

BOOK REVIEW

MODELING LEGAL ARGUMENT: REASONING WITH CASES AND HYPOTHETICALS

By Kevin D. Ashley.

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*Reviewed by Virginia J. Wise **

*Modeling Legal Argument: Reasoning with Cases and Hypotheticals*¹ is the second book in the series on Artificial Intelligence and Legal Reasoning edited by L. Thorne McCarty and Edwina Rissland, two of the leaders in a relatively new field that attempts to apply techniques of computer science, formal decision theory, and artificial intelligence ("AI") to law and legal reasoning. Like the previous volume in this series,² this is a revision of a doctoral dissertation in computer science. Its author, Kevin Ashley, is a Harvard Law School graduate who is now a Research Scientist at the Learning Research and Development Center and Assistant Professor of Law at the University of Pittsburgh.

I do not come to this book with formal training in computer science or the theory of artificial intelligence, so my aim is not to review the book from the perspective of an insider to those or related fields. Thus I do not evaluate Ashley's technical programming skills or the elegance of his computational models. Rather, as a user and teacher of the theory and practice of legal research and legal information, my goal is to consider this book from the perspective of a knowledgeable consumer of the insights potentially offered by those who strive to model legal reasoning in more formal ways. If what this new field has yet produced remains too internal for those situated as I am, it may indicate something about

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1. KEVIN D. ASHLEY, *MODELING LEGAL ARGUMENT: REASONING WITH CASES AND HYPOTHETICALS* (1990).

2. ANNE VON DER LIETH GARDNER, *AN ARTIFICIAL INTELLIGENCE APPROACH TO LEGAL REASONING* (1987).

the prospects for widespread acceptance of perspectives such as that offered by Ashley.³

Most lawyers are of course familiar with the application of computer technology to the practice of law in the form of LEXIS and Westlaw. In addition, software programs that handle forms, pleadings, and routine operations like word processing and billing are well understood by an increasingly dominant segment of the legal profession. Ashley and other proponents of applying the techniques of artificial intelligence to law have a loftier vision, however, of the computer's role in aiding a lawyer's decisionmaking processes. They wish to assist the lawyer not only in the prosaic task of sifting through the ever-increasing volume of cases, statutes, regulations, and secondary literature, but also in the use of the computer as a guide to making judgments about the probable outcome of a specific case in a particular field of law. To develop "intelligent machines" capable of performing tasks which rely on judgment and which will respond to a constantly shifting database of precedents in case law and regular changes in statutes and regulations, they must be able to reduce the law to a set of rules which can then be subjected to at least probabilistic manipulation.

Although Ashley provides the obligatory acknowledgement to Hart, Dworkin, and Llewellyn,⁴ he never directly confronts the most difficult challenges that some accounts of legal reasoning pose for any enterprise such as this. He does note regretfully in his introduction that, "[u]nfortunately for AI, legal reasoning involves interpretation of textual materials. Understanding natural language is a notoriously difficult problem for computer programs. . . . This is especially true in law, where the problems and situations are as complex and diverse as human experience and the prose is so atrociously poor" (p. 2). But the author does not face up to the fact that in quite different ways both Dworkin and the Realists called into question the very idea that decisionmaking by judges relies exclusively or even predominantly on that realm of materi-

3. Chapter 9, *A Theory of Case-Based Argument in Hypo*, is the most technical in the book. However, Ashley introduces it with an accessible exposition of set theory, and is to be applauded as well for following each equation with a non-symbolic English explanation. ASHLEY, *supra* note 1, at 157-81.

4. These theorists and others are noted in the bibliography, ASHLEY, *supra* note 1, at 315-22, and there are brief excursions in traditional legal theory at other places throughout the book. *Id.* at 230-32. Still, this book does not draw heavily on the large and plainly relevant jurisprudence of legal reasoning and legal argumentation, and in this regard it is noticeably different from other approaches. See, e.g., RICHARD E. SUSSKIND, *EXPERT SYSTEMS IN LAW: A JURISPRUDENTIAL Inquiry* (1987); Edwina L. Rissland, *Artificial Intelligence in Law: Stepping Stones to a Model of Legal Reasoning*, 99 *YALE L.J.* 1957 (1990).

als commonly referred to as "legal." If with some frequency materials other than those found in books of statutes and cases play a major role in judicial decisionmaking, then any attempt to model legal reasoning on an artificially truncated set of such sources is doomed to failure. In this regard Dworkin and the Realists may be wrong in their descriptive accounts, and indeed the techniques of computerized empirical analysis may help us evaluate these descriptive claims. Nevertheless, it is important to recognize at the outset that Ashley and many others writing in a similar vein presuppose without extended argument a highly controversial model of the nature of legal reasoning—a model perhaps selected because it is sound, but possibly also because it may be the only model that makes the subsequent enterprise plausible.

Ashley's own task is thus one of examining the problems and potential of developing a model that relies on a complex interplay of deductive logic and reasoning by analogy. The book describes the construction and use of a computer program called Hypo, which takes the law of trade secrets disputes as its domain of expertise. Hypo focuses on the ways in which cases might be used to generate rules and hypotheticals which would in turn enable an attorney to reach a concrete conclusion about the strength of his or her argument within a particular factual context. The most interesting aspect of the work is Ashley's claim that there is often no "right" answer in the legal universe (p. 2). Thus, his essentially probabilistic model presents a world in which there is a continuum of relevant cases and where there may be counterexample cases which do not fit the pattern. Good expert systems, like good lawyers, Ashley argues, should be able to marshal evidence and effectively explain the reasoning for the advice they render (p. 5). They should be able to offer alternatives, not just say "yes" or "no." And such systems should be able to evaluate the negative cases as well as the positive ones, posing hypotheticals just as a good judge or law professor would do, in order to articulate the possible variations that might arise in a future case.

Despite Ashley's magnanimous jurisprudential presuppositions, Hypo employs a relatively limited universe of legal materials. Its Case Knowledge Base ("CKB") consists of thirty cases dealing with trade secrets disputes taken from a variety of state and Federal jurisdictions.⁵ Although Ashley includes two other sources, namely the Uniform Trade

5. The cases themselves are listed in Appendix E, *id.* at 265-71. Surprisingly, the cases are set out with a citation system so inconsistent as surely to befuddle any computer retrieval system. "Automated Systems, Inc. v. Service Bureau Corp., 401 F.2d 619 (10 Cir. 1968)" is followed by "Black, Sivalls & Bryson, Inc. v. Keystone Steel Fabrication, Inc., 584 F.2d 946 (10th Cir. 1978)" (emphasis added). Some Massachusetts cases are given only with the "N.E.2d" citation (*Analogic*), others (*J.T. Healy*) are given only with

Secrets Act and section 757 of the Restatement of Torts,⁶ he uses these merely as a basis for providing a short explanation of trade secrets law; the program itself does not utilize these materials directly. Although the common law system relies in theory on case-based analogical reasoning, no lawyer in the United States in the twentieth century could colorably argue that statutes, administrative regulations, and even secondary sources play no role in a common law court's judgment in deciding a particular case. Thus, not only is Ashley's confinement within the domain of the legal jurisprudentially problematic, but even what he chooses to use within that domain is far narrower than what a practicing lawyer or legal scholar would consider. To this end, Edwina Rissland has recently said of the first volume in the series on Artificial Intelligence and Legal Reasoning that Gardner's effort is a single "stepping stone" on the path to a complete model of legal reasoning.⁷ Much the same can be said about this book, and it is thus advisable to view it as a necessarily over-simplified approach in order best to be able to apply the new techniques described therein to a manageable array of sources.

The cases in the database have been analyzed and indexed in a variety of ways. Each case receives a Legal Case Frame⁸ of two layers (pp. 36-37). The top layer includes such information as the name, citation, parties, legal claims, and outcome of the case. The "underlying" case frame presents important information about facts with legal significance, such as whether the actors in the dispute are persons, corporations, or employees. Although Ashley acknowledges the existence of digests and the West Key Number System,⁹ he seems not to appreciate that West's editors have been trying for over a hundred years to provide a similar case frame focusing on the very same type of analysis of topics, claims, remedies, parties, and so on. For instance, a seemingly archaic-sounding Key Number such as "Master and Servant—inventions or discoveries by servant" actually embodies many of the concepts Ashley includes in his Legal Case Frames, namely employment, promise, reliance, knowledge, and product worked on.

the Massachusetts citation, and still others (*Dougherty*) are given with parallel official and unofficial (New York) citations. However picky this may seem in other contexts, the dependence of computer searching on seemingly technical and substantively irrelevant differences suggests that matters of detail and citational consistency are likely to be especially important in any computer-based approach to locating and using legal information.

6. This is again a quite inadequate citation, with no indication as to whether the reference is to the Restatement First or the Restatement Second.

7. Rissland, *supra* note 4, at 1970-71.

8. A complete list of Legal Case Frames is supplied in Appendix C, ASHLEY, *supra* note 1, at 259.

9. *E.g.*, *id.* at 10, 246.

On many levels Ashley's program simply constructs an Ashley Key Number System which, because it is focused on the narrow domain of trade secrets, is far more specific in analyzing a particular set of cases and problems. And as with the West Key Number System, the Ashley Key Number System rarely seems to acknowledge that any such indexing itself involves making underlying intellectual assumptions about what information is important (and what is unimportant) in a particular case. All of Hypo's ability to manipulate and argue with cases is dependent on this initial intellectual decision about classification and indexing, a decision that in turn depends on a human expert to decide what factors are important in the trade secrets context.¹⁰

Accepting the limitations of the Legal Case Frame structure imposed by Ashley, however, does not make application of the structure within Hypo any less interesting. Hypo then assigns values to certain factual predicates such as "Employee Worked for Both Plaintiff and Defendant," matches them to cases already existing in the database, combines these factual matches with the Dimensional Index described below, and makes a recommendation to the user concerning the "best case" to cite to support a particular position.

The Dimensional Index is a necessary prerequisite for the effective operation of Hypo. It enables the program to compare and weigh the arguments of a Current Fact Situation in light of the background database of cases with known outcomes. For example, in the trade secrets context, whether a plaintiff took active security measures to protect the trade secret is an important criterion which judges consider. This "Dimension" depends on several factual determinations, such as whether access to the premises was controlled, whether the product was marked confidential, and whether there were employee nondisclosure agreements; Ashley calls the latter items Factual Predicates. If a case in the database is decided in favor of plaintiff because plaintiff adopted security measures, then Hypo is capable of taking a Current Fact Situation provided by the attorney using the system and comparing it with the Multiple Dimensional Index to see how close the "fit" is with previous cases. Hypo will retrieve not only cases that fit the criteria, but also will

10. Perhaps it is only my own ignorance, but I find it harder to become politically or morally engaged with trade secrets law than with, say, the issues of abortion or sexual harassment. This is important, because it may indicate that this is an area in which relatively formal manipulation of technical legal materials plays a larger role in determining outcome than in some other areas. See Frederick Schauer, *Statutory Construction and the Coordinating Function of Plain Meaning*, 1990 SUP. CT. REV. 231. Thus, the utility of Hypo and related approaches may be directly proportional to the dominance of the technical over the broadly political, moral, social, and psychological.

locate "near miss" cases which do not quite match. As all attorneys conducting research know, there is seldom a case "on all fours" which neatly solves the problems of a particular client. Expressing the ideas of Range and Pro-Plaintiff Direction establish where the cases will sit along the axis of probability of helpfulness to one party or the other. These indicators may be simple binary comparisons such as one concerning a noncompetition agreement, which may be computed as either "yes" (one existed), or "no" (a noncompetition agreement did not exist). Or they may be computational with several possibilities, such as, "to how many people was the information disclosed, 3 or 6000." A Claim Lattice is then constructed which establishes where the Current Fact Situation sits along the range of relevant cases. This lattice arrangement theoretically enables the program to determine which cases should be most relevant or provide the closest analogies.

Ashley claims that

[d]imensions cut down on the amount of interpretation needed by the person entering a case into the CKB [Case Knowledge Base]. He or she need only record the court's decision with respect to plaintiff's claims and the facts reported by the court from which the case's position on various Dimensions can be inferred. Although that in itself is an interpretive task, it requires less interpretation than determining what issues the courts decided and what rationales they used in their decisions (p. 126).

This, however, is a rather large claim to make for a database of thirty rather well-defined cases. Hypo has thirteen implemented Dimensions for the thirty cases. Each of these Dimensions requires a generalization, some prerequisites, and several focal slots. Thus, Ashley's claims about simplification seem exaggerated, and such exaggeration becomes more problematic as the size of the database increases. Still, standard sources like Shepard's Citations and the Key Number System themselves suggest that over time tasks of classification that seem initially daunting nevertheless become manageable as their production and use is routinized.

An interesting feature of Hypo is that it does not stop with the simple "matching" operation that many of us associate with the crude full text word searching capabilities of LEXIS or Westlaw. According to Ashley, Hypo, after analyzing a Current Fact Situation in light of a database of real or hypothetical cases fitted with Legal Case Frames and Dimensional Indexes, can then generate what he styles a Three-Ply Argument. This is the judgmental heart of the program.

The three strands of the argument consist first of Point for Plaintiff as Side-1, comprising the appropriate citations to the cases which support the plaintiff's assertion (p. 20). For example,

Where: Plaintiff adopted security measures.

Plaintiff should win a claim for Trade Secrets Misappropriation.

Cite: *USM v. Marson*.

Strand two of the argument, consisting of counterexamples, is expressed as Response for Defendant as Side-2:

Where:

Even though: Plaintiff adopted security measures.

Defendant should win a claim for Trade Secrets Misappropriation.

Cite: *Healy, Inc. v. Murphy, Inc.*

And finally, strand three, Rebuttal for Plaintiff as Side-1:

Healy, Inc. v. Murphy, Inc. is distinguishable because:

In the Current Fact Situation, plaintiff adopted more security measures than in *Healy v. Murphy* (pp. 295-96).

In real litigation, of course, the attorney inputting the Current Fact Situation may not have full information about what security measures were taken by his client. Hypo can then, according to Ashley, generate some questions or hypotheticals for the attorney by positing cases with other factors that might make a stronger case for his or her side. For instance, the attorney may not know whether his or her client signed a nondisclosure agreement. Hypo could suggest that the presence of such an agreement might make the plaintiff's case stronger.

Moreover, new cases can be added to the Case Knowledge Base as they are decided. They may change the recommendations for a Current Fact Situation in much the same way that the input of a new figure into a spreadsheet can have the domino effect of changing a variety of other numbers and relationships. For these reasons, Ashley stresses the flexi-

bility of Hypo (p. 251). It can present a different set of responses depending on the factual situations or the position of a party (plaintiff or defendant), and it can assess where a case fits along a continuum rather than simply state what the rule is. Thus what some might (erroneously) think of as a weakness actually points out one of Hypo's great strengths: It does not provide "black letter law" answers, nor is it dependent on the strict rules of logic.

To assess Hypo's effectiveness as a reasoner, Ashley offers an analysis of Hypo given four particular fact situations and the briefs and opinions in the four real cases. He concludes that Hypo utilized the same cases and reasoning that courts actually used, although real courts may weigh the factors in different ways, and therefore their outcomes may differ from Hypo's prediction (p. 193). The limited number of examples and the small size of the database, however, weaken the persuasiveness of Ashley's arguments about the effectiveness of Hypo here, for the divergence between the use of these four cases and how any other predictive model would be tested with scientific rigor is immediately apparent. Still, even if this brief experiment falls far short of establishing the reliability of Hypo, it is suggestive of how a more elaborate test might be structured in the future.

In one chapter, Ashley seeks to broaden the appeal of his approach by providing a series of examples of case-based reasoning in non-legal contexts, including parental decisions about what movies are appropriate for a twelve-year old, decisionmaking in the Cuban missile crisis, and real estate appraisal. The first part (pp. 195-207), while readable and interesting, merely skims the surface of the rich decisionmaking literature in fields such as public policy or economics. The second part (pp. 207-22), however, which reviews the artificial intelligence literature concerning case-based reasoning, is an excellent starting point for a lawyer unfamiliar with the ways that computer scientists have thought about the problems of inference, analogy, memory organization, example-based reasoning, and explanation.

Toward the end of the book Ashley compares his work with other artificial intelligence models of legal reasoning (pp. 223-28). He provides a neat summary of the prior work of Gardner, McCarty, Rissland, Goldman, and Hafner, and offers contrasts between their work and the Hypo model. Ashley also briefly suggests that Hypo might serve as a device both to retrieve and to order relevant cases gathered from databases like Westlaw and LEXIS. He concedes that this would entail re-expressing cases in a manner which is entirely different from the way they are now structured in the databases. More practically, I would suggest, as a research agenda item for future studies in artificial intelligence and law, a model should be developed which uses the already existing

Key Number System familiar to lawyers as the basis for structures like the Claim Lattices proposed by Ashley (p. 246).

This type of strategic simplification seems desirable, at least in the short term, because it may make it possible to include in this and similar models more significant factors that all of them ignore. For example, although Ashley mentions court position within the jurisdictional hierarchy as a factor which lawyers consider in case-based reasoning to determine whether one case "trumps" another, in no place are jurisdiction-based weighting factors for precedents built into Ashley's "Dimensions." Perhaps again this is due to the limited size of the database, or to the difficult problem of determining whether a case higher in the same jurisdiction but not as close factually is more relevant than a case which is very similar factually, but derives from another jurisdiction. Ashley is clearly aware of this problem jurisprudentially, but it nevertheless seems that the present model is distortingly oversimplified in as much as it chooses to take factual similarity as more relevant than jurisdictional authority.

In his conclusion, Ashley acknowledges that one improvement an extended Hypo program would need is the ability to "import" arguments from one type of claim to another, to analogize not only to other trade secrets cases but also, say, to contracts cases with similar facts (p. 244). And he acknowledges that the program would have to be able to "learn" new Dimensions if a real case disposed of a claim in a way that contradicted the outcome posited by Hypo (p. 247). Thus again Ashley acknowledges the truncated nature of the model, and as with all models, the question persists whether the gains from focusing on a narrow range of manageable materials represent a sufficient payoff once the artificial narrowness is recognized in a real world context. But because this field is so new, my inclination is to think that the narrowing is necessary to get the field off to a useful start. At some point, however, a richness that approximates actual research practice will have to be added if models like Ashley's are to serve the purposes for which they are designed.

The purposes of this book remain ambiguous, however. Its persistent use of jargon suggests that it is aimed only at those with sophisticated computer science training, and not at most lawyers or legal scholars. One is awash in the alphabet soup of CBR (Case Based Reasoning), CFS (Current Fact Situation), and CEG (Constrained Example Generation). Although the author provides a helpful glossary, a lawyer unfamiliar with artificial intelligence terminology may find it heavy going. Still, lawyers and legal scholars should not be dissuaded by the unfortunately typical dominance of neologisms and jargon from taking this book seriously. Despite the limitations of the size of the database and the restricted nature of the domain of trade secrets, Ashley's work remains

important for those who wish to understand and analyze how lawyers use precedent and methods of argument to shape their determination of what cases to cite out of the mass of materials available to them. Thus Ashley successfully contributes to our understanding of some of the central problems of legal theory, while also making a major contribution to the work linking questions of artificial intelligence with those of legal reasoning. Integrating rule-based, logic-based, and example-based models with the case-based reasoning model presented here should present challenges to artificial intelligence researchers and legal philosophers for decades to come.