORE AND LESS
7	P1						
	P2						((a&b)>c) & ((d&e)>f) & (Ne>g) & (h>i) — MORE
	P3						—
8	P1	.ade>.f	Y Y Y				

This is followed by some more ultimate questioning and a classification-relational question by P2.

Play	Player	Questions	Answers	Move F	P	R	GOAL(S)
. . .							
							Ultimate Question: ((aVb) > (c&(d>((e>f)&(Ne>g))))) & (h>i) — Answer: MORE
9	P1						
	P2						a > ((b>c) & ((d&e)>f) & (Ne>g) & (h>i)) — MORE
	P3						—
10	P2	.adNe>.g	Y Y Y				

Then the match is ended (by P2) in the next round of questions.

Play	Player	Questions	Answers	Move F	P	R	GOAL(S)
. . .							
							Ultimate Question: (aVb) > (c&(d>((e>f)&(Ne>g))) & (h>i)) — Answer: MORE
11	P1						
	P2						a > ((b>c) & (d>((e>f)&(Ne>g))) & (h>i))
CONGRATULATIONS							
	P3						—

Although she was caught flubbing, P2 was the first (and the only) player to identify the normalized rule so she scored the most points and won the match.

SCORING

Player	P1	P2	P3
Rule	0	25	0
Solution	10	6	8
Total	10	31	8

The prototype version of the computer program that serves as the ANSWER SOURCE for the CLEAR LEGAL LANGUAGE Game as well as the detailed set of rules that define the game may be obtained by sending a formatted floppy disk for the IBM Personal Computer to Layman E. Allen, University of Michigan Law School, Ann Arbor, MI 48109 (and the program will be sent as soon as it is finished!).

IV. FUTURE DEVELOPMENTS

Significant progress has been achieved in helping to improve the understanding of drafting and interpreting legal rules. To indicate the need for extending current instruction in legal writing to include skills of logical analysis, this article analyzes in excruciating detail the dual richness of the logical structure of legal rules. The article also describes a currently available computer program, NORMALIZER, and demonstrates how the program can assist analysts in normalizing the expression of legal rules. The article then describes the beginning versions of the CLEAR LEGAL LANGUAGE Game, designed to help instruct drafters and interpreters of legal language in the handling of logical structure; a pair of sample matches illustrate the CLEAR LEGAL LANGUAGE Game. This is a fruitful beginning of a task of substantial proportions; clearly, much remains to be done. What we now see looming on the horizon is only a part of the emerging picture of what needs to be developed in the future.

The analysis of the richness of the logical structure can usefully be extended in various ways. The number of possible different rules that can be written from a limited number of conditions and a limited number of results should be analyzed for more than merely two conditions and two results. Deeper insight

into the ways in which rules with different meanings are produced by changes in logical structure can be achieved if the analysis is pushed at least as far as to the cases of four conditions and four results. The analysis of the richness of logical structure in the second respect, the multiplicity of interpretations of natural language terminology used to express structure, should also be extended. The terms 'shall not', 'may', and 'may not' should be examined in detail the way that 'shall' was in this article. Additional terms used to express normative ideas such as 'directive' also need investigation. Perhaps the deepest insights into complexities of normative ideas will result from efforts to completely formalize a modernized version of the Hohfeldian fundamental legal conceptions. Significant partial formalization of the concepts of RIGHT, DUTY, PRIVILEGE, and NORIGHT have already been achieved,[10] but the harder task of adequate formalization of POWER, LIABILITY, DISABILITY, and IMMUNITY remains a challenge.

The current version of the NORMALIZER program can usefully be extended in various ways, also. At present, parts of sentences can be handled by treating them the way that complete sentences are treated, but more effective analysis will be possible when the program's capability for handling within-sentence logical structure is completed. The process of normalizing a legal rule can also be made easier for a human analyst by increasing the encyclopedia of defined structural terms that the NORMALIZER program can access. Additional defined between-sentence structural terms expand the variety of advanced forms of normalization, as well as simplify the normalization of a rule by making the defined terms and the natural language terms more similar. Defined within-sentence structural terms will permit a more complete disambiguation of existing legal rules—a clarification of the within-sentence logical structure in addition to the between-sentence logical structure that is handled by basic, clear, and advanced forms of normalization. The human analyst's most difficult task, the formulating of questions about the ambiguities of the logical structure of the Present Versions of legal rules, can probably also be assisted significantly by additional facilities in the program to help generate such questions.

The official set of rules that define the current version of the CLEAR LEGAL LANGUAGE Game still need to be completed,

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10. *See* Allen, *Formalizing Hohfeldian Analysis to Clarify the Multiple Senses of 'Legal Right': A Powerful Lens for the Electronic Age*, 48 S. CAL. L. REV. 428 (1974).

as does the computer program for its ANSWER SOURCE. It is possible to specify how these can be used as a solitaire version of the game (a puzzle), and this needs to be done. The current version of the game deals only with the between-sentence logical structure; it needs to be extended to make the handling of deontic and Hohfeldian terminology of the within-sentence structure a significant part of playing a match.

Experience in using such a game and its associated puzzles as part of a course or workshop will also increase our understanding of how such tools can be employed most effectively. We welcome the cooperation of any teachers or learners who would like to participate in a network of sharing such experiences. As to why anybody should be motivated to do so, the implications of recognizing the richness of the logical structure of legal rules and having available precise language tools for dealing with it deserve repetition. The very quality of thinking about legal rules is likely to be profoundly affected by having a realistic sense of the complexity of what is involved and having an adequate language in which to do such thinking. Wherever legal drafters intend to be clear about the logical relationships involved in legal rules, more adequate tools to facilitate achieving such clarity will exist. Whenever interpreters of existing legal rules are faced with such rules written entirely in natural language not enriched by defined structural terminology, detection of alternative logical interpretations will be greatly enhanced. Anyone confronted with the vast number of different possibilities will be more likely to appreciate the usefulness of a language rich enough to precisely distinguish among those possibilities. Regulations can be more informative; contracts can better achieve what parties want; statutes can more adequately serve their intended purposes; wherever better writing can enhance the quality of legal life, the analysis of the logical structure of legal writing and the CLEAR LEGAL LANGUAGE Game are a means for approaching that goal.