# Computational Models, Argumentation Theories and Legal Practice

Trevor Bench-Capon[1], James Freeman[2],
Hanns Hohmann[3] and Henry Prakken[4].

***Abstract***

*In this paper we will draw upon insights from computational approaches and argumentation theories to create a framework for the rational reconstruction of legal argument. Taking the perspective of a lawyer we develop a conceptual model intended to accommodate all stages involved in legal argument. We then relate Argumentation Theory and work in AI and Law to this conceptual model. We conclude by considering the scope for the two disciplines learning from one another, and by drawing attention to areas that we believe offer fruitful opportunities for inter-disciplinary research.*

## 1. Introduction

Imagine a person who wants to obtain compensation for injuries sustained in a car accident coming to a lawyer to engage her as an advocate in his case. What the client wants to accomplish by this engagement is obvious. Obviously, his narrative in the initial interview gives the lawyer some idea of how to proceed. Obviously too, the lawyer's professional competence will be a major factor in whether the client has a successful outcome. But could the lawyer be aided by computational methods? Could her effectiveness as an advocate be enhanced by computer support? To answer this question, we need to develop a conceptual model of the procedure the advocate would follow in legal practice in constructing her case, to see where computer support might be appropriate. And if computational methods are to aid that practice in arguing cases effectively, this model should also be informed by insights from argumentation theories.

In this paper we develop such a conceptual model, drawing upon insights from both computational approaches and argumentation theories. We illustrate the model with the classic case of MacPherson v Buick Motor Co, decided by the New York Court of Appeals in 1916[5]. This case involved an injury sustained when a defective wheel on an automobile collapsed. The car had been bought from a dealer, who had bought it from the Buick Motor Company, which in turn had bought the offending wheel from the Imperial Wheel Company. After having developed and illustrated the conceptual model in the next section, we discuss in separate sections how work in Argumentation Theory and AI and Law relates to it. We conclude by considering the scope for the two disciplines to learn

[1] Department of Computer Science, The University of Liverpool, Liverpool, UK. tbc@csc.liv.ac.uk
[2] Department of Philosophy, Hunter College of the City University of New York, New York, USA.
[3] Department of Communication Studies, San Jose State University, San Jose, USA.
[4] Department of Information and Computing Sciences, Utrecht University, Utrecht, The Netherlands.
[5] 217 NY., 11N.E. 1050 (1916). The argumentation in this case is discussed in Levi (1949) and Golding (1984).

from one another, and by drawing attention to areas that we believe offer fruitful opportunities for inter-disciplinary research.

## 2. A Conceptual Process Model of Legal Argumentation

### 2.1. Brief overview

Let us begin by getting a brief overview of the lawyer's procedure, and then take a more detailed view. This will give at least a first approximation to our conceptual model. At the first interview, the lawyer is confronted with certain givens. First, the client has presented her with a certain story of the case. But there are many more givens. The case has a legal, cultural, and socio-political context. This context includes rules or norms permitting or even enjoining certain legal claims and modes of procedure, certain cultural values to be respected and societal policies to be considered, and an audience of decision-makers, at this point perhaps not yet precisely determined, whose views and sensibilities must be reckoned with in preparing a persuasive case to be submitted to them.

Interpretation may involve maximizing or minimizing aspects of the case, and emphasising or de-emphasising elements of the norms to be applied. Taking the givens in light of these interpretive principles, the lawyer constructs a theory of the situation. This will include *her* perception of the facts together with *her* interpretation of the rules she intends to apply in constructing her arguments as an advocate and anticipating opposing counsel's arguments. This theory then constitutes in the first instance the framework or background, the lawyer's understanding of the situation, in light of which she will construct specific arguments. For example, in light of the givens the question arises of whether this is a case of tort or contract. Is the client due compensation for injuries as a matter of tort law or as a matter of contract law? Has some contract been breached? Could this be argued? Would going for a claim based on tort be a more straightforward strategy? Suppose the advocate decides to go for a claim based on tort. Then the body of tort law becomes incorporated into the theory, while the body of contract law does not. To use Toulmin's terminology (Toulmin 1958), specific tort laws will then provide warrants indicating how we get from data to claim and thus also provide parameters for what data to present to justify the claim. Theory formation thus determines the legal nature of the case according to the lawyer's understanding, and so identifies the body of law proper to appeal to in constructing specific arguments.

Given the theory, the advocate proceeds to construct a body of explicit arguments. As we see it, there is a threefold aspect to the lawyer's goal here, corresponding to three disciplinary perspectives on argument evaluation in argumentation theory. First, there is a logical or critical requirement. This means that ideally the data presented in the premises to support the claim for compensation must be factually true and that the warrants must reflect a correct understanding of the provisions of the body of law incorporated into the theory. Given these warrants, the data must actually constitute good grounds for the claim according to properly applied rules of inference.

Secondly, there is a dialectical requirement. Both the lawyer's argumentation and that of opposing counsel are presented before a judge and jury, and we expect these persons to take dialectical considerations into account as rational adjudicators of the dispute. We expect the opposing counsel to present rebuttal arguments. Associated with the warrant are conditions of exception. Do any of these arguably hold in this case? Do the relevant laws here indicate that the warrant has authority in this case? Considering such issues is dialectically relevant to resolving a difference of opinion over whether the claimant is due compensation for damages. A dialectically astute lawyer will anticipate these rebuttals and objections, and either prepare countering arguments to them or revise her body of initial arguments to avoid these objections. To the extent that her arguments survive on the "dialectical tier," she satisfies the dialectical requirement.

Finally, the lawyer's goal involves a rhetorical requirement. She needs to move judge and jury to decide in favor of this client. Her argumentation must not only be logically correct and dialectically defensible, it must have persuasive force. Of the sound arguments available, how should they be selected, arranged, and presented in court to effectively bring those deciding the case to find in favor of her client? Clearly here factors pertaining to the cultural and socio-political context are especially relevant. Even after making the presentation, the lawyer's task need not be completed. Based on the response of opposing counsel and of the adjudicators, the case may continue. But that response acts as feedback to the lawyer, feedback which will be added to her considerations so far, in developing her next presentation in this case.

The preceding brief overview of the lawyer's procedure in constructing her argumentative legal case is summarised in Figure 1:

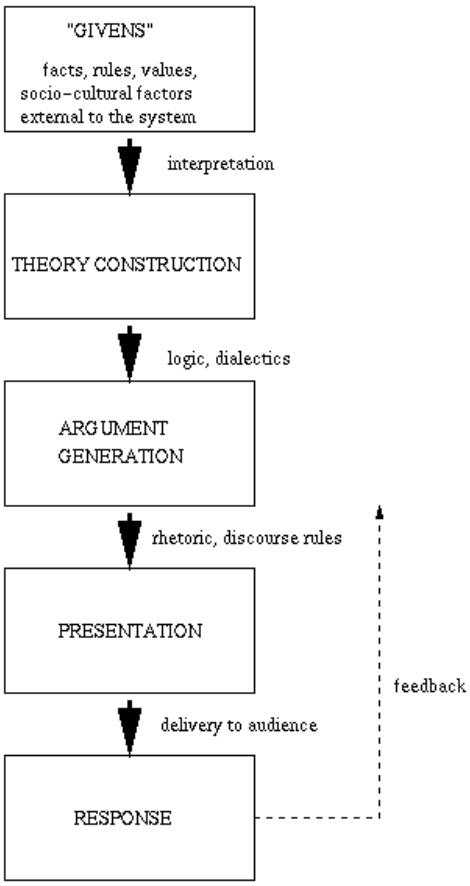


**Figure 1: Overview of Legal Argumentation**

## 2.2 Illustrating the model

Let us now unpack what the various steps in this procedure involve. This unpacking approach will arrive at the detailed conceptual model shown in Figure 2 below, at the end of the discussion.

### *2.2.1 The givens*

So what exactly are the givens with which the lawyer begins? Broadly speaking, they are of five types. To begin with, there is the case as presented by the client together with the outcome he desires. The client will for instance tell the advocate that while he was driving the new Buick he had recently purchased from a retail dealer, the car suddenly collapsed and he was thrown out and injured; that apparently the collapse was caused by the disintegration of a wheel; and that he would like to obtain compensation for his injuries and the financial expenses and losses associated with them.

The next component of the givens that the lawyer needs to address is a body of normative sources of different types and levels of authority and generality. These include statutes,

legal precedents, legal principles and policies, and most generally values embodied in the legal system. Such normative sources will allow the lawyer to construct a substantive legal claim based on the facts giving rise to the case. Thirdly there are legal procedural norms which govern the selection of proper formal steps to be taken in the conduct of the dispute. In the case we are using as our example, these norms would be those incorporated in the legal system of the state of New York, where the accident occurred, and where the lawsuit is being conducted. However, it should be noted that the decision in which jurisdiction and in which court to commence litigation in which form is itself subject to a large body of procedural rules that may require extensive argumentation even before the substantive justification for the plaintiff's case can be addressed. Sometimes the lawyer may be in a position to try to argue for a particular forum in order to bring the case in a setting where she can make the most persuasive substantive argument, since the substantive norms (statutes, precedents, etc.) may be more favorable for her case in one jurisdiction or court than in another.

The fourth component of the givens is a broader societal contextual situation to be taken into account; although this case may not yet have been referred to a particular court, the lawyer is certainly justified in presuming that members of the court or jury will bring to the case some cultural outlook, and that certain factors of a socio-political nature may very well colour their response to her argumentation when she eventually presents her client's claims. The setting for our case is the year 1916; automobiles are still a relatively novel means of transportation that may be embraced as a harbinger of progress by some and viewed with apprehension by others. The advocate will be faced with different views on the relative importance of the need to protect consumers against injuries from defective products while encouraging manufacturers or their suppliers to improve the safeguards against such defects in the production process, and of the need to protect a growing automobile industry against the negative economic effects of new liability claims while encouraging dealers or consumers to assume a greater share of the responsibility for the safety of cars. Furthermore, there will be conflicting views within the legal community about the appropriateness of modifying existing legal standards in order to accommodate such policy concerns. Clearly, the lawyer's knowledge of the contextual situation, of the pertinent factors and views, and of their distribution in the relevant audience will increase as the case proceeds, but some initial view needs to be taken.

In addition to substantive and procedural norms and the contextual situation, all broad types of givens, there will finally be specific legal strategy heuristics to which the lawyer may appeal for direction in selecting, interpreting, and combining the factual, legal, and contextual elements best suited to persuade the anticipated audience of adjudicators of the merits of her client's claims. These heuristics might for instance tell the lawyer how to enhance or undermine the credibility of witnesses called to establish the facts of a case; or they might inform her of the different approaches available to the interpretation of legal norms by appeals to elements such as word meaning, legislative intent or objective purpose. These are generally not fixed decision programs with precisely specified conditions for the choice of certain strategies, but rather more rules of thumb extracted from often ambiguous experiences with the practice of legal persuasion, conveyed to

lawyers in the course of their legal education through their training in writings on trial and appellate advocacy, and through advice received from colleagues in their professional career. In recent years, efforts have been made to put such persuasion heuristics on a more solid scientific footing by means of empirical research reflected in a growing literature. Increasingly professional trial consultants are involved in strategy planning, especially in big cases. Nevertheless it is fair to say that predictive certainty in such endeavors has remained an elusive goal[6].

*2.2.2 Theory construction*

Given the case as presented by the client together with the normative sources and strategy heuristics, and her view of the overall contextual situation, the lawyer will develop a partial description of her client's case. The description is partial in two senses of the word. First, it is not a complete description. But secondly, it is partial to the client and his desired outcome. Besides formulating this partial description, the lawyer will make a selection of norms from the available sources of substantive standards, since clearly not all of these will be relevant to this case. The two tasks are very much interrelated, since the relevant norms will help the lawyer select and shape the relevant facts just as much as the facts of the case will direct her search for the appropriate norms for the justification of her client's claim.

In our example case, a claim based on the law of torts appears the most likely avenue, since no clear contractual link exists between the plaintiff (MacPherson) and the defendant car manufacturer (Buick Motor Co.). In this case a tort claim was indeed chosen as the most promising avenue. This still leaves the manufacturer of the defective part as a potential defendant, but not only does the car manufacturer have "deeper pockets," i.e. a better ability to pay claims, but the manufacturer is also in a better position to distribute such costs by means of price and insurance. Furthermore, the manufacturer's reputation is perceived to stand behind the product, and it is in a position to test all the parts as they work together in the finished product. Suing one manufacturer of a defective product is more economical than suing multiple suppliers. All of these factors make the manufacturer the defendant of choice for the plaintiff, and also a defendant likely to be accepted by the courts as a matter of trial economy as well as from the perspective of aiming at an appropriate distribution of burdens resulting from product defects, quite apart from the specific applicable substantive rules.

In the case of *MacPherson*, the rules governing tort claims are not codified in the state of New York, but are to be found in the common law whose principles the state shares with other jurisdictions, whose relevant precedents therefore have persuasive force in the present case, even if they are not binding precedents for the New York courts. The central basis for tort claims is the principle, based on a long line of precedents, that a plaintiff can recover damages caused by the culpable actions of others, if those others owe the injured party a duty of care. Since it cannot be shown that the manufacturer knew of the

6 The large literature on trial advocacy may be exemplified by works such as Bergman (1997) and Mauet (1980); on appellate advocacy see Hornstein 1984. Traditional approaches as well as empirical studies on trial persuasion are surveyed in Matlon (1988) and Rieke and Stutman (1990).

defect and willfully concealed it, the description of the case put forward by the advocate will emphasise, apart from her client's injury and the causality of the collapsing wheel for the accident leading to that injury, the defendant's opportunity to discover the defect in the wheel by reasonable inspection, and the omission of such inspection, as well as the ability to foresee that an overlooked defect would make it probable that the user of the product could be injured by its resulting failure to perform properly.

With the partial descriptions formulated and norms selected, and in light of the procedural norms, the lawyer then will proceed to construct her theory, the set of facts and rules in terms of which she will formulate her argument for the client. This argument will interpret and mutually adapt the selected factual, legal (substantive and procedural), and contextual elements of the case so as to create a cohesive justification for the claim that the relevant substantive norms, as applied to the significant facts of the case in the proper legal procedure and in light of the salient features of the larger social context, establish that the adjudicators should decide in favor of the client. At this point the need to provide a coherent theory will both limit what can be included and require certain elements to be included. The core of her claim in this case will be that the Buick Motor Co. is liable for damages to MacPherson because it negligently failed to inspect the wheel whose collapse caused the accident in which the plaintiff foreseeably was injured. The theory will thus comprise the facts and normative sources necessary to argue this position.

*2.2.3 Generation and dialectical structuring of arguments*

The next phase is argument generation. The central difficulty, in the present case, is that traditionally the duty of care of manufacturers whose violation would establish negligence was limited to the immediate purchasers of their products with whom they had contractual relations, which served as the legal basis for that duty of care and vigilance of the maker towards the buyer. What is now needed in constructing a persuasive case in favor of the advocate's client is a set of arguments, both pro arguments the lawyer may use and con arguments she anticipates the opposition may use. The advocate must try to establish an exception to the rule that requires a contractual basis for the duty of care, and she must rebut arguments aimed at maintaining the applicability of the general rule.

One such exception is indicated by the earlier case of *Thomas v. Winchester* (6 N.Y. 397, 57 Am. Dec. 455 [1852]). In that case a manufacturer had mislabeled a bottle of (poisonous) belladonna as (harmless) dandelion extract, and the purchaser who bought this from a druggist who had purchased it from the manufacturer was able to recover damages from the latter because in the opinion of the court the poison foreseeably posed an "imminent danger" to the life of any users beyond the initial buyer who had purchased it for resale to these users. The lawyer's opponent could point out that both *Thomas v. Winchester* and two related English cases which had preceded it (*Dixon v. Bell* [1816] and *Langridge v. Levy* [1837]) had found liability in situations where the products in question were in their normal operation implements of destruction, while a third English case (*Winterbottom v. Wright* [1842]) had rejected liability in the case of a defective

stagecoach, and *Thomas v. Winchester* had specifically stated that this decision would not apply to a defective wagon.

The advocate for the plaintiff now needs to counter this attempt to distinguish the present case from the chosen precedent finding liability by distinguishing automobiles from stage coaches and wagons and assimilating them to guns and poisons. She might for instance point to the considerably higher speeds at which automobiles move, speeds that make serious injuries more probable and foreseeable than in the case of stagecoaches and wagons. She might also attend to subsequent New York decisions (*Devlin v. Smith* [1882], *Davies v. Pelham Hod Elevating Co.* [1892], *Burke v. Ireland* [1898], *Kahner v. Otis Elevator Co.*, *Torgesen v. Schultz* [1908], *Statler v. Ray Mfg. Co.* [1909]) in which defects in a scaffold, an elevator rope, a building, an elevator, an aerated water bottle, and a coffee urn were held to make these articles imminently dangerous and establish liability of the negligent manufacturers to third-party users. In response, the defendant's attorney may point to other New York cases (*Loop v. Litchfield* [1870] and *Losee v. Clute* [1873]) in which liability was denied in cases involving a defective balance wheel in a saw and a defective steam boiler.

To counter this, the plaintiff's lawyer could try to distinguish these cases by pointing out that non-liability was not due to a denial of the possibility that such articles might pose imminent dangers, but to other factors: the defect in the balance wheel had been pointed out to the buyer, and it did not break until five years later; the steam boiler was tested by the final user, and the manufacturer knew that such a test would occur. She may also argue that the cases denying liability are relatively early and superseded by the later cases establishing a legal trend towards stricter liability. This in turn may lead the advocate for the defendant Buick to point to then recent cases in other jurisdictions (*Huset v. J.I. Case Threshing Machine Co.* [U.S. Circuit 1903] and *Earl v. Lubbock* [England 1905]) in which liability had been denied in cases involving a defective threshing machine and a van.

To this the plaintiff's lawyer may reply by pointing out that the former case was based on the clearly mistaken assumption that injuries from the defective product involved would not be foreseeable, and that the decision was criticised in the legal literature on this account; and that in the second case the defendant had not manufactured but only maintained the van. She may also point to other decisions of some authority in other jurisdictions (e.g., *Heaven v. Pender* [England 1883] and *Olds Motor Works v. Shaffer* [Kentucky 1913]) in which the principle of a duty of care of the manufacturer of a defective product to third parties irrespective of contract was endorsed and led to findings of liability for injuries caused by defective staging suspended from a ship and a defective car.

Apart from such primarily precedent-based arguments the plaintiff's advocate could also point out that the liability of manufacturers to third parties in cases of defective products is analogous to the well-established liability of landlords to third parties in cases of dangerous premises if these are leased to be used by the public. She may use an argument from absurd consequences by pointing out that a denial of liability in cases like the

present one would lead to the unreasonable conclusion that the buyer not likely to be hurt, namely the dealer, would be protected, while the retail purchaser likely to be hurt would not be protected. She could also point to changed social circumstances as justifying a modification of liability standards, an argument further supporting the observation that the trend of the New York decisions has been in the direction of wider liability.

As the preceding reconstruction of the process of argument generation shows, lawyers tend to pair opposing arguments in a loose way as they construct them. We propose, however, that analytically the process of dialectical structuring of arguments could usefully be seen as a separate, more systematic and formalised process operating on the complete set of arguments that can be constructed from the theory formed for the case. This process will answer questions such as: What are the arguments which will constitute the basic case for the claim that the defendant automobile manufacturer is legally responsible for the client plaintiff's personal injury? What are the data these arguments appeal to? What warrants do they employ? What arguments of the opposition will attack these arguments, either by presenting rebuttals or by allegedly showing that the warrants do not apply or have no authority in this case? What arguments counter these rebuttals? What arguments show the warrants *are* properly backed? The more inclusive the theory, the larger the set of available arguments will be, and the greater the chance of anticipating counter-arguments. In light of these dialectical considerations, the set of arguments becomes a set of dialectically structured arguments.

Perhaps just by virtue of thus having been dialectically structured, it may become apparent that some of the arguments in the set may not be logically cogent. Some will be stronger than others. Some may be rebutted. Some may be successfully attacked. It should be noted that such a formal dialectical structuring and assessment is not a common aspect of lawyers' current practice in constructing their arguments. This would therefore definitely be an area where a dialectical procedure combining insights of AI and Law research and dialectical and logical approaches to Argumentation Theory could make an important contribution to increasing the rationality of strategic planning for legal argumentation practice. Using logical assessment criteria as well as audience-related criteria, legal advocates could make a more thoroughly considered selection of arguments to be included in persuasive cases to be presented to adjudicators.

### *2.2.4 Argument presentation*

Such expanded criteria may also include certain procedural and discourse rules helping lawyers determine the set of arguments to be presented by restricting their choices according to other normative criteria. At present, the sources of such rules that lawyers consider are generally limited to rules of legal procedure and evidence and to certain rules of legal ethics that try to restrain the persuasive zeal of advocates and to ensure that adjudicators will not be misled in making their decisions. In our example case for instance, the question arose whether the jury's decision favoring the plaintiff was proper in light of the judge's instruction to the jury that "an automobile is not an inherently dangerous vehicle." But on behalf of the plaintiff it could be pointed out that this could properly be interpreted to refer to the fact that a car is not inherently dangerous when

properly made, but may still become imminently dangerous when defective; and the defendant's claim that it may have been unfairly disadvantaged would be undermined by the realization that the criticised instruction was actually more likely to work in the defendant's favor. Rules of evidence would restrict the plaintiff in various ways, for instance preventing him from presenting evidence that was legally irrelevant, such as profit figures from Buick's balance sheet, or highly inflammatory, such as gory pictures of his injuries. But it is conceivable that a consideration of argumentation theories focusing on discourse rules could lead to further refinements in the standards aimed at ensuring the fairness of legal arguments.

Here we begin to address the question of how to present arguments once they have been selected and assessed. In the light of presentation heuristics and again in the light of procedural and discourse rules and the overall contextual situation, the lawyer determines a mode of presentation for her arguments. Here concerns of rhetorical invention and dialectical evaluation are supplemented by considerations of rhetorical arrangement and style, including the effective use of affective components of argumentation.

In our example, requirements of persuasive arrangement could be served in support of the plaintiff's case by establishing the liability-friendly trend of New York decisions early on, before dealing with the somewhat more mixed picture in other jurisdictions. In contrast, the defendant's lawyer would be likely to highlight decisions denying liability in cases involving means of transportation early on. Given the legal climate of 1916, the plaintiff's lawyer would also be well-advised to choose an arrangement emphasizing technical arguments from precedent over more policy-oriented arguments that might receive greater weight in a legal case in our own day. On the other hand, the generic and fairly bland style of typical legal discourse that is designed to emphasise its cool rationality might occasionally be abandoned by somewhat more eloquent formulations, especially at moments where arguments are made that might more readily appeal to a broader audience of non-lawyers. A good example is provided by a passage in Judge Cardozo's majority opinion in *MacPherson v. Buick Motor Co.* in which he moves from the technicalities of law and precedent to a larger common-sense perspective:

> The [car] dealer was indeed the one person of whom it might be said with some approach to certainty that by him the car would not be used. Yet the defendant [Buick Motor Co.] would have us say that he was the one person whom it was under a legal duty to protect. The law does not lead us to so inconsequent a conclusion. Precedents drawn from the days of travel by stagecoach do not fit the conditions of travel to-day. The principle that the danger must be imminent does not change, but the things subject to the principle do change. They are whatever the needs of life in a developing civilization require them to be (111 N.E. 1050, 1053 [1916]).

Here three carefully constructed antitheses, also involving elements of parallelism, are punctuated by two brief concluding sentences, the first of which dissociates the law from the bane of apparently absurd technicalities that lay people often find repellent, while the second associates the law with the popular pathos of progress, likely less tarnished in

1916 than it is now, and projects humility by presenting the law as servant rather than master of life. At the same time the car manufacturer is subtly saddled with the charge of promoting absurdity to the detriment of consumers in need of protection, a characterization not likely to prompt a positive response to the defendant's case from a popular audience.

Such milder forms of affective appeal might be supplemented in the presentation of the case to the jury by more openly emotional elements of persuasion, highlighting, within the limits defined by rules of evidence, the sorry fate of the plaintiff precipitated by his accident, and the deplorable indifference of the defendant to the plight of its ultimate customers. While, on the other hand, the defendant may try to portray the plaintiff as a reckless driver who is at least partly responsible for his own suffering, in contrast to a careful defendant who had no reason to suspect that existing safety precautions in the manufacturing process were not sufficient.

*2.2.5 Argument delivery, response and feedback*

Having constructed the case through the preceding stages of our process model, the plaintiff's lawyer will then proceed to the actual delivery, to which the opposition responds. We have already considered some of these possible responses above. Another might involve a concession (possibly only *arguendo*) that the defendant might be liable if it had been careless, but denying negligence by pointing out, for instance, that the Imperial Wheel Co., the maker of the defective wheel, was a highly reputable manufacturer which had supplied 80,000 wheels, none of which had proved defective, prior to the accident in the present case, indicating that the Buick Motor Co. had no reason to suspect a need for special testing of the wheels. Or the defendant could argue that the then most recent, most pertinent and highly authoritative precedent by a Federal Court (*Cadillac v. Johnson* [U.S. Circuit 1915]) actually denied the liability of a car manufacturer to the user of a defective car.

This response may generate certain feedback loops. At the very least, the plaintiff's lawyer might take this response as a further factor, together with her dialectically structured arguments, the logical assessment criteria for them, and the overall discourse rules, in re-assessing what arguments to present. She might reply to the first response by emphasizing the special responsibility of the manufacturer for the finished product which requires that the component parts be subjected to ordinary and simple tests in addition to those carried out by the parts supplier, a duty endorsed by the United States Supreme Court (*Richmond & Danville R. Co. v. Elliott*, 149 U.S. 266, 272 [1893]). And she might downplay the weight of the U.S. Circuit Court Case by pointing to the fact that it had not yet been confirmed by higher courts, and that it featured a significant dissent.

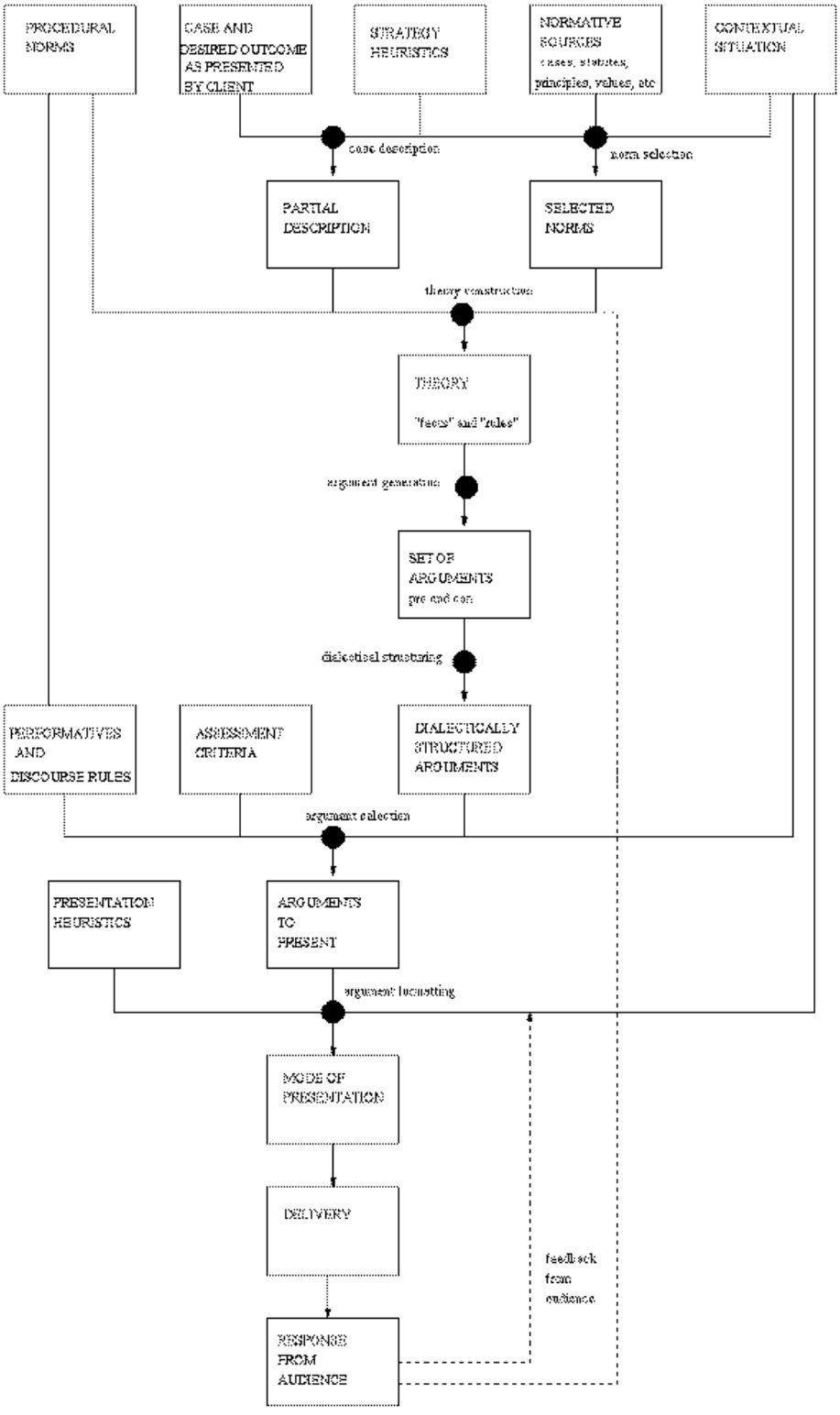


**Figure 2: Conceptual Model**

In a more extreme case, the response may lead the lawyer to revise her theory of the case, her understanding of the facts and the applicable legal rules, which then will affect her reconsideration and revision of the subsequent steps in her procedure. Thus insurmountable obstacles in the path of a claim based on traditional tort law principles might prompt a shift to an argument from implied contract, or might ultimately lead to a more radical argument urging that in the area of product liability requirements of manufacturers' culpability should be abandoned in favor of strict liability. This strategy was of course ultimately pursued with some success, though not without engendering some continuing opposition. The entire process that our model conceptualises is summarised in figure 2.

Our conceptual model focuses on the tasks of the private advocate in constructing an argument for a client. This was also the emphasis in classical rhetorical theories of forensic persuasion and it is today a major focus of AI & Law research into legal argument. Moreover, this perspective also dominates the legal literature of trial advocacy and appellate advocacy, even though these topics also embrace the needs of public prosecutors to some extent. By contrast, the literature on legal reasoning tends to be oriented more towards the perspective of the judge who has to justify a decision which makes a stronger claim to objectivity[7]. If our model were to be modified to apply to the legal tasks of arguers other than advocates, some changes would obviously be in order. Thus for instance the "case" facts for the prosecutor would be provided by various public investigations, for the judge by the briefs and oral arguments of the parties and others invited to contribute to the persuasive process; and the aim would presumably shift towards a just resolution of the legal dispute, even though political aims cannot be ruled out for judges and even less clearly for prosecutors, especially if they are elected. In the area of the "contextual situation," concerns for the institutional position of the arguer and the authority of the institution within which he or she works would come more to the fore. There would also be some changes in the sets of procedural and dialogue rules governing the arguments of these different legal agents. Nevertheless, major features of our process model would continue to be applicable to their legal tasks. A more detailed consideration of variations of the model over a broader domain of tasks deserves future attention.

In the subsequent sections of the present paper, we would now like to address the question how insights from theories of legal argumentation and computation can help us in further specifying and interpreting this conceptual model, and in converting it into a computational model that may aid a lawyer in preparing her case and its presentation.

## 3. Argumentation Theories and Computational Legal Argument

[7] See e.g. Levi (1949), Wasserstrom (1961), Golding (1984), Alexy (1987).

J. Wenzel (1979) identifies three approaches to argument - the rhetorical, dialectical, and logical. The rhetorical approach is concerned with argument as process - the process of addressing persuasive messages to an audience to win their acceptance of a standpoint. What factors affect the persuasive force of a proponent's messages in favor of a standpoint, and how may the proponent maximize that persuasive force?

The dialectical approach is concerned with argument as procedure - the procedure of several parties, ordinarily two, coming to a rational agreement over some point at issue. What contributions are permissible at what point in the dialogue to resolve disagreement over this standpoint? When may one party advance reasons for a point of view? When may a party question or even attempt to rebut some claim? What are the criteria indicating when the participants should agree that the difference of opinion has been resolved?

The logical approach is concerned with argument as product - the product in which the reasoning justifying a conclusion is laid out for analysis and evaluation. We may likewise distinguish argumentation theories according as to whether rhetorical, dialectical, or logical issues predominate. A prime modern example of the rhetorical approach, originally defined by classical rhetorical theories such as those of Aristotle, Cicero and Quintilian[8], is Perelman and Olbrechts-Tyteca's *The New Rhetoric* (1969). Perelman himself was a legal scholar and issues in legal argumentation motivated his own work. The dialectical approach is represented prominently by the pragma-dialectical argumentation theory of van Eemeren and Grootendorst (1984, 1992). Douglas Walton has also developed a dialectical approach through dialogue theory (Walton 1995, 1996, 1998, Walton and Krabbe 1995). Toulmin's model (Toulmin 1958), although motivated by jurisprudential procedural concepts, may be viewed as a "new logic" or as logical reconstruction. Finally, mention should also be made of formal dialogue games which model logical argument in a dialogical setting, beginning with the work of Hamblin (1970). Focusing on particular approaches, we may ask two questions - How are these approaches currently reflected in our model? How can particular theories contribute to further specifying elements of the model[9]?

### 3.1 The Place of Approaches to Argumentation in the Conceptual Model

The rhetorical approach Wenzel describes is built into our model from the start. The lawyer's very assignment is one of persuasion - to direct messages to judge and jury, the court, to bring about their accepting that the car manufacturer is liable to the consumer for a defective product. But who are these persons - the judge and members of the jury? They are persons living in a cultural context which may shape their understanding of persuasive messages. The contextual situation sets parameters for any argumentative appeal. Given these parameters, some procedures may be effective and others not; some

8 See Aristotle (1991), Cicero (1949), and Quintilian (1920ff).; for an historical overview of the development of theories of legal rhetoric see Hohmann (1998).

9 For recent work integrating the three (rhetorical dialectical, and logical) perspectives on argumentation see Tindale (1999). For an overview of the development of the relationships between rhetoric and dialectic, with a special emphasis on legal argumentation, see Hohmann (2000).

strategies in developing a case may be effective, others not. Our strategy heuristics incorporate these rhetorical factors; and heuristics on how to present the case also guide the lawyer in maximizing persuasive effectiveness.

The lawyer is expected not just to persuade the court but also to bring about a rational resolution over a disputed point. Rules concerning performatives and discourse are intended to promote the achievement of this goal. Ideally, the court will not have any preconceived opinion, positive or negative, on whether the manufacturer in this case is liable. Imaginatively, the lawyer may think of herself as entering into a dialogue with judge and jury where the opposing counsel may voice their doubts as they may arise in the course of her presentation. This is why her view of the applicable arguments must be dialectically structured. Not only must she have a view of what particular data support her case via which warrants, she also needs to be aware of certain opposing questions and how she might deal with them. What exceptions do the warrants allow? That is, how can her arguments be rebutted? Has the opposition plausibly raised the question of whether any of these rebuttals hold? Can these rebuttals be countered? Can the counters to the rebuttals be themselves rebutted? Do the warrants reflect defensible or proper interpretations of the law?

Besides the procedural aspects and the dialectical structure in which these pro and con arguments are arranged, there is also the question of whether the arguments put forward are internally sound from a logical point of view. Do the premises give us good reason to accept the conclusion? If we were justified in accepting the premises, and if there were no counter arguments, would we be justified in accepting the conclusion? Are we justified in accepting the basic premises themselves? The argument generation stage addresses these concerns in the model.

### 3.2 How Theories of Argumentation may Contribute to the Conceptual Model

Do any of the argumentation theories mentioned earlier contribute to advancing the process of developing and presenting legal argumentation? Do any of these theories contribute to specifying elements in the model further, or allow us to have a deeper understanding of these elements? We believe they do.

To begin with, we can map some basic aspects of theories of classical rhetoric onto this conceptual model. A central feature of the rhetorical theory of invention (Greek *heuresis*, Latin *inventio*), i.e. the heuristic theory designed to help arguers to identify in any given situation the available means of persuasion, is the system of *staseis* (Latin *status*), which organises lines of legal argumentation according to whether they address issues of fact, of definition (i.e. the interpretation of facts in light of legal rules), of quality (i.e. the possibility of claiming some exceptional justification invoking higher values), or of procedure (i.e. whether the present court has proper legal jurisdiction to decide the case). These four elements of the *stasis* system can be related to our model fairly straightforwardly: the issue of fact (*coniectura*) corresponds to the transformation of the case presented by the client into the partial description entering into the theory of the case, and to the arguments supporting that persuasive account of the case; the issue of

definition (*definitio*) relates to arguments concerning the formalised normative sources, their interpretation, and the subsumption of the case facts under the selected norms in the theory of the case; the issue of quality (*qualitas*) relates to arguments addressing the contextual situation, especially insofar as it concerns reasons for making exceptions to general rules for particular (kinds of) cases; and the issue of procedure (*translatio*) relates to arguments concerning procedural norms. Classical theories of rhetoric offer rather rich strategy heuristics for arguments surrounding all of these issues, many elements of which can serve as starting points for the exploration of argument schemes in these areas. Only the issue of *translatio* is significantly more restricted in classical rhetorical theory than is the consideration of procedural norms in our model; the classical *status* of *translatio* addresses exclusively the issue of whether the court has jurisdiction over the case to be presented to it; this is due to the fact that in the legal context in which ancient rhetoric emerged, the formal rules of evidence and other norms regulating case presentation were much more rudimentary than they are now[10].

Classical rhetorical theory emphasises that in addition to the element of *logos*, the direct justification of a legal claim represented by the case- and rule-based arguments that are at the core of most current modelling of legal argumentation, there are other elements of persuasion that importantly affect the persuasive success of arguments in the legal process and elsewhere. These relate broadly to the perceived character (competence, credibility, sympathy) of the speaker (*ethos*) and the emotional impact of a case on the audience (*pathos*), and rhetorical theory has provided elaborate advice on how to make use of such factors, while emphasizing that they are by no means extra-rational. While in the past, such personal and emotional factors were often rejected as inappropriate for rational argument, contemporary argumentation theorists increasingly tend to endorse the notion that there can be non-fallacious uses of such means of persuasion (e.g. Walton 1992). Legal advocates as well as courts expend considerable care in projecting and assessing competence and authority in their arguments. And they are clearly concerned with the emotional impact of their briefs and opinions, especially in cases involving emotional issues such as abortion and the death penalty. In our conceptual model, these considerations make an appearance in the phase of argument generation and especially in the heuristics relating to the mode of presentation of legal arguments.

The strategy and presentation heuristics incorporated into our conceptual model also take into account the importance of arrangement (Greek *taxis*, Latin *dispositio*). The theoretical treatment of this element concerns not only the perspicuous organization of bodies of argument, but also draws attention to the fact that the sequence in which arguments are presented may have an impact on their persuasive effect.

A further part of rhetoric addressed within the heuristics of our conceptual model, in addition to invention and arrangement (and leaving aside memory [*memoria*] and delivery [*pronuntiatio*], parts added later in the development of rhetorical theory and

10 For an extensive discussion of the classical *stasis* system see Calboli Montefusco (1986); on the application of this theory to contemporary legal argumentation see Hohmann (1989).

relevant chiefly to oral argument), is style (Greek *lexis*, Latin *elocutio*). Historically, there has often been a tendency to treat style as a mere additive to an underlying logical argument. But we think that we should consider the possibility that a vivid example, a telling phrase, or a well-chosen metaphor may be in fact more essential to the force of an argument. Such a closer link between style and substance is also suggested by the importance of style in conveying character and emotion.

We may also consider rhetorical theory when we address the question how the lawyer takes into account the contextual situation of her argument. She may have an intuitive conception that certain salient socio-cultural facts will affect what the audience finds persuasive. Clearly then her appraisal could be enhanced by some theory of the facts which affect the acceptability of arguments. Perelman and Olbrechts-Tyteca (1969) present such a theory. What are the presuppositions or starting points an audience may share? What are the patterns of reasoning they follow? Perelman believed he could understand the normative aspects of argumentation, what is involved with dialectical structure and logical appraisal, through conceptualising persuasion as addressed to a universal audience. Although this is controversial theoretically, the notion of a universal audience holds promise for elaborating the rhetorical elements in the model. Are there universal factors, factors invariant across audiences, which should be recognised as included in the procedural norms, performatives and discourse rules, strategy heuristics, and presentation heuristics? To what extent does awareness of these factors enhance the effectiveness of the arguments construed according to the model? Such a perspective could usefully complement the traditional focus of rhetoric on the receptivity of particular audiences in their concrete social settings. For those who find the notion of a universal audience too all-embracing, it may be said that a recent writer on legal argument (Christie 2000), uses the notion of an "ideal" audience, which may be perceived differently in different jurisdictions, to similar effect[11].

According to the pragma-dialectical theory, argumentative dialogue passes through various stages - confrontation, communication, argumentation, and resolution. At the confrontation stage, disagreement surfaces. The communication stage seeks to identify points of agreement, for example, what arguments forms will be accepted. Argumentation then goes forward, if successful, towards reaching a resolution. Clearly our model reflects the first three of these stages. At the end of the day, the final response will reflect a resolution of the dispute. So all four stages are represented. Fallacies may develop at each stage. A theory of the stages and their attendant fallacies then would clearly enhance our understanding of these elements of the model most directly connected with the pragma-dialectical scheme - the theory constructed, the arguments generated and assessed dialectically and logically and the final response to the argument delivered[12].

In a number of recent works, in particular *The New Dialectic* (1998), *A Pragmatic Theory of Fallacy* (1995), and *Commitment in Dialogue* (1995) (co-authored with Erik Krabbe), Douglas Walton has developed a theory of types of dialogue. This theory is quite relevant

11 For a recent discussion of the difficulties associated with the concept of a universal audience see also Tindale (1999), pp. 87ff., 117ff.

12 For a recent general overview of theories of legal argumentation, with a special emphasis on the pragma-dialectical perspective, see Feteris (1999).

to our model. Walton distinguishes in particular persuasion, inquiry, information seeking, negotiation, and eristic dialogues. Since the lawyer is trying to persuade the court to accept the manufacturer's liability to the client, her whole proceeding might be modeled (even though its presentation is often monological) as a persuasion dialogue, since the goal of such dialogues is to move from an initial situation where there is a conflict of opinion to a final situation where the issue is resolved or at least clarified. But Walton speaks of dialectical shifts - in the course of one type of dialogue the participants may begin a dialogue of a different type. Dialectical shifts may be licit or illicit, depending on whether the shift furthers the goal of the original dialogue. Given the logical and dialectical constraints, we may understand the lawyer to shift licitly from a persuasion dialogue to an inquiry whose goal is to prove some claim by first verifying evidence. Clearly, in the course of presenting her case, the lawyer may need to orchestrate information seeking dialogues for the court. But there is always the danger that the situation may degenerate. Lawyer and opposing counsel may start quarreling, a type of eristic dialogue. Walton seeks to understand fallacies as involving illicit dialectical shifts. To the extent that we can see whether the lawyer or other parties to this legal argumentation can illicitly commit fallacies, we extend our understanding of the issues in our model.

Formal dialectics, as presented initially in Hamblin's *Fallacies* (1970), constitutes another area for a potential contribution from argumentation theory to computational approaches to legal argumentation. As Hamblin points out, dialectical systems can be studied descriptively or formally. Judicial proceedings - certain proceedings such as juridical examination and cross-examination at least - can be viewed as dialectical systems. They will be governed by rules which allow participants to make contributions of certain sorts to the dialogue. According to Hamblin, "A formal approach...consists in the setting up of simple systems of precise but not necessarily realistic rules, and the plotting of the properties of the dialogues that might be played out in accordance with them." (1970, p. 256) These formal systems, however, are intended to throw light on actual systems. Hence if a formal system were constructed with an eye both to some type of juridical interchange and also to realization through some computer system, it might be quite possible for formal dialectics to unite computational procedures with procedures found in legal argument, in particular with argument generation and dialectical structuring[13].

This can have not only a productive but a critical dimension. A central notion of formal dialectic is that of commitment or commitment store. As one proceeds through a dialogue, one incurs commitments to various statements. Frequently the number of statements one is committed to grows as the dialogue proceeds, although retraction is possible. When one incurs a commitment, it is added to one's commitment store. Clearly, in legal proceedings one's commitments need to form a logically consistent set. Displaying them in a commitment store with perhaps a way to trace out their logical consequences could obviously enhance one's ability to remain consistent.

Finally, Toulmin's model (Toulmin 1958) marks an advance over a purely deductive understanding of logical assessment. Toulmin's warrants may be understood as non-

[13] This work has been further developed by MacKenzie (1979) and Walton and Krabbe (1995).

deductive or material inference rules. The arguments generated through use of these rules are defeasible if the rebuttals associated with the warrant come into play. Considering Toulmin's model then opens up the whole field of defeasible reasoning. This has recently received a great deal of investigation within Artificial Intelligence. Toulmin's model has provided a point of departure for some of this work. In the next section we discuss AI and Law systems which address problems associated with legal argument.

Toulmin's model also provides a point of departure for analyzing and evaluating non-deductive or defeasible reasoning through argumentation schemes[14]. This approach seeks to categorize arguments and to associate with each category a set of critical questions bearing on the cogency of arguments within that category. For example, as Blair points out, we may identify the category of arguments which appeal to a source, arguments which instantiate the pattern:

> *S* asserts that *P*.
> Normally, when *S* asserts *P*, *P*.
> So *P* (probably, plausibly). (Blair (1999), p. 9.)

Two principal critical questions associated with this schema are "Is there any reason not to trust *S* to be truthful on this occasion?" and "Is *S* in a position to know *P* on this occasion?" (Blair (1999), p. 10) In each case, we can frame more specific critical questions dealing with why *S*'s truthfulness or competence might come into question, e.g. "Does *S* have any interest in not being truthful in this case?" (Blair (1999), p. 10). We can in turn entertain even more specific questions attempting to pinpoint what that interest might be. Clearly, these questions facilitate identifying operative rebuttals, if any, which undermine the force of the argument, and so research on argument schemes is very relevant to the dialectical structuring phase of our conceptual model.

This completes our overview of relevant work within general argumentation theory. In addition to this work, there is also relevant legal-theoretical research on argument[15]. In particular, the legal philosophers Aarnio, Alexy and Peczenik have made various in-depth studies of the role of coherence in legal reasoning and of discourse norms for rational legal reasoning[16]. Their work on coherence especially addresses the theory construction phase of our conceptual model, while their work on discursive rationality is particularly relevant for the argument generation and presentation phases.

## 4. Work in AI and Law

The importance of argument in modelling legal reasoning has been recognised from the earliest attempts to apply AI techniques to law. Thorne McCarty's work, some of the earliest in the field, took as its central problem the reconstruction of the majority and minority opinions in the case of *Eisner v Macomber* (summarised in McCarty 1995).

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[14] See Kienpointer (1992), van Eemeren and Grootendorst (1992), Walton (1996), and Blair (1999).

15 For general overviews see Neumann (1986) and Feteris (1999).

[16] Alexy (1978), Aarnio et al, (1981), Alexy and Peczenik, (1990), Peczenik (1996).

These opinions are essentially arguments suggesting respectively that the court should find for and against the plaintiff. Another important early work was Gardner's system for distinguishing "easy" from "hard" cases (Gardner 1987). The seminal work of Edwina Rissland and Kevin Ashley in the HYPO system (Ashley 1990) developed by Rissland with David Skalak into the CABARET system (Skalak and Rissland 1992), and by Ashley and Vincent Aleven into the CATO system (Aleven 1997), modelled reasoning with cases as using cases to ground an argument and to license a variety of argument moves. The setting here is adversarial: the argument is structured around a move, counter moves from an opponent and a rebuttal of these counter moves (the "3-ply" structure). Rissland and Skalak, with Timur Friedman then produced BankXX (Rissland et al 1996), a system which constructs an argument by identifying and composing "argument pieces" from a variety of legal materials. All of these systems are designed to account for the possibility of disagreement in law: even given the same starting materials it is still often possible to construct defensible arguments for either side. In a separate development GREBE (Branting 1991, 1999) represents the most thorough attempt to use semantic networks to represent case based arguments.

The above systems all start from arguments deployed on the basis of cases: legal reasoning is seen as relating the current decisions to past decisions, and arguing that some past decision should govern the present case. A different approach to argument in law can be seen to emerge from a different tradition, where the reasoning is intended to be essentially rule based. The key early paper here is the formalisation of the British Nationality Act (BNA) as a logic program (Sergot et al 1986). For this tradition a phenomenon which needs to be accounted for is the defeasibility of legal reasoning. An argument can be accepted and yet overturned - not only in light of new facts, but in response to a stronger argument. Law itself is typically structured around some general norm and exceptions to it (and exceptions to these exceptions). This gives rise to the fact that norms derived from law are often conflicting, and such conflicts need to be resolved to come to a decision. Work which attempts to explain defeasibility and normative conflict in terms of argument and counterargument was produced by Henry Prakken and Giovanni Sartor (Prakken 1993, Prakken and Sartor 1996, referred to in this paper as *PRATOR*) who used argumentation logics and Jaap Hage (Hage 1997) and his group at Maastricht, notably Bart Verheij (Verheij 1996), which developed Reason Based Logic (RBL) specifically to address these issues. Another work in the logic and argument tradition is New HELIC II (Nitta et al 1995). Verheij went on to develop ARGUMED, a system which supports a user in constructing arguments through a graphical interface (Verheij 1999).

At much the same time as this theme of using argument to account for defeasibility was emerging, attention began to be paid to the view of law as a *process*. Law is not conducted as a free for all argument, but is constrained by rather strict rules of procedure, designed to give due process. The seminal work in this area is Tom Gordon's *Pleadings Game* (Gordon 1995). In order to model the process of a particular legal proceeding, civil pleadings, he characterised the process as a two player *dialogue game*, designed to identify which issues were agreed between the parties, and which remained in dispute and so required decision in a trial. Other relevant early work in this area is Hage et al (1994),

which gave a dialogical account of reasoning in hard cases. An interesting approach to modelling defeasibility as dispute can be found in Loui and Norman (1995), which explores the notion of attacking arguments by uncovering and attacking their rationales. The notion of a dialogue game was taken up by others, including Arno Lodder at Maastricht (Lodder 1999), who used Hage's Reason Based Logic and Hage et al (1994) to develop DIALAW. Another system for mediating arguments, allowing many participants, adapted from Toulmin's schema, can be found in Loui et al (1997). This work makes ample use of the techniques of formal dialectics discussed in section 3.2 above.

Dialogue games had also been used in a different context. The traditional explanation methods of expert systems, based on the proof trace from a rule based system, were felt to be inappropriate, particularly to the legal domain, where the explanation of the reasons for a conclusion - the argument for that conclusion - was held to be of paramount importance. Bench-Capon proposed a method of argument based explanation in which the explanation would be structured as an argument through participation in a dialogue game, originally based on the formal dialogue game DC devised in MacKenzie (1979) but soon changed (Bench-Capon et al 1993), in favour of a game based on the argument scheme of (Toulmin 1958). This line of work culminated in the PLAID system (Bench-Capon and Staniford 1995). The idea of using Toulmin's argument scheme for explanation was adopted by others, most notably John Zeleznikow and Andrew Stranieri (1995) in the Split-Up system. These explanation systems rely mainly on "canned text", structured by Toulmin's scheme. There has been little or no exploration of the generation of natural language arguments in the domain.

Other areas which have received some attention include the effect of different burdens of proof in the DART system (Freeman and Farley 1996) and the role of teleological considerations in legal argument (Berman and Hafner 1993). Both these topics are currently experiencing an increase in research activity.

From this brief overview it is apparent that argument has been a central notion of work in AI and Law, and has been put to a variety of uses. Further, there seems to be growing agreement in the field that models of legal argument can be described in terms of four layers.[17] The first layer, (normally called the *logical* layer, but which we will call the *argument construction* layer, to emphasis the part in plays in our model) provides the logical structure of single arguments, i.e., it defines how pieces of information can be combined in order to provide basic support for a claim. The second layer (the *dialectical* one) focuses on conflicting arguments: it introduces such notions as 'counterargument', 'attack', 'rebuttal' and 'defeat', and it defines, given a set of premises and assessment criteria, which of the possible arguments prevail. The combination of the argument construction and dialectical layers can be regarded as the layers addressed by nonmonotonic logic. One variant of such logics, viz. logics for defeasible argumentation, explicitly separates the two layers. For an overview of such argumentation logics see

[17] The combination of the first three layers was first discussed by Prakken (1995). The first and third layer were also discussed by Brewka and Gordon (1994), splitting the procedural layer into a speech act layer (defining the possible speech acts) and a protocol layer (defining legality of the moves). The fourth layer was added by Prakken (1997) and also discussed in Sartor (1997).

Prakken and Vreeswijk, 2000. The third layer (the *procedural* one) regulates how an actual dispute can be conducted, i.e., how parties can introduce or challenge new information and state new arguments. In other words, this level defines the possible speech acts, and the discourse rules for when and how these speech acts can be performed and what their effects are. Thus the procedural layer differs from the first two in one crucial respect. While the argument construction and dialectical layers assume a fixed set of premises, at the procedural layer the set of premises is constructed dynamically, as during a debate. This also holds for the final layer, the *strategic* or *heuristic* one, which provides rational ways of conducting a dispute within the procedural bounds stated at the third layer. The fourth layer considers heuristics for choosing modes of presentation, for choosing between the available arguments, and it considers strategies for expanding the available information and constructing new theories.

Coming back to the three approaches in argumentation theory discussed in Section 2, we see that the logical and rhetorical approaches fully map on to the present argument construction and heuristic/strategic layers; however, the dialectical approach is distributed over the dialectical layer, which includes the dialectical structuring and argument assessment, and the procedural layer, which addresses the procedural and discourse aspects. Incidentally, this illustrates that while in argumentation theory the three approaches are sometimes seen as rivals, in AI & Law the consensus is that a full model of legal argument should incorporate all these aspects.

How do the four layers fit with the conceptual model of this paper? The first layer has a clear mapping to the stage of argument generation. The second layer maps to the stage of dialectical structuring and is also a key element in the process of argument selection, since it determines the assessment criteria which are an important input to this process. The third layer, which supplies procedural norms and the specific discourse rules, feeds both into this argument selection process, and into the process which decides upon the mode of presentation of the selected argument. The fourth layer is now divided into several elements, reflecting the various roles the heuristics can play. These roles pertain to the partial description and theory formation stages, to the selection of arguments and to the formatting of arguments for presentation. Thus strategy heuristics are important not only in the selection of arguments and the refinement of theories as the argument proceeds, but also in the formulation of the initial theory and case description from which the argument will begin.

In the remainder of this section we will discuss, in terms of the conceptual model of this paper, a selection of AI and Law systems which address argument. Table 1 gives some basic information about the systems we will consider: the developers, a key reference, the domain of law they address, where applicable, and an indication of the status of their implementation.

| | **Developer(s)** | **Key Reference** | **Domain of Law** | **Implementation Status** |
|---|---|---|---|---|
| **ARGUMED** | Verheij | Verheij (1999) | Non-specific | Prototype |
| **BANKXX** | Rissland, Friedman, Skalak | Rissland et al (1996) | US Bankruptcy Law | Prototype |

| | | | | |
|---|---|---|---|---|
| **BNA** | Imperial College | Sergot et al (1986) | British Nationality Act | Trialed |
| **CABARET** | Rissland, Skalak | Skalak and Rissland (1992) | US Tax Law | Prototype |
| **CATO** | Ashley, Aleven | Aleven (1997) | US Trade Secrets | Trialed |
| **DART** | Freeman, Farley | Farley and Freeman (1996) | Non-specific | Prototype |
| **DIALAW** | Lodder | Lodder (1998) | Non-specific | Prototype |
| **GARDNER** | Gardner | Gardner (1987) | US Contract Law | Prototype |
| **GREBE** | Branting | Branting (1999) | Industrial Accident | Prototype |
| **HELIC II** | Nitta and others | Nitta et al (1995) | Non-specific | Prototype |
| **HYPO** | Rissland, Ashley | Ashley (1990) | US Trade Secrets | Prototype |
| **LOUI and NORMAN** | Loui, Norman | Loui and Norman (1995) | Non-specific | Theoretical |
| **McCARTY** | McCarty | McCarty (1995) | US Tax Law | Theoretical |
| **PLAID** | Bench-Capon, Staniford | Bench-Capon and Staniford (1995) | Non-specific | Prototype |
| **PLEADINGS GAME** | Gordon | Gordon (1995) | Civil Pleadings | Prototype |
| **PRATOR** | Prakken, Sartor | Prakken and Sartor (1996) | Non-specific | Theoretical |
| **RBL** | Hage, Verheij | Hage (1997) | Non-specific | Theoretical |
| **ROOM 5** | Loui et al | Loui et al (1997) | Non-specific | Trialed |
| **SPLIT-UP** | Stranieri, Zeleznikow | Zeleznikow and Stranieri (1995) | Australian Family Law | Trialed |

**Table 1: Selected AI and Law systems addressing argument**

Next we summarise in Table 2 which of the processes from our conceptual model are automated by the various systems, indicated by an X. For each table entry further details will be given in subsequent tables. In the column on argument generation, M signifies a mediation system. Such systems do not themselves generate arguments, but allow the user to supply them in a certain logical or rhetorical format. N indicates a system which identifies an argument by interpreting the output of a particular "black-box" AI technique, namely an artificial neural network.

When reading Table 2 and the other tables, the reader should keep in mind that they often considerably simplify the systems, and that they reflect the present authors' interpretations.

| | **Case Description** | **Theory Formation** | **Argument Generation** | **Dialectical Structuring** | **Argument Selection** | **Argument Formatting** |
|---|---|---|---|---|---|---|
| **ARGUMED** | | | M | X | X | X |
| **BANKXX** | | | X | | | X |
| **BNA** | | | X | | | |
| **CABARET** | | X | X | X | X | X |
| **CATO** | | | X | X | X | X |
| **DART** | | | X | X | X | X |
| **DIALAW** | | | M | X | X | |
| **GARDNER** | | | X | X | X | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **GREBE** | | X | X | | X | |
| **HELIC II** | | | X | X | X | |
| **HYPO** | | | X | X | X | X |
| **LOUI and NORMAN** | | X | X | X | X | |
| **McCARTY** | | X | X | | | |
| **PLAID** | | | X | | X | X |
| **PLEADINGS GAME** | | | M | X | X | |
| **PRATOR** | | | X | X | X | |
| **RBL** | | | X | X | X | |
| **ROOM 5** | | | M | X | | X |
| **SPLIT-UP** | | | N | | X | X |

**Table 2: Processes in Conceptual Model Automated in the Selected Systems**

As we can see from this table, AI and Law research has so far largely neglected the processes of case description and theory formation. Yet rhetorical studies of legal argument stress the importance of these processes in practical legal argument, and have much to offer. More on this will be said in the concluding section.

| | **Partial Description** | **Procedural Norms** | **Normative Sources** | **Technique** |
|---|---|---|---|---|
| **CABARET** | Factors | | Cases, Legislation | Argument Strategies |
| **GREBE** | Semantic network of case | | Cases represented as semantic nets | Structural Matching |
| **LOUI and NORMAN** | | | Cases, Defeasible rules | Inclusion of rationales |
| **McCARTY** | | | Cases, Model of ownership | Prototype Deformation |

**Table 3: Theory Formation in Systems Which Address this Process**

Table 3 shows the four systems which address theory formation. GREBE selects the cases that it will place in its theory by attempting to match the structure of the semantic network representing the current case with the semantic networks representing past cases. The past cases with sufficient structural similarity are included in the theory, subsequent arguments being generated from consideration of the similarities and differences with the current case. Loui and Norman allow an argument to be restated by inclusion of its rationale. For example if an argument includes "if a then b", its rationale might be "if a then c, and if c then b". Adding the rationale allows attacks to be made on the full version of the argument that would not have been possible on the compressed argument. In particular, the full argument can be attacked on its intermediate conclusion “c”, which was not part of the compressed argument. Both adding such rationales and meeting attacks based on them cause the theory to be modified. As well as this ("compression") rationale, Loui and Norman (1995) give four other rationales. McCarty generates his theory by deforming existing prototypes into a form which will include the case under the desired class. CABARET provides a number of argument strategies which can produce

new rules: for example dropping a term from the antecedent of an existing rule ("broadening").

Table 4 considers the systems with respect to argument generation.

| | **Logic** | **Argument Schemes** | **Other** |
|---|---|---|---|
| **ARGUMED** | Modus Ponens | | |
| **BANKXX** | | | Best first heuristic search |
| **BNA** | Logic programming | | |
| **CABARET** | Modus ponens | Cite, distinguish | |
| **CATO** | | Cite, distinguish | |
| **DART** | Modus ponens, Modus tollens | Abduction, *A contrario* | |
| **DIALAW** | Reason Based Logic | | |
| **GARDNER** | Modus Ponens | | |
| **GREBE** | | | Comparison of semantic nets |
| **HELIC II** | Logic programming | Rule Broadening? | |
| **HYPO** | | Cite, distinguish | |
| **LOUI and NORMAN** | Any Defeasible Logic | rationale-based attacks | |
| **McCARTY** | | | Prototype Instantiation |
| **PLAID** | Annotated logic program | Toulmin | |
| **PLEADINGS GAME** | Conditional entailment | | |
| **PRATOR** | Logic programming | | |
| **RBL** | Reason Based Logic | | |
| **ROOM 5** | Defeasible propositional | Toulmin-like | |
| **SPLIT-UP** | | | Neural net |

**Table 4: Argument Generation in the Selected Systems**

Since we have selected the systems because they address argument, all the systems have some method here. The majority use deduction to generate the arguments, but we can also see some use of customised argument schemes, particularly in those which are predominately based on cases rather than statutes. DART, which is a rule based system, supplements logical inference rules, which it terms with two apparently fallacious argument schemes, affirmation of the antecedent and denial of the consequent. The

problems arising from the use of these schemes are addressed in their techniques for dialectical structuring. Four of the systems rely on AI techniques to generate their arguments.

| | **Discourse Rules** | **Dialectical Structuring** | **Assessment Criteria** | **Contextual Situation** |
|---|---|---|---|---|
| **ARGUMED** | | Undercutters | Undercutters succeed | |
| **BANKXX** | | | | |
| **BNA** | | | | |
| **CABARET** | 3-ply structure | Counterexamples Distinctions, Rule conflicts | Relevant similarities | |
| **CATO** | 3-ply structure | Counterexamples, Distinctions | Relevant similarities | |
| **DART** | Argument and counterargument | Rule conflicts, Argument scheme undercutters | Standard of proof, Rule class priorities | |
| **DIALAW** | Mackenzie-like dialogue game | As RBL | As RBL | |
| **GARDNER** | | Rule conflicts | Source priority | |
| **GORDON** | Rules of pleading | Rule conflicts, NAF[18] attacks, Applicability attacks | Defeasible priorities | |
| **GREBE** | | Conflicting outcomes | Structural similarity | |
| **HELIC II** | Own dialogue game | Rule conflicts, NAF attacks? | Defeasible priorities | |
| **HYPO** | 3-ply structure | Counterexamples, Distinctions | Relevant similarities | |
| **LOUI and NORMAN** | Procedural model of dispute | Rule conflicts, Undercutters | Defeaters and undercutters succeed | |
| **McCARTY** | | | | |
| **PLAID** | "Toulmin" Dialogue Game | | | User Preference |
| **PRATOR** | | Rule conflicts, NAF attacks, Applicability attacks | Defeasible priorities | |
| **RBL** | | Rule conflicts, attacks on applicability or validity, exclusion | Reason weighting, Defeasible priorities | |
| **ROOM 5** | | | | |
| **SPLIT-UP** | | | Corresponds to Neural Net output | |

**Table 5: Argument Selection in the Selected Systems.**

Table 5 turns to the process of selecting the argument to be put forward. The dialectical structure imposed on the arguments generated is an important input to this process, and we include the method of dialectical structuring as a column, along with the other inputs to the process taken from the conceptual model. Most of the systems identify relations

**[18] "NAF" stands for "Negation as Failure".**

that can exist between arguments and can put them into conflict, and they identify criteria for assessing the relative status of conflicting arguments. Some of these systems also include heuristics for choosing the most appropriate of the arguments which dialectically prevail. Many of the systems also pay attention to the discourse rules governing the situation in which they will be advanced. Most striking from the table is the lack of consideration of the social context as an explicit factor: the audience and its value system is almost universally ignored, or left implicit. Arguably PLAID is an exception: much of its purpose is to provide a tool to enable a user to select the information to present in the light of assumptions about what the intended audience would already know or be prepared to accept.

| | **Presentation Heuristics** | **Discourse Rules** | **Contextual Situation** |
|---|---|---|---|
| **ARGUMED** | Graphical representation | | |
| **BANKXX** | Text template | | |
| **BNA** | | | |
| **CABARET** | Text template? | Points of view | |
| **CATO** | Text template; Factor hierarchy for emphasis | 3-ply argument | |
| **DART** | Text template based on Toulmin | | |
| **DIALAW** | | | |
| **GARDNER** | | | |
| **GREBE** | | | |
| **HELIC II** | | | |
| **HYPO** | Text template; But, see, accord | 3-ply argument | |
| **LOUI and NORMAN** | | | |
| **McCARTY** | | | |
| **PLAID** | Text template to transform Toulmin Structure | | |
| **PLEADINGS GAME** | | | |
| **PRATOR** | | | |
| **RBL** | | | |
| **ROOM 5** | Tabular presentation of Toulmin elements | Support vertical, attack horizontal | View of supporting cases; access to decision texts |
| **SPLIT-UP** | Text template based on Toulmin | | |

**Table 6: Argument Formatting in the Selected Systems**

Table 6 summarises the techniques for formatting arguments in the selected systems. All the systems which format their arguments have these formats 'built-in', and rely on rather

simple techniques centering on the use of "canned text". Rhetorical theory, however, tells us that the most appropriate form of the argument can only be discovered by reference to elements of the context in which the argument is to be presented. We will return to this issue in the discussion in the final section.

From the above it is evident that most attention in AI and Law has focussed on the first two layers of the four layer model. In our opinion, one important insight has been the usefulness of separating the logic or schemes which generate arguments from the dialectical relations of attack and defeat which give rise to defeasibility, re-instatement and non-monotonic behaviour in general. Within these layers a variety of techniques have been employed, and there is a good degree of understanding of what can be done here. Coverage of the other layers is somewhat sketchier: the importance of discourse rules is certainly recognised and some systems are largely motivated by the desire to address this problem. A variety of dialogue systems have been explored, and can provide a basis for those who wish to carry the work further. The greatest lack is at the heuristic layer: even those systems which employ heuristics tend to derive the heuristics from consideration of how the particular system should be used rather than from actual legal practice. Rule broadening seems an example of such an heuristic. One feature of the conceptual model introduced in this paper is that it identifies the roles that such heuristics can play. Also neglected is the role of audience and context. Argumentation theory and legal practice, in contrast, show how essential these matters are for modelling argument in a realistic fashion. Finally we can remark that theory formation is in most systems performed by the system builder, or, in mediation systems, by the user, and is thus a given to the system, whereas the conceptual model shows it is this process that determines much of what can subsequently be done, and is thus an indispensable part of the reasoning process.

## 5. Discussion

In this concluding section we will discuss what we feel that Argumentation Theory can learn from AI and Law, and *vice versa*, and then finish by identifying some opportunities for research relating the two fields.

### 5.1 What can Argumentation Theory learn from AI and Law?

One thing that making a model computational always achieves is that it forces a precise statement of that model. When implementing the model, compromises often have to be made, but the very making of these compromises means that the issue is confronted, options are identified and some characterisation of the advantages and disadvantages of those options is obtained. Sometimes part of a model may even have to be omitted, as building a computational model will require some simplifications to be feasible. Even this may lead to some gains, as it allows us to pose questions as to how essential that part was and what is lost by its omission.

Once the model has been implemented, it provides a vehicle for conducting empirical tests to determine how well it can be made to perform in practice. Questions such as the range and depth of the explanation provided by the model can be asked, and the extent to

which it is domain specific or general can be explored. Typically such tests will lead to modifications, refinements and qualifications.

An implemented model is also itself a persuasive device: that the program exists at all demonstrates that the model is stated with precision, albeit usually with some simplification of the original, and the behaviour of the program may provide practical evidence of the utility of the model.

Additional to these general points, we can point to some specific lessons that can be transferred. First we can say that AI and Law research illustrates the possibility of a logic for defeasible argumentation. This partly draws on the area of nonmonotonic logic in general AI. One point that AI & Law has emphasised is that in formalising nonmonotonic reasoning it is fruitful to separate the phase of argument generation from the phases of dialectical structuring and argument selection (this is reflected in the distinction between the argument construction and dialectical layers of legal argument). This insight is also relevant for argumentation theory, where both aspects are present but sometimes conflated. In addition, a good deal is known from this work about how to formalise reasoning with rules and exceptions; reasoning about rule conflicts; about the backing, validity and applicability of rules; and about the logical relation between rules and principles. At present, argumentation theory - at least that done in the informal logic tradition - lacks a comprehensive understanding of argument strength for non-deductive arguments. Non-monotonic logic, especially in its argument-based form, is a principal candidate for such an understanding or a resource from which such an understanding can be developed. The fact that it has been shown useful in evaluating legal reasoning is a further mark of its potential significance for argumentation theory. For, as Toulmin argued when putting forward his jurisprudential model, his schema of legal reasoning applies to much of reasoning in general. Also the formalisation of legal procedures, as in, for example, Gordon (1995), has shown how insight into argument in general can be gained from such an exercise. Finally, the work on case based reasoning has developed customised argument schemes for drawing conclusions from cases, and even some inventional and presentation heuristics associated with these schemes, for example HYPO, CABARET and CATO.

### 5.2 What Can AI and Law Learn From Argumentation Theory?

The dominant paradigm of reasoning in AI is the mathematical-logical style of deductive reasoning. This even holds for AI's formalisations of defeasible reasoning: typically, these formalisations focus on model-theoretic semantics and associated proof theory, and ignore such issues as procedure, resource bounds, and audience. Argumentation theory teaches that constraining reasoning into this paradigm can cause much that is important to be ignored or abstracted away. Law is certainly an area where this is true, and many of those interested in AI and Law have been attracted by the opportunity argumentation theory affords to explore such issues. As the survey in the earlier section shows, however, there are many factors which have yet to be taken from argumentation theory into this work. Notions such as the influence of the audience, and the need to take

account of the values that come from the social context are still largely virgin territory for the AI and Law explorer. We hope that the conceptual model presented in this paper will help to raise awareness of the areas that remain to be charted.

Some specific things that might be taken into AI and Law from argumentation theory include the considerable body of work on argumentation schemes and associated "critical questions", work on legal rhetoric which promises to be a source of inventional and presentational heuristics, and the vital part played by theory formation and the initial description of the case in determining the arguments that are possible.

### 5.3 Issues for Future Exploration

We will conclude this paper by putting forward some topics which we will see as interesting and fruitful opportunities for inter-disciplinary research and transfer of ideas.

*What role should argument schemes play in computational models of legal argument?* Argument schemes could be seen as inventional heuristics, as presumptively valid inference rules, as presentational heuristics, or even as some combination of these. Those regarded as presumptively valid inference rules could be naturally adopted by existing AI and Law work through the use of argumentation logics, in the stages of argument generation and selection. For instance, John Pollock's notion of defeasible reasons with undercutting defeaters naturally maps onto the notion of argument schemes with critical questions (Pollock, 1995). But this leaves the question as to which argument schemes can be treated this way, and which have to be located in other parts of our conceptual model as inventional or presentational heuristics.

*To what extent does non-monotonic logic yield a generally applicable approach to evaluating non-demonstrative reasoning?* In argumentation theory and particularly in informal logic, the ground adequacy of premises, whether or not they support the conclusion with sufficient weight, is a principal factor in evaluation of arguments. As pointed out above, currently in argumentation theory there is no general theory of argument strength for non-deductive or non-demonstrative arguments. The extent to which non-monotonic logic, especially in its argument-based form, may fill this gap is a very significant open question.

*To what extent can we incorporate the situational context in computational systems?* The importance of considering the audience and especially the values and beliefs of that audience when formulating and choosing an argument is a clear lesson from argumentation theory. As yet little appreciation of this importance has been shown in AI and Law. Exploring the impact of addressing a particular audience might prove valuable in, for example, organising rule priorities according to the values of the audience; accounting for differences in interpretation in different jurisdictions; and explaining how interpretations change over time.

*What is the role of procedure in producing 'good' legal arguments?* This topic will build on work of e.g. Gordon (1995) in AI & Law and e.g. Toulmin (1958) and Alexy (1989)

in argumentation theory to explore further the role of procedure in legal argument. The idea here is that a legal decision is just and rational if it has been successfully defended in a fair and effective procedure. Granted that justice and rationality have a procedural side, the issue is to what extent can discourse rules for fair and effective legal dispute can be implemented, so that a computer could guide and mediate a legal dispute between humans. Current AI & Law research on this issue, which already partly draws on argumentation theory and formal dialectics, could benefit from closer collaboration.

*What can be done to automate theory formation in AI and Law?* One implication of our conceptual model is that the theory formation stage plays a crucial role in the construction of legal argument – no particular theory is applicable to all cases. As we saw from the discussion in section 3, the problem has been no more than superficially addressed in AI and Law: even those few systems which pay attention to this stage do not take into account many of the elements involved in the process. When – as is the typical case – theory formation is entirely the responsibility of the system builder, the system that results is rather inflexible, convincing for cases for which the given theory is appropriate and off the point for those that are not. The potential for automating this stage is unclear, but is sufficiently important to merit investigation.

*What argument schemes available in the literature of rhetoric and law can be used to tackle the theory formation problem?* Schemes that have been elaborated with considerable detail in the literature of law and rhetoric include treatments of argumentative patterns related to the persuasive establishment and description of facts, the interpretation and argumentative use of rules and precedents, systems of excuses, and considerations of consequences and policies. Such schemes may be very helpful in the development of heuristics for theory formation[19].

*How can we introduce notions of affect into arguments produced by computational systems?* All lawyers recognise that the persuasiveness of their case is highly dependent on the language in which it is couched[20]. AI and Law systems, by relying on "canned text", deny themselves this opportunity to strengthen their arguments. Work exists, e.g. Grasso et al (2000), which adapts the form in which an argument is presented to the particular audience to which it is to be presented. If we are to emulate this feature of legal argument, which is for the lawyer second nature, we need to ensure that our computational models can represent the required contextual features which enable such elements to be introduced.

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19 We point again to the literature on trial and appellate advocacy, exemplified by Mauet (1980), Hornstein (1984), and Bergman (1997). On the rhetorical treatment of facts see also Eberle (1989). For patterns of argumentation in the common law see Stone (1964) (pp. 235ff.) and Eisenberg (1988); the latter is reviewed from a rhetorical perspective in Hohmann (1990). On legal interpretation in general see Llewellyn (1950), Twining (1976), and Leyh (1992). On constitutional interpretation see Bobbit (1982). On a variety of legal argument types see Struck (1971) and Ott (1990). On legal rhetoric in general see also Goodrich (1987), Sobota (1990), Gast (1992), Haft (1995), Sarat and Kearns (1996).

20 Such concerns are explored in analyses such as those of White (1985) and Bosmajian (1992).

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