Visualization tools and argument schemes revisited

TERENCE J. ANDERSON†
Professor, University of Miami School of Law, Coral Gables, FL 33124–8087

In their respective papers, Gordon1 and Walton2 have addressed many of the concerns raised in my initial paper on visualization tools and argument schemes.3 Gordon’s simplified description of Carneades graphs effectively demonstrates that mastery of the mathematical theory on which the system is based is not necessary for its use. Walton has developed subquestions for each of the six critical questions for his scheme for Argument from Expert Opinion that satisfy the conditions for the admission of expert evidence and provide criteria for testing its probative value. The more detailed scheme provides a valuable heuristic device for lawyers, law students, and others concerned with the uses and limitations of expert evidence in legal contexts. Those papers also make it possible to refine and clarify the concerns that remain.

1. Visualization tools

Araucaria, Carneades and the modified Wigmorean chart method of analysis (MWA) can all be used to produce a graphic representation of an argument.4 Each has its own set of symbols and a coherent set of rules and procedures for their use. From the standpoint of the consumer of the graphic representation, their relative utility is a function of intended use. From the standpoint of the creator of the graphic representation, their utility is a function of purpose.5

If the intended use was to enable students to develop skill in analysing and critiquing relatively simple arguments, the choice would depend upon the standpoint of the teacher and the purpose of the course. In a course that included informal logic using argument schemes, Araucaria would be the clear choice. Its program incorporates argument schemes and can generate upon command a graphic

† Email: tanderso@law.miami.edu


2 DOUGLAS WALTON, Visualization Tools, Argument Schemes and Expert Evidence (hereinafter ‘Argument Schemes’), ibid. at xxx.

3 TERENCE J. ANDERSON, Visualization Tools and Argument Schemes: A Question of Standpoint (hereinafter ‘Standpoint’), ibid. at xxx.

4 In 1913, John Henry Wigmore presented his chart method for analysing complex bodies of evidence and depicting the results of the analysis in graphic form in The Problem of Proof, 8 Illinois Law Review 77 (1913). In 1991, William Twining and I published a modified scheme for Wigmorean analysis. The modified scheme has a more rigorous protocol for its use, but a simplified set of symbols for depicting the results. The protocol and charting scheme for MWA and its evolution are described and documented in more detail in Standpoint, at xxx. Araucaria and Carneades are described in Standpoint, at xxx. Walton illustrates Araucaria in Argument Schemes, at xxx, and discusses Carneades at xxx. Gordon, one of the creators of Carneades, describes the system and illustrates its use in Carneades Graphs.

5 The utility of Araucaria, Carneades and MWA as drawing tools is limited. The Araucaria program has commands that enable the user to generate the appropriate combination of symbols to depict linked and convergent arguments with exceptions and rebutters from a manually constructed list of propositions. Carneades and MWA do not presently have any ‘drawing capability’. The user must select the appropriate symbols from a palette containing its symbols and insert them, one by one, into the graph or chart. Preparing a graphic representation of a complex argument is a labour-intensive process.
representation of convergent or linked arguments and can insert implied premises and undercutters and rebutters. In the hands of a skilled user, it could generate and revise arguments on the screen during a class. In a course designed to teach students a rigorous method of evaluating arguments to determine whether they satisfied one of the proof standards that have been modelled, Carneades would be the choice. The system requires that the user determine whether an argument satisfies the specified standard of proof and supplies carefully defined criteria that must be applied in making that judgement. In a course that had analysing evidence in legal contexts as a component, MWA would be the choice because it was designed for use in that context and uses terms with which law students must become and lawyers are familiar to classify the kinds of evidence and the probative processes involved.

Any of the systems could be used for microanalysis of simple arguments or segments of more complex arguments. Any of the systems could be used to generate a graphic depiction of a complex argument. If, however, the intended purpose was to analyse a complex body of evidence in order to construct and refine the strongest arguments for and against an ultimate proposition to be proved or tested and to represent the results of the analysis in graphic form, I do not think the case has been made for Araucaria or Carneades. Either of them could be used to depict the results of a completed analysis, but neither was designed as a method for constructing and revising complex arguments. In legal contexts, MWA remains the only program designed for that purpose.

Moreover, Gordon’s paper does not resolve the central problem that limits the utility of Carneades in legal contexts. The system has been designed to evaluate arguments using ‘computational models . . . of proof standards’. Three standards have been modelled—“scintilla of evidence” (SE), “best argument” (BA) and “dialectical validity” (DV). But as Gordon notes, ‘The legal proof standards of “preponderance of evidence”, “beyond reasonable doubt” and “clear and convincing evidence” . . . have yet to be formally modeled’. A central issue in the probabilities debate has been whether useful ‘computational models’ of these standards can be established. Unless and until such models are created, Carneades will have only limited utility for legal theorists and practitioners concerned with analysing and evaluating evidence (the ‘evidence in law’ or ‘EL’ community). If such models were developed, a Carneades argument evaluation would, presumably, be similar to an evaluation that relied upon Bayes’ theorem. Thus far, those who have advocated the use of Bayes’ theorem or other computational models for deciding cases have had limited success in persuading members of the EL community of the utility or feasibility of using such computational models for the evaluation of evidence under those standards of proof.

2. Argument schemes

There is one basic argument scheme to which all rational arguments must conform. Every argument must be based upon a generalization that serves as a major premise. In deductive logic, the

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6 Carneades Graphs, at xxx.
7 Ibid. at xxx.
8 There are, of course, circumstances in which the use of statistical or other computational methods are necessary and proper, e.g. in wrongful death cases requiring the calculation of life expectancies, in many employment discrimination cases, in cases where blood-type, DNA, or fingerprint evidence is relevant and so on. Elsewhere I have suggested that probabilistic calculations of the odds of success and the probable value of a case may be useful tools for developing, justifying or explaining positions taken in settlement negotiations or client counselling. See Terence J. Anderson, Refocusing the New Evidence Scholarship, 13 Cardozo Law Review 783 (1991).
generalization is a universal proposition and is ordinarily stated—to use a classical example: ‘All men are mortal; Socrates is a man; therefore, Socrates is a mortal’. In (informal) inductive logic, what Walton calls presumptive reasoning, the generalization is less than universal and ordinarily is implicit—to paraphrase the Pollock example: ‘In most instances an object that appears to be red is an object that is in fact red; object x appears to red; it is highly probable that object x is in fact red’. In abductive logic, the conclusion is speculative and the generalization is the hypothesis to be tested—to use a 9/11 example: ‘Foreign nationals from the middle east, who had no prior flight training or experience, enrolled in American flight schools seeking to learn how to fly large commercial airplanes; if Mideastern terrorists were planning to hijack American commercial airliners and use them as weapons, they might send terrorists to flight schools in America to learn how to fly commercial airliners; Mideastern terrorists might be planning to hijack American commercial airliners and use them as weapons’.9

Evidential reasoning in legal contexts is ordinarily inferential.10 Thus, it is possible to articulate a basic argument scheme that can be applied to all inferential arguments: the generalization is applied to an evidential proposition to demonstrate that it supports the conclusion. For example,

**Generalization:** A person who enters another’s house usually remains for at least 15 min.

**Evidential proposition:** X entered Y’s house at 4:15 p.m. on 1 January.

**Inferential conclusion:** It is highly probable that X was in Y’s house at 4:30 p.m. on 1 January.11

This is the basic scheme that has been used in constructing and critiquing arguments in law and other disciplines, such as history, that require that conclusions be rationally justifiable.12 The scheme has, explicitly or implicitly, been recognized as the basis for evidential reasoning in law at least since the 18th century.13 It is the scheme implicit in Wigmore’s statement of the principles of proof and explicit in MWA.14

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9 The sources of the example and the intellectual procedure by which the hypothesis might have been tested are discussed and developed in Terence Anderson, David Schum & William Twining, *Analysis of Evidence* (2nd ed. 2001) at 48–50 (hereinafter ‘Analysis II’), Cambridge University Press, Cambridge.

10 During the investigative stage, of course, abductive reasoning is often required.

11 A standard set of critical questions might be articulated as follows:

CQ1: What are the exceptions (alternative explanations) that might undercut or reduce the degree of certainty of the inferential conclusion?

CQ2: Are there any rebutters, i.e. evidential propositions that can be marshalled to support a rival inferential conclusion or that can be marshalled to support an inference that denies the evidential proposition?

CQ3: To what extent do the exceptions and rebutters collectively undermine the degree of certainty that should be accorded the inferential conclusion?

CQ4: Is there evidence that can be marshalled to corroborate or provide additional support for the inferential conclusion?

CQ5: To what extent does the corroborating evidence increase the degree of certainty that should be accorded the inferential conclusion?


Each of the different argument schemes Walton has identified conforms to this basic model. The differences stem from the fact that a different set of critical questions can be identified for each of the stereotypical forms of argument that Walton has identified. As I understand it, Walton developed these stereotypical argument schemes for three purposes. First, he wanted to create a vehicle that could be used to enable students and others to develop a skill in analysing and criticizing arguments in practical contexts. ‘Each scheme has a set of critical questions that represent the standard ways of critically probing into an argument to find its weaknesses’. Second, he wanted to create a device for determining the dialectical validity (DV) of an argument. Walton defined argument schemes as devices to show how the burden of producing evidence shifts back and forth between the proponent and the opponent at each step in an argument in a two-person dialogue. Using these schemes and the rules for various types of dialogues, a person can determine the DV of an argument. Third, he has worked to create simple stereotypical patterns that might facilitate the development of artificial intelligence computer programs for argument analysis. For these purposes, Walton is one of the leading authorities in the world.

In Argument Schemes and elsewhere, Walton has claimed that these schemes can and should be used in legal contexts. The central questions raised by that claim are two: Whether and which of these schemes would provide added value for those in the EL community, over and above the value inherent in the basic scheme, that would justify the investment in time and energy necessary for their mastery? How could the schemes so identified be modified to establish or enhance the added value in legal contexts? In Argument Schemes, Walton has effectively answered both the questions with respect to the scheme for Argument from Expert Opinion. He has provided a careful summary of the law establishing the conditions for admissibility of expert opinion evidence and demonstrated how his revised critical questions and subquestions provide a framework for determining whether and the extent to which those conditions have been satisfied.

Walton’s answers, however, raise two further questions: The first is whether and to what extent could the modified scheme for Argument from Expert Opinion be used by those in the argument theory community for the purposes for which they were originally intended? Walton has recognized the problems suggested by this question and placed them on the agenda for further research. The second is which of the other schemes Walton has described could be similarly modified to give them the necessary added value for the EL community and how? If anyone can answer these questions, it is Doug Walton.

15 Argument Schemes, at xxx.
16 Argument Schemes, at xxx.
17 Standpoint, at xxx.
19 Arguments Schemes, at xxx.
20 Argument Schemes, at xxx.