

What to Expect from Legal Logic?

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Abstract. This paper argues for a proper position for legal logic in between a general theory of *legal* reasoning and a general theory of *valid* reasoning. In discussion with McCarty it argues that legal logic should not be seen as a general theory of legal reasoning, but rather as a theory of what counts as valid reasoning in the legal field. In discussion with earlier work by Verheij and the author himself, and of Prakken and Sartor, the paper argues that legal logic should employ a conceptual framework that is as close to that of the legal domain as possible. A simpler logic, how attractive as it might seem at first sight, has the disadvantage that it leads to problematic formalizations of the domain theory and to marginalization of the logic as means to evaluate the validity of informal arguments.

1 What Legal *Logic* is not

In his paper *Some Arguments About Legal Arguments*, Thorne McCarty [7] did something which is regrettably seldom done in the publications on Law and Artificial Intelligence. He attacked the work of other authors and thereby made an end to what seemed to be a silent convention, namely that researchers merely continue their own research and only address the work of others to show that they are familiar with the recent literature in their field. Science progresses through criticism (Popper) and overpoliteness does not contribute to such progress. In this paper I intend to continue the polemical spirit in which McCarty so boldly advanced his paper. And which publication would be a more worthy candidate for being the first object of criticism than McCarty's own paper?

In the already mentioned paper, McCarty launched an attack against, amongst others, rule-based theories of legal argument. In fact, he only discusses argument-based approaches, but I suspect that his criticisms would also apply to other rule-based approaches, such as Reason-based Logic, which McCarty seems to have overlooked. The precise nature of McCarty's attack is not easy to determine, since his argument against rule-based theories consists mainly of examples, but I think that the following adequately rephrases his point in the form of an argument.

1. A lawyer who makes an argument before a real judge will use a simple and clear set of rules which favor his client.

2. Arguments as discussed by the authors of rule-based systems are rather complex, featuring for example priorities on rules. Moreover, it is sometimes an issue for discussion between the theoreticians themselves what the outcomes of these arguments should be.
3. Therefore, arguments as they occur in rule-based systems are unlike the arguments that are used by lawyers who argue for real judges.
4. Therefore, rule-based systems are 'wrong'.

The final conclusion of this argument is formulated so vaguely on purpose, because McCarty himself does not really draw a conclusion at all in the section of his paper devoted to rule-based systems. In a later section, under the optimistic heading 'The Correct Theory' McCarty emphasizes that legal reasoning is a form of theory construction. Maybe his criticism of rule-based approaches should therefore be formulated as the objection that these approaches do not address theory construction, and therefore misconstrue the nature of legal reasoning.

Although I agree with McCarty's point that legal reasoning is (to some extent) theory construction, I heartily disagree with his attempt to adduce this observation as an objection to rule-based theories of legal argument. It seems, at least at first sight, that McCarty fell victim to a popular error in thinking about legal logic, namely that legal logic should solve the problems with which a lawyer who has to 'solve' a case, is wrestling. A logic which does not support a lawyer in fulfilling his reasoning tasks would for this reason be defective. Obviously this criticism of legal logic is wrong, because it overlooks that legal logic aims to provide standards for evaluating the logical qualities of legal arguments, and does not pretend to be a tool to solve legal problems. I cannot imagine that McCarty would adhere to this mistaken view of legal logic, but it seems to me that he has overlooked that the rule-based theories of legal argument were intended as logical theories and not as theories about how to solve legal problems. As a consequence, he seems to adduce reasons against theories of legal logic, which would be forceful against theories about legal problem solving.

McCarty might defend himself by pointing out that his criticism is not directed at legal logic as a theory of legal problem solving but, on the contrary, at 'grossly exaggerated, and seriously mistaken' claims about the nature of these legal logics. In fact, he quoted Prakken and Sartor in his paper to support the view that these authors made such claims.

Personally I cannot see that the quotation at issue supports the view that Prakken and Sartor made such wrong claims for their logic. But that is not the main point. Even if Prakken and Sartor would have made such exaggerated claims, this would not be a ground to criticize rule-based theories of legal argument, but only a ground to criticize exaggerated claims for such logics and those who made those claims. The main line of McCarty's 'argument' is directed against the rule-based theories of legal reasoning themselves, however, and not against wrongly made claims about them.

What then about McCarty's point that a lawyer who makes an argument before a real judge will use a simple and clear set of rules and that the arguments dealt with by rule-based systems are often highly complex? It seems to me that this point may be inspired by the common law background of McCarty, where the materials that form the input of legal decision making consist to a large extent of case law which is, in comparison to statutory regulations, little structured. Case law asks for much more reconstruction than statutory law, before it can be applied to new cases. To be convincing, reconstructions need to be relatively simple, given

the constraints on judicial information processing capabilities. That the arguments leading to such reconstructions need not be simple at all, is illustrated by, for instance, the work of Dworkin on constitutional interpretation [1].

Statutory regulations are meant to be applied to concrete cases without additional reconstruction. That it is, at least in theory, always possible to reconstruct statutory law from an interpretation at first sight into an interpretation in the light of all the rest of the law and its underlying values, policies etc. [Peczenik and Hage 2000], does not subtract from this. Working with statutory law in its *prima facie* interpretation sometimes involves the complications dealt with by rule-based theories of legal reasoning and these theories therefore rightly deal with these complications. That doctrinal literature often redescribes statutory law with as one of its purposes to lessen these complications, does not take anything away from this observation, because the reconstructions given in this literature are based on the same complex reasoning patterns that should be used by legal decision makers if the literature had not ‘compiled the complications out’, to use a computational expression.

My critical evaluation of McCarty’s criticism on rule-based theories of legal reasoning can be summarized in two points: First it seems, despite the above-mentioned counterindications, that McCarty unjustly expects from logical theories of legal reasoning that they are tools for legal problem solving, and in this light scorns them for not paying attention to theory construction. And second, McCarty seems to undervalue the role of logic in both legal decision making and theory construction. This may be caused by his background in the common law tradition, where the materials that go into theory construction are less structured than the statutory regulations that are all important in the civil law tradition.

2 What *Legal Logic* should be

It seems that McCarty’s expectancies with regard to legal *logic* are too high, because he expects more from logic than it is meant to do. Arguably some modern theories of legal logic succumb to the opposite mistake by setting their demands on *legal logic* too low. In the rest of this paper I will try to formulate some objections against earlier work by Verheij and myself, and work by Prakken and Sartor. My argument against these logics boils down to it that

1. There are many viable logics, and none of them is a priori better than the others.
2. Which logic is the best, depends on the purpose for which the logic is to be used, including the knowledge domain in question.
3. A logic for a particular domain should use a conceptual framework that is as close as possible to that of the domain in question. Logics that fail in this respect are not useful for testing the validity of arguments.
4. The logics in question do not take sufficient characteristics of the legal domain into account.

Since my argument deals amongst others with philosophical questions about the nature of logic, it pays attention to some elementary logical issues which will be familiar to those who are well acquainted with formal logic and its philosophy. Nevertheless, I feel that even some of those readers might benefit from re-thinking what they already felt to know.

2.1 *The Purpose of Logic*

I will take logic to be a theory that provides standards to evaluate arguments on their logical validity.¹ Modern versions of logic tend to be formal in two senses. The first sense is that they are concerned with the form, rather than the content of arguments, on the assumption that it is the form, not the content which determines whether an argument is valid. The second sense is that modern logics tend to be developed by means of so-called logical languages, which are defined precisely. These languages are called formal, presumably because they use meaningless characters to represent meaningful elements of natural language. In this way, the formal nature (in the first sense) of logical appraisal is emphasized.

Logics tend to provide procedures by means of which the validity of arguments in their formal language can be tested. In propositional logic this procedure consists, for instance, of drawing up a truth table. To evaluate an argument in natural language, the argument must first be formalized, that is, translated into the language of some formal logic. The resulting formal argument can then be tested, and the outcome of this test is applied to the original informal argument.

Regrettably, the exactness with which the quality of formalized arguments can be tested is not available for the translation of the natural language argument into the formal argument. As a consequence, there is some room for gerrymandering. If an intuitively valid argument comes out invalid, or the other way round, this can be interpreted as a reason why the argument was incorrectly formalized. As we will see, there is also room for choosing a logic, where some arguments come out as invalid under one logic, while they come out as valid under another logic. In my opinion this room for choosing a formalization should be minimized, and this leads me, in the end, to the conclusion that the language of logic should be as close *as viable* to the informal language which it is meant to formalize.

2.2 *Logical Form*

A logic should provide tests for the validity of arguments. In theory, a logic might consist of an enumeration of all arguments which it considers to be valid. In practice this is not viable, and therefore logics tend to characterize arguments by means of some abstract properties and these properties are the basis of the evaluation of these arguments as valid or invalid. Traditionally these abstract properties concern what is called the ‘form’ of the argument, and therefore it is the form of an argument, and not its content, that determines whether an argument is valid. For instance, arguments of the form ‘ $p \rightarrow q$, p therefore q ’ are valid, while arguments of the form ‘ $p \rightarrow q$, q , therefore p ’ are invalid.

Attractive as this simple theory about logical validity may seem at first sight, it has the drawback that the notion of logical form is not so clear. Take the following informal argument:

All thieves are punishable
John is a thief
Therefore: John is punishable

¹In this characterisation, I use the word ‘valid’ not in the strict sense of deductive validity, but in the broad sense of ‘good from a logical point of view’, where the standards for goodness remain largely unspecified.

Formalized in propositional logic it has the form:

‘p, q therefore r’ and this form is invalid. The informal argument is therefore classified as invalid under propositional logic. But formalized in predicate logic it becomes

$$\forall x(\text{Thief}(x) \rightarrow \text{Punishable}(x)), \text{Thief}(a), \text{therefore Punishable}(a)$$

and this form is valid.² The same argument that was invalid under propositional logic turns out to be valid under predicate logic. This phenomenon is explained by the fact that predicate logic recognizes more as logical form. In particular it recognizes the universal quantifier as a logical expression, that is as something that determines the logical form of the sentence, while propositional logic does not recognize quantifiers as determiners of logical form.

In general it may be said that a logic is more powerful (stronger) if it recognizes more logical form and abstracts less away as ‘mere content’.³ In this sense modal propositional logic is more powerful than ‘mere’ propositional logic, because it recognizes modal words like ‘necessarily’ and ‘possibly’ as determinative of logical form. Deontic logics are more powerful than their non-deontic counterparts, because they recognize the words ‘ought’ and ‘permitted’ as determining logical form, etc. It depends on the logic what counts as logical form.⁴ It is, for example, possible to develop a logic of love and hate that recognizes the validity of arguments of the form *x*hates *y*, therefore: *x*does not love*y*[14]. An understandable question in this connection is whether it makes sense to develop such a logic.

2.3 From Strong Logic to Weak Logic

To see the importance of the issue how strong a logic is, I will pay special attention to what seem to me to be the strongest and the weakest possible logic. Given my starting point, according to which logic should provide standards for evaluating arguments as to their validity, a logic should ex hypothesi deal with arguments and formulate standards for their validity.

The strongest possible logic consists of a list of all valid arguments. If an argument is taken to be a set of premises and a conclusion, the list should specify for every combination of a set of premises and a conclusion whether the conclusion ‘logically follows from’ the premises in the set.⁵ Every item in the list can be seen as an inference rule of the logic, and this logic has an inference rule for every individual valid argument. This logic is the strongest possible logic, since it recognizes everything as logical form. In fact it does not distinguish between form and content, and nothing of an argument is left out of consideration in determining its validity.

²One might object that the first ‘formalisation’ of the argument is not a proper formalisation at all, because it neglects the logical structure available in the informal argument. This objection misses the point however, the point being that there is no such thing as inherent logical structure, but merely something which we choose to treat as logical structure. The adoption of a particular system of formal logic is implicitly a choice about what we want to recognize as logical structure.

³One can think of different ways to characterize the ‘power’ of a logic. One other characterisation would be in terms of the number of theorems a logic has, another one in terms of the expressiveness of the logical language used. My characterisation should be distinguished from these other ones.

⁴Related themes are explored in [14, 15 and 16].

⁵Since it is not necessarily the case that a conclusion that follows from a set of premises also follows from each superset, this logic need not be monotonic.

The weakest possible logic looks, strange enough, very much like the strongest possible one. This is easily seen if the list that specifies the strongest logic is written down as follows, where $A \dots A''$ represent sets of premises and $p \dots p''$ represent conclusions:

$$A \vdash p, A' \vdash p', A'' \vdash p'', \dots$$

Notice that the items in this list are not sentences of the logical language, but inference rules of the metalanguage in which it is specified which arguments are valid ones.

The weakest possible logic, which is essentially a stripped down version of propositional logic, only recognizes arguments of the form ' $P \rightarrow q$, P , therefore q ' as valid, where P stands for (the truth of) a set of sentences. For every argument of the list above, an additional premise would be needed to be valid under this weak logic:

$$A \rightarrow p, A' \rightarrow p', A'' \rightarrow p'', \dots$$

As is clear from this example, the additional premise specifies by means of (the truth of) a sentence of the object language that the argument from the rest of the premises to the conclusion is valid. The inference rules of the strongest possible logic are replaced by object language sentences, but otherwise the logics are very much alike.

Nevertheless there is an important difference between the logics, because the strongest logic recognizes everything as logical form, while the weakest logic hardly recognizes any logical form. In the weakest logic every valid argument must contain a premise of the form $P \rightarrow q$, in order to specify that the conclusion q follows from the other premises of the argument. In other words, all valid arguments have the 'validity' of the argument as one of their premises.⁶ There is hardly a task left over for the logic, because the validity of the argument comes down to the truth of the premise that declares the argument to be valid.

2.4 Pragmatism and the Choice of a Logic

The strongest possible logic is impracticable, because it presupposes an exhaustive list of all valid arguments. The weakest possible logic is almost useless, because it leaves the judgment on the validity of an argument to one of the premises of the argument. Any realistic logic should be somewhere in between these extremes. However, there appears to be no hard and fast standard to determine where precisely one should be in between these extremes. Apparently there is no such thing as THE logic. There are merely many different logics, and it is a matter of choice which one would like to use.

There is a trade-off here. The weaker a logic is, the simpler it tends to be, and simplicity is often considered to be a virtue in science (and in real life law, if we may believe McCarty). We have already seen, however, that too much weakness goes at the cost of usefulness. Stronger logics are more useful to test arguments for their validity, but they tend to be more complex. Given this trade-off, I therefore propose to use those logics (it is improbable that there is only one) which are most suited for the domain (and within the domain: the reasoning task) in question.

⁶The word 'validity' is placed between quotes, because it is not exactly the validity of the argument that is stated in the premise, but rather the truth of a conditional sentence that corresponds to the validity of the argument.

In my opinion a logic should be adapted to the way in which the domain to which it is applied, is conceptualized. To be more specific, a logic for the use in legal reasoning systems should exhibit *as many as possible* characteristics of the legal domain *that are relevant for the validity of legal reasoning* as logical form. And if it turns out that for reasoning purposes it is useful to distinguish more than one legal domain, the logic should exhibit as many as possible characteristics of the subdomain in question. In the following two subsections I will give two examples of logics that in my opinion exhibit too little of the structure of the domain that they attempt to capture.

2.5 Rules and Principles in Reason-based Logic

Let me start with what I now regard as a mistake of my own. In our work on Reason-based Logic of about 1995 [3, 12, 13], Verheij and I defended an integrated view on rules and principles. That is, we took principles as logical primitives and expressed rules in terms of them.

Our argument was basically as follows. Legal principles have the structure of conditionals. They differ from traditional conditionals in two ways. First, if their condition part is satisfied, this does not allow the derivation of the conclusion, but merely the derivation of a reason for the conclusion. Whether the conclusion follows depends on all reasons pro and con this conclusion. In short the application of a principle merely contributes to the derivation of a conclusion. Principles should therefore never be considered on their own, but always in combination with other reasons, or generators of reasons.

Second, principles differ from traditional conditionals in that their operation can be shut out. If there is an exception to a principle, the fact that the condition part of the principle is satisfied does not make the principle generate a reason for its conclusion anymore.

Legal rules seem to be different from principles in that their application guarantees their conclusions. So, where principles only generate reasons which must be considered in combination with possible other reasons, rules guarantee their conclusions when they are applied.

In the work mentioned at the beginning of this section, Verheij and I simulated the operation of legal rules, by treating them as principles which not only provided reasons for their conclusions, but also created exceptions to (almost) all competing principles. If a principle generates exceptions to its competitors, the reason for its conclusion has no competition anymore. So, even though this reason should in principle be balanced against other reasons, these other reasons are in fact absent. The effect of this is that the single reason based upon the principle determines the conclusion on its own, and this is very similar to the operation of a legal rule that guarantees its conclusion. On this analysis, legal rules are principles which block the operation of all competing principles.

This approach has the advantage of a simpler logic, because it is not necessary anymore to distinguish both principles and rules in the logical language. Moreover, it opens the way for a gradual transition between principles and rules, by considering principles that shut out the operation of more and more of their competitors. It has the disadvantage that the logical behavior of legal rules is not part of the logic anymore, but must be simulated by adding to the premises of rule-based arguments that the principle that takes the logical role of the rule must make exceptions to all competing principles. Presently I would consider this as a reason

against the *legal* logic which makes such a simulation necessary. In *Reasoning with Rules* [4], I therefore proposed a version of Reason-based Logic in which rules and principles are given different logical characteristics.⁷

2.6 Misrepresenting the Weighing of Reasons as Rule-based Arguments

As my second example of a theory that buys logical simplicity at the cost of misrepresenting the legal domain I will take the system popularized by Prakken and Sartor [e.g. 9]. I will call this system PS-logic. I expect that most readers are sufficiently familiar with it to make extensive exposition superfluous.

An argument in PS logic is a sequence of instantiated rules, where the rules are chained by their conclusions and conditions. Arguments can attack each other. One argument is for instance said to *rebut* another argument if the conclusions of the two arguments are complementary. In case of two arguments which rebut each other, the *stronger* argument of the two defeats the other one. Which argument is the stronger is determined by priority relations over the rules on which the arguments are based.

The idea of arguments that attack each other is quite alien to the legal domain, especially in the civil law areas, which rather deals with rules, principles, rights, values and exceptions. Whether somebody has a right, or is liable to be punished, ideally depends on the facts of the case and the law in question, and not on the arguments which lawyers might make to support the conclusions that such a right or liability exists. That reality is in this respect less than ideal, and that arguments can influence the outcome of legal cases does not show that the law is about arguments, but rather that our *views about the law* can be *influenced* by arguments. It is important to recognize that the questions what the law is and what we are justified to believe that the law is are, at least in principle, very different.⁸

This does not imply that PS logic is useless in connection with legal arguments. As Prakken and Sartor have shown frequently, the contrary is true. With some ingenuity it is possible to translate many different kinds of legal arguments into the conceptual framework of PS logic. My point here is that this translation is sometimes quite counterintuitive, as a consequence of the difference in conceptual framework employed by the law and PS logic. Since I do not have much space here, I will illustrate my point with a single example⁹:

A case exhibits three factors, say a, b, and c. The factors a and b plead for decision D, while c pleads for decision $\neg D$. Let us assume that the factors a and b are individually outweighed by c, but that together they outweigh c. Since all three factors are available in our example case, the solution is simple: decision D is the appropriate one.

⁷Reconsidering this issue again, about a year after writing the first version of this paper, I would say that the hybrid construction of our early work has some advantages that make it worthwhile to maintain the construction. It should not be used as an alternative for the logical representation of rules, however. In this respect I stick to the criticism ventilated in this paper.

⁸There is still a complication here, which was emphasized in [2, 6, and 8]. Because the law is an open system, the distinction between what the law is, and between what the best theory of the law says the law is, is not so sharp, to say the least. As a consequence legal arguments *that are actually adduced* (and not merely the possible ones on the basis of a set of premises; see [5]) can change the law, and thereby determine what the law *is*.

⁹The example has on purpose some similarity with the arguments discussed in [11]. Another example concerning oversimplification in PS-logic would be that (legal) rules are represented as sentences of the object language. See [14] for - in my opinion well-founded - criticism on this approach.

How should this be formalized in PS-logic? First the factors must be translated in to instantiated rules:

$$a \rightarrow D, b \rightarrow D, c \rightarrow \neg D.$$

Second priorities should be assigned to these instantiated rules:

$$c \rightarrow \neg D > a \rightarrow D$$

$$c \rightarrow \neg D > b \rightarrow D$$

Unhappily, given these priorities, the argument based on the rule $c \rightarrow \neg D$ defeats the arguments based on the rules $a \rightarrow D$ and $b \rightarrow D$, and the seeming conclusion should be that $\neg D$. Because the factors a and b together outweigh c , this is undesirable, and to avoid this undesirable conclusion, a new rule must be introduced, namely the rule $(a \ \& \ b) \rightarrow D$. This rule has priority over the rule $c \rightarrow \neg D$, and this solves the logical problem.

However, this solution introduces a conceptual problem, because the legal problem as stated originally did not mention the new rule at all. In fact it did not mention rules at all, only factors. Because of the universalizability of factors, the step from factors to rules has something to be said for it. But universalization from sets of factors to rules with compound conditions is a far cry from what happens in legal thinking. This step is a purely artificial one, only defensible because of the need to obtain the correct logical result. It is only necessary because PS-logic works with rules, rather than factors or reasons, and therefore needs a separate rule for every set of reasons. Again we see that the lack of logical power must be compensated for by introducing additional premises which seem to have no counterpart in the original domain theory.

The same point can be made in a slightly different way, namely by observing that if a logic is too weak, the validity of an argument must be coded into its (hidden) premises. Intuitively if the two factors a and b are both present, the decision should be D , even in the presence of factor c . Although the original theory does not contain a premise that would make the necessary derivation of the conclusion D possible, the desirability of this conclusion ‘shows’ that the premises

$$(a \ \& \ b) \rightarrow D, \text{ and}$$

$$(a \ \& \ b) \rightarrow D > c \rightarrow \neg D$$

‘must’ be true and can therefore be added to the premises of the argument. This is a perfect example of the point made in section 2.3 that premises often are nothing else than coding an argument’s intuitive validity into the premises of the argument. Unnecessary to say that the possibility to do this makes the logic almost useless as a test for the argument’s validity.

The ‘poor’ conceptualization of the legal domain in PS-logic, which has no place for the weighing of reasons, makes this logic relatively simple and maybe therefore attractive at first sight. But the gain in simplicity goes at the cost of more difficult formalization and the introduction of unnatural premises, as was illustrated by the example above. Obviously, one example is not sufficient to reject PS-logic. However, in my opinion, this example illustrates a fundamental point, namely that if a logic for a domain does not use the conceptualization of

the domain itself, the gain in logical simplicity must be bought at the cost of more complex and often unnatural formalizations of the domain knowledge. The disadvantage of this becomes clear from the above example, in which the formalization of the argument is adapted to make the formalized argument logically valid, as the informal argument intuitively seems to be.

3 What to Expect from Legal Logic?

In the above sections I developed two lines of thought that I want to tie together as a partial answer to the question what to expect from legal logic. First I argued that we should not expect from legal logic that it is a full theory of legal problem solving. It is merely a theory of valid legal reasoning in a broad sense. Such a theory is relevant for legal problem solving because legal problem solving involves legal reasoning. But the ability to reason validly is not sufficient to solve legal problems. Theories of legal logic can and should not be blamed for that, however.

Our expectations from legal logic should not be exaggerated, but they should not be too modest either. There are many viable systems of logic, and from a theory of legal logic we should expect more than that it is merely possible to express legal reasoning by means of it. For that last purpose a stripped down version of propositional logic suffices, as we have seen above. This brings me to the second argument line, to the effect that a logic that is meant to deal with legal reasoning should use a conceptual framework that resembles as much as possible that of the legal domain. The temptation to use a simpler logic should be resisted, because the simplicity of the logic is bought at the cost of more difficult and unnatural formalization of domain theories. Moreover, the translation of informal arguments into the language of the logic asks for more ‘creativity’ of the translator. It is tempting to use this creativity to ensure that intuitively valid arguments come out valid on the translation, and that intuitively invalid arguments come out invalid. But then the logic has lost much of its use, because the verdict on the validity of the informal argument lies with the translator, and not with the logic.

So, what should we expect from legal logic? Not a general theory for legal problem solving, but tools that facilitate the logical evaluation of *informal* legal arguments and that seek, for this purpose to adopt as much as possible the conceptual framework of real legal reasoning. The study of legal logic should start with the law, and not with formal logic [7]. The central question should not be how we can use logical tools for the evaluation of legal arguments [cf. 10], but how we can cast the forms of valid legal reasoning into a logical system. We should take the law as the starting point for our research on legal logic, and not already existing systems of non-legal logic.

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References

- [1] Dworkin, R. (1996). *Freedom's law. The moral reading of the American Constitution*. Harvard University Press, Cambridge.
- [2] Hage, J.C., R. Leenes, and A. Lodder (1994). Hard cases; a procedural approach. *Artificial Intelligence and Law*, vol. 2, pp. 113-167.
- [3] Hage, J.C. (1996). A Model of Legal Reasoning and a Logic to Match. *Artificial Intelligence and Law* **4**, nos. 3-4 (1996), pp. 199-273. Also in H. Prakken and G. Sartor (eds.), *Logical Models of Legal Argumentation*, Kluwer Academic Publishers, Dordrecht, pp. 43-117.
- [4] Hage, J.C. (1997). *Reasoning with rules*, Kluwer Academic Publishers, Dordrecht.
- [5] Hage J.C. (2000). Dialectical Models in Artificial Intelligence and Law. *Artificial Intelligence and Law* **8**, (2000), p. 137-172.
- [6] Lodder A. (1999). *DiaLaw. On Legal Justification and Dialogical Models of Argumentation*. Kluwer, Dordrecht.
- [7] McCarty, L.T. (1997) Some Arguments about Legal Arguments. *Proceedings of the Sixth International Conference on Artificial Intelligence and Law*, ACM, New York, 1997, pp. 215-224.
- [8] Peczenik, A. and J.C. Hage (2000). Legal Knowledge about What?, *Ratio Juris* **13**, no. 3, p. 326-345.
- [9] Prakken, H. and G. Sartor (1996). A Dialectical Model of Assessing Conflicting Arguments in Legal Reasoning. *Artificial Intelligence and Law*, **4** no. 3/4. pp. 331-368. Also in H. Prakken and G. Sartor (eds.), *Logical Models of Legal Argumentation*. Kluwer Academic Publishers, Dordrecht 1997.
- [10] Prakken, H. (1997). *Logical tools for modeling legal argument, A Study of Defeasible Reasoning in Law*, Kluwer, Dordrecht.
- [11] Prakken, H. (2000), An exercise in formalizing teleological case-based reasoning (extended abstract). J. Breuker e.a (eds.) *Proceedings of the Thirteenth Jurix Conference*. IOS Press, Amsterdam, p. 49-58.
- [12] Verheij, Bart (1996). *Rules, Reasons, Arguments. Formal studies of argumentation and defeat*. Thesis Maastricht University.
- [13] Verheij, H.B., J.C. Hage and H.J. van den Herik (1998). An integrated view of rules and principles. *Artificial Intelligence and Law* **6**, no. 1, p. 3-26.
- [14] Verheij, Bart (1999). Logic, Context, and Valid Inference. Or: Can there be a Logic of Law? In H.J. van den Herik (ed.), *Proceedings of the Twelfth Jurix Conference*, GNI, Nijmegen, p. 109-121.
- [15] R.P. Loui, Ampliative Inference, Computation and Dialectic, in R. Cummins and J. Pollock (eds.), *Philosophy and AI. Essays at the interface*. MIT Press, Cambridge 1991.
- [16] R.P. Loui, How a formal theory of rationality can be normative. *Journal of Philosophy* **90** (1993), p. 137-143.