THE AMERICAN ASSOCIATION OF AMERICAN LAW SCHOOLS JURIMETRICS COMMITTEE REPORT ON SCIENTIFIC INVESTIGATION OF LEGAL PROBLEMS

LAYMAN E. ALLEN*

The 1961 report of the Jurimetrics Committee of the American Association of American Law Schools describes the interests of the committee in investigating

1. the possible usefulness of programmed self-instructional materials in legal education,
2. the use of symbolic logic as an analytic tool for detecting and controlling syntactic ambiguity in written legal documents,
3. the possible use of electronic computers and other methods of automatic data retrieval as aids in doing legal research,
4. the utility of semantics (including general semantics and recent development in linguistics) for improving communication in law,
5. the quantitative analysis of various aspects of the legal decision process, and
6. other implications of developments in science for law.

This note is intended to be a brief explanation of some of those interests.

* * * * * * *

S1 1. If
   a. some of the members of the Jurimetrics Committee of the American Association of Law Schools are interested in programmed learning,
   then
   b. investigation of programmed learning will be included within the scope of the committee's activities.

*Assistant Professor of Law, Yale Law School; Fellow 1961-62, Center for Advanced Study in the Behavioral Sciences.
2. Some of the members of Jurimetrics Committee of the American Association of Law Schools are interested in programmed learning.

Therefore

3. Investigation of learning will be included within the scope of the committee's activities.

As you may have already suspected from the format of the sentences in S1, the material presented in this note will illustrate programmed learning.

Professor B. F. Skinner, Harvard psychologist, has pioneered the development of programmed learning. For this reason the text materials used in this method of learning are sometimes called Skinner learning programs.

Skinner learning programs differ from ordinary textbooks and other customary methods of instruction in at least three important respects.

The first important respect in which Skinner learning programs are different is that they require active participation by the learner to a much greater degree than do ordinary textbooks and other customary methods of instruction.

Active participation by the learner is assured in a Skinner learning program by compelling the learner to respond to the material of the program as he reads through it; whereas in ordinary textbooks there is usually no guarantee of any such active participation by the learner.
| S4 | For example, some part of a given statement might be omitted and the learner called upon to fill in the blank with an appropriate response in a Skinner learning __R4__. |
| S5 | The second important respect in which Skinner learning programs differ from ordinary textbooks and other customary methods of instruction is that the learner's responses to the learning program are immediately evaluated. Correct responses are reinforced, but incorrect responses are not __R5__. |
| S6 | Reinforcement of responses is provided by furnishing the learner with a suggested response to be compared with the response that he has made. |
|     | The response that the learner makes on his answer sheet as the appropriate response for a blank in a given statement is called, as you might expect, the learner's __R6__. |
| S7 | The suggested response, on the other hand, is the response that the programmer regards as appropriate for a blank in a given statement. |
|     | The programmer, as you would probably guess, is the person who writes the Skinner __R7__. |
| S8 | The learner's response is reinforced if it corresponds to the programmer's __R8__ response, because the learner is given confirmation that to some extent he "understands" the message that the programmer is trying to communicate. |
| S9 | The learner's response is not reinforced if it differs from the programmer's suggested re- |
sponse; insofar as the learner cannot successfully predict what the programmer will suggest as the appropriate response, the learner will realize that for some reason he has failed to understand fully the message that the R9? is trying to communicate.

S10 Failure of the learner to predict the suggested response may result from either

1) the programmer's failure to communicate his message clearly and in sufficient detail, or
2) the learner's failure to give sufficient attention to the information, cues, and hints that the programmer has provided to help the learner predict the suggested R10?.

S11 Skinner learning programs also help to minimize breakdowns in communication that result from the learner's inattentiveness.

From the immediate evaluation of his response, the learner is alerted whenever he departs from the suggested response and is warned to examine the materials of the program in the immediate vicinity of the "incorrect" response more carefully to see whether the programmer has given any cues that should have prompted the learner to give the programmer's R11? response.

S12 Skinner learning programs also help to minimize breakdowns in communication that result from the programmer's failure to write the learning R12? effectively.

S13 The learner's answer sheets, containing all the learners' responses, will show the R13? just exactly where his program has failed to communicate its message to the learners who have used the program.
The third important respect in which Skinner learning programs differ from ordinary textbooks and other customary methods of instruction is this feedback of information to the programmer from every learner who uses the program.

The information on the answer sheets will indicate to the programmer just where the learners failed to predict the suggested responses and where his presentation may be weak or obscure—and will, in many cases, thus furnish hints for revising and improving the program.

The material presented here could quite appropriately be called a Skinner learning program.

In the learning-program format that is being used here, the suggested response to a blank in a given statement appears immediately to the right of the next statement.

Thus, the suggested response to the blank in S16 appears immediately to the right of S17, and the suggested response to the blank in S17 appears immediately to the right of S18.

In summary, Skinner learning programs differ from ordinary textbooks and other customary methods of instruction in the emphasis given to

1. active participation of learners,
2. immediate reinforcement of responses, and
3. feedback to programmers.

If a. some of the members of the Jurimetrics Committee are interested
in symbolic logic, then
b. investigation of symbolic logic will be included within the scope of the committee’s activities.

2. Some of the members of the Jurimetrics Committee are interested in symbolic logic.

Therefore
3. Investigation of ___R19__ will be included within the scope of the committee’s activities.

S20 Members of the bar and law teachers with an interest in precise communication will find techniques of symbolic ___R20__ useful to represent statements and this, in turn, helpful in detecting syntactic ambiguity.

S21 Which of the following alternatives should ___S20__ be interpreted as stating?

Alternative A1
1. Members of the bar will find techniques of symbolic logic useful to represent statements and this, in turn, helpful in detecting syntactic ambiguity; and
2. law teachers with an interest in precise communication will find techniques of symbolic logic useful to represent statements and this, in turn, helpful in detecting syntactic ambiguity.

Alternative A2
1. Members of the bar with an interest in precise communication will find techniques of symbolic logic useful to represent statements and this, in
2. law teachers with an interest in precise communication will find techniques of symbolic logic useful to represent statements and this, in turn, helpful in detecting syntactic ambiguity.

S22 If

1. we use the following representations
   B Members of the bar
   & and
   C law teachers
   D with an interest in precise communication
   E will find techniques of symbolic logic useful to represent statements and this, in turn, helpful in detecting syntactic ambiguity

then

2. we can represent Alternative A1 by 'BE & CDE', and
3. we can represent Alternative A2 by 'R21?'.

S23 In S22 we specified capital letters to represent various sequences of words of S20 and a 'R22?' to represent the word 'and'.

S24 Using the representations specified in S22, we would represent S20 by 'B r \[ \& \] C \& D \& E\) to indicate that S20 was intended to be interpreted as stating Alternative 1.

On the other hand, we would represent S20 by 'B \& \[ \& \] C \& D \& E\) to indicate that S20 was intended to be interpreted as stating R24?.
Now let us consider a statement which differs from S20 only in that it contains three additional words, and let us ask whether this new statement expresses the same proposition as does S20.

S25 Persons who are members of the bar and law teachers with an interest in precise communication will find techniques of symbolic logic useful to represent statements and this, in turn, helpful in detecting __R25__ ambiguity.

S26 If

1. we use the following representations
   A Persons who are
   B members of the bar
   & and
   C law teachers
   D with an interest in precise communication
   E will find techniques of symbolic logic useful to represent statements and this, in turn, helpful in detecting syntactic ambiguity

then

2. which of the three alternatives represented or stated below should S25 be interpreted as stating?
   A1 ABE & ACDE
   A2 ABDE & ACDE
   A3 Persons who are both members of the bar and law teachers with an interest in precise communication will find techniques of symbolic logic useful to represent statements and this, in turn, helpful in detecting __R26__

S27 We would represent S25 by 'A - [B & E] - C - D' to indicate that S25 was intended to be in-

R24 Alternative 2

R25 syntactic

R26 syntactic ambiguity
interpreted as stating A1, but we would represent S25 by ‘\[B \& C \cdot D \cdot E\]’ to indicate that S25 was intended to be interpreted as stating A2.

S28 The representation ‘\[A \cdot B \& C \cdot D \cdot E\]’ states the same proposition as the representation ‘\[ABE \& ACDE\]’; so ‘\[B \& C \cdot D \cdot E\]’ is intended to be interpreted as indicating that the ‘\&’ connects the ‘ABE’ to the ‘ACDE’.

Similarly, the representation ‘\[A \cdot B \& C \cdot D \cdot E\]’ states the same proposition as the representation ‘\[ABDE \& ACDE\]’, and ‘\[B \& C \cdot D \cdot E\]’ is intended to be interpreted as indicating that the ‘\&’ connects the ‘ABDE’ to the ‘ACDE’.

S29 The need for some further refinement in our way of indicating in a representation of a statement just which words an ‘and’ in the statement is meant to connect, is pointed up when we try to represent Alternative A3 of S25.

We observe, first, that the ‘and’ that occurs between ‘bar’ and ‘law’ is being interpreted as connecting parts of sentences in Alternative A3, rather than connecting entire sentences as in Alternative A1 and Alternative A2.

We observe also that Alternative A3 itself is ambiguous; it is not clear whether
a) the ‘&’ is intended to connect ‘B’ with ‘CD’, or
b) the ‘&’ is intended to connect ‘B’ with only ‘C’.

This ambiguity turns out, however, to be harmless since the interpretations of S25 represented by A3a and A3b express the same proposition:

\[
\begin{align*}
A3a & : A \imp B \land C \imp D \land E \\
A3b & : A \imp B \land C \imp D \land E
\end{align*}
\]

The reason why Alternatives A3a and A3b express the same proposition is that if a person is a member of the bar and is a law teacher with an interest in precise communication, then that person is a member of the bar with an interest in precise communication.

While it happens in the particular example considered here that (because of the nature of the sequence of words represented by ‘D’) the interpretation of S25 represented by ‘\[
\begin{array}{c}
A \imp B \land C \imp D \land E
\end{array}
\]’ expressed the same proposition as that expressed by the interpretation represented by ‘\[
\begin{array}{c}
A \imp B \land C \imp D \land E
\end{array}
\]’, such representations do not always represent statements that express the same proposition.
There are pairs of statements represented by these same representations that do not express the same proposition.

S31 A close look at the representations of the various interpretations of S25 indicates how the diagrams show just which sets of words are connected to each other by the 'and'.

In \[ \begin{array}{c}
A \\
B \\
C \end{array} \right \downarrow D \quad E \]

'ACDE', while in \[ \begin{array}{c}
A \\
B \\
C \\
D \end{array} \right \downarrow E \]

the 'and' connects 'B' to 'CD'.

Similarly, in \[ \begin{array}{c}
A \\
B \\
C \end{array} \right \downarrow D \quad E \]

'ABDE' to 'ACDE', while in \[ \begin{array}{c}
A \\
B \\
C \end{array} \right \downarrow E \]

the 'and' connects 'B' to 'D-E'.

S32 Similarly, in the representation

\[ \begin{array}{c}
G \\
H \\
F \end{array} \right \downarrow L \quad \begin{array}{c}
I \\
J \\
K \end{array} \]

the 'and' connects 'GH' to 'L'.

S33 And likewise, in the representation

\[ \begin{array}{c}
F \\
G \end{array} \right \downarrow J-K \quad \begin{array}{c}
H \\
I \end{array} \]

the 'and' connects 'FGJK' to 'IJK'.

R30 proposition

R31 C

R32 IJK
In summary, four alternative interpretations of S25 have been described; their representations are as follows:

- \[ A_1 \{ A \rightarrow \{ B \rightarrow \{ C \rightarrow \{ D \rightarrow E \} \} \} \}
- \[ A_2 \{ A \rightarrow \{ B \rightarrow \{ C \rightarrow \{ D \rightarrow E \} \} \} \}
- \[ A_3a \{ A \rightarrow \{ B \rightarrow \{ C \rightarrow D \} \} \}
- \[ A_3b \{ A \rightarrow \{ B \rightarrow \{ C \} \} \}

The differences among the first three alternatives and the similarity of A3a and R34 are made evident by the following tabulation:

<table>
<thead>
<tr>
<th>Type of Person</th>
<th>Does S25 assert that this type of person will find techniques of symbolic logic useful to represent statements and this, in turn, helpful in detecting syntactic ambiguity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB Person who is a member of the bar</td>
<td>\begin{tabular}{llll} A1 &amp; A2 &amp; A3a &amp; A3b \ Yes &amp; No &amp; No &amp; No \end{tabular}</td>
</tr>
<tr>
<td>ABD Person who is a member of the bar with an interest in precise communication</td>
<td>\begin{tabular}{llll} Yes &amp; Yes &amp; No &amp; No \end{tabular}</td>
</tr>
</tbody>
</table>

1. No offense is intended in proceeding as if AB and ABD were not synonymous expressions.
Now that two of the subjects that will be investigated by the Jurimetrics Committee have been briefly illustrated, namely, programmed learning and __R35?__, it is appropriate to specify what else will be within the scope of the committee's activities.

1. If
   a. some of the members of the Jurimetrics Committee are interested in the possible use of electronic computers and other methods of automatic data retrieval in doing legal research,
   then
   b. investigation of the possible use of electronic computers and other methods of automatic data retrieval in doing legal research will be included within the scope of the committee's activities.

2. Some of the members of the Jurimetrics Committee are interested in the possible use of electronic computers and other methods of automatic data retrieval in doing legal research. Therefore

3. Investigation of the possible use of electronic computers and other methods of automatic data retrieval in doing legal research will be included within the scope of the committee's activities.

One rather obvious and elementary method for retrieving documents automatically is to "instruct" the machine to pick out those documents that contain specified words.
For example, if
1. each of the first 36 statements in this learning program (i.e., S1 through S36) is considered to be a document,
2. the information in these documents is transformed into some "machine-readable" form (punched card, magnetic tape, or other) so that the machine can have access to it, and
3. the machine is "instructed" to select those documents that contain the word 'logic',
then
4. the following eight documents would be: S19, S20, S21, S22, S25, S26, S34, and S35.

However, if the machine is instructed to select those documents that contain both the word 'logic' and the word 'jurimetrics', then only documents S19 and would be selected.

On the other hand, if the machine is instructed to select those documents that contain both
1. the word 'logic' and
2. either the word 'jurimetrics' or the word 'alternative',
then documents S19, S21, S22, S34, and would be selected.

Notice that for the instructions given in there is some question about whether S26 should also be selected by the machine, because this document contains the word 'logic' and the word 'alternatives'.

The instructions call for either 'jurimetrics' or 'alternative'; thus, the question is whether 'alternatives' is enough that S26 should also be selected.
S41 The decision as to whether 'alternatives' is enough like 'alternative' that S26 should be selected by the instructions given in S39, is one that can be made by the machine after some human being has given the machine the appropriate criteria for making such decisions.

Formulating the criteria for deciding that given words used in a specified subject matter are somehow sufficiently alike that they should be treated by the machine as occurrences of each other, is a task that will require the judgment of a specialist in that subject matter.

The judgment of doctors will be needed in formulating the criteria for similarity with regard to the medical literature, and the judgment of _____ will be needed in formulating the criteria for similarity with regard to the legal literature.

S42 When automatic methods for making literature searches are developed to the point where it becomes economically feasible for lawyers to search all of the past decisions of courts, the legal profession might find itself confronted with a somewhat provocative question, namely, whether such information is really the most useful of that available for guiding courts in making decisions today.

Inexpensive automatic searching methods will also give lawyers greater access to the wisdom (and folly?) of other intellectual disciplines. To what extent will the profession deem it appropriate to avail itself of such greater access?

This brief discussion of data retrieval indicates the third subject that will be investi-
gated by the Jurimetrics Committee. The first two subjects were programmed learning and ___.

**S43** Notice the common thread that runs through the three subjects. Programmed learning deals with the effectiveness with which information is communicated; symbolic logic deals with the precision with which information is communicated; and data retrieval deals with the quantity of information communicated.

One begins to suspect that the Jurimetrics Committee is concerned with the problem of ___ of information in law.

**S44** Some of the members of the Jurimetrics Committee are interested in semantics; some are interested in the quantitative analysis of the legal decision process; and some, in other implications of developments in science for law.

As you might expect, investigation of semantics, quantitative analysis of the legal decision process, and other implications of developments in ___ for law will be included within the scope of the committee's activities.

**S45** Colleagues have asked various members of the Jurimetrics Committee what 'jurimetrics' means.

"When I use a word," Humpty Dumpty said, in a rather scornful tone, "it means just what I choose it to mean — neither more nor less."

"The question is," said Alice, "whether you can make words mean so many different things."
"The question is," said Humpty Dumpty, "which is to be \text{R45?} — that's all."

Since at the present time members of the Jurimetrics Committee are interested in a plan to investigate

1. programmed learning,
2. symbolic logic,
3. information retrieval,
4. semantics,
5. quantitative methods, and
6. other implications of developments in science for law,

it is proposed that 'jurimetrics' (not to be confused with 'geriatrics' as some colleagues have wryly suggested) shall for now at least cover the bearing of these six subjects upon law.\textsuperscript{2}

In short, it is intended that 'jurimetrics' shall cover the combination of law, science, and communication.\textsuperscript{3}

If the mixture of Latin and Greek roots in the word 'jurimetrics' has led to some confusion,\textsuperscript{4} it is hoped that this Skinner learning program has helped to clarify.\textsuperscript{5}

\textsuperscript{2} Professor Charles D. Kelso has suggested that the interests of others in the activities of the Jurimetrics Committee might be further stimulated by relating these activities to such traditional concept as 'last clear chance' and 'discovered peril': "You might get in a corny kick or two about the Jurimetrics Committee having discovered the peril of our profession, and liability will follow unless it takes this last clear chance to avoid the proximate results of years of negligent inattention to the risks of injury which have flowed from ignoring the need to assimilate modern communication and scientific theory."

\textsuperscript{3} Professors Harold D. Lasswell and Myres S. McDougal will undoubtedly recognize this as a branch of Law, Science, and Policy.

\textsuperscript{4} The term was first used by Lee Loevinger more than a decade ago in an article in which he coined 'jurimetrics' to refer to the scientific investigation of legal problems. See \textit{Jurimetrics: The Next Step Forward}, 33 Minn. L. Rev. 455 (1949).

\textsuperscript{5} For various helpful comments and suggestions on this note, I am indebted
to many of my colleagues at Yale Law School and on the Jurimetrics Committee and to Professor Charles D. Kelso, i.e.,

... to many of my colleagues at Yale Law School and on the Jurimetrics Committee ... rather than ... to many of my colleagues at Yale Law School and on the Jurimetrics Committee ...