# Legal logic? Or can we do without?[*]

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**Abstract.** In this paper the thesis is argued that there is no need for a special legal logic to deal with the defeasibility of legal arguments. An important argument for this thesis is that legal judgements ask for a complete justification and that such a complete justification requires a deductively valid argument.

## 1. Introduction

Since 1951 we know a branch of logic which is of special interest to logicians who are interested in normative (legal, moral) reasoning and to lawyers and ethicians who are interested in logic: deontic logic, which studies normative argument.[1] Deontic operators (obligation, prohibition, permission) are formally reconstructed, meaning that they are defined within a formal system. The ideal is that the relations between them are completely and reliably formulated in the system. Axioms and rules of inference are also part of their meaning. It is standard to use the capitals O, P and F for obligation, permission and prohibition respectively. If we use O as a primitive deontic operator the definition of the other ones are:

Df. 1 $\quad Pp = \sim O \sim p,$
Df. 2 $\quad Fp = O \sim p.$

Standard axioms are:

Ax. 1 $\quad O(p \ \& \ q) \equiv Op \ \& \ Oq,$
Ax. 2 $\quad \sim (Op \ \& \ O \sim p),$
Ax. 3 $\quad O(p \ v \sim p).$[2]

As a formal system, however, this deontic system is only a game of symbols. As long as we are within the formal system, the reference to the deontic operators may be put between parentheses. We do not need to know that O refers to obligation for the deduction of O(pvq) from Op.

Douglas Hofstadter has made a system with no intended application at all: the MIU-system (Hofstadter 1980, p. 33 ff.). It has a definition of well formed strings: any sequence of the letters M, I and U. There is one axiom: MI. And there are a number of rules to infer new strings from strings we already have in our possession: (1) If we have xI we may infer xIU, (2) If we have Mx we may infer Mxx, (3) If we have xIIIy, we may infer xUy and (4) If we have xUUy, we may infer xy (x and y are, of course, variables for (parts of) strings). Now we can infer lots of formulas, starting with MI: MII, MIIII, MUI, MUIU, MUIUUIU, MUIIU, and so on. What is the meaning of this formal system? The answer is: as long as we have no intended application it has no other meaning than the meaning which is syntactically (formally) defined in the system.

Logical systems usually have intended applications. They are meant to reconstruct arguments and test their validity. We use them to investigate formal characteristics of crucial concepts.[3] They can be meant more in particular to reconstruct and test a specific kind of arguments and investigate concepts which are crucial in this specific kind of arguments. Deontic logic presents an example. In this case we construct the logical system such that it suitably reconstructs normative argument. We use it to investigate the deontic operators. But as a formal system the system is not dependent from this application. If it somehow leads to paradoxes (as standard deontic logic does according to a number of authors), then one cannot conclude that the system as such has a defect. As a formal system it remains the formal system it was: we still can infer formulas from formulas, according to the rules of the system. The only conclusion is that the system appears to be not as apt for the reconstruction of this particular kind of arguments as we thought it to be.

Modern logic knows a proliferation of formal systems. We have proposition logic and predicate logic, we have modal logic and (inspired by it) deontic logic, we have the traditional two-valued systems, but we also have three-valued, four-valued and other many-valued systems, we have mono-tonic logic and non-monotonic logic. The question which system is or which systems are the right one(s) is nonsensical. As long as they are consistent, they are all 'right ones' – and one may even doubt the necessity of this requirement of consistency. Most of these systems have their intended applications. The only serious question for the valuation of formal systems is: how useful they are for the analysis in their intended field of application.

Two possible alternatives to formal deductive logic have been developed: so called informal logic (in a legal context also: legal logic) and non-monotonic logic. In this paper, I want to discuss whether these two approaches, important as they may be, can really be seen as alternatives to formal deductive (monotonic) logic. Informal and, to a lesser degree, non-monotonic logic are considered as field dependent. So we can summarize my question: do we need a legal logic? Or can we do without?[4]

## 2. The question illustrated

I start with a few memories. In 1981 a small conference took place in Amsterdam, where logicians and legal philosophers came together. The topic was the meaning of logic for the law and for legal reasoning. One of the invited spakers was Chaïm Perelman. I had the honour of being one of the other invited speakers.

Earlier that year I had defended a thesis on logic and law.[5] In that thesis I had criticised Perelman's view on logic and law. Perelman had argued, in many publications, that formal, deductive logic was not useful for the law; the law needed informal, legal logic. Deductive logic, in his view, was compelling. Deductive logic could be important for mathematics. But legal arguments usually are not compelling at all: their conclusions are made plausible for an audience.

I disagreed with this view. I believed, as I still do, that deductive logic is essential for the justification of conclusions. I had explained my view in my thesis and I thought that, speaking on a conference where Perelman was present as well, was a good opportunity to inform Perelman about my objections to his theory.

The result was disappointing, in a way. Perelman said that he completely agreed with me. That was the end of the discussion. Not long after that conferene Perelman died, so there was no possibility for a new attempt to start the discussion.

Second memory. A few years later I presented a paper, again on logic and law, for Dutch philosophers. I explained that in deductive logic a conclusion can be deduced from a set of premises if and only if the conclusion necessarily is true if the premises are true. This is, of course, trivial. But three or four members from the audience protested vehemently: how could I say that a conclusion ever is necessarily true. More in particular, how could I say such a silly thing in the context of legal conclusions.

Last memory. About 5 years ago I, again, presented a paper. This time it was on a Dutch conference on legal argumentation and my topic was legal reasoning. I remarked, in passing, that there was no specific legal logic. Later that day a young Dutch colleague, whom I much appreciate for his intelligence, asked me how I could say such a remarkable thing.

During the 1980s of the last century I thought that the view that formal deductive logic is essential for the justification of conclusions and that this formal deductive logic is field independent had become dominant. Perelman could not give an answer to criticism on his view, and, moreover, he had passed away. Only some backward philosophers, who did not know anything about logic, represented by my second memory, still had other views, but their views clearly were founded on misunderstandings. But the third memory illustrates how wrong I was. To the end of the 1980s, the picture

changed already. I learned from Henry Prakken's Ph.D. Research (1997) about non-monotonic logic. Non-monotonic logic was not an informal or material logic. But it also was not deductive. Prakken did not present non-monotonic logic as a better alternative for monotonic logic. He presented it as essential for the development of legal expert systems: in AI and law we needed a logic which could handle inconsistencies and which could justify conclusions in a defeasible way.

I had my doubts. Not, of course on the quality of Prakken's work. Nor on the importance of non-monotonic logic for AI and law. But I had my doubts about defeasible justification. Could a defeasible justication be a justification at all ? I could easily place non-monotonic logic in the context of discovery. But in the context of justification ?

But when I thought that non-monotonic logic belonged to the context of discovery Prakken protested: in his view non-monotonic logic also justifies conclusions, but in a weaker sense of justification. There seemed to be a disagreement which was not only terminological.

## 3. Non-formal logic

I have argued already im my thesis that non-formal logic is not an alternative to formal logic. All argument, I said, is open to formal analysis, but also to a non-formal approach. The first one studies the validity of the argument, the second one the acceptability of (some of) its premises, including the implicit premises which might figure in the argument. But, as subject matter and methods used by these two different approaches are quite different, it is only embarrassing to collect them under the one concept of logic (Soeteman 1989, p. 10f.).

I was concerned because of the non-formal approach of authors like Perelman (Perelman and Olbrechts-Tyteca 1958; Perelman 1963, 1970). Perelman opposed non-formal logic to formal logic, saying that formal logic is about deductive and compelling arguments, while non-formal logic was about arguments which are, at best, convincing. As he also and rightly believed that in law most arguments are contestable and at best convincing, the implication of his approach is that formal logic only has a very limited relevance for legal reasoning. The consequence of this view is that the acceptability of legal argument is made dependent on associations, on analogies which as a matter of fact are convincing for an audience, on commonplaces, and so on. This allows empirical research of legal reasoning (which types of arguments are generally accepted, and so on), but it prevents rational analysis of legal reasoning. Perelman reduced justification to the question whether an audience, or an audience of reasonable persons, accepted the conclusion. But if I am a reasonable person in the audience, my question is not whether I happen to accept the conclusion, but whether the

audience, including me, should accept the conclusion, given the arguments presented.

Jaap Hage recently has formulated my argument against a merely informal analysis of legal argument as follows: "Either such an argument can be made formally valid by adding an acceptable premise to it, or it cannot. If it can be made valid, the best thing to do is to add this acceptable premise and remain satisfied with the resulting validity according to formal logic. If the argument cannot be made formally valid by adding an acceptable premise, it should be discarded as an invalid argument" (Hage 2001). I would never say that one (who?) should add an acceptable premise, but only that it should be taken into consideration if one wants to study the logical validity of the argument. But apart from this minor point Hage's summary is correct.

Hage is kind enough to qualify my argument as powerful. But he goes on to say that my argument presupposes a distinction between form and content, which with respect to arguments in ordinary language is much less clear than is suggested (Hage 2001, p. 355). "Logical form is not something that is given with an argument … On beforehand there is no objection against taking elements from the legal domain and incorporating them in a special legal logic, which recognises more logical form than, for instance, predicate logic" (Hage 2001, p. 356).

I completely agree with Hage's remarks on form and content. There is no sharp and given distinction. Content can be formalised whenever we want to do so. But I fail to see why this possibility of formal analysis would be an argument against my objections to a merely informal analysis.

As far as Hage wants to say that formal logical systems can be developed which have as their intended field of application legal arguments, he also is right. It could be possible, e.g., to develop some formal characteristics of legal concepts, as *tort* or *property* or *agreement* and to construct formal systems elaborating these concepts. Whether one wants to name such a system a *legal logic* is a matter of terminology. As one can never exclude the possibility that the system, as a formal system, can appear to have other applications then the intended one, this terminology could give a wrong suggestion. But I have to admit that comparable considerations do not prevent us from calling the logic which analyses deontic operators a deontic logic.

Hage also objects that my argument against informal logic can be adduced against predicate logic as well. Take the example (from Hage):

(1)  All thieves are punishable,
     John is a thief,
     Therefore: John is punishable.

This is not a valid argument according to propositional logic: P, Q, therefore R is not a valid scheme. It is, however, valid according to predicate logic:

(x) (thief(x) ⊃ punishable(x)), thief(John), therefore: punishable(John) is a valid scheme. But we could make the propositional scheme valid as well, Hage argues following my argument, by adding an implicit premise: (P&Q) ⊃ R. Hage concludes that my argument should imply that predicate logic is superfluous next to propositional logic (Hage 2001, p. 356). But this, surely, is a mistake. I agree that everyone who accepts the validity of (1) should accept the truth of (P&Q) ⊃ R.[6] But its truth is dependent on its content. If, however, we use predicate logic, we may reformulate (P&Q) ⊃ R as: ((x) (thief(x) ⊃ punishable(x)) & thief(John)) ⊃ punishable(John), which is true because of its form. This proves that (1) is logically valid according to predicate logic, even without adding an implicit premise. Predicate logic is a more powerful logical system, which gives us the opportunity to discover logical validity in arguments which, as such (without addition of other premises which might be false) cannot be discovered with only propositional logic.

As far as Hage interprets my argument as an argument against more specific logical systems, he misinterprets it. My argument was only directed against the use of non-formal 'logics' as alternative for formal logical analysis.

## 4. The point of deductive analysis

I am afraid, however, that the difference of opinion goes deeper. My argument is an argument for formal analysis of legal reasoning. The deeper reason for this formal analysis is that (legal) arguments should be reconstructed as deductively valid. I am afraid that Hage's objection is not so much about formality, but much more about deduction. He will agree that deductive validity is dependent from formal properties of the argument. But, he will argue, in law many arguments are not deductive at all. Very often, there are *contributive* reasons for a conclusion, which are in no way *decisive* reasons. Contributive reasons might be defeated. Legal logic is developed or has to be developed to formalise legal, i.e., defeasible reasoning.

Let me first explain why I believe deductive analysis of legal argument to be important. The reason is: as long as an argument is not reconstructed as deductively valid an alternative conclusion is still possible, even if one accepts all the premises of the argument, and the conclusion therefore is not completely justified. There is much more legal argument than judicial argument only, but for judicial argument it is of the greatest importance that conclusions are warranted: individuals are sent to jail or are condemned to pay huge amounts of money. Also many other important decisions are taken for them by judges. In many other legal arguments the stakes are not that high, but it still is important, that if one gives an argument to justify a conclusion one indeed justifies the conclusion.[7]

It is clear that in daily practice most arguments do not have a deductive form. It is even questionable what can be meant with 'deductive form' as applied to arguments in ordinary language. But it is also clear that a serious argument tries to justify its conclusion. An argument has the general form:

(2) P1, P2, ..., Pn,
 Therefore: C.

A complete justification of the conclusion C requires that C follows deductively from the set of premises {P1, P2, ..., Pn}. Formal logic studies under which conditions such is the case. It therefore has to interpret the argument and to translate it into some formal system. If (2) is not valid according to some formal system, it is always possible (from a formal point of view) to guarantee its validity by adding an additional premise, i.e. the logical minimum $Pn + 1$: $(P1 \& P2 \& \cdots \& Pn) \supset C$.

Every argument can be reconstructed as logically valid in this way. The point of this is modest, but essential. In general, the proponent of an argument is committed to the premises of the logical reconstruction of the argument. The opponent who disagrees with the conclusion has to disagree with at least one of the premises: (s)he may select the premise or premises to attack. If, however, an argument is not reconstructed as deductively valid, there are hidden commitments with the proponent. Again, the opponent might disagree with the conclusion, but now even without disagreeing with any of the premises.[8] Making implicit commitments explicit, at least in reconstruction, has dialogical advantages.

## 5. Monotonic and non-monotonic reasoning

In almost every introduction to logic one can read that logic is about the study of valid argument. The traditional logical interpretation of validity is as follows. An argument is valid if and only if the conclusion necessarily follows from its premises, i.e., if and only if a world where the premises are true and the conclusion is false is not possible. From 'all human beings are mortal' it follows that 'the human being Socrates is mortal' if it is not possible that in some world as a matter of fact all human beings are mortal, but not the human being Socrates.

This logical validity is monotonic: if we add new premises to a valid argument, the argument remains valid. This is necessarily the case. The class of all worlds in which all the original premises and the added premises are true is a subclass of (or equal to) the class of all worlds in which all the original premises are true. If the conclusion is true in all the worlds of the bigger class, it is also true in all worlds of its subclass.

But the daily practice of arguing is different. If I phone my wife that I am in the plane which departed from London Heathrow to Schiphol Amsterdam at 8 p.m. (Dutch time), she may rightly conclude that I am expected home at about 10 p.m. But added information might make this conclusion completely unwarranted. It is possible that it turns out that for some reason my plane has to be diverted to Brussels. Or that because of an accident with Dutch railway my travelling time from Schiphol airport to my home is lengthened considerably.

We have the same experience within the law. In Dutch law, when the marriage between two persons ends (either by a divorce or by death of one of the partners) usually their joint property should be divided in two equal parts: each of the partners (or her/his heirs) will receive half of it. But what if a poor, young (38) homosexual nurse marries an old, ill but very wealthy lady and murders her within a few weeks?[9] A legal norm could be given the general structure: *if p, then q should (may) be done*. But even if the fact p is established, it may be too hasty to conclude that q should (may) be done. In many cases legal rules are open to exceptions. Moreover, the class of exceptions is open: we are not able to present an exhaustive set of all the possible exceptions. In every new case, particular circumstances might appear, which possibly justify an exception.

Another problem with traditional logic, which I will only mention in passing in this essay, is the possibility of inconsistencies within a legal system. Positive legal systems are man-made. They are not perfect. Unfortunately, it is possible that they show contradictions. Legal methods have been developed to cope with these difficulties. We have priority rules (lex posterior derogat legi priori, lex specialis derogat legi generalis); we interpret the inconsistencies away as soon as we find them. But in monotonic logic we can deduce whatever we want from an inconsistent set of premises. Monotonic logic presupposes that an inconsistent set of premises cannot be true. Therefore, trivially, in all the worlds where this set is true (i.e., none), the conclusion, whatever this may be, is true: ex falso sequitur quodlibet. Such observations have stimulated the development of non-monotonic logical systems (Prakken 1997). In a non-monotonic logic an argument may be valid, although added information could make the argument invalid. In non-monotonic logic some inconsistency in positive law does not lead to a total collapse of the legal system: it is tried to formalise priority rules, as mentioned in the last paragraph.

I believe that modern non-monotonic logic in law is partly a revival of the ideas of Ch.Perelman, and also S. Toulmin (1958), who always stressed what is now called the defeasibility of legal argument.[10] Just as I believed when writing my book *Logic in Law* that Perelman and Toulmin said interesting things about legal reasoning, I believe now that non-monotonic logicians give interesting analyses. They are even better, because they use the tools of modern formal logic, which Perelman and Toulmin did not.

Perelman and Toulmin often formulated their views in opposition to formal, deductive logic, which created a false contrast. The formal aspects of legal reasoning are not an issue today. But some adherents of non-monotonic legal logic seem to consider deductive validity as little relevant as Perelman and Toulmin did. The question now is: is legal reasoning non-monotonic, should we need a specific legal non-monotonic logic and which is its relation to monotonic logic?

## 6. Defeasible beliefs

It is clear that all our knowledge, including knowledge about positive law and about facts which are relevant for law application, is defeasible. Beliefs may be justified, but nevertheless turn out to be wrong. Let us take the example of my plane from London to Amsterdam. When my wife first thought that I could be home about 10 p.m. she was wrong. Added information about the diversion of my plane to Brussels exposed the mistake. The argument was:

(3) The plane of my husband departed from London at 8 p.m.,
Therefore: my husband will be at home at about 10 p.m.

To reconstruct the argument as logically valid we have to add the premise: If the plane of my husband departed from London at 8 p.m. then he will be at home at about 10 p.m. This was exactly the additional premise my wife was prepared to accept. She knew from her experience that this additional premise usually is true. She also knows, of course, that in exceptional circumstances it might turn out to be false. But as all other human beings, my wife uses the normality hypothesis: if no information to the contrary is available we suppose that events have their usual course.

One might call (3) an example of defeasible reasoning. But as (3) is formulated it simply is not valid. The premise is a reason to accept the conclusion only if the logical minimum is accepted. The most simple explanation why this logical minimum more often than not remains implicit is that it is so obvious: in normal circumstances it is true.

The same applies to the law. Let us suppose a rule

(4) If p then Oq.

Many rules are open to exceptions. There are general exceptions like force majeure and self-defence. And there may be special exceptions to special rules. It is also usual that in positive law many exceptions are not formulated in the rules themselves (as part of 'p' in (4)), but in some other statute or in another provision of the same statute. The condition of normality implies

that we presume that no exception applies as long as we have no specific reason to the contrary. A claimant who argues for Oq only has to argue for p: in normal circumstances that will be enough to conclude Oq. Additional information, however, may block this conclusion. In a judicial process this additional information often has to be put forward by the defendant, who has the burden of proof of the exception.

There seems a logical difference with (3). Unlike (3)

(5)  If p then Oq,
     p,
     Therefore: Oq,

seems logically valid.

It is logically valid only, however, if we interpret 'if … then…' as a material implication (or a stronger connective). But in that interpretation, 'if p then Oq' is, given the existence of exceptions, clearly not a valid legal norm. We should give a weaker interpretation to (4): we should interpret it as a prima facie rule, meaning that in usual cases of p, if no exception applies, it follows that Oq. If we interpret (4) in this way, (5) is not logically valid. To interpret it as a valid scheme, we have to add the logical minimum (if p then Oq and p, then Oq), which we can do under conditions of normality.

As far as we look into these defeasible beliefs, we may develop a non-monotonic logic. It might be that such a non-monotonic logic is better for the development of legal expert systems.[11] Or it might be wise for other reasons to develop a logic which is more close to the daily practice, by not bothering about exceptions as long as there is no reason to believe that they are present. But such a non-monotonic logic cannot replace deductive, monotonic logic. The non-monotonic argument is only valid under the presumption that the normality hypothesis applies to the case. Addition of this hypothesis to the premises presents us with a monotonic deductive argument. The defeasibility is, then, not in a defeasible argument, but in one of the premises, i.e., the normality hypothesis.

## 7. Reasoning with defeasible legal rules

So far there is nothing special with legal reasoning. Additional information may falsify a belief which is justified under conditions of normality, just as in non-legal reasoning. But there is something more at stake in law. Legal rules, it has been said, are open: there is always (or at least in many cases) the possibility that we discover new exceptions. It is not possible to specify all the exceptions exhaustively. It might be the case that a legal rule in specific circumstances conflicts with another legal rule. Or it might be that principles behind the legal rules justify some exception which we did not make before.[12]

The implication seems to be that every subsumption of some facts under a legal rule is (in principle) defeasible: on closer inspection an exception might be required in these particular circumstances. That would mean that in legal practice deduction is impossible: we only have defeasible legal rules.

This last conclusion, however, is too hasty. The question is again, as in the case of defeasible beliefs, where to locate the defeasibility: in the rules or in the reasoning. Let us take again the case of the poor nurse who marries and murders his wealthy bride. The original argument of the nurse was:

(6) If the marriage ends then both partners (or their heirs) should have half of the matrimonial property.
This marriage between me and my wife Juliet has ended (by my killing of Juliet).
Therefore: I, Romeo, should have half of the matrimonial property.

There are a number of reasons to interpret the legal rule involved rather strict: the prevention of endless fights about the settlement of the joint property, legal certainty (also for other parties who may be involved), and so on. As far as I know there was no exception to the rule before this case arose. But there are also reasons to make an exception in this particular case. The most important reason might be that the judge should not cooperate in the murderer carrying off his prize.

We can interpret the rule in two different ways. First, we can interpret it in a prima facie way, meaning that until we find in some case compelling reasons to the contrary, the property should be divided by half. In this interpretation (6) is only a valid argument if we add the logical minimum, which means if we add the normality thesis.

Second, we can interpret the rule in an all-things-considered way, meaning that in all situations which should be subsumed under its antecedent the consequent gives the valid legal consequence and that (6) is a valid argument.

Now, suppose we agree with the Dutch courts that an exception should be made in this case. In the first interpretation we can only make this exception by challenging the normality thesis, which was one of the premises. In the second interpretation, we challenge the legal rule in the first premise: we change it into a rule with an exception.

The story about non-monotonic logic is the same as with defeasible beliefs. If we interpret the rule in (6) in the all-things-considered way we do not need any non-monotonic logic. We argue monotonically, which does not imply that our conclusions are undefeasible, but only that the conclusions can only be defeated if one of the premises is defeated. A proponent of non-monotonic logic might argue, however, that, as legal systems are open, it is very implausible to give any legal rule a monotonic, all-things-considered interpretation. If we agree with this argument,[13] we

should interpret the rule in (6) in a prima facie way. It is clear that, given this interpretation of the rule, (6) is not deductively valid. At most we can say that the conclusion is made plausible. But how do we know that the conclusion is plausible? The answer is: because the conclusion follows in normal circumstances and we have no reason to suppose that in the case at hand the circumstances are not normal. Again: addition of the normality hypothesis to (6) makes it a valid deductive argument. Even if we add the normality hypothesis by default.

We can say (as I suggested Hage did), that plausibility is all we have in law. Legal argument is as a matter of fact defeasible. Let me accept this observation, at least for the sake of argument. The practice of legal argument is a practice where limited knowledge results in plausible, but defeasible conclusions. Then we have reason to try to develop formal schemes of argument, reconstructing this legal reasoning. If we want to instruct computers, e.g., we need such formal schemes.

However, these non-monotonic schemes are no alternative for monotonic, deductive schemes. Just as Perelman's and Toulmin's informal analysis of (legal) argument could not replace formal analysis, so non-monotonic analysis cannot replace monotonic analysis. One way to express this fact is to say that non-monotonic logic is about the context of discovery, monotonic logic about the context of justification. However, adherents of non-monotonic logic usually don't agree with this characterisation. They claim that non-monotonic logic also is about justification: not about deductive but about defeasible justification. Non-monotonic logic justifies that a conclusion is plausible. But as far as this claim is true, the plausibility-claim presupposes a normality hypothesis. If (as is common) this normality hypothesis remains implicit, it is still there, nevertheless. Without it, the argument is completely unconvincing.[14] From the point of view of deductive, monotonic analysis, defeasibility of conclusions always means that premises are defeasible. Such a monotonic analysis remains very useful, for complete justification, without hindering the relevancy of non-monotonic analysis.

As a conclusion, I suggest that my 'powerful argument' also stands in relation to non-monotonic logic. We might use non-monotonic logic, which could be constructed especially for legal reasoning. But in the end, the study of the justification of a conclusion requires traditional, monotonic formal logic, which is not specifically legal.

## Notes

1   In 1951 Von Wright's *Deontic Logic* was published. This paper is generally recognized as the beginning of modern deontic logic. But the study of logical relations between normative concepts is older. For a short historical overview, see Kalinowski (1972, pp. 31–78).

[2] These definitions use the standard connectives of propositional logic: $\sim$ is the negation (not), & is the conjunction (and), $v$ is the disjunction (or), $\equiv$ is the equivalence(if and only if). Another standard connective is $\supset$ for the implication (if... then).

[3] In propositional logic the connectives (see footnote 2), in predicate logic 'all' and 'some', in deontic logic the deontic operators.

[4] Sometimes legal interpretation or judicial decision making are called legal logic. I have, of course, no objections against the study of these topics.

[5] A. Soeteman, Logic in Law, Kluwer Academic Publishers, Dordrecht, 1989 (revised English edition).

[6] The capitals here are propositional constants, they do not represent arbitrary propositions, but just and only the propositions which are expressed in (1).

[7] In his paper Law and Defeasibility, published in this issue, Hage argues from the supposition that my 'complete justification' of a conclusion means that the conclusion is beyond any doubt. But that is a misunderstanding, possibly caused by my incomplete formulations. Complete justification refers to a relation between premises of an argument and the conclusion: it is the relation which exists if, whenever the premises are accepted (as true or as legally valid), the conclusion has to be accepted. Thus I am not striving for 'impeccable legal conclusions' which are 'absolutely justified'. I am striving for conclusions which are completely, that is deductively, justified by the premises of the argument. The point of this is not to make conclusions more certain or stronger, the point is to locate possible reasons for uncertainty in the premises of the argument. If someone challenges the conclusion then, in my model, he has not to challenge some rather unspecified relation between premises but, as is argued in this paper, he has to challenge at least one specific premise. My point is not ontological, it is argumentational, or pragmatic.

[8] For more details, see Soeteman (1995).

[9] The Dutch High Court had to decide this case in December 1990: HR 7-12-1990, NJ 1991, 593. The court judged that the husband's demands conflicted with the requirements of reasonability and equity to such a degree, not to say that they were shocking to the sense of justice, that compliance of these demands should be completely denied to him. I analysed the case in Soeteman (1995).

[10] Cf. Prakken (1997, p. 256), who argues that his system formalises Toulmin's ideas on the structure of argument.

[11] Cf. Prakken (1997, p. 34 and 35).

[12] See Prakken (1997), who also gives some examples.

[13] Legal positivists are inclined to deny that legal rules are defeasible in such a degree as proponents of non-monotonic logic believe. See, for instance, Bayón (2001), who argues that the consequence of the view that all legal rules are defeasible is that the law is pervasively indeterminate.

[14] It is indifferent for my analysis whether the often implicit defeasibility of a conclusion is made explicit in one of the premises (e.g., in a normality hypothesis which is accepted by default, as long as we have no reason not to accept it) or in the conclusion, which can be reconstructed as: it is plausible that Oq. In the last case the normality hypothesis is part of the prima facie meaning of 'if p then Oq'.

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