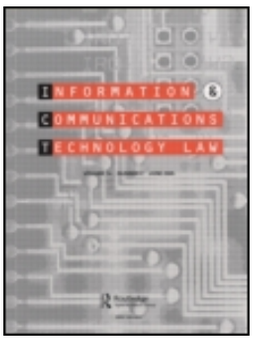

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Truth and Consequence: Complementing Logic with Values in Legal Reasoning

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ABSTRACT *In this paper I discuss attempts to model legal reasoning with case precedents. I draw attention to the need to consider not only the factors in a case, but also the social purposes that are served by deciding cases with reference to these factors. I show how considering such purposes allow us to give more predictive power to precedents; to discriminate between arguments advanced on the basis of factors; and to explain how the law can evolve as social attitudes change.*

1. Introduction

In the introduction to Perelman and Olbrechts-Tytecha (1969), the authors write:

> Logic underwent a brilliant development during the last century when, abandoning the old formulas, it set out to analyze the methods of proof effectively used by mathematicians. Modern formal logic became, in this way, the study of the methods of demonstration used in the mathematical sciences. One result of this development is to limit its domain, since everything ignored by mathematicians is foreign to it. Logicians owe it to themselves to complete the theory of demonstration obtained in this way by a theory of argumentation. (p. 10)

This mathematically inspired model of reasoning has also dominated attempts in Artificial Intelligence to handle practical situations where we find that our theory contains conflicts, or our information is incomplete, so that we need to reason in a defeasible or non-monotonic manner. So far the ideas of Perelman have been picked up mainly by those interested in the natural language presentation of reasoning. In, for example, Grasso *et al.* (2000) and Reed (1999) a theory of argumentation has been used to produce more convincing presentations of reasoning. The question arises, however, as to whether this is simply a matter of presentation, or whether the theory of argumentation impacts also on the conclusions that can be reached. In this paper I want to consider for one domain of reasoning, namely reasoning in law, whether we do indeed need to complete our theory of demonstration by a theory of argumentation.

2. Legal reasoning

Legal reasoning takes place in a context provided by previous decisions. Although a framework is provided by statutes, the law is developed through a

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series of decisions applied to particular cases. The doctrine of *stare decisis* is important, in which previous decisions are held to be binding on courts of equal or lower status. Thus the task confronted by a legal reasoner is to apply the law to a particular set of facts presented in the case under consideration in a way which is consistent with the way it has been applied to other sets of facts in the past. Noteworthy are the following points.

- There are only two possibilities for the decision: either the court must find for the plaintiff or for the defendant.
- One of the options must be embraced: a decision in favour of one party or the other must be made.
- The decision must be justified: the decision comprises not only the verdict, but a description of the case and the reasons for the decision.
- Disagreement is inherent in the system: the case only arises because there is disagreement, and the parties are represented by lawyers who will present the reasons why their clients should win. Moreover higher courts recognise that the outcome need not be unanimous. In the UK three judges sit in the Court of Appeal and five in the House of Lords (the highest court in the UK), and it is possible that the verdict is a majority one, with the right for dissenting judges to present their reasons for dissent.
- Disagreement may not be based on any difference in facts or the interpretation of fact. It may well be possible to agree on the issues pertaining to a case and yet disagree about the right outcome.
- The decision is defeasible: the verdict may be appealed to a higher court (except in the case of the highest court).

Perelman emphasises this possibility of disagreement (Perelman, 1980):

> if men oppose each other concerning a decision to be taken, it is not because some commit an error of logic or calculation. They discuss apropos the applicable rule, the ends to be considered, the meaning to be given to values. (p. 150)

The next section will discuss how legal reasoning has been modelled, and the extent to which logic can represent the reasoning.

3. Modelling legal reasoning

Attempts have been made to model legal reasoning with cases using rules. The idea is to summarise the various decisions in the form of rules, and then to apply these rules to the new case in hand. This approach has been criticised both from a jurisprudence theoretical standpoint (e.g. Moles, 1987) and from a practical standpoint. It enshrines a positivist approach to law which makes the application of law look more mechanical that is felt appropriate and imposes a particular interpretation (which has no legal standing) on a decision. In practical terms the difficulties arise when attempting to discover the operative rule: there is the problem of the appropriate level of abstraction from the case facts to the terms to be used in the rule (e.g. Twining & Miers, 1976)—too little abstraction and the rule fails to apply to new cases, too much and inappropriate cases are brought under its scope—and there is also the problem that plausible rules provide too little coverage to be useful in predicting the outcome in new cases. A more popular approach has therefore been to employ case-based reasoning.

The simplest approach to case-based reasoning (e.g. Kowalski, 1989) is to identify a set of factors that may be present or absent in a case and describe the cases in terms of these factors. A new case is then matched with the existing cases, and the decision in the closest match is applied to the new case. This approach is somewhat unsophisticated, and does not seem to reflect the way cases are actually used in reasoning. The best, and most well known, attempt to model legal reasoning with cases is the HYPO system of Rissland and Ashley, best described in Ashley (1990).

In HYPO the factors under which a case is described are not surface features of the case, but issues and distinctions that have been employed in past decisions, and which result from a thorough analysis of the law. HYPO takes as its domain the US Trade Secrets Law and examples of such issues would be the number of people who knew the putative secret, and the ease in which the secret could have been discovered by reverse engineering. Each of the factors represent a distinction which was introduced in some particular case, and which has been refined in succeeding cases. All of the issues will favour either the plaintiff or the defendant. If the plaintiff took measures to protect his secret and restrict its knowledge that will be in his favour. If the secret is easily reverse engineerable, that will favour the defendant.

Given these factors, and a representation of past cases in terms of them, when confronted with a new case we can organise the existing cases according to the factors shared. If we are now constructing an argument for the plaintiff we will ideally cite a case in which:

(1) the decision was for the plaintiff;
(2) the pro-plaintiff factors in that case are in the new case;
(3) the pro-defendant factors in the new case are in that case.

If we can find such a case, the decision is clear—the new case is completely on point. Typically, however, there will be no such case, and either (2) or (3) cannot be satisfied. Here the defendant can argue that the cases are distinguishable, on the grounds that the plaintiff's case is weaker than the original if (2) is not satisfied, or that the defendant's case is stronger in the new case if (3) is not satisfied. Alternatively, the defendant will be able to produce a counter example—a case decided for the defendant which is as on-point than the case cited by the plaintiff.

The plaintiff can now respond to these objections by distinguishing the current case from any counter-examples, or by pointing to cases where favourable factors missing in the current case did not prevent a decision for the plaintiff, or by pointing to additional factors present in the new case which favour the plaintiff.

HYPO is a sophisticated system, which does seem to reflect and enable moves typically made by lawyers when arguing with cases (citing, distinguishing, supplying counter examples, giving instances where a missing factor is not fatal, etc). While, however, it can reproduce the arguments which can be constructed by the different sides, it provides no insight into why one of the arguments might be favoured over the other.

An interesting presentation of HYPO can be found in a reconstruction of the reasoning by Prakken and Sartor[1] (Prakken & Sartor, 1998), which expresses a set of decisions in terms of a set of arguments. They represent a case as a conjunction of three rules:

(1) conjunction of pro-plaintiff factors in the case is the reason to decide for plaintiff;
(2) conjunction of pro-defendant factors in the case is the reason to decide for defendant;
(3) either the pro-plaintiff reason is preferred to the pro-defendant reason or vice versa, depending on how the case was decided.

They can then describe the various argument moves in terms relating to these rules.

If we adopt Prakken and Sartor's representation of cases, we can conveniently represent our current understanding of the case law as a directed graph, following Bench-Capon (1999). All possible combinations of pro-plaintiff factors form a straightforward hierarchy ordered on the assumption that an additional factor for a side will strengthen the case for that side. The possible combinations of pro-defendant factors form a similar hierarchy. The two hierarchies are then joined by edges between them. An edge is inserted to connect the node containing the pro-plaintiff factors in a particular case with the node containing the pro-defendant factors in that case, and the edge is directed to indicate the decision made in that case. An example, with pro-plaintiff factors A and B, and pro-defendant factors C, D and E, is shown in Figure 1.

When we consider a new case we consider the two nodes representing the factors present in that case. If a path exists between them, the direction of the path will give us the decision determined by the precedents. The graph must contain no cycles, since this would imply that precedent determines victory for both sides—which would render our theory of the law incoherent. If no path exists we add an edge linking the two relevant nodes. Since the edge can be directed in either direction (no cycle can be introduced because no path currently exists) we can see that the outcome is not determined by the precedents currently represented by the graph. Eventually paths will exist between all pairs of nodes, when we can be said to have a complete understanding of this area of law. Such a graph may be said to represent a theory of law in this domain. It is *coherent* if acyclic, and *complete* if a path exists between every pair of nodes.

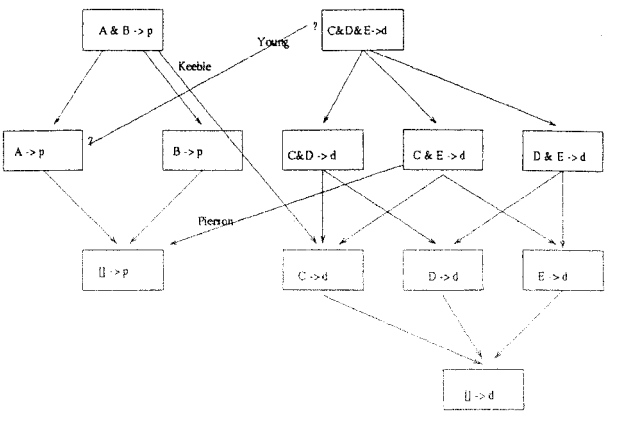

Figure 1. Graph representation of decided cases in a legal domain: Pierson decided for the defendant, Keeble for the plaintiff and Young under consideration.

4. Limitations

The benefit of the modelling described in the previous section is that it can give a good *ex post* account of how a decision was reached: but it gives no account of *why* the decision was reached. Quoting Perelman (1980) again:

> With the judicial syllogism we lose sight of the fact that the judge's intellectual effort has already been achieved, his deliberation finished, and there remains only the question of form. The important thing is not the passage from premises to conclusion but the way the judge justifies his premises, both in fact and in law. (p. 150)

If we know the facts of a case and the priority that is given to one rule as against another we can deduce the result. But, no guidance is given as to why one rule should be preferred against another. Logic is, after all, concerned only with things known from their form alone: why then should we use it to predict things which depend on content? Thus the first criticism is that the account can explain past cases but when confronted with a new case, the decision appears arbitrary, whereas we know that it is held to be rational, and indeed reasons must be given by the judges. It is precisely this that Perelman requires his theory of argumentation for Perelman (1980):

> A demonstration is correct or incorrect, it is imposed absolutely or lacks value; but in argumentation it is always possible to plead for or against, because arguments which support one thesis do not entirely exclude those supporting the other one; this in no way means that all arguments are of the same value … When we must justify preferences, deliberate about a decision, or discuss values, then argumentation and recourse to dialectics are indispensable. (p. 150)

The position both respects logic—it can rule out an argument as incoherent—but also recognises the need for rational criteria for the justification of two equally (logically) tenable views. They may be tenable logically while untenable with respect to dialectics.

Also, importantly, the taking together of all the factors in favour of a given side in a case fails to distinguish between several different situations.

(1) It may be that two factors in fact require one another to have effect. Thus losing either of them would deprive the other of its weight in the argument.
(2) It may be that two factors are entirely independent of one another. In such a case what is being presented when both are present is two distinct arguments, rather than one argument strengthened by the presence of both factors.
(3) It may be that two factors can be substituted for one another; thus whether both are present, or either one, presents an equally strong argument.

The last point is addressed in Aleven (1997), where the notion of abstract factors is introduced. If two factors are subsumed under the same abstract factor, it is possible to argue that a case with one present has the same weight as one with the other present. This is an interesting step on the road to assessing arguments which are not obviously constrained by the theory: we can block, for example, a move which distinguishes the case on the absence of a given factor

if another factor relating to the same abstract factor is present (irrespective of whether this factor was present in the original case).

The other two situations have, however, been no more than partially addressed: it may be that the first case suggests the needs for sub-arguments, a possibility recognised without being discussed in detail, in Prakken and Sartor (1998). The second case, however, is not addressed at all in the literature: there is no way of distinguishing between factors making a single, stronger argument from those making two weaker ones.

The account we are looking for should accommodate all of these distinctions, and build on the notion in Aleven (1997) so as to extend our ability to assess logically coherent disagreements.

5. Values, purposes and consequences

The idea is that disputes which cannot be resolved by pointing to the logical coherence of the theory can be resolved by a consideration of the values of the parties to the dispute. Work such as that of Grasso *et al.* (2000) has argued that to be persuasive an argument must conform not only to logic, but also to the values of those to whom it is addressed. In the case of a legal dispute judges attempt to provide a persuasive argument for the decision they wish to give, addressed in the first instance to the other judges trying the case with them, and then in the second instance to the public to which they are ultimately responsible. In a sense the judges are intended to embody society at large, and to try cases against the background of the value system of that society.

This is broadly the position taken by Moles (1987) who has criticised rule based representations of law as adopting an unrealistically formal approach. He argues that judges must consider consequences as well as the letter of the law.

The point is well made by an example quoted in Perelman (1980). Suppose the law has decided that dogs should not be allowed in a railway carriages. One should feel aggrieved neither if one is prevented from taking ones bear on board (even if it is on a leash), nor if one's neighbour is permitted access with his chihuahua: in both cases the purposes served by the ban on (typical) dogs are served also here.

One paper which has argued for the importance of representing the purposes underlying decisions is Berman and Hafner (1993). Their concern is to argue that case-based models which aspire to reflect 'the way in which practicing professionals use legal decisions' must represent the purposes behind the rules articulated in cases. They centre their thinking on an example of the law as it develops through three cases: *Pierson*, *Keeble* and *Young*.

In the first case, *Pierson v Post*, the plaintiff was hunting a fox in the traditional manner using horse and hound when the defendant killed and carried off the fox. The plaintiff was held to have no right to the fox because he had gained no possession of it. In the second case, *Keeble v Hickeringill*, the plaintiff owned a pond and made his living by luring wild ducks there with decoys and shooting them to supply a local poulterer. Out of malice the defendant used guns to scare the ducks away from the pond. Here the plaintiff won. In a third case, *Young v Hitchens*; both parties were commercial fisherman. While the plaintiff was closing his nets, the defendant sped into the gap, spread his own net and caught the fish. In this case the defendant won.

If we wish to argue *Young* against the background of *Pierson* and *Keeble* in the manner of HYPO (Ashley, 1990) we can readily identify a number of factors (which I associate with the letters shown in Figure 1). Whether the plaintiff owns the land (B), whether the land is open (E), whether the animal was caught (C) and whether either or both the parties are engaged in making their livelihood (A for the plaintiff and D for the defendant) are obvious ones. *Pierson* now looks rather clear: the plaintiff does not own the land, did not catch the beast and was looking for pleasure rather than business. No factor favours the plaintiff in this case. (Note that in part it is the choice of factors that lead to this result. The factors recognised in a domain reflect the decisions that have been made.) In *Keeble*, although the plaintiff was not in possession of the ducks, he had the pro plaintiff factors that the land was owned and he was engaged in a commercial pursuit, and we know that these were sufficient.

If the defendant were to propose that *Pierson* is followed in *Young* we can distinguish on the grounds that the plaintiff is making his living, and cite *Keeble* to show that not having captured the prey is not fatal to the plaintiff's case. But for the defendant we can distinguish *Keeble*, because in *Young* the water is not owned by the plaintiff, and add that the motive of the defendant was that he too had a living to make. So the issues are identified, but the question remains as to whether we are persuaded (or are able to persuade a judge) that the extra factors in *Young* are sufficient to cause us to reject *Pierson*. What makes one side of the case more persuasive than the other?

Figure 1 shows the situation in the notation described in section 3 above. If, however, we probe deeper into the decisions and find out why the factors used above are relevant, we can come to a clearer view of the matter. The judges who found in favour of the defendant in *Pierson* did so:

> For the sake of certainty, and preserving peace and order in society. If first seeing, starting or pursuing such animals … should afford the basis of actions it would provide a fertile source of quarrels and actions. (Quoted in Berman & Hafner, 1993)

Although one judge dissented in *Pierson* (for him the pursuit and destruction of foxes was sufficiently socially valuable to be encouraged and protected by law), the majority line was clear: this was not the sort of dispute in which the law should concern itself, unless the right to the fox was established beyond all doubt by its actual capture.

In *Keeble* it was held that:

> When decoys have been used in order to take a profit for the owner of the pond and whereby the markets of the nation may be furnished; there is great reason to give encouragement thereunto. (Quoted in Berman & Hafner, 1993)

Here there is sufficient social value (an economic value) to make it worthwhile for the law to intervene. That the plaintiff was making his living makes the opinion that the activity is worthwhile beyond doubt.

When we come to Young with this background we can see that the decision must go for the defendant: the social utility is equal whether *Young* or *Hitchens* take the fish to market, and the land is unowned. To involve the law in such disputes would provide a fertile source of quarrels and actions without compensating social benefits.

Thus we can see that what might have led us to decide *Young* in the same way as *Keeble*, that in both cases the plaintiff was pursuing their livelihood, is not really relevant: the purpose of finding for the plaintiff in *Keeble* is neutralised in *Young* by the fact that the defendant is also pursuing their livelihood.

But note also that *Young* is not strengthened for the defendant by the fact that the plaintiff does not own the land: that is rather a separate argument, because it promotes a separate purpose: moreover it is not clear that ownership of a pond confers ownership of wild animals which temporarily alight on it.

Another case where two factors are both required is shown in Berman & Hafner (1993) in a discussion of Branting's Grebe system (Branting, 1991). Grebe is a system which models industrial compensation law through a semantic network representation of precedents. In Branting (1991) a case (decided for the plaintiff) where a person was injured when collecting iced water for workers at an oil drilling site, was held to support a decision in the favour of a schoolteacher collecting sandwiches for her lunch. Grebe, however, considers the argument weakened because the school is not unduly hot. This is obviously anomalous: the temperature is relevant in the first case because it establishes the operational need for iced water; the temperature of the school is irrelevant to establishing an operational need for sandwiches in the second case.

Understanding the teleology of the decisions thus enables us to steer away from two traps: seeing the common factor of *Young* and *Keeble* (pursuit of livelihood) as relevant when in fact it carries no weight when the defendant is similarly engaged: or as seeing the ownership of the land as important in *Keeble*, when in fact is a separate and rather weak argument.

6. Modelling purpose

In the last section evidence was presented which shows that purposes motivating factors play an important role in reasoning with legal cases. If we represent legal cases in terms of factors which represent reasons for deciding for one side we should also represent the purpose which is promoted by deciding for that side in the presence of that factor. To return to our example, we could see the following purposes as relevant (other formulations are possible, but these will serve here):

- V1: encouragement of economically valuable activity;
- V2: clarity of the law;
- V3: allowing the unfettered enjoyment of property to which one has title.

Now we can say for the factors in the example:

- if A then deciding for the plaintiff promotes V1;
- if B then deciding for the plaintiff promotes V3;
- if B then deciding for the defendant promotes V2 (since it is not clear whether a wild animal being on a person's land confers ownership);
- if C then deciding for the defendant promotes V2;
- if D then deciding for the plaintiff promotes V1;
- if E then deciding for the defendant promotes V3.

This allows us to distinguish cleanly between the case where two factors should be combined in a single argument from where the two factors represent different argument. If two factors promote the same purpose (for example both pursuing

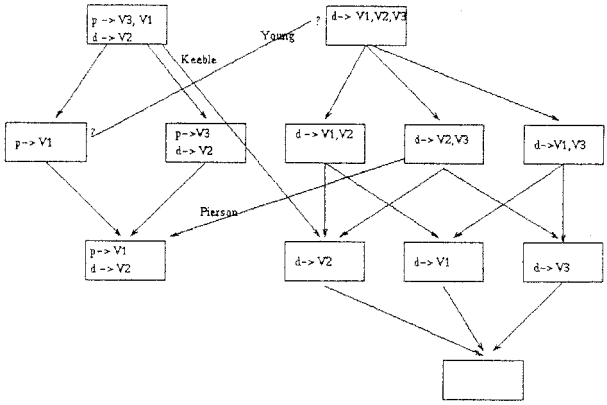

Figure 2. Purpose orientated representation of Pierson, Keeble and Young.

livelihood and having been awarded a medal for some activity would strengthen the argument that the activity is of value), they represent a single argument. If two factors promote different purposes they form separate arguments. Moreover we can now see why two arguments, each individually weaker than some third opposing argument, can be combined to defeat it. While the purpose promoted by the third argument may be valued more highly than either of the other two, the ability to promote two purposes at once may make it worth sacrificing the other purpose.

If we now return to the graph in Figure 1, but replace the factors by the purposes they promote, writing 'deciding for the plaintiff promotes V1' as $p \rightarrow V1$, we get Figure 2. I have included the purposes for the empty node on the plaintiff side in an effort to reflect the dissenting view in *Pierson*: fox hunting is possible of economic value, but holding this for an unpaid activity militates against clear law.

We now explain the reasoning in the cases as follows. In *Pierson*, the decision should go to the defendant because the uncertainty surrounding possession of the animal, and the value of the activity, together with the desire to provide equal rights on common land, were considered (except by the dissenting judge) to outweigh the economic worth of the activity. In *Keeble* there can be no doubt that the activity is valuable, and this value is prized sufficiently to overcome the lack of clarity introduced. In *Young*, V1 points in neither direction: a finding for either side will promote V1. Once we remove the purpose motivating factor A, it becomes clear that the case should be decided on the basis of *Pierson*.

Now, however, we reach this situation. Suppose we have linked our set of factors to the purposes they promote, and have a ranking which accords different weights to various purposes, and combinations of purposes. We can now deduce from these which side should be preferred in a given case. But we criticised accounts such as Prakken & Sartor (1998) for their inability to make other than arbitrary preferences between reasons not revealed in past decisions. Do we not simply move the problem a stage further back, and lay ourselves open to criticism because we cannot rationally defend the preference for one purpose over another? And if this is so, can we be said to be 'completing the theory of demonstration by a theory of argumentation', where the latter is meant

to be different in kind, rather than simply subject matter from the former? Is the ranking of purposes itself a subject of debate?

The answer seems to be 'not explicitly'. Judges are supposed in some way to embody the purposes which society wishes to promote and the preferences between them. As such they tend to act in a rather conservative manner, but are also open to change. Moles (1987) traces a shift in values in a series of cases involving the right to occupancy of a marital home in the context of domestic violence. From an initial position in which the purposes of protection of property were taken as paramount the situation shifts to one where the purposes of providing a violence free home for a woman to bring up her children in given preference. This series of cases generated a great deal of public debate, in which it became clear that the purposes promoted in the earlier decisions were no longer in accord with the public mood. This is often how the value preferences of judges shift.

The significance of this is that the things which are valued—and their relative values are removed from debate. The judges are supposed to have the values of society *as they currently are*, and to reason from this as a foundation. Judges are presumed to change their values as the society they represent changes its values: when they move too slowly public criticism is supposed to prompt the change.

As an aside one can see that this is why the prospect of a computer judge has always attracted such hostility. Applying the law (and the logic of past decisions) is one thing, and could well be done by a machine, but reflecting the values of a community requires that the life of the community be lived. This is an extreme case of the criticism often levelled at judges that their position removes them from the society the values of which they are supposed to reflect.

7. From facts to values: the layers of legal reasoning

We are now ready to turn back to the initial question: do we need to complement a theory of demonstration with a theory of argumentation in order to model legal reasoning?

What we have seen is that decisions are made on particular cases, with a regard to the way past cases were decided (and—importantly—in the knowledge that they will be used to inform the decisions of future cases), so to achieve certain purposes approved by society at large, and deriving from the judge's perception of the purposes. What seems mysterious is the move from facts to verdicts: often it seems that cases which are similar on the facts are treated differently, and that factually quite different cases are held to be similar. The move from facts to verdicts occurs in several stages. First the law evolves a series of distinctions (which are represented as factors in systems such as HYPO). Each distinction is made on the basis of facts in the case, but is not constrained by any common view of the facts. Consider the dog and bear example in section 5. Here the distinction between dogs and non-dogs is not zoological, but based on some perception of the typical properties of dogs which makes it right to classify bears as dogs and chihuahuas as non-dogs. The distinctions are introduced with the following in mind.

- If the distinction can be made in a case it should be a reason for deciding the case in a particular way—the distinction will favour either the plaintiff or the defendant, so that there is some point in making the distinction.

- The distinction should be justifiable in terms of some purposes which we (judges and society) wish to promote: dogs should be excluded to protect the safety, comfort and peace of mind of other passengers.
- The distinction should be capable of application, since the case is meant to stand as a precedent for future decisions.

One task for Artificial Intelligence would be to apply existing distinctions to categorise cases—or even draw new distinctions. No success has been reported here. Successful systems, such as HYPO (Ashley, 1990) and CATO (Aleven, 1997) represent—using the skill and judgement of the system builder—cases using the distinctions before applying their automated techniques. Systems which rely on surface features of the case rather than developed distinctions used from analysis of past decisions seem to perform relatively poorly, as might be expected from the difficulty of automatically classifying cases according to these distinctions. What these systems can do is apply existing law when it determines an outcome (which is rare), or point to the distinctions favourable to each side which would suggest that that side should win. What typically happens is that the case is similar to some cases decided previously but the argument is weaker because some distinctions drawn in the previous case cannot be drawn in the new one. The decision therefore turns on whether the weakening of the argument is sufficient to turn the decision around.

If we want to discriminate between positions which are not determined by the distinctions alone, we need to consider the purposes promoted by the distinctions. Given a ranking on the comparative valuations of the purposes motivating distinctions—which can itself be seen as being revealed in the past decisions—we can deduce which distinction should be held to carry the greater weight.

We thus have an interaction between various levels of consideration: facts; distinctions which can be made on the basis of facts; purposes motivating distinctions; and values attached to purposes. Within a given level demonstration is possible, but the terms that appear there—the distinctions which can made, for example—are justified by reference to their connection to terms at the next level.

8. Conclusions

We began by quoting Perelman's contention that the theory of demonstration needed to be completed by a theory of argument. What our discussion has suggested is that this theory of argumentation perhaps comprises no more than an understanding of the layers that lie between fact and value, and the relationships between them. Against this background a theory of demonstration may still suffice. On this view reasoning with priorities completes the theory: dialectics are concerned with establishing the priorities. But the may be demonstrated from a suitable theory of value. In some comments on this work (Prakken, 2000) Henry Prakken has shown how, by the addition of suitable axioms relating values to rules, an ordering on values, and a way of comparing the values promoted by rules, a formalisation of the situation with the logic of Prakken & Sartor (1998) is possible. Obviously the provision of such axioms will require some considerable work of knowledge representation. Never the less identifying the need for this knowledge, and the way in which it can be used, seems to point the way forward to some interesting and vital research.

Note

1. In fact their formalism is capable of more than this. Indeed they specifically recognise that most on pointness is not the only source of rule priorities.

References

Aleven, V. (1997) *Teaching Case Based Argumentation Through an Example and Models*. PhD Thesis. The University of Pittsburg.

Ashley, K.D. (1990) *Modelling Legal Argument* (Cambridge, MA, Bradford Books).

Bench-Capon, T.J.M. (1999) *Some observations on modelling case based reasoning with formal argument models*. In *Proceedings of the Seventh International Conference on AI and Law*, Oslo.

Berman, D. & Hafner, C. (1993) Representing teleological structure in legal reasoning. In *Proceedings of the Fourth International Conference on AI and Law*, Amsterdam.

Branting, L.K. (1991) Reasoning with portions of precedents, in *Proceedings of the Third International Conference on AI and Law*, Oxford.

Grasso, F., Cawley, A. & Jones, R. (2000) Dialectical argumentation to solve conflicts in advice giving. *International Journal of Human Computer Studies*, 53, pp. 1077–1115.

Kowalski, A. (1989) Case-based reasoning and the deep structure approach to knowledge representation. In *Proceedings of the Third International Conference on AI and Law*. Vancouver.

Moles, R.N. (1987) *Definition and Rule in Legal Theory* (Oxford, Blackwell).

Perelman, C. (1980) *Justice, Law and Argument*, Reidel, (Dordrecht, Reidel)

Perelman, C. & Olbrechts-Tyteca, L. (1969) *The New Rhetoric* (Notre Dame, Notre Dame Press).

Prakken, H. (2000) *An Exercise in Formalising Teleological Reasoning*. Private Communication. Draft of a Paper to be submitted to AI and Law.

Prakken, H. & Sartor, G. (1998) Modelling reasoning with precedents in a formal dialogue game. *Artificial Intelligence and Law*, 2–4, pp. 231–87.

Reed, C. (1999) The role of saliency in generating natural language arguments. In *Proceedings of the sixteenth International Joint Conference on Artificial Intelligence*, Stockholm.

Twining, W. & Miers, D. (1976) *How To Do Things With Rules* (London, Weidenfeld and Nicholson).