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Logic and Law: A Matter of Values Behind Content and Form

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Abstract: This special issue on Logic and Law consists of four research papers and one interview focusing on epistemological reflections on relationships between logic and law, whether in a reductionist or complementary approach. Logic aims to elucidate through formal frameworks, yet it often grapples with the intricate nuances of everyday legal discourse. While law endeavors to delineate permissible conduct within defined jurisdictions, it often encounters challenges stemming from the ambiguity of terms, leading to frequent judicial interpretations and the perception that proliferating exceptions undermines the efficacy of the rule itself.
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Rule is rule. Here is a blatant tautology. But, not everyone agrees about the correctness of this or that law. Are they merely legal, legitimate, limited in space and time, imposed by some over the others? Rule is rule, but no one agrees about which one should be obeyed. Justice or equality, reciprocity are such criteria that can help to discriminate between good laws and bad laws. Everything is a matter of values and values to defend other values, accordingly. Truth has its own word as well, and logic with it.

There are legal rules and logical rules. Thinking about the sources of logic and law is like searching for the roots of validity: What makes any argument correct, and according to what authorities? Legal reasoning is grounded on law, and law is not a single thing. Logical reasoning is grounded on truth, and truth is not a single thing. Both may be posited or specified, however, for it is not because a concept is tricky that it cannot be defined and limited by a number of clauses. So what is properly logical into legal reasoning, and how can the former feature contribute to the latter? Four papers are included into the present issue entitled *Logic and Law*, in order to deal with the tricky interconnections between both axiological disciplines from different standpoints.

In the first paper, "How law's nature influences law's logic", Jaap Hage (University of Maastricht) tackles the sources of rule from the domain of social conventions. Ontological assumptions (one-sided direction of fit from world to language, external relations, bivalence) are approached by the author, who claims that the objects of a world depicted by "model-theoretic semantic" betray a biased way of how sentences are true or false. In particular, classical logic yields a world view of material facts that doesn't take the normative dimension of laws and rules into account; their internal relations or interconnections are made silent by classical logic, so they are to

be included into our social reality of duties and obligations by a specific logic of legal reasoning; but the latter still differs from the huge number of non-classical logics that blossomed from the 1950s. In non-classical logics, rules proceed as further truth-values or intensional operators. In Hage's logic, rules are logical individuals "just like persons, organizations, and pieces of furniture". Moreover, legal reasoning deals with rules that may be added or removed, so it has to do with constructivist facts that are to be taken seriously: "constructivist reality is what rationally ought to be recognised as real", and such a mixture affects the usual, classical rules of inference including the property of monotonicity. Such a simple rule as Modus Ponens cannot be applied to legal reasoning, Hage claims, once assuming that rules do not occur as arguments.

Rules are space-time dependent and, thus, hardly reducible to logical laws. Does it mean that reasonings *per analogiam*, *a fortiori* or *e contrario* are not of logical nature, for want of any formal criterion to warrant their truth-values?

The same issue appears in the second paper, "Legal reasoning and logic", where Jan Woleński (University of Information Technology and Management in Rzeszow) shows that the logical virtue of disambiguating ordinary language frequently meets orderline cases in the area of law. To what extent is legal logic a proper "logic", assuming that the latter essentially relates to entailment relations from premises to conclusion?

Paradox of the Court illustrates how a lack of precision leads to difficulties once the sources of a rule are not specified: Who has to pay between Protagoras and Euthalos, assuming that the latter is expected to pay the former once he wins his first court case but suddenly decided to postpone legal practise? If Protagoras pursues his student, then by virtue of their contract Euthalos doesn't pay by losing the trial against his teacher; if Euthalos wins the trial, then he doesn't pay his teacher although he should by virtue of their contract. Assuming that norms proceed as deontic statements (unlike Jaap Hage, accordingly), Jan Woleński points to a number of difficulties logic faces when applied to legal reasoning: the ambiguous meaning of logical constants ("and", "if and only if", "more" and "less") into ordinary legal statements. Two famous laws are cases in point, i.e. *argumentum a contrario* and *argumentum a fortiori*. Wolenski claims that instances of the former are easy to disentangle logically, whereas the latter includes cases in which informal interpretations are necessary to validate formal schemes. There is something that logic cannot control to make its own application safer, consequently. Unless the variety of informal interpretations of formal laws occur as a case for logical pluralism, i.e. the view that there is not only one set of valid laws of logic in any rational context?

This position is advanced in the third paper, "Legal Gap and their Logical Forms". Matheus Gabriel Barbosa (Federal University of Goiás) and Fabien Schang (Lycée Alfred Mézières, Jarny) argue for a many-valued treatment of one of the main arguments against the logical treatment of law cases, viz. legal gaps. Unlike Jaap Hage, both authors assume two non-classical-friendly clauses: rules are sources of law, these occur as a metalogical operator whose flexible authority leads to a number of distinctive truth-conditions; legal reasoning is made of truth-apt objects that enter into schemes of valid entailment (once truth is extended to a finite subset of designated values). Ordinary difficulties like antinomy (excessive norms) and gap (insufficient norms) are both formalized and streamlined into different logical systems that extend from most to least strict in terms of permission and prohibition. Then two different systems of law, Common Law (if something is not prohibited then it is permitted) and Civil Law (if something is not permitted then it is prohibited), are exemplified and treated as asymmetric inferences that cannot be validated by normal modal logic (that assumes symmetry: something is not prohibited if, *and only if*, it is not permitted). For this purpose, the authors show that a many-valued analysis of deontic operators (permission and obligation) overcomes the previous difficulty and claim that a formal treatment of informal issues is made possible by a more open-minded formal semantics. And yet, extending the range of logic to legal reasoning doesn't explain how such a generalization of logical forms may lead to successful assessments in concrete cases including open-textured concepts.

In the fourth and ultimate paper, "Neural Networks in Legal Theory", Vadim Verenich (University of Tallinn) extends the formal ground to naturalist arguments and advocates a unifying

source of rules in terms of neural networks. The author recalls that ambiguity or vagueness are the main reasons to criticize any purely formal treatment of legal reasoning. Nevertheless, logic may be extended to more mathematical devices like the statistical approach of database legal systems and fuzzy, non-monotonic decision processes. Finally, a neutral network model of legal reasoning is preferred over the formal, syllogistic pattern by turning ordered sequences from axioms to theorems into synaptic connections of computational units. The author argues that this view does justice to an evolutionary version of the sources of law. Merits and limits of an such an AI-friendly approach to legal reasoning are scrutinized as well, in order to illustrate the variety of arguments with respect to the relationship between logical and legal systems.

In a nutshell: the present issue is nothing but a new attempt to update the epistemological reflection on logic and law, whether in a reductionist or complementary approach. Logic is expected to clarify by means of formal schemes; but its weak point is an excessively broad analysis of subtle daily-life legal arguments. Law is expected to make sense of what is permitted or not into a delimited area of jurisdiction; but its weak point is a wide range of ambiguous terms that lead to frequent jurisprudence and the resulting impression that multiplying exceptions doesn't make the rule anymore. It is not logic over law, or law despite logic. Let us think about law with logic, assuming that none consists in a standing number of tenets. Both disciplines are living and growing. The reader is pleased to consider herself as Neurath in his boat, eventually.