

# The Lvov–Warsaw School as a Source of Inspiration for Argumentation Theory

Marcin Koszowy · Michał Araszekiewicz

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**Abstract** The thesis of the paper holds that some future developments of argumentation theory may be inspired by the rich logico-methodological legacy of the Lvov–Warsaw School (LWS), the Polish research movement that was most active from 1895 to 1939. As a selection of ideas of the LWS which exploit both formal and pragmatic aspects of the force of argument, we present: Ajdukiewicz’s account of reasoning and inference, Bocheński’s analyses of superstitions or dogmas, and Frydman’s constructive approach to legal interpretation. This paper does not aim at exhaustive elaboration of any of these topics or their usefulness in current discussions within argumentation theory. Rather, we intend to indicate chosen directions of a potentially fruitful research program for the emerging Polish School of Argumentation which would consist in application of methods and conceptions elaborated by the LWS to selected open problems of contemporary research on argumentation.

**Keywords** Roots of the Polish School of Argumentation · Logical culture · Formal and pragmatic force of argument · Uncertain reasoning · Fallacies · Argumentation schemes · Legal argumentation · Legal constructivism

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M. Koszowy (✉)

Department of Logic, Informatics and Philosophy of Science, University of Białystok,  
Plac Uniwersytecki 1, 15-420 Białystok, Poland  
e-mail: koszowy@uwb.edu.pl

M. Araszekiewicz

Department of Legal Theory, Faculty of Law and Administration, Jagiellonian University,  
ul. Bracka 12, room 111, 31-005 Kraków, Poland  
e-mail: michal.araszekiewicz@uj.edu.pl

## 1 Introduction

The flourishing of contemporary argumentation theory may be illustrated with a variety of research ideas, approaches and methods which are capable of encompassing many aspects of rich phenomenon of argumentation. Thanks to applicability of various traditions in philosophy, logic, cognitive science, computer science, and legal theory, intensive attempts have been made towards dealing with a number of open problems which still need to be explored and discussed in a systematic way.

The thesis of this paper holds that the logico-methodological tradition of the Lvov–Warsaw School (LWS) may constitute a source of inspiration for some current problems in contemporary argumentation theory. The rise and development of the LWS—the philosophical movement (1895–1939) established by Kazimierz Twardowski in Lwów (Lvov) (see Woleński 1989, Ch. 1; Lapointe et al. 2009; Jadacki 2009) is associated with ‘The Golden Age of Science and Letters’ in Poland (Simons 2002, 2014). The heritage of the LWS is famous for the developments of mathematical logic, thanks to such thinkers as Łukasiewicz, Leśniewski, Tarski, Sobociński, Mostowski, Lejewski, Jaśkowski<sup>1</sup> and many others (see, e.g. Kneale and Kneale 1962; Woleński 1995). Apart from outstanding achievements in formal logic, the rich legacy of the LWS covers a great variety of ideas in epistemology, ontology, philosophy of language, philosophy of argument, methodology of science, legal theory, ethics and aesthetics. Amongst the key research strands of the LWS (see, e.g. Woleński 1985; Jadacki 2009) there are: the general attitude to consider specific problems rather than to build philosophical syntheses; the claim that the methods of language analysis are indispensable in solving philosophical problems; the significance of the association between philosophy and logic, and between philosophy and science (see also Smith 2006, p. 22).

Although an important strand in the contemporary study of argumentation is to build bridges between distinct research perspectives and traditions (see e.g. van Eemeren 1995; van Eemeren et al. 2014), the legacy of the LWS is almost absent in contemporary study of argumentation. One possible explanation of this fact would be that probably the LWS has not very much to say about argument analysis, evaluation and presentation. However, the rich repertoire of tools applicable in the study of language and reasoning elaborated in the school allows to cast some doubts on this claim. Another possible explanation of the lack of the LWS on the map of research traditions applied in the study of argumentation is the fact that the international recognition of the heritage of the school focuses almost entirely on the development of formal logic. Although analytic philosophers discuss in details the formal-logical heritage of the LWS (see, e.g. Jadacki 2009; Smith 2006; Woleński 1989), some other achievements of the school are not sufficiently represented in the world’s philosophy. According to the *Stanford Encyclopedia of Philosophy* (Woleński 2010b), apart from the achievements in mathematical logic, the LWS is scarcely known outside Poland as the broader philosophical enterprise:

<sup>1</sup> For a note on Jaśkowski’s ‘discussive logic’ (Jaśkowski 1948) as a remarkable attempt at combining formal and informal accounts of everyday arguments and disagreements see (Griffin 2013).

As far as the matter concerns international importance, one thing is clear. The logical achievements of the LWS became the most famous. Doubtless, the Warsaw school of logic contributed very much to the development of logic in the 20th century. Other contributions are known but rather marginally. This is partially due to the fact that most philosophical writings of the LWS appeared in Polish. However, this factor does not explain everything. Many writings of the LWS were originally published in English, French or German. However, their influence was very moderate, considerably lesser than that of similar writings of philosophers from the leading countries (Woleński 2010b).

We may here observe a gap between the rich repertoire of research devices of the study of language and reasoning in the LWS and the lack of this tradition in contemporary philosophy of argument. This observation is a point of departure for raising the question: which of contemporary open problems in argumentation theory may be attacked by employing the legacy of the LWS?

In what follows we will answer this question by showing how some ideas of the LWS may constitute a source of inspiration for solving some selected open problems in argumentation theory. The idea of logical culture employed in the LWS research (Sect. 2.1) constitutes a general framework for discussion of more concrete ideas, such as Ajdukiewicz's account of inference—as it may be employed in argument analysis and evaluation (Sect. 2.2), Bocheński's theory of superstitions or dogmas—as it may enrich the state of the art in the study of fallacies and argumentation schemes (Sect. 3), and Frydman's constructive theory of legal interpretation—as it is potentially fruitful for development of contemporary formal models of legal reasoning (Sect. 4). Our discussion of these four areas will demonstrate clear affinities between the ideas of the LWS and the concepts and methods of contemporary argumentation theory. Our hope is that making these affinities plain will make the case that the ideas of the LWS merit further investigation by contemporary argumentation theorists.

## 2 Logical Culture and Pragmatic Logic

In this section we will show how the ideal of logical culture present in the tradition of the LWS is linked to argumentation theory (Sect. 2.1.) and how some key elements of this ideal may be inspiring for the study of reasoning in argumentation theory (Sect. 2.2.). Although the concept of logical culture is common for various areas of interest of the LWS, the study of reasoning is the representative area in which it manifests itself most clearly (Woleński 2010b). Hence, it seems quite natural to discuss it in the context of the study of reasoning.

### 2.1 The Ideal of Logical Culture

The term 'logical culture' was employed by the major representatives of the LWS to denote the general ideal which should be realized in order to move one's thinking and language use in a more logical direction. Logical culture joins two components:

(1) advances in the logical studies are claimed to be applicable in (2) teaching skills of expressing our thoughts with precise language and of proper thinking (Ajdukiewicz 1974, pp. 2–3). A clear demonstration of this attitude was given by Tarski in his *Introduction to Logic and to the Methodology of Deductive Sciences*:

[...] by perfecting and sharpening the tools of thought, [logic] makes man more critical — and thus makes less likely their being misled by all the pseudo-reasonings to which they are in various parts of the world incessantly exposed today (Tarski 1995, p. xi).

The idea of applying logic to form a person who “possesses logical knowledge and competence in logical thinking and expressing one’s thoughts” (Czeżowski 2000, p. 68) refers not only to knowledge and skills of formal logic, but also to the ability of employing semiotics and methodology of science in analysing and evaluating language use and reasoning (Koszowy 2010).<sup>2</sup> Some representatives of the LWS (e.g. Ajdukiewicz 1974) hold that the application of the sets of rules elaborated by these disciplines in analysing and evaluating language use and reasoning is a form of manifesting one’s rationality, what is close to Johnson’s idea that “the practice of argumentation is best understood as an exercise in manifest rationality” (Johnson 2000, p. 10).<sup>3</sup>

The similarity between logical education in Poland and argumentation theory may be explained by exposing the resemblance between LWS and the pragma-dialectical ideal of critical discussion. The main affinity lies in the very rationale for building the theory of argument. For example, van Eemeren (2012) explains the motivation for the theory developed in (van Eemeren and Grootendorst 1984) by claiming that the pragma-dialectical approach “should systematically combine a commitment to empirically adequate description with a critical normative stance” (van Eemeren 2012, p. 440). For example, Ajdukiewicz’s account of pragmatic methodology (Ajdukiewicz 1974) also combines these pragmatic and normative insights:

The standards of correctness of research procedures, as formulated in methodology, *are not dictated by it to researchers in advance*. Such standards are derived from *practical activities* of competent researchers, who approve of some procedures in research, they disapprove of others (Ajdukiewicz 1974, p. 187 [emphases added]).

Here we may observe the presence of the similar components of the research program which are noted by van Eemeren. For Ajdukiewicz clearly begins with the practice of researchers (in van Eemeren’s terms: ‘empirically adequate description’ of the practice of researchers), which is the point of reference to formulate methodological standards (rules, norms), which constitute ‘a normative stance’.

<sup>2</sup> An interesting research task would be to consider to what extent the ideal of logical culture is today realized within current educational programs in Poland which—amongst other aims—stress the need of developing linguistic and reasoning abilities of students (see e.g. Federowicz and Sitek 2011, Eds.). However, this task goes beyond the scope of this paper.

<sup>3</sup> For the discussion of key affinities between the LWS and the Informal Logic Initiative see (Koszowy 2013).

## 2.2 The LWS and the Inquiry into the Nature of Reasoning

In this section we will argue that some ideas constituting the pragmatic approach to reasoning in the LWS anticipated discussions of one of the major open problems in argumentation theory, i.e. what is the nature of common-sense reasoning in natural language communication? (e.g. Pollock 1995; Prakken and Vreeswijk 2002; Rahwan and Simari 2009, Eds.).

Since formal logic constituted the key interest of the LWS (Woleński 1988), it is not surprising that representatives of the LWS were referring mostly to deductive criteria of validity of reasoning as the foundation for the ‘proper’ theory of reasoning. For example, Łukasiewicz, by claiming that deductive methods are exclusively useful in scientific research, completely lost interest in studying any other kinds of reasoning except deductive ones (see Woleński 1988, p. 29). It should be noted that nowadays the use of rigorous formal methods to model also non-deductive reasoning is a standard approach (Selinger 2014, this issue, and literature quoted there).

A clear example of extending the formal tradition of the LWS in order to grasp the broader class of commonsense reasoning, are Hitchcock’s (Hitchcock 2009) analyses of Tarski’s account of logical consequence. Hitchcock proposes an extension of Tarski’s condition for the adequacy of an account of what it is for a sentence to follow from the sentences of a given class, in order to include some extra-logical terms as if they were logical. According to Hitchcock, this extension may be formulated as follows: “for some non-empty subset of the extra-logical constants in the sentences of the class  $K$  and in the sentence  $X$ , if uniform substitution on these constants produces a new class of sentences  $K'$  and a new sentence  $X'$ , then the sentence  $X'$  must be true if all the sentences of the class  $K'$  are true” (Hitchcock 2009, p. 143). This line of inquiry may be continued by showing those attempts present in the LWS which are focused on broadening the scope of formal-logical notions in order to grasp some common natural language communication phenomena. Hitchcock’s approach is fully justified by the fact that most of the prominent representatives of the LWS, such as Tarski, employed definitions of logical consequence as a theoretical foundation of the theory of reasoning. Thus, Hitchcock’s analyses show that even those key representatives of the LWS who were developing formal logic have worked in ways that argumentation theorists can recognize and appreciate.

Another idea of the LWS which seems to be quite remarkable from the point of view of argumentation theory is Ajdukiewicz’s approach to classify reasoning. In his famous talk given at the 1st Conference of Logicians in 1952 in Warsaw (which was later published in Polish in *Studia Logica*, vol. 2, 1955), Ajdukiewicz presented his critique of classifications of reasoning proposed by Łukasiewicz and Czeżowski (see Woleński 1988, p. 44). One of Ajdukiewicz’s objections which may be crucial for the study of argumentation is that they defined a number of methodological terms (such as inference) in a way which departs from their common use in natural language. This inclination causes that, according to Ajdukiewicz, some distinctions of reasoning (such as the distinction between the reason and the consequence) are artificial (Ajdukiewicz 1955; see Woleński 1988, p. 45).

Ajdukiewicz's inquiry into the nature of reasoning motivated some of his students to continue his pragmatic insights. Amongst them there are: Kokoszyńska (1957), who included in her classification of reasoning in order to include uncertain inference, Dąbbska (1962), who included reasoning by analogy in her classification of reasoning, and Szaniawski (1962), who proposed the pragmatic justification of uncertain inferences.

Although this pragmatic line of the study of reasoning contains quite promising insights into the nature of common-sense reasoning, it did not have enough strong impact on the development of methodology of science in Poland (Woleński 1988, p. 29). Hence, we propose the following research hypothesis: the pragmatic line of inquiry into the nature of reasoning started by Ajdukiewicz, although not well-known outside Poland, may serve as a legitimate point of departure for inspirations of the study of common-sense reasoning. Amongst possible candidates for most useful ideas there is Ajdukiewicz's account of consequence.

Ajdukiewicz (1974, p. 99) accepts the following general concept of consequence: "a statement  $B$  is a consequence of a statement  $A$  if and only if the conditional sentence that has  $A$  as its antecedent and  $B$  as its consequent is true". This concept is an extension of the concept of logical consequence and it bases on the sentential schemata which are 'always true' in the sense that they are satisfied by all values of the variables which occur in them. These schemata belong not only to logic, but also to extra-logical theories.

This approach may be treated as one that anticipated contemporary argumentation theory with regard to the project of reconciling formal and informal approaches to argumentation. Ajdukiewicz claims that the postulate of building an adequate model for non-deductive reasoning should lead to extending the conditions for validity of reasoning. This conciliatory view fits quite naturally to some approaches to argumentation theory, where, on the one hand, "standardized forms of argument that represent common species of arguments encountered in everyday conversational argumentation need to have a precise, partly formal structure" (Walton 2008, p. xiii), and, on the other hand, the extra-formal accounts are necessary in the study of common-sense reasoning (e.g. Walton et al. 2008). Hence, the discussed idea of treating formal and informal approaches to reasoning as two complementary (and not competing) wings of inquiry is in accord with some attempts at reconciling formal and informal logic (e.g. Walton and Gordon 2013), as well as at linking together computational models of argument with pragma-dialectical discussion rules (Visser et al. 2011).

An example of a similar pragmatic approach to inference is present in the work of Łuszczewska-Romahnowa (1962), who explores at least three ideas which anticipated some crucial strands in argumentation theory. First, her 'pragmatic account of entailment' relates validity of reasoning to the context in which the given reasoning is performed: "the sequence of propositions  $p_1, \dots, p_n$  entails pragmatically the proposition  $p_k$  (given the theoretical context) if the implication  $p_1, \dots, p_n \rightarrow p_k$  has been justified within this context." This idea is similar to some attempts of extending the criteria of argument's validity in order to grasp not only deductive, but also uncertain common-sense reasoning (e.g. Hitchcock 2009). Second, by discussing the role of replies to arguments, she proposes a sort of a

dialogical account of arguments. This approach may be interpreted in terms of argumentation theory as a formal dialogue account of replies to arguments. This idea is in line with formal-dialectical approaches to argumentation (Hamblin 1970; Barth and Krabbe 1982). Third, Łuszczewska-Romahnowa's pragmatic account of entailment employs the structural approach to fallacies. It is based on quite modern idea that the recognition of the structure of argument allows to identify typical logical fallacies. Hence, as early as in 1960s, i.e. in the times when the unprecise 'fallacy approach' to arguments (Hamblin 1970) was dominating in logic textbooks, Łuszczewska-Romahnowa proposed the approach the assumptions of which are close the argumentation scheme theory approach (Walton et al. 2008). These similarities may be a point of departure for exploring some key affinities between Łuszczewska-Romahnowa's use of replies as tools for identifying fallacies and the basic idea of the pragma-dialectical approach, where identifying fallacies as violations of the rules for critical discussion makes the resolution of the difference of opinion more difficult, or even obstructs it (see e.g. van Eemeren and Grootendorst 2004, p. 162; Debowska 2010, pp. 105–106). Another possible line of inquiry inspired by Łuszczewska-Romahnowa's account could be to compare her approach to replies as ways of criticizing arguments with the "technique of applying the general guidelines of criticism for each type of argumentation scheme to each individual case (Walton 2008, p. ix).

### 3 Fallacies and Argumentation Schemes

In this section we will argue that some ideas of the LWS are capable to enrich the state of the art in the study of fallacies and argumentation schemes. Some basic affinities between the LWS and argumentation theory with regard to the study of fallacies (Sect. 3.1.) are the point of departure for the discussion concerning possible applications of Bocheński's account of *One Hundred Superstitions* (Bocheński 1994) in recognizing new kinds of argumentation schemes for fallacious arguments (Sect. 3.2.).

#### 3.1 The Systematic Study of Fallacies as a Key Feature of Distinct Research Perspectives

The systematic study of the fallacies in the LWS was associated with the ideal of logical culture. Apart from the 'positive' goal of logical culture which is to acquire knowledge and skills of logic, the 'negative' part of inquiry was to identify typical 'logical' fallacies in speech communication and reasoning. The common tendency of the study of the fallacies in the LWS manifests itself in the optimistic claim that the study of mishaps of language use and reasoning helps in developing knowledge of cognitive and linguistic mechanisms of error (e.g. Kamiński 1962, pp. 5–6). The study of fallacies from the point of view of the LWS is built upon the methodological program which is close to descriptive approaches developed by some logicians and argumentation theorists who pursue the analysis of particular

fallacies without stressing the need to build a separate fallacy theory. Quite recently, the problem of identifying fallacies is investigated by the Polish School of Argumentation by employing both formal (Yaskorska et al. 2013; Kacprzak and Yaskorska 2014, this issue) and pragmatic tools (Budzynska and Witek 2014, this issue).

The very first goal of philosophical analysis undertaken in the LWS was to formulate a given statement as clearly as possible in order to avoid an obscure style in thinking and expressing thoughts (see Twardowski 1999; Woleński 2010b). This postulate may be labeled ‘the principle of clarity’ (Jadacki 2009). We may here notice two affinities with the pragma-dialectical theory of argumentation. First, the principle of clarity is in accord with the Commandment 10 for a reasonable discussants (van Eemeren and Grootendorst 2004, pp. 187–196) (i.e. ‘the language use rule’), which holds that discussants may not use any formulations that are insufficiently clear or confusingly ambiguous, and they may not deliberately misinterpret the other party’s formulations. This commandment is designed to ensure that misunderstandings arising from unclear, vague, or equivocal formulations in the discourse are avoided (ibid., p. 196). Second, the principle of clarity is similar to the usage declarative in pragma-dialectics: discussants can always ask for clarification by performing a directive or provide clarification themselves with a usage declarative (van Eemeren and Grootendorst 1987, p. 294).

The main similarity between the study of fallacies in the LWS and within the informal logic and critical thinking movement in North America lies in conceiving fallacies as pitfalls of non-critical thinking. Although the terms such as ‘critical thinking’ or ‘critical thinker’ are not present in the writings of the representatives and inheritors of the LWS, one may observe the general approach to identifying most typical fallacies as violations of the rules of correct thinking and language use. This account is present in Kamiński’s taxonomy of logical fallacies (Kamiński 1962, pp. 29–39). Kamiński distinguishes four general types of logical fallacies, namely epistemological fallacies, semiotic fallacies, fallacies of reasoning (‘logical fallacies in a strict sense’), and methodological fallacies of employing rules governing knowledge-gaining procedures. This systematization is based on assumption that fallacies are in fact instances of violating norms of proper cognition and language use.

### 3.2 Bocheński’s Study of Dogmas and Superstitions as a Link Between LWS and Argumentation Theory

An exemplification of discussed tendencies in the study of the fallacies are Bocheński’s analyses of *One Hundred Superstitions* (Bocheński 1994). The goal of his account of superstitions (or dogmas) is to help people to recognize typical mechanisms commonly employed in the social communication and cognition the aim of which is to convince someone to accept false beliefs.

In what follows we will discuss three examples of argumentation schemes for fallacious arguments which may be built upon Bocheński’s analyses of



superstitions. One of the typical dogmas discussed by Bocheński concerns appeals to authority (Bocheński 1994, pp. 24–26). The key part of Bocheński’s theory of authority (Bocheński 1974, Ch. 4) is the distinction between ‘epistemic authority’ (i.e. the authority of a person who possesses knowledge in a given field) and ‘deontic authority’ (i.e. someone who is authorized to formulate directives). This ambiguity of ‘authority’ is discussed by Walton (1997, Ch. 3) as the distinction between cognitive (de facto) and administrative (de iure) authority (see also Budzynska 2010). In what follows we propose the reconstruction of Bocheński’s analyses of the superstitions concerning authority by identifying them as schemes for fallacious arguments.

According to Bocheński, a typical superstition concerning authority relies on claiming that every appeal to authority is against reason and so the proposition uttered by the authority should not be accepted in the epistemological sense, i.e. it should not be included into the the set of beliefs of the audience. This superstition may be reconstructed as follows.

Scheme for fallacious argument: ‘authority is against reason’

Every appeal to authority is against reason.	
One should always rely on reason.	
X is an authority in a given field.	
X says $p$	
$p$ should not be accepted.	

The second case of a superstition concerning authority is the belief which is based on confusing deontic authority with epistemic authority. It may be reconstructed as follows.

Scheme for fallacious argument: ‘confusing epistemic and deontic authority’

$X$ is authorized to perform directives.	
$X$ says $p$ .	
$p$ belongs to assertives.	
$p$ should be accepted.	

From the fact that  $X$  is a deontic authority one implies that the assertive (which belongs to the domain of the epistemic authority) is true. This case may be analysed as a clear instance of equivocation: ‘authority’ means either deontic authority which is authorized to formulate directives or epistemic authority which is authorized to formulate assertives.

The similar task may be accomplished with regards to some other superstitions listed by Bocheński. For instance, he discusses the common dogma related to the views on the social role of artists (pp. 21–22). As Bocheński argues, from the very fact that someone is an artist, one may fallaciously conclude that he or she is competent to act as an expert in a given field or as someone who is authorized to formulate moral judgments. On the basis of this point we may propose another example of a scheme for fallacious argument. The scheme points to the mechanism of extending the area of one’s expertise:

Scheme for fallacious argument: ‘the extension of authority’

*X* is an artist.

*X* says *p*.

*p* belongs to assertives or directives.

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*p* should be accepted or done.

The next possible step towards developing argumentation scheme theory in a direction inspired by Bocheński would be to broaden the list of critical questions for the general ‘appeal to authority’ argumentation scheme (e.g. Walton 1997, pp. 101–102, 210). In fact, Bocheński’s analyses of superstitions implicitly point to the critical questioning procedure. Following some of these hints, we may propose the following critical questions:

- CQ1 *By claiming that someone is an authority in the domain do we mean ‘deontic’ or ‘epistemic’ authority?*—as this question would allow to identify the fallacy of confusing two kinds of authority;
- CQ2 *Does someone claimed to be an authority utter assertives or directives?*—since being epistemic authority does not entail being competent to formulate directives (Bocheński 1974, p. 263), this critical question would point to the fallacy of extrapolating authority from the set of assertives to the set of directives;
- CQ3 *Does someone claimed to be an authority in a given domain extend his or her area of competence by addressing world view or religious issues?*—since, according to Bocheński (1974, p. 265), appeals to epistemic authority should not concern world view or religious beliefs, this question may be employed in identifying the fallacy of confusing expertise with world view;
- CQ4 *Is someone in a position to be an authority for this concrete audience?*—since Bocheński conceives authority as a relation (“*X* is an authority for *Y* in the domain *D*”), this critical question would allow to point to the fallacy of appealing the authority which does not fit to the audience.

Hence, the promising line of inquiry would be to extract critical questions from Bocheński’s works, next to systematize them, and finally to include them into the sets of critical questions for various argumentation schemes.

This sample of the rich repertoire of intellectual fallacies analyzed by Bocheński allows for making a safe conjecture that a further analysis of Bocheński’s examples could constitute a fruitful inspiration for a systematic study of fallacies committed in social and political discourses. On the basis of those examples the program of employing the ‘theory of superstitions’ in the argument scheme theory may be started.

#### 4 The LWS and Legal Argumentation

This section presents the LWS as a source of inspiration for contemporary theory of legal argumentation. In particular, it is shown that one of the recent topics in this

theory, namely, legal constructivism, has been investigated by one of the LWS representatives, Sawa Frydman. We argue that Frydman's conception may be useful for the development of a model of legal argumentation representing statutory interpretation.

#### 4.1 Legal Constructivism: Nowadays and in the LWS

In principle, the most important LWS scholars did not investigate the topic of legal argumentation systematically. Although Kotarbiński (Kotarbiński 1961a, pp. 447–451, Kotarbiński 1966) devoted some attention to practical reasoning, his work cannot be assessed as an important contribution to legal argumentation theory. However, all important LWS representatives were deeply concerned about logic understood broadly as theory of proper reasoning and this general methodological attitude had great influence on the development of legal scholarship in Poland in the 20th century. Twardowski and Łukasiewicz recognized importance of logic in legal education and Kotarbiński authored a handbook of logic for lawyers (Kotarbiński 1961b) which made his general theory of reasoning (Kotarbiński 1961a, pp. 257–287) even more influential as regards legal audience. The influence of contributions of LWS on Polish legal theory and doctrine cannot be deeply analysed in this paper, although it is worthwhile to mention the works of Ziemiński (2011), Wróblewski (1992) and Woleński (1972, 1980, 2007) who were applying methods developed by the LWS to the problems of legal reasoning.

Although mainstream LWS scholars were influential for the development of Polish legal theory but have not dealt with legal argumentation systematically, there is also a group of legal philosophers and theorists classified as members of the LWS, such as Józef Zajkowski or Sawa Frydman (Woleński 1985, p. 25) whose work is basically unknown to English-speaking academy<sup>4</sup> and who dealt with important issues that contemporary argumentation theorists would find surprisingly current. The aim of this section is, therefore, to show the similarities and inspirations of topics discussed in contemporary theory of legal argumentation on the one hand and by one of less known LWS scholars, Frydman, on the other hand.

One of the most important and current topics in this theory is whether legal argumentation is constructive or reconstructive. For instance Hage in one of his recent papers (Hage 2013) discusses, first, an intuitively appealing distinction between easy and hard cases in law and a criterion for this distinction according to which in easy cases legal argumentation performs an epistemic function<sup>5</sup>, and in hard cases legal argumentation is constitutive or constructive<sup>6</sup> (Hage 2013, p. 126).

<sup>4</sup> Their work is not the topic of intensive investigations in Polish legal academy either, but cf. Płeszka (2005, 2010), Moś (1987, 1991), Zieliński (2002).

<sup>5</sup> Argumentation helps to reconstruct the process of reasoning representing application of a legal rule to a state of affairs, but does not create any new elements in the world of law.

<sup>6</sup> Argumentation itself determines (creates) legal outcomes of cases. For a discussion of a more specific topic concerning procedures for construction of successful analogous and e contrario arguments in the field of law, cf. Araszkievicz (2011).

Hage contests the sharpness of the distinction by criticizing the abovementioned criterion. He argues for a unified view according to which legal argumentation should be seen as constructive both in easy and hard cases. Legal consequences do not have any kind of ‘independent existence’, but they emerge as conclusions of law-applying arguments (Hage 2013, pp. 142–143).

Hage’s contribution is a general legal-philosophical elaboration of a topic which has been looked at from many angles in AI and Law community since the 1990s. In 1997, McCarty published a paper in which he criticized formerly developed models of legal argument in the field of AI and Law. According to him, legal reasoning is a form of theory construction (and not reconstruction) of any kind of pre-existing entities (McCarty 1997, p. 221). This idea has been transformed into a precise, computational model by Bench-Capon and Sartor (2003). Their highly complex proposal cannot be presented here in detail. In short, legal reasoning, with particular regard to legal reasoning in common law countries, can be seen as a process of theory construction. Theories are then used to model argument moves, such as citing cases and presenting counterexamples (Bench-Capon and Sartor 2003, pp. 115 ff.). Theories may be evaluated against certain criteria, jointly referred to as coherence criteria, such as explanatory power or consistency (pp. 113–114).

The line of AI and law research presented above is very vivid, yet, at least as regards computational features, limited to modeling of legal argumentation in common law systems rather than in *jus civile* systems. Due to its high level of generality, Hage’s proposal encompasses legal argumentation in both types of systems, but in order to develop a computational constructive model of legal argumentation with statutes, a more detailed insight concerning constructivism of legal argumentation as regards statutory law is needed. Interestingly, such theoretical background may be found in the work of one of LWS scholars, legal philosopher Sawa Frydman.

In his work entitled *Legal Dogmatics in the Light of Sociology. Study 1: On Interpretation of Statutes*, published in Polish, Frydman (1936) intends to analyse the phenomenon of statutory interpretation in scientific manner. The main object of Frydman’s investigations is the so-called dogmatic legal interpretation, that is, interpretation performed by legal scholars in abstraction, independently of concrete legal cases.

Frydman avoids formulation of arbitrary definitions, in particular he tends not to define the crucial term ‘interpretation’ at the outset of his analysis, but begins with introduction of a technical and more tangible concept of ‘pattern of behaviour’ and contends that patterns of behaviour may be formulated in different types of expressions. The author makes use of careful conceptual distinctions and provides clear criteria for these distinctions. One of the most important distinctions concerns the aim of performing statutory interpretation:

1. interpretation aiming at recognizing and justifying of patterns of behaviour on the basis of a statute (so-called objective interpretation)<sup>7</sup>;

<sup>7</sup> Objective interpretation takes place, for instance, when an impartial legal scholar investigates to construct a proper pattern of behaviour on the basis of the wording of the statute, legislative intent and other relevant materials.

2. interpretation aiming at justifying of patterns of behaviour recognized independently of the statute, yet potentially ‘supported’ by the statute (so-called apparently objective interpretation)<sup>8</sup>;
3. interpretation aiming at foreseeing the behaviour of individuals to whom the statute will be a guideline for behaviour or who will attempt to ground their behaviour in the statute (so-called anticipatory interpretation)<sup>9</sup> (Frydman 1936, p. 160).

For the sake of brevity, here we will comment only on the conception of objective interpretation. Frydman advocates the following sense of objectivity:

interpretation (of a statute) is objective if and only if it is true that from the premises  $p, q, r$  it follows that: the statute  $S$  contains the pattern of behaviour  $Z$  (Frydman 1936, p. 177).

He puts emphasis on the relation between the premises and conclusion of the process of interpretation. As premises of interpretation are chosen on arbitrary basis, hence, the sense of statutes is constructed rather than reconstructed (Frydman 1936, p. 178). In consequence, Frydman’s proposal is a very early and very well-elaborated example of constructivist approach to legal reasoning. In the following subsection we suggest reasons for adopting of Frydman’s ideas as a point of departure for investigations concerning constructive model of legal reasoning with statutes.

#### 4.2 Frydman’s Conception of Constructive Interpretation as a Basis for Extension of Contemporary Models of Legal Argumentation

Frydman’s constructive theory of interpretation is a very early antecedent of contemporary theories of legal argumentation employing the notion of construction. Due to its methodological rigour, Frydman’s proposal is very understandable also for contemporary scholar. It offers a rich, technically sound and at the same time realistic account of interpretation of statutes in civil law countries. Therefore, we contend, it may be fruitfully used as a point of departure or a source of inspiration for development of a formal model of statutory interpretation, accounted as a constructive process. There are at least three advantages which justify such choice.

First, Frydman’s theory encompasses numerous useful distinctions (as the one encompassing objective, apparently objective and anticipatory interpretation) and thus enables a theorist to develop a nuanced model without excessive oversimplifications and to take different nuances concerning statutory interpretation into account. In certain works in the field of AI and law it is clearly stated what is the aim of the argumentation modeled and what is the role of the subject who performs acts of argumentation (Ashley 1990). However, Frydman’s contribution enables us

<sup>8</sup> This kind of interpretation can be performed by an attorney, who attempts to show that some behaviour of his client (chosen on the basis of extra-legal, for instance economic, considerations) is exactly what a statute requires from its addressees.

<sup>9</sup> If an attorney tries to foresee the interpretive decision of the court, he or she is involved in anticipatory interpretation.

to look at these topics from a very broad perspective, in particular by combining the criterion of person performing act of interpretation (a professional counsel, a judge or a legal scholar) with criterion of aim of interpretation (objective, apparently objective and anticipatory interpretation) at the point of departure of development of a given model. Hence, Frydman's conceptual scheme provides authors of models of argumentation with conceptual tools for precise characterization of a type of legal argumentation they intend to model.

Second, due to its constructive character, Frydman's theory stimulates focus on justificatory argumentation in legal reasoning. Frydman's constructivism seems also to be realistic (in the sense of representing actual legal argumentative practice), for we do not dispose of any 'ultimate' criterion that could be used to assess the properness of legal argumentation.<sup>10</sup>

Finally, third, due to emphasis on the relation between premises and conclusion, Frydman's theory is a motivating factor to look at this relation in the specific context of statutory interpretation. Frydman himself presumably employed a traditional notion of logical entailment here however, his account of 'logic' in this respect was not limited to deductive inference, but also to other types of intellectual operations such as 'comparison of generated results, delimiting the scopes, elimination of contradictions, yielding consequences' (Frydman 1936, p. 209).<sup>11</sup> Formalization and operationalization of these notions can possibly lead to interesting results as regards modeling of the process of argumentation concerning the sense of statutes.

## 5 Conclusion

Since some of the ideas of the school are still remarkably vivid in the Polish research community, they should not be treated as purely historical achievements. Although the logico-methodological ideas of the LWS were designed for different purposes, the flourishing of argumentation theory may be an inspiration for exploring their new applications. Hence, three representative areas of inquiry discussed in the paper (i.e. uncertain reasoning, fallacies and legal argumentation) may become the point of departure for further study aimed at bridging the gap between the LWS and contemporary study of argument.

Apart from discussed topics, the rich legacy of the LWS covers a number of other ideas which are in line with current research strands in argumentation theory. Hence, at least three more issues could be included into this inquiry: Twardowski's arguments against symbolomania and pragmatophobia, Ajdukiewicz's model of subjectively uncertain inference and Bocheński's account of deontic authority. The reason to discuss Twardowski's criticism (Twardowski 1999) of 'symbolomania'

<sup>10</sup> Hage's claims that reconstructivism theses are not falsifiable seems to support Frydman's position very strongly (see Hage 2013, p. 142).

<sup>11</sup> The topic of the so-called legal inferences is a very interesting one. Many types of arguments actually used in legal practice are non-deductive, but in many cases it is possible to treat them logically and to reconstruct them as valid deductive patterns. Cf. Woleński (2010a, pp. 83–84), discussing *argumentum a fortiori*

(the view which holds that symbolization in formal logic is an exclusive source of language precision and clarity) is that it may be inspiring for seeking for detailed connections between the pragmatic approach to language and reasoning in the LWS and in argumentation theory. Ajdukiewicz's probabilistic model of subjectively uncertain inference (Ajdukiewicz 1974) in which we accept the conclusion with lesser certainty than the premises may be studied in line with contemporary achievements in building computational models of defeasible arguments. Finally, Bocheński's account of deontic authority (Bocheński 1974) may become a foundation for an inquiry towards building argumentation schemes for appeals to such authorities which are (socially, morally) authorized to tell people what they should do.

Since the emerging Polish School of Argumentation is, amongst other tasks, focused on bridging the gap between Polish research tradition and the study of language, reasoning and argument in contemporary argumentation theory, the proposed directions of future inquiry may constitute one of its important areas of development. This should lead not only to contributions to contemporary discussions on selected open problems in argumentation theory, but also to popularization of the LWS heritage concerning pragmatic logic, fallacies and legal reasoning.

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## References

- Ajdukiewicz, K. 1955. Klasyfikacja rozumowań (Classification of reasoning). *Studia Logica* 2: 278–299.
- Ajdukiewicz, K. 1974. *Pragmatic Logic* (trans: Wojtasiewicz, O.) Dordrecht/Boston/Warsaw: D. Reidel Publishing Company & PWN/Polish Scientific Publishers.
- Araszkiwicz, M. 2011. Analogy, similarity and factors. In *ICAAIL'11 Proceedings of the 13th International Conference on Artificial Intelligence and Law*, ed. K. Ashley, and T. van Engers, 101–105. New York: ACM.
- Ashley, K. 1990. *Modeling legal argument. Reasoning with cases and hypotheticals*. Cambridge, MA: MIT.
- Barth, E.M., and E.C.W. Krabbe. 1982. *From axiom to dialogue: A philosophical study of logics and argumentation*. Berlin: Walter de Gruyter.
- Bench-Capon, T.J.M., and G. Sartor. 2003. A model of legal reasoning with cases incorporating theories and values. *Artificial Intelligence* 150: 97–142.
- Bocheński, J.M. 1974. An analysis of authority. In *Authority*, ed. F.J. Adelman, 58–65. The Hague: Martinus Nijhoff.
- Bocheński, J.M. 1994. *Sto zabobonów (One hundred superstitions)*. Kraków: Philed.

- Budzynska, K. 2010. Argument analysis: Components of interpersonal argumentation. In *Frontiers in artificial intelligence and applications. Proceedings of 3rd international conference on computational models of argument (COMMA 2010)*, ed. P. Baroni et al., 135–146. Amsterdam: IOS Press.
- Budzynska, K., and M. Witek. 2014. Non-inferential aspects of ad hominem and ad baculum. In *The Polish School of Argumentation*, eds. K. Budzynska, and M. Koszowy, special issue of the journal *Argumentation*, vol. 3, this issue.
- Czeżowski, T. 2000. On logical culture. In *Knowledge, science, and values. A program for scientific philosophy*, ed. L. Gumański, 68–75. Amsterdam: Rodopi.
- Dąbmska, I. 1962. O metodzie analogii (On the method of analogy). In *Dwa studia z teorii naukowego poznania (Two studies in the theory of scientific cognition)*, ed. I. Dąbmska. Łódź: Państwowe Wydawnictwo Naukowe.
- Debowoska, K. 2010. Model pragma-dialektyczny a rozumowanie abdukcyjne (The pragma-dialectical model and abductive reasoning). *Forum Artis Rhetoricae* 20–21(1–2): 96–124.
- Federowicz, M., and M. Sitek. (eds.) 2010. *A society on the road to knowledge. Report on the state of education 2010*. Warsaw: Educational Research Institute.
- Frydman, S. 1936. Dogmatyka prawa w świetle socjologii. Studjum I: O wykładni ustaw (Legal dogmatics in the light of sociology. Study 1: On interpretation of statutes). In *Ogólna nauka o prawie (General Jurisprudence)*, ed. B. Wróblewski, 141–316. Wilno: Nakładem Koła Filozoficznego Studentów Uniwersytetu Stefana Batorego w Wilnie (Issued by the Scientific Circle of the Students of Stefan Batory University in Vilnius).
- Griffin, N. 2013. Commentary on: Marcin Koszowy's "Polish logical studies in an informal logic perspective". In *Virtues of argumentation. Proceedings of the 10th international conference of the Ontario Society for the Study of Argumentation (OSSA)*, eds. D. Mohammed, and M. Lewiński, pp. 1–5, 22–26 May 2013. Windsor, ON: OSSA.
- Hage, J. 2013. Construction or reconstruction? On the function of argumentation in the law. In *Legal argumentation theory: Cross-disciplinary perspectives, law and philosophy library 102*, ed. C. Dahlman, and E. Feteris. Dordrecht: Springer.
- Hamblin, C.L. 1970. *Fallacies*. London: Methuen.
- Hitchcock, D. 2009. Non-logical consequence. *Studies in Logic, Grammar and Rhetoric* 16(29): 137–158.
- Jadacki, J.J. 2009. *Polish analytical philosophy. Studies on its heritage*. Warsaw: Wydawnictwo Naukowe Semper.
- Jaśkowski, S. 1948. Rachunek zdań dla systemów dedukcyjnych sprzecznych. *Studia Societatis Scientiarum Torunensis, Section A* 1(5): 55–77. (Engl. translation: Propositional Calculus for Contradictory Deductive Systems. *Studia Logica*, 24(1969), 143–57).
- Johnson, R.H. 2000. *Manifest rationality: A pragmatic theory of argument*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Kacprzak, M., and O. Yaskorska. 2014. Dialogue protocols for formal fallacies. In *The Polish School of Argumentation*, eds. K. Budzynska, and M. Koszowy, special issue of the journal *Argumentation*, vol. 3 (in press).
- Kamiński, S. 1962. Systematyzacja typowych błędów logicznych (Classification of the typical logical fallacies). *Roczniki Filozoficzne (Annals of Philosophy)* 10: 5–39.
- Kokoszyńska, M. 1957. O 'dobrej' i 'złej' indukcji (On 'good' and 'bad' induction). *Studia Logica* 5: 43–70.
- Koszowy, M. 2010. Pragmatic logic and the study of argumentation. *Studies in Logic, Grammar and Rhetoric* 22(35): 29–45.
- Koszowy, M. 2013. Polish logical studies from an informal logic perspective. In *Virtues of argumentation. Proceedings of the 10th international conference of the Ontario Society for the Study of Argumentation (OSSA)*, eds. D. Mohammed, and M. Lewiński, pp. 1–10, 22–26 May 2013. Windsor, ON: OSSA.
- Kotarbiński, T. 1961a. *Elementy teorii poznania, logiki formalnej i metodologii nauk (Elements of epistemology, formal logic and methodology of sciences)*. Wrocław/Warszawa/Kraków: Ossolineum.
- Kotarbiński, T. 1961b. *Kurs logiki dla prawników (A Course on Logic for Lawyers)*. Warszawa: Państwowe Wydawnictwo Naukowe.
- Kotarbiński, T. 1966. Zagadnienie racjonalności rozumowań rozkaźnikowych (The Issue of Rationality of Reasoning Involving Orders). *Studia Filozoficzne (Philosophical Studies)* 2: 53–60.
- Kneale, W., and M. Kneale. 1962. *The development of logic*. Oxford: Clarendon Press.
- Lapointe, S., J. Woleński, M. Marion, and W. Miskiewicz. (eds.) 2009. *The golden age of Polish philosophy. Kazimierz Twardowski's philosophical legacy*. Dordrecht: Springer.



- Luszczewska-Romahnowa, S. 1962. Pewne pojęcie poprawnej inferencji i pragmatyczne pojęcie wynikania (A certain concept of valid inference and the pragmatic concept of entailment). *Studia Logica* 13: 203–208.
- McCarty, L. T. 1997. Some arguments about legal arguments. *ICAIL '97 proceedings of the 6th international conference on artificial intelligence and law*, 215–224. New York: ACM.
- Moś, U. 1987. Wykładnia prawa i problem empirycznych badań wykładni w ujęciu Sawy Frydmana (Legal Interpretation and the Problem of Empirical Research on Interpretation in the Account of Sawa Frydman). *Państwo i Prawo (Law and State)* 9: 75.
- Moś, U. 1991. Sawa Frydman: A Polish legal realist. *Ratio Juris* 4: 72–78.
- Pleszka, K. 2005. Konstrukcyjna teoria wykładni Sawy Frydmana—próba współczesnego ujęcia (Sawa Frydman's Constructive Theory of Interpretation—An Attempt of a Contemporary Account). *Państwo i Prawo (Law and State)* 5: 3–19.
- Pleszka, K. 2010. *Wykładnia rozszerzająca (Extensive Interpretation)*. Warszawa: Oficyna a Wolters Kluwer Business.
- Pollock, J. 1995. *Cognitive carpentry: A blueprint for how to build a person*. Cambridge, MA: MIT Press.
- Prakken, H., and G. Vreeswijk. 2002. Logics for defeasible argumentation. In *Handbook of philosophical logic*, vol. 4, ed. D. Gabbay, and F. Guentner, 219–318. Dordrecht: Kluwer Academic Publishers.
- Rahwan, I., and G. Simari (eds.). 2009. *Argumentation in artificial intelligence*. Dordrecht: Springer.
- Sartor, G. 2005. *Legal reasoning a cognitive approach to law. A treatise of legal philosophy and general jurisprudence*, vol. 5, ed. E. Pattaro. Dordrecht: Springer.
- Selinger, M. 2014. Towards formal representation and evaluation of arguments. In *The Polish School of Argumentation*, eds. K. Budzyska, and M. Koszowy, special issue of the journal *Argumentation*, vol. 3, this issue.
- Simons, P. 2002. *A golden age in science and letters: The Lwów-Warsaw Philosophical School, 1895–1939*. <https://sites.google.com/site/petermsimons/peter-s-files>.
- Simons, P. 2014. Linguistic complexity and argumentative unity: A Lvov–Warsaw School supplement. *Studies in Logic, Grammar and Rhetoric* 36(49): 101–119. doi:10.2478/slgr-2014-0005.
- Smith, B. 2006. Why Polish philosophy does not exist. In *The Lvov–Warsaw School—The new generation. Poznań Studies in the Philosophy of the Sciences and the Humanities*, vol. 89, eds. J.J. Jadacki, and J. Pańniczek, pp. 19–39. Amsterdam: Rodopi.
- Szaniawski, K. 1962. Pragmatyczne uzasadnienie zawodnych sposobów wnioskowania (Pragmatic justification of fallible ways of reasoning). *Studia Logica* 13: 219–223.
- Tarski, A. 1995. *Introduction to logic and to the methodology of deductive sciences*. New York: Dover Publications.
- Twardowski, K. 1999. Symbolomania and pragmatophobia. In *On actions, products and other topics in philosophy*, ed. J. Brandl, and J. Woleński, 261–270. Amsterdam: Rodopi.
- van Eemeren, F.H. 1995. A world of difference: The rich state of argumentation theory. *Informal Logic* 17: 144–158.
- van Eemeren, F.H. 2012. The pragma-dialectical theory under discussion. *Argumentation* 26: 439–457. doi:10.1007/s.10503-012-9274-7.
- van Eemeren, F.H., and R. Grootendorst. 1984. *Speech acts in argumentative discussions. A theoretical model for the analysis of discussions directed towards solving conflicts of opinion*. Berlin/Dordrecht: De Gruyter/Foris Publications.
- van Eemeren, F.H., and R. Grootendorst. 1987. Fallacies in pragma-dialectical perspective. *Argumentation* 1: 283–301.
- van Eemeren, F.H., and R. Grootendorst. 2004. *A systematic theory of argumentation: The pragma-dialectical approach*. Cambridge: Cambridge University Press.
- van Eemeren, F.H., B. Garssen, E.C.W. Krabbe, B. Verheij, and J.H.M. Wagemans. 2014. *Handbook of argumentation theory. A comprehensive overview of the state of the art*. Dordrecht: Springer.
- Visser, J., F. Bex, C. Reed, and B. Garssen. 2011. Correspondence between the pragma-dialectical discussion model and the Argument Interchange Format. *Studies in Logic, Grammar and Rhetoric* 23(36): 189–223.
- Walton, D. 1997. *Appeal to expert opinion: Arguments from authority*. University Park, PA: The Pennsylvania State University Press.
- Walton, D. 2008. *Informal logic. A pragmatic approach*, 2nd ed. Cambridge: Cambridge University Press.
- Walton, D. and Gordon, T. 2013. How to formalize informal logic. In *Virtues of argumentation. Proceedings of the 10th international conference of the Ontario Society for the Study of*

- Argumentation (OSSA)*, eds. D. Mohammed and M. Lewiński, pp. 1–6, 22–26 May 2013. Windsor, ON: OSSA.
- Walton, D., C. Reed, and F. Macagno. 2008. *Argumentation schemes*. Cambridge: Cambridge University Press.
- Woleński, J. 1972. *Logiczne problemy wykładni prawa (Logical Problems of Legal Interpretation)*. Kraków: Uniwersytet Jagielloński.
- Woleński, J. 1980. *Z zagadnień analitycznej filozofii prawa (Issues in Analytical Philosophy of Law)*. Warszawa: PWN.
- Woleński, J. 1985. *Filozoficzna Szkoła Lwowsko-Warszawska (Lvov–Warsaw Philosophical School)*. Warszawa: PWN.
- Woleński, J. 1988. Klasyfikacje rozumowań (Classifications of reasoning). *Edukacja Filozoficzna (Philosophical Education)* 5: 23–51.
- Woleński, J. 1989. *Logic and philosophy in the Lvov–Warsaw School*. Dordrecht: D. Reidel.
- Woleński, J. 1995. Mathematical logic in Poland 1900–1939: People, circles, institutions, ideas. *Modern Logic* 5: 363–405.
- Woleński, J. 2007. Models of legal reasoning. In *Law and legal cultures in the 21st century: Diversity and unity*, ed. T. Gizbert-Studnicki, and J. Stelmach, 37–60. Warszawa: Oficyna a Wolters Kluwer Business.
- Woleński, J. 2010a. Formal and informal in legal logic. In *Approaches to legal rationality*, ed. D.M. Gabbay, P. Canivez, S. Rahman, and A. Therceli, 73–86. Dordrecht: Springer.
- Woleński, J. 2010b. Lvov–Warsaw School. In *The Stanford Encyclopedia of Philosophy (Winter 2003 Edition)*, ed. E. N. Zalta. <http://plato.stanford.edu/entries/lvov-warsaw/>.
- Wróblewski, J. 1992. *The judicial application of law*, ed. Z. Bankowski and N. MacCormick. Dordrecht: Springer.
- Yaskorska, O., K. Budzyska, and M. Kacprzak. 2013. Proving propositional tautologies in a natural dialogue. *Fundamenta Informaticae* 128(1–2): 239–253.
- Zieliński, M. 2002. *Wykładnia prawa. Zasady, reguły, wskazówki (Legal Interpretation. Principles, Rules, Guidelines)*. Warszawa: LexisNexis.
- Ziemiński, Z. 2011. *Logika praktyczna (Practical Logic)*, 26th ed. Warszawa: PWN.