Visualization tools and argument schemes: a question of standpoint

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Visualization tools and argument schemes, such as those described by Thomas Gordon and Douglas Walton, have been developed by a community of scholars interested in argumentation theory and artificial intelligence, primarily theorists in logic, argumentation and information science (collectively the ‘argument theory’ or ‘AT’ community). The visualization tools provide excellent vehicles for teaching critical thinking skills and make it possible to depict the relationships and functions of the propositions in an argument in a form that facilitates analysis. The argumentation schemes provide a mechanism for stating stereotypical arguments in a standardized format that makes it possible to critique and determine their dialectical validity.

The ongoing development of argument schemes and visualization tools may also hold promise for those seeking to develop artificial intelligence systems. By establishing standardized templates for varied arguments, argument schemes may provide a vehicle through which the arguments can be used and manipulated in artificial intelligence systems. The classification of the types of propositions in an argument, e.g. premises, assumptions, exceptions, etc., and development of symbol systems for depicting both the relationships and the functions of propositions in an argument may make it possible to create computer programs that may enable artificial intelligence systems to generate and depict the products of their analysis in an Araucaria- or Carneades-like format.

The AT community has long been interested in whether and how its tools might be used to facilitate the understanding and solution of legal problems. The AT community’s interest in evidential reasoning to resolve disputed questions of fact in legal contexts is more recent. The visualization

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1 At the Cardozo conference, Gordon and Walton presented a joint paper. This article, Visualization tools and argument schemes: a question of standpoint, was written as a comment on that paper and was forwarded to each of the authors in mid-May. In early July, they submitted separate papers revised to address many of the points made here. See THOMAS F. GORDON, Visualizing Carneades Argument Graphs, 6 Law, Probability and Risk, 109–17 (hereinafter ‘Carneades Graphs’) and DOUGLAS WALTON, Visualization Tools, Argument Schemes and Expert Opinion Evidence in Law, ibid. 119–40 (hereinafter ‘Argument Schemes’). Nonetheless, the points developed here provide a basis for better understanding the arguments advanced in their separate papers and the comment that follows those articles, Visualization Tools and Argument Schemes Revisited, ibid. 141–44 (hereinafter ‘Revisited’).


3 David A. Schum was probably the first major figure to straddle the AT and EL communities and his Evidential Foundations of Probabilistic Reasoning at 100–109 (John Wiley & Sons, 1994) (hereinafter ‘Foundations’) is seminal. Interest in the AT community mushroomed in the 1990s. See DOUGLAS WALTON, Argumentation Methods for Artificial Intelligence in Law 1 (Springer, 2005) (hereinafter ‘Walton (2005)’) (identifying major participants and their dates of entry into the fray). From the outset, the AT community has been interested in the use of informal logic to demonstrate and critique claims that the evidence can be marshalled to support or undermine a specified conclusion. See, e.g. CHRIS REED, DOUGLAS WALTON &
tools and argument schemes that have been developed since that time have been designed primarily for use by those working in the AT community and for that community they hold promise. Walton, Gordon and others have expressed the view that the tools and schemes they have developed can also be used by and useful for those concerned with the resolution of disputed questions of fact in legal contexts. Those tools and schemes are or could readily be adapted for use by legal theorists and practitioners concerned with analysing evidence (the ‘evidence in law’ or ‘EL’ community) for some purposes. They have not, however, been designed and may not be adaptable to satisfy the needs of those in the EL community concerned with analysing and constructing arguments based upon complex masses of evidence of the kind that is present in even relatively simple cases involving disputed questions of fact.

This comment describes what I think are the uses and limitations of AT tools and schemes in legal contexts and suggests possible adaptations that might increase the utility of such tools for the EL community. The points developed below can be simply summarized:

1. Araucaria and Carneades were designed to analyse arguments and could be used in their present form to critique and revise specific arguments that might be made in cases involving disputed questions of fact. Araucaria and Carneades were not designed to construct arguments—to identify inferences that the evidential data available in a complex, mixed mass of evidence might support and to determine what further inferences are necessary and how they could be marshalled in support of or in opposition to the proposition to be proved in a case, the ‘ultimate probandum’ to use Wigmore’s term. For that reason, it is hard to see how either could, in its present form, significantly aid an investigator seeking evidence or a lawyer analysing a mass of evidence to prepare for a trial or a law teacher trying to enable students to learn a rigorous method for performing those tasks.

2. Araucaria, as a program for diagramming the relationships among propositions in an argument, could easily be adapted for use in legal contexts. Only a few symbols would have to be added to its existing palette—a symbol to depict explanatory undercutters in a manner that distinguishes them from rival or denial rebutters, and one or more symbols to identify evidential data or other foundational propositions that form the evidential basis for an argument in a manner that distinguishes them from inferential propositions in that argument. A few new terms or an alternate terminology would enable users to more easily distinguish the differing functions
that evidential propositions serve in legal contexts.\(^7\) The central question is whether Araucaria can be adapted to serve as a usable and useful device for constructing complex arguments.

3. Carneades could be similarly adapted for use by the mathematically oriented members of the EL community as a vehicle for analysing and evaluating specific arguments based upon the evidence in a case. Carneades is a formal system designed not only to depict the relationship of propositions in an argument but also to evaluate whether inferences satisfy the appropriate proof standard at each step in an argument. It is a mathematical model and for that reason, Carneades users in law would be like Pascalian in the probabilities debate, and the program will produce diagrams analogous to those produced by Bayes’ nets—useful for some purposes by the mathematically inclined, but not for most members of the EL community.\(^8\) For that and other reasons, the possibility that Carneades could be adapted for general use in the EL community is remote.

4. Argument schemes that are useful in legal contexts have been and could be developed. The central question is useful for what purposes. The scheme for Argument from Expert Opinion as originally developed by Walton and presented at the Cardozo conference would need to be revised to become a useful vehicle for teaching law students critical questions they should consider in thinking about expert witnesses or for an after-the-fact analysis of an opinion given by an expert in a case.\(^9\) The scheme, in its original form, is not consistent with the forms and requirements imposed by the rules of evidence and other norms that govern trial and other processes designed for the resolution of disputed questions of fact. It could be modified to meet those requirements, but the question then would be whether it would still be useful for the purposes for which it was originally designed—i.e. for determining the dialogic validity of an argument or for translating arguments into a format that could be used in artificial intelligence systems.

This comment begins with a description of a method of analysis and the only contemporary visualization tool designed by evidence theorists in the EL community for use by those working in that community, modified Wigmorean analysis (MWA), and uses that description to develop the first three points. The uses and limits of argument schemes are discussed in a separate section.

1. **Visualization tools**

1.1 *Modified Wigmorean analysis*

In 1913, John Henry Wigmore first introduced his ‘Principles of Judicial Proof’.\(^10\) In that volume, he described the principles of informal logic and illustrated their use in analysing evidence and

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\(^7\) See William Twining, *Rethinking Evidence* (Cambridge University Press 2d ed. 2006), at 125–130 (for a description and summary of the debate) and Symposium, Decision and Inference in Litigation, 13 *Cardozo Law Review*, 253–1079 (for illustrations) (articles and comments by participants in the debates).

\(^8\) The comments on the scheme Argument for Expert Opinion in this paper were based upon the scheme as developed in Douglas Walton, *Appeal to Expert Opinion* (Penn State Press, 1997) and presented at the conference. *Argument Schemes* presents a version modified to take into account the legal requirements discussed below at 106–07. The modified scheme is discussed in *Revisited*.

\(^9\) There were three editions. The last was published in 1937 and was titled *The Science of Judicial Proof* (Little, Brown & Co.) (hereinafter ‘Science’).
constructing arguments in legal disputes. He also presented a chart method of analysis that could be used to graphically depict the logical relationship among propositions supported by the evidential data in a case and the inferential propositions necessary to demonstrate the relationship to the ultimate proposition to be proved, the ultimate probandum.

Wigmore’s classification of evidential data and evidential propositions and his description of the probative processes were central. Wigmore distinguished between two kinds of evidential data that will be presented to the fact finder in a legal dispute—testimonial and circumstantial, primarily tangible—and two kinds of propositions involved—evidential propositions, the propositions asserted by a witness or the propositions shown by tangible evidence, and inferential propositions, the propositions to be inferred from the evidence offered to support it.11 Wigmore identified five probative processes to specify the different functions of inferential propositions in an argument. He categorized the main relations between evidentiary propositions in terms of the probative processes for which they might be offered—proponent’s assertion (PA), opponent’s denial (OD), opponent’s rival (OR), opponent’s explanation (OE) and proponent’s corroboration (PC).12

When a party offers a testimonial assertion or a tangible item as evidence at trial, she is a proponent claiming that the proffered datum supports an assertion that is relevant. That is a proponent’s assertion (PA). In most instances, the proponent must also claim that initial assertion supports a further assertion (an interim probandum) which in turn supports a further assertion and so on, until the logical basis for the claim that the proffered datum makes a fact of consequence more probable or less probable has been demonstrated. There are three, and only three, ways through which the opposing party can challenge such an assertion or the inferences it supports. She may deny it, opponent’s denial (OD); she may offer evidence supporting a conflicting rival proposition (OR) or she may offer alternative explanations, with or without supporting evidence, opponent’s explanation (OE).13 After a proponent’s assertion has been attacked, the proponent may offer further evidence to corroborate the initial assertion (PC).

Wigmore designed the symbols for his chart method so that they clearly identified the kinds of evidential data and the kinds of inferential propositions and specified the function of each proposition in the argument. Wigmore’s original chart method was, however, too complex for use in law teaching or practice. It required the use of 64 different symbols to depict the arguments in a case and the illustrative charts of the evidence in the two cases that Wigmore charted were not very good.14 For those and other reasons, neither the book nor the chart method were widely adopted by the legal academy and largely disappeared after Wigmore’s death in 1943.15

11 Science, §§5 and 6.
12 The description of the adaption of Araucaria to enable users to draw ‘Wigmore diagrams’ does not mention opponent’s rival or denial and does distinguish between circumstantial evidential data and inferences which are always circumstantial. The number of Wigmorean symbols that retained in Araucaria substantially exceeds the number that retained for MWA. See Glenn Rowe & Chris Reed, Translating Wigmore Diagrams, in Computational Models of Argument—Proceedings of COMMA 2006 at 171–182 (Paul E. Dunne and Trevor J. M. Bench-Capon eds., IOS Press, 2006).
13 Science, §§12–25.
14 See Terence Anderson & William Twining, Analysis of Evidence: How to Do Things with Facts Based on Wigmore’s Science of Judicial Proof at 136–141 (Little, Brown & Co., 1991) (hereinafter Analysis I) (using Wigmore’s chart of the evidence in Commonwealth v. Umilian, reproduced ibid. at 131–135, to illustrate why Wigmore was not very good at applying the system he designed.).
The method was rediscovered in the 1970s and a modified version of the chart method and a 
new seven-step protocol for its use (collectively ‘modified Wigmorean analysis’ or ‘MWA’) was 
published in 1991.\textsuperscript{16} The number of symbols was reduced from 64 to 8:

\begin{itemize}
  \item [\square] (1) The square for depicting testimonial assertions;
  \item [\circ] (2) The circle for depicting circumstantial evidence or inferred propositions;
  \item [>] (3) The open angle to identify an argument that provides an alternative explanation for an 
inference proposed by the other side;
  \item [\langle] (4) A vertical triangle to identify an argument that corroborates a proposed inference;\textsuperscript{17}
  \item [\uparrow] (5) A line with an arrow to indicate the ‘direction’ of a proposed inferential relationship be-
tween or among propositions—vertical lines indicate ‘tends to support’; horizontal lines 
indicate ‘tends to negate or weaken’ or ‘tends to corroborate’;
  \item [\infty] (6) The infinity symbol to identify testimonial assertions or real evidence that the fact finders 
will hear or otherwise perceive with their other senses;
  \item [\¶] (7) A paragraph symbol to identify facts that the tribunal will judicially note or otherwise 
accept without evidential support and
  \item [\textbf{G}] (8) The letter ‘G’ to denote the generalization that justifies an inference; ordinarily only used 
when the generalization is non-obvious.\textsuperscript{18}
\end{itemize}

A seven-step protocol was prescribed for its use: (1) clarify standpoint, (2) formulate the ultimate 
probandum, (3) formulate the penultimate probanda, (4) formulate provisional theories of the case, 
(5) formulate the key list, (6) prepare the charts and (7) refine and complete the analysis.\textsuperscript{19} The same 
protocol could be used to conduct an analysis using Araucaria or, to a lesser degree, Carneades. 
Steps 1, 2, 3, 5 and 6 of the protocol provide a framework for comparing the uses and limitations of 
the three systems.

1.2 A framework for comparison

1.2.1 Standpoint. An analyst must answer four questions to clarify her standpoint. First, who 
am I for the purposes of this analysis? For example, an analyst could be an investigator, a lawyer 
preparing for trial, a lawyer preparing for an appeal or a scholar critiquing the evidentiary basis for a 
decision. Second, at what stage of what process am I? The objectives of the analysis differ at different 
stages. An investigator or lawyer in the discovery process is analysing the available data to deter-
mine what more is necessary. A lawyer immediately before trial is using a completed database to 
construct and marshal the strongest arguments for supporting the position of the party she represents

\textsuperscript{16} Analysis I. During the same period, David Schum had independently rediscovered Wigmore and had developed his own modifications to enhance its utility. See DAVID A. SCHUM, Evidence and Inference for the Intelligence Analyst (University 
Press of America, 1987); see also Foundations.
\textsuperscript{17} Both the symbol and the probative process for proponent’s corroboration are rarely useful in contexts other than trial 
preparation. It is only useful in that context because evidence cannot be admitted unless and until the proponent has attacked 
the proponent’s assertion and and identifying evidence that a plaintiff may offer in rebuttal after the defense has rested.
\textsuperscript{18} Analysis I at 144–148; see also TERENCE ANDERSON, WILLIAM TWINING & DAVID SCHUM, Analysis of Evidence at 
\textsuperscript{19} Analysis I at 120–130; Analysis II at 124–134.
and undermining the position of her opponent. A post-trial analyst may have differing objectives—to critique the job done by counsel, to determine the dialogic validity of particular arguments, to determine whether the evidence was or could have been marshalled to support the verdict or decision made and so on.

Third, what does the available database include? The stage of the process and the evidence available limit the objectives the analyst may seek. If the analyst seeks to determine whether a jury verdict was justified, she must limit herself to the evidence presented at trial. If the analyst is a historian seeking to determine whether a conviction was just, she is not limited to the record; her analysis should include all available data. Finally, what is the objective of the analysis—e.g. to determine what additional evidence might be available, to construct and marshal arguments to 

Two further points are relevant to the comparison. In a real case of any size, the objective is to analyse a complex, mixed mass of evidence and construct and depict how the evidence and the arguments it supports can be marshalled to support or undermine the ultimate probandum to be proved. On the other hand, for some purposes, the objective may be to subject some part of the evidence to microscopic analyses for a more limited purpose such as determining the credibility of an assertion made by a witness or an opinion given by an expert witness.

1.2.2 The ultimate and penultimate probanda. Unlike analyses in other contexts, in legal contexts the law defines the facts that must be proved in order for a plaintiff or a prosecutor to prevail. To use a still familiar example, in the O. J. Simpson case, the ultimate probandum had to be derived from the rule of law defining first-degree murder. Under section 187(a) of the California Penal Code, ‘Murder is the unlawful killing of a human being . . . with malice aforethought.’ That section might be rephrased as the major premise of a syllogism:

If a human being, a victim, is dead, and the victim died as a result of an unlawful act, and it was the accused who committed the act that caused the victim’s death, and the person who committed the act that caused the victim’s death acted with malice aforethought, then the accused is guilty of murder.

For the murder of Nicole Brown Simpson (‘NBS’), the ultimate probandum had to be a proposition that satisfied the conditions of that major premise. That proposition might be framed in the abstract as follows:

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21 See, e.g. René Weis, Criminal Justice: The True Story of Edith Thompson (1988) (a historical analysis of not only the evidence offered at trial but also all other available evidence concerning Edith Thompson’s guilt, concluding she was in fact innocent of the crime charged).
22 It should be clear that analysis and evaluation cannot be completely compartmentalized in practice. As the analyst constructs an argument, she automatically appraises its strength. It has proved useful to maintain the distinction in applying the protocols for analysis.
NBS is dead; and NBS died as the result of an unlawful act; and it was Orenthal James Simpson (‘OJS’) who committed the act that caused NBS’s death; and the person who committed the acts that caused NBS’s death acted with malice aforethought.

Ordinarily, the ultimate probandum or probanda are complex propositions with more than one condition that must be satisfied. Determining the penultimate probanda, initially and at a minimum, requires that the analysts convert the complex ultimate probandum into a compound proposition and partition (and often subpartition) that proposition into its component simple propositions. In the O. J. Simpson case, framing the penultimate probanda requires partitioning the ultimate probandum until it has been reduced to its elements expressed as simple, declarative sentences, e.g.

1. NBS is dead.
2. NBS died as the result of an unlawful act.
3. It was OJS who committed the act that caused NBS’s death.
4. The person who committed the acts that caused NBS’s death acted with malice aforethought.

1.2.3 The key list and charts. Each of the three systems requires a set of propositions to be analysed. These are evidential propositions—testimonial assertions, stipulated or judicially noticed facts, propositions in a document—and inferential propositions and generalizations (or warrants). In MWA, the construction of the key list and the charting of its proposition are reflexive. Typically, a Wigmorean first determines her standpoint. She then would determine the ultimate and penultimate probanda that must be proved to the required degree of certainty for the prosecutor or the plaintiff to prevail and adopt provisional theories of the case as a touchstone for her analysis. She will then convert the available evidential data into simple declarative evidential propositions. Then, the hard work begins. Inferential propositions must be identified that alone or in combination establish the relevance of each evidential proposition to a penultimate probandum or to the credibility of a witness who will testify. Every step in an inferential chain represents a potential source of doubt, and the analyst needs to figure out what rival or explanatory propositions the opposing side could plausibly use to undermine the probative value of the inference being considered. In the course of doing that, the analyst will frequently discover that a necessary step in the chain has been omitted. MWA posits that the chart method is the most rigourous method of analysis because charting the inference as the key list develops is the exercise that enables or forces the analyst to spot flaws or discover other possibilities in the analysis to date. Thus, the key list is not a fixed text that constitutes the starting point for the exercise of diagramming propositional relationships. In MWA, it is one product of the analysis, a product that has been constructed and refined in the charting process. Another product is the chart that has evolved as the key list was being constructed. This raises a question that I partially address below: Can either Araucaria or Carneades be modified to be a significant aid to analysis and argument construction in a complex case?

25 The penultimate probanda establish the limits of relevance. Every evidential proposition must alter the probability (positively or negatively) of a penultimate probandum or the credibility of a witness who has testified. See, e.g. Federal Rule of Evidence 401 (relevance defined).
26 See Analysis II at 24–26, 128–129, 239–241 (for an example of the interactive process).
27 Many charts are initially drawn by hand. All the basic MWA symbols are standard logic symbols that can be drawn freehand or by using a logic template, such as a ‘Berol, RapiDesign, Standard Logic Symbols’. The finished charts are most frequently produced on computers using a Microsoft Visio palette of Wigmore symbols or other programs.
1.3 Araucaria

Araucaria represents a further simplification for Wigmore’s chart method. It requires only five (rather than eight) symbols.

- Boxes represent node depicting propositions.
- Shaded boxes with dashed boundaries represent implied propositions.
- A line with arrow connecting one node to another node depicts that the first proposition supports the second.
- The horizontal line with vertical lines attached to two or more nodes below with a line with an arrow connecting to a node above the line depicts a linked argument—an argument in which none of the linked propositions individually supports the inference indicated supports the inference.
- Diagonal lines connecting two nodes to a node above them represents a convergent arguments.
- A line with an arrow at each end depicts the relationship between an inference and a proposition that rebuts or undercuts that inference.\(^{28}\)

The utility of Araucaria as a tool for diagramming arguments in legal contexts is limited by its failure to include symbols that make it easy to distinguish an opponent’s denial and rival arguments, arguments that rebut or negate a proponent’s assertion, from an opponent’s explanations, which undercut or weaken a proponent’s assertion, ordinarily by challenging the generalization upon which that argument depends. In a legal context involving a disputed question of fact, there must be an evidential datum that is the base for each inference that can be marshalled in support of and in opposition to the proposition to be proved. The absence of a symbol that enables the analyst (and the reader) to identify an evidential datum (or other base which represents the starting point for an inferential chain) in a way that distinguishes it from the inferences which it supports creates a barrier, albeit one that could be overcome easily.\(^{29}\) Araucaria could easily be modified to address these problems, and terms for the functions of propositions in an argument might be refined to make them more readily understood or user-friendly to those in the EL community.\(^{30}\)

With those changes, Araucaria could become a drawing program that an analyst could use to draw a chart (an acyclic diagram) depicting the relationships among propositions on a key list after the analysis had been completed. The analyst could paste a key list as ‘a text’ to be analysed into Araucaria and use the functions embedded in Araucaria to translate her hand-drawn charts into computer-drawn charts. If the adaptations were made, the complexity questions would also have to be addressed. MWA can be used to depict the relationships among the propositions on a key list of any length. Charted analyses of cases or other problems prepared by students in Analysis

\(^{28}\) An argument using all four symbols is depicted in Argument Diagramming in Fig. 2.

\(^{29}\) Araucaria can be used to construct a Wigmorean diagram, but it uses the original symbol Wigmore developed in 1913 and for that reason its practical utility is limited. Araucaria in its present form has one feature that suggests how MWA might be improved. A convergent argument, an argument in which each of the supporting propositions independently supports the inferred problem, is charted in MWA as a linked argument, and the diagram does not identify the distinction between such an argument and an argument based upon a combination of two or more propositions, none of which standing alone supports the inferred proposition. Araucaria adopts a protocol that diagrammatically distinguishes a convergent from a linked argument.

\(^{30}\) Araucaria also includes a database of ‘argument schemes’. This raises the issue whether the additional terms and concepts that have been developed to describe propositions in an argument scheme can also be converted.
of Evidence courses taught by Twining or Anderson typically have 200–600 propositions. The designers of Araucaria would have to determine whether the program could accommodate and diagram the relationships among the propositions on a key list with that many propositions.

If these adaptations were made, Araucaria might become the drawing program of choice for analysts who hand draw and revise their charts during the analysis and argument construction process and want to convert hand-drawn charts into machine-drawn form. The choice would be based upon the ease of use. Many Wigmoreans construct and revise their key lists and charts using a computer. The available programs enable them to insert symbols and modify arguments as their analysis develops. I have been unable to determine whether Araucaria could be adapted so that a key list and chart could be constructed and revised in a similarly interactive fashion using that program.

1.4 Carneades

The problems with Carneades are more formidable. Carneades is designed on the assumption that probative value or force can be usefully recorded in an argument diagram. That assumption raises all of the issues that have been addressed in the probabilities debate—the debate between the Pascallians who claim that all probabilistic reasoning must be mathematical in principle and the Baconians who reject that claim. The designers of MWA concluded that, whatever the merits of that debate, neither the probative force of a simple argument nor the net persuasive effect of a complex argument could usefully be depicted in a chart for two reasons. First, the assigned values could only be those of the analyst and are unlikely to be shared by other readers of the analysis and in an argument of any complexity would only be determined after the fact, i.e. a completed analysis ordinarily enables the analyst to conclude whether the ultimate probandum has or has not been proved to the required degree of certainty. Any attempt to assign probative force to the supporting and opposing inferences would represent an after-the-fact attempt to insert values that would provide a formal justification for the conclusion reached. Whatever the validity of that position, the likelihood that Carneades could be adapted for general use in the EL community will remain remote.

The Carneades Argumentation Framework is a ‘formal, mathematical model of argument evaluation which applies proof standards to determine the defensibility of arguments and the acceptability of statements on an issue-by-issue basis’. Its use requires mastery of 10 formal (mostly boolean) definitions, 2 theorems and 15 symbols. It is a closed system in that every argument must result in a formal conclusion that determines whether a premise is acceptable or unacceptable or true or false. The products generated by this kind of Carneades analysis may be of interest to the legal community at large. Nonetheless, the purposes for which the systems were designed are not central to the work of most in the EL community, and, apart from the few Bayesians in that community, few are likely

31 For example, Jay Bishop and Nicole Walsh, two first-year law students at University of Miami who took the Analysis of Evidence course, submitted a project titled The Trial of I. Scooter Libby, a charted analysis of the evidence presented in United States v. Libby, Cr. Case No. 05-394 (D.D.C. verdict 6 March 2007). The key list had 359 propositions. The project (without the appendix) appears at http://ssrn.com/abstract=1028593 and is available from the author at tanderso@law.miami.edu.

32 There are a variety of programs that have or enable users to create the symbols in the basic Wigmorean palette (reproduced at p. 5 above). A VISO palette of basic Wigmorean symbols has been created for use by students and others at the University of Miami and is available from the author at tanderso@law.miami.edu.

33 See sources cited in n. 8 above.

34 Carneades Argumentation Framework at 196.

to conclude that the benefits from the system justify the investment of time that would be necessary for its mastery.

2. Argument schemes

Lawyers have had to deal with recurring forms of evidence for centuries. In all or almost all trials of cases involving disputed questions of fact, witnesses have testified and will testify and documents or other forms of tangible evidence have been and will be introduced as evidence. In many cases, some of the witnesses have been and will be experts. Rules of evidence and the norms of practice have been established and evolved to establish the conditions that must be satisfied for the admission of the various forms of evidence and to define their uses and limitations. As a result, practitioners’ manuals have long existed to show lawyers the ‘critical questions’ that should be asked by the proponent of the evidence and to suggest lines of inquiry that the opponent might want to pursue on cross-examination. Many of these could be reformulated in the form of ‘argument schemes’ as Walton uses that term. An analysis of the legal requirements for the use of expert testimony illustrates the challenges.

The conditions for admitting expert testimony in the United States federal courts are prescribed by Rule 702 of the Federal Rules of Evidence.

If scientific, technical or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods and (3) the witness has applied the principles and methods reliably to the facts of the case.

These conditions might be restated in the format used by Walton as follows:

1. Domain D constitutes scientific, technical or other specialized knowledge.
   a. Domain D constitutes knowledge.
   b. The knowledge in domain D is scientific, technical or otherwise specialized.

2. Assertion A is a part of or could be derived from domain D through the use of principles and methods that are reliable.

37 See, e.g. DOUGLAS WALTON, Argument Schemes for Presumptive Reasoning (Lawrence Erlbaum Associates, 1996).
38 The following analysis was based upon the argument scheme presented at the Cardozo conference and in Walton’s earlier work. See DOUGLAS WALTON, Appeal to Expert Opinion (1997).
39 Federal Rule of Evidence 702. The conditions also state standards the fact finder may consider in evaluating expert testimony after it has been admitted.
a. Assertion A is a part of or could be derived from the domain D.

b. The principles and methods available for deriving assertion A from domain D are reliable.

3. E is an expert in domain D by virtue of knowledge, skill, experience, training or education.

4. E has sufficient facts or data upon which to base assertion A.

5. E has applied the principles and methods for deriving assertion A from domain D reliably.

6. Assertion A will assist the trier of fact to understand the evidence or to determine a fact in issue in this case.

Any of these conditions may be questioned in a particular case, and several are likely questioned in a case involving conflicting expertise.

Walton has reformulated the scheme for Argument from Expert Opinion to address these conditions in order to establish or enhance its utility in the EL community. The reformulated version raises a new and important question: Whether, which, and for what purposes would an argument scheme that conformed to these requirements necessary to make it useable in the EL community still be useful for those in the AT community?

Until recently, the work of those in the AT community has not involved significant input from those in the EL community. Similarly, members of the EL community have rarely sought to involve scholars from the AT community in their work. One consequence of this separation has been the development of interdisciplinary barriers that have limited cross-community understanding and appreciation of the work done in each of the communities. Substantial credit should be given to Peter Tillers and Henry Prakken for organizing the Cardozo conference to bring representatives of the two communities together.

Acknowledgements

I have long-standing intellectual debts to William Twining and David Schum which are again reflected here. I have profited from the comments from Thomas Gordon on a draft of the present paper and from prior books and papers written by the participants in the Cardozo conference on Graphic and Visual Representations of Evidence and Inference in Legal Settings particularly those written by Douglas Walton and Thomas Gordon. I am again indebted to Peter Tillers, the maestro of evidence conferences, and Henry Prakken for organizing the Cardozo conference.

\[40\] See Argument Schemes at 130–37.

\[41\] I address that issue in Revisited, at 144.