

**Dieter Krimphove
and Gabriel M. Lentner (Eds.)**

Law and Logic

Contemporary Issues

Duncker & Humblot · Berlin

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By

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Preface

This edited volume seeks to revive the field of law and logic, by providing an up-to-date and accessible survey of several relevant areas that fall within that category. This is done through a consolidation of current and innovative scholarship in the aforementioned field. Each author is an expert in his or her field, and each chapter offers an analysis of current issues, challenges, problems, limitations and/or developments.

The general contribution of this book to existing scholarship is threefold.

- First, it seeks to consolidate current and cutting-edge scholarship by bringing together the various approaches and different theories of law and logic in one volume.
- Secondly, this consolidation is presented in a way that is both stimulating for current debates in the field, and at the same time, accessible to a wider audience (particularly to readers without prior knowledge of formal logic).
- Finally, this book aims at highlighting the practical applicability, utility and relevance of logic for the study of law, and its application (including legal argumentation), whilst at the same time recognizing its limits.

Part I: General Issues

The first part of the book addresses general issues of law and logic.

The first contribution sets the scene with an overview of the historical development of legal-logic along with an account of the new law and economics approach to legal logic by Dieter Krimphove.

Matthias Armgardt provides a timely account of another historical topic entitled ‘Law and Logic in Leibniz’s Legal Philosophy’, which is just as relevant today as it has been hundreds of years ago.

In the next contribution, Bartosz Brożek looks at the two faces of legal reasoning: rule-based and case-based reasoning. With the use of deontic logic, he demonstrates that legal reasoning is never purely rule-based nor case-based, but that it always requires some kind of interplay between abstract rules and concrete legal decisions.

Then, Michael S Green discusses legal logic and (American) legal realism. He takes issue with the often misinterpreted quote of Judge Oliver Holmes that “[t]he life of the law has not been logic. It has been experience.” He demonstrates that, in fact, the set of loosely-related errors to which the realists thought traditionalists succumbed to, did not concern reliance on logic but had other sources.

Part II: Specific Issues

The second part of the book then addresses specific issues of law and logic.

Scott Brewer introduces the *Logocratic Approach*, which uses propositional logic to evaluate legal arguments. His contribution will demonstrate its use for teaching and analyzing American contract law by presenting the relevant teaching materials he uses at Harvard Law School.

Jaap Hage introduces the topic of logical techniques in avoiding conflicts of norms in international law. His contribution provides an extensive practical account of how logical techniques can (and are currently) used in order to deal with conflicts of norms in a field where such conflicts occur on a regular basis due to the continuous fragmentation of international law.

Jan C. Joerden then presents the use of logic in (German) criminal law in solving selected legal issues. The author convincingly demonstrates the utility of logical instruments – particularly propositional logic, class logic and relational logic – for the analysis of the structures of criminal legal terms and dogmatic questions.

What follows is a discussion and analysis of legal arguments in public international law, by Gabriel M. Lentner. He introduces the logocratic method as developed by Scott Brewer and applies this method to several arguments in international law, in order to develop criteria for the analysis of the strengths and weaknesses of international legal arguments.

Antonino Rotolo follows, and he introduces the use of logic for legal interpretation. More specifically, he introduces the concept of ‘Meaning Negotiation’. He develops a framework to model meta-argumentation over the legal meaning of terms occurring within legal provisions, and to show how negotiations may take place in this context.

Finally, Tanel Kerikmäe and Sandra Särav devote their contribution to the rather topical discourse of automation. Specifically, the authors address the questions on what information technology can do to make the legal administration and decision-making system more just, impartial, fair; and how the digital and technological developments (mainly in the sphere of Artificial Intelligence) impact or change legal reasoning.

With this consolidation of contributions, the editors are confident to provide important impulses for the further development of this subject.

Krems and Paderborn in spring 2017

Dieter Krimphove
Gabriel M. Lentner

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Part I

General Issues

A Historical Overview of the Development of Legal Logic

By Dieter Krimphove

I. Introduction

This contribution presents an overview of the development of legal logic from a historical perspective. It will first outline the challenges and problems associated with the task of writing about the historical development of legal logic. Next, the main part of this contribution will present the development of legal logic along with its historic roots in antiquity to its modern application. Then, the theory of the new institutional economics is introduced and analysed. The final section will conclude looking at logic's significance for law today.

II. The problem

For two main reasons, it is almost impossible to write a history of legal logic. First, it is difficult to chart roughly 2,500 years of intellectual development in the limited space available here. This allows only for the mention of the most important historical developments and cannot, therefore, do justice to all the intellectual heavyweights and innovations of the field.

The other main reason for the difficulty to write about the history of legal logic are of methodological nature: how one may analyse the phenomenon of legal logic *objectively*? This last point may appear surprising. After all, logic (and legal logic in particular), is described as an objective, universally-accepted phenomenon and must therefore be untainted with human subjectivity, bias, narrow-mindedness or a person's individual values formed by his or her experience.

This uncompromising "objectivity of logic" is particularly well-illustrated by the universally accepted axiom, the "*principle of non-contradiction*". This principle holds that contradictory statements cannot claim to be equally valid.¹ In other words, S cannot be both P and not P at the same time [$\neg(S=P) \wedge (S \neq P)$]. Black is simply not white [$\neg(S = W)$] and a coffee cup cannot exist and not exist simultaneously [$\neg(K = \neg K)$]. It follows, therefore, that one of the statements must always be wrong.

¹ The first: *Aristoteles*, *Metaphysik* (τὰ μετὰ τὰ φυσικὰ) Book (№ IV) Γ 6, 1011b, 13 f. 16 f. 20 f.

Arguments for the universality of the principle of non-contradiction is also found elsewhere. For example, the encyclical letter “*Fides et Ratio*”² by Pope John Paul II, also emphasises logic’s absolute universality. It argues that the principle of the non-contradiction,³ as the centrifuge for all philosophical knowledge, represents mankind’s intellectual heritage which, although shared by all, takes different forms (much like its cultural heritage).⁴ It is not by chance that the encyclical letter also refers to fundamental moral views, which offer great insight into the nature of legal logic and to which it attributes the same fundamental significance as the principle of *non-contradiction*.

Despite the *postulate of objectivity*, it cannot be denied that logic is also influenced by individual will.⁵ Throughout history and its various intellectual epochs (including rationalism), logicians have utilised the apparently objective science of logic for their own purposes, beyond the realm of formal logic. More or less sub-consciously, they have allowed their unspoken aims to influence their use of logic or have dealt with logical questions in accordance with unspoken values. This is particularly true of the strictly formal “Mathematical Logic” of the late 19th and early 20th centuries, which believed that logic could be used to describe mathematical structures and problems.

Eventually, the problem with objectivity was tackled by linguistics. *Boole*⁶ and *Frege*⁷ as well as *Hilbert*⁸, *Pierce* and *Whitehead/Russell*⁹ developed an auton-

² Encyclical Letter *Fides et Ratio* of the Supreme Pontiff John Paul II to the Bishops of the Catholic Church on the Relationship between Faith and Reason of 14. 9. 1998.

³ Described here under “principle of non-contradiction”.

⁴ *John Paul II: Fides et Ratio*, nos. 4 and 34.

⁵ Concerning the following, see Chapter 2.1 and Chapter 2.2. below (both with further references).

⁶ See: *Boole*, *The mathematical Analysis of Logic*, being an essay towards a calculus of deductive reasoning, London 1847, pp. 15 ff.; *the same*, *An Investigation on the Laws of thought*, on which are founded the mathematical theories of logic and probabilities, London 1854, p. 27.

⁷ *Frege*, *Begriffsschrift, eine der arithmetischen nachgebildete Formel Sprache des reinen Denkens*, Halle 1879; *Frege*, *Grundgesetze der Arithmetik – Begriff schriftlich abgeleitet jener 1893/1903 I*, 1 ff.; concerning the development see also: *Frege*, *Über formale Theorien der Arithmetik*, in: *Jenaische Zeitschrift für Naturwissenschaften* 19 (1886), Supplement (Heft), pp. 94 ff.

⁸ *Hilbert*, *Neubegründung der Mathematik. Erste Abhandlung*, in: *Abhandlungen aus der Mathematik*, 1922, Bd. 1, pp. 157 ff., see also: *Hilbert*, *Gesammelte Werke*, Bd. 3, Kapitel 10; *the same*, *Die Grundlagen der Mathematik*, *Abhandlungen aus dem mathematischen Seminar der Hamburgischen Universität*, VI. Band (1928); See also: *the same*, *Über das Unendliche*, *Mathematische Annalen* 95 (1926), p. 170; see also: *Tapp*, *An den Grenzen des Endlichen. Das Hilbertprogramm im Kontext von Formalismus und Finitismus*, Heidelberg 2013.

⁹ The latter in its revolutionary *Principia Mathematica* von 1910–1913; *Whitehead/Russell*, *Principia Mathematica*, 2. ed. Cambridge 1913.

omous, formally abstract sign language for the use in logic, which should work independent of values. Through such abstract and strictly formal language, they tried to prevent any subjective influences affecting logical analysis. While such abstract sign language may function *in vitro*, it cannot – in the view of the author – be used for logical issues, which can only be expressed by natural language. Particularly problematic is therefore its use in law, a field that is geared towards practice.¹⁰

On this basis, a historical survey of logic – and legal logic in particular – may be better framed in terms of different philosophical, cultural and even economic developments. That insight guides the following inquiry.

III. The fundamental problem presented by the history of legal logic

Unlike, say, surveys of political and military history or the history of ideas, philosophy or culture, any attempt to describe the history of logic is hampered by two fundamental difficulties: on the one hand, its inability to develop and, on the other, its unequal historical development.

1. The inability of logic to develop

From the outset it must be stated that it is highly debatable whether logic, by its very nature, is capable of development. The assumption that logic is a universal and objective phenomenon (e.g. the *principle of non-contradiction*), gives rise to the basic question as to whether it is at all capable of development or progress – let alone be considered a product of cultural or philosophical evolution. Logic represents an intrinsic, basic human characteristic that an individual needs to cope with the environment he or she inhabits. It is bestowed on an individual only once and does not form the subject of his or her evolution. Moreover, it is not possible to improve logic qualitatively or dynamically. For example, in a bi-polar logical system there is only one logically right or wrong statement: one answer cannot be more logical or qualitatively better than another (i.e. there are no differing degrees of logic). Therefore, one cannot refer to an historical ‘development’ or ‘progress’ of logic.

This historical survey accepts that logic is not capable of development. Whenever reference is made to ‘development’ in this context, it should be regarded not as relating to logic itself but rather to its perception within the evolving intellectual environment. That such an evolution must also affect the perception and significance of logic in terms of its causal connections and intellectual history is a different question. This can be dealt with in an historical overview of logic.

¹⁰ See Chapter III. 11., III. 12. and III. 13. below (with further references).