
16th ArgDiaP Conference
Argumentation and Corpus Linguistics

at

Warsaw Argumentation Week 2018
September 16, 2018, Warsaw



A B S T R A C T S



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Institute for Philosophy & Sociology at the Polish Academy of Sciences (IFiS PAN)

The study of linguistics has been revolutionised in recent years by the availability of computerised corpora containing millions of searchable texts and allowing for the testing of a wide range of theories and hypotheses on the use of language. Argumentation studies are increasingly ready to take advantage of technology in similar ways with the development of argument mining techniques. This event seeks to bring together linguists and argumentation scholars who are interested in the use of corpora, in order that they may share knowledge and experiences and examine the ways in which studies in the two areas may complement each other.

The event is part of Warsaw Argumentation Week WAW 2018 (06-16 September 2018) which also features COMMA 2018, the 7th International Conference on Computational Models of Argument (12-14 Sept). It is co-located with the 1st International Workshop on Methodologies for Research on Rhetoric (MET-RhET) and the 2nd International Workshop on Methodologies for Research on Legal Argumentation (MET-ARG) which will run on Sat, 15th Sept. All ArgDiaP events take place in Warsaw at the Institute for Philosophy & Sociology at the Polish Academy of Sciences (IFiS PAN).

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Chair: Katarzyna Budzynska (Poland)
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Invited speakers

Chris Reed, Centre for Argument Technology, University of Dundee UK

Bonnie Webber, Institute for Language, Cognition and Computation, University of Edinburgh UK

Accepted Papers

Martin Hinton. *Mining Meta-arguments in Online Corpora*

Jacky Visser and Jean H.M. Wagemans. *Annotating Argument Schemes with the Periodic Table of Arguments*

Mariusz Urbanski and Natalia Żyluk. *'Why did you ask this question?' Modelling polar questions processing in information-seeking dialogues*

Sarah Bourse, Marie Garnier and Saint Dizier Patrick. *Investigating Argument Relatedness by Means of Frames*

Katarzyna Budzynska, Martín Pereira-Fariña, Dominic De Franco, Rory Duthie, Nuria Franco-Guillen, Annette Hautli-Janisz, Janier Mathilde, Marcin Koszowy, Luana Marinho, Elena Musi, Alison Pease, Brian Plüss, Chris Reed and Jacky Visser. *Time-constrained Multi-layer Corpus Creation*

Michał Araszkievicz and Marcin Koszowy. *Corpus Analysis of Appeals to Deontic Authority in the Reasoning of the Polish Administrative Courts*

Farshad Badie. *Towards World Identification in Description Logics*

Paweł Łupkowski. *Modifying and Rephrasing Questions in Information Seeking Dialogues – Erotetic Reasoning Corpus Study*

Programme

- 8.50–9.00 Opening
- 9:00–10:00 **Invited speaker.** Bonnie Webber: *Implicit Discourse Relations: More common than thought*
- 10:00–10:30 Jacky Visser and Jean H.M. Wagemans: *Annotating Argument Schemes with the Periodic Table of Arguments*
- 10:30–11:00 Martin Hinton: *Mining Meta-arguments in Online Corpora*
- 11:00–11:30 coffee break
- 11:30–12:00 Farshad Badie: *Towards World Identification in Description Logics*
- 12:00–12:30 Sarah Bourse, Marie Garnier and Saint Dizier Patrick: *Investigating Argument Relatedness by Means of Frames*
- 12:30–13:00 Mariusz Urbanski and Natalia Żyluk: *‘Why did you ask this question?’ Modelling polar questions processing in information-seeking dialogues*
- 13:10–14:50 lunch
- 15:00–16:00 **Invited speaker.** Chris Reed: *Corpora for Argument Technology*
- 16:00–16:30 coffee break
- 16:30–17:00 Katarzyna Budzynska, Martín Pereira-Fariña, Dominic De Franco, Rory Duthie, Nuria Franco-Guillen, Annette Hautli-Janisz, Janier Mathilde, Marcin Koszowy, Luana Marinho, Elena Musi, Alison Pease, Brian Plüss, Chris Reed and Jacky Visser: *Time-constrained Multi-layer Corpus Creation*
- 17:00–17:30 Michał Araszkiewicz and Marcin Koszowy: *Corpus Analysis of Appeals to Deontic Authority in the Reasoning of the Polish Administrative Courts*
- 17:30–18:00 Paweł Łupkowski: *Modifying and Rephrasing Questions in Information Seeking Dialogues-Erotetic Reasoning Corpus Study*
- 18:00–18:10 Conference Closing

Implicit Discourse Relations: More common than thought

Bonnie Webber

Institute for Language, Cognition and Computation, University of Edinburgh UK

Discourse annotation recorded in the 2008 release of the Penn Discourse TreeBank (Version 2.0, LDC Catalogue number LDC2008T05) and the many shallow discourse parsers that it has been used to train have assumed that discourse relations were either marked explicitly (e.g. by a conjunction or discourse adverbial) or inferrable as Implicit Relations from features of their presumed arguments.

While discourse adverbials can appear on their own, most can also appear with different explicit conjunctions — e.g., “but instead” or “so instead” or “or instead”; “because otherwise” or “but otherwise” or “and otherwise”, etc. This leads to the question whether explicit discourse adverbials (signalling one discourse relation) co-exist with distinct implicit discourse relations, even when appearing on their own.

While discourse relations are only one factor in identifying argument structures (cf. [Stab & Guryevich, 2017]) and only a subset of discourse relations may be relevant to the task [Biran & Rambow, 2011], recognizing implicit discourse relations is known to be challenging, and recognizing that there are more of them than previously thought just increases the challenge.

In this talk, I’ll present two types of evidence that implicit discourse relations co-exist with explicit connectives: (1) Experiments carried out with support from the Nuance Foundation, show that a combination of the properties of explicit connectives, features of their arguments, and the role that the token plays in the discourse, makes available a set of predictable and manipulable discourse relations that hold in the context; and (2) the revised and augmented version of the Penn Discourse

TreeBank (Version 3.0) that will be released this Fall provides manual annotation of many (but not all) of the implicit discourse relations that can be inferred along with explicit discourse connectives.

Annotating Argument Schemes with the Periodic Table of Arguments

Jacky Visser, *University of Dundee, United Kingdom*

Jean H.M. Wagemans, *University of Amsterdam, The Netherlands*

The *Periodic Table of Arguments* (PTA) is a recently developed method of describing and classifying the various types of argument [7, 8]. The PTA unifies the traditional dialectical accounts of argument schemes and fallacies and the rhetorical accounts of logical, ethotic, and pathetic means of persuasion into an encompassing theoretical framework. The classification of the types of argument takes place on the basis of three independent partial characteristics: first-order / second-order arguments; subject / predicate arguments; combinations of statements of value / policy / fact. These partial characteristics are then superpositioned so as to provide a full description of the type of argument. The present version of the theoretical framework of the PTA distinguishes between 36 main types of argument.

Given the formal nature of the description of argument types in the PTA, it lends itself well for formal linguistic and computational research into argumentative discourse. Being a factorial typology of argument schemes, it is also a promising starting point for carrying out empirical research into the occurrence of different types of argument in large corpora of argumentative discourse. In order to test these intuitions, Visser et al. [6] have recently used the PTA as a basis for the annotation of the various argument types in the existing US2016 corpus of televised candidates' debates and associated Reddit commentary during the lead-up to the 2016 US presidential elections (the US2016 corpus is introduced in [5], and it is publicly available at corpora.aifdb.org/US2016). The 98,000-word corpus comprises annotations of argumentative and discursive structure on the basis of *Inference An-*

choring Theory [4].

Visser et al. [6] report on the extension of a 17,000-word sub-corpus of US2016 with the classification of the types of the existing annotated arguments. The factorial typology of the PTA allowed the complex task of argument scheme classification to be broken down into three independent much simpler partial sub-tasks: 1) distinguishing first-order from second-order arguments, 2) subject from predicate arguments, and 3) classifying statements as either evaluative, policy-proposing, or factual. The resulting inter-annotator agreement – varying between Cohen’s κ ’s [1] of 0.658 and 0.851 for the constitutive sub-tasks of the annotation – falls within the range of substantial to almost perfect [2], which is considerably higher than those previously obtained for argument scheme classification (see, e.g., [3]). This leads the authors to conclude that the annotated “corpus opens up new avenues in automatic scheme identification by providing the means to break down the objective into simpler classification tasks”.

However, Visser et al. [6] also report on some difficulties in applying the theoretical framework of the PTA to the often less than perfectly well-formed discourse encountered in the annotated election debates. In particular, they remark that there is a “[n]otably low [...] proportion of second-order arguments [and] [c]onversely, there is a high number of default inference classifications” – where the ‘default inference’ means that the inferential relation could not be successfully classified. In addition, an anonymous reviewer noted that “the number of instances used for computing the [inter-annotator agreement] is not overwhelming. Esp. in the situation where relatively few schemes cover the vast majority of the data, a larger proportion would be more informative.”

Our aim in the present paper is to address those difficulties by providing an extended and more refined version of the annotation guidelines for the benefit of future PTA-based annotations of corpora of argumentative discourse. To this end we systematically re-examine the relation between the starting points of the PTA approach to argument classification and the PTA-based annotation guidelines on

the basis of an error-analysis of the instances where the annotators did not agree on the appropriate classification.

This means that first of all, for each of the three partial characteristics of arguments that constitute the theoretical framework of the PTA, we describe how they are operationalised in the annotation guidelines. An innovation is that we propose to group the three sets of instructions into two. We do so by combining the first two partial characteristics (first-order / second-order arguments; subject / predicate arguments) into what we call ‘argument form’, thereby establishing a correspondence with the most recent visualisation of the PTA (see [8]). The resulting description of the four different argument forms is reflected in the division of the table in four different ‘quadrants’. At the same time, we propose to keep the third characteristic (combinations of statements of policy / value / fact) as a distinct one, related to what we call the ‘argument substance’: the types of statements expressed in the premise and the conclusion of the argument.

Regarding the operationalisation of the three partial characteristics in the annotation guidelines, we provide a decision tree with a limited number of heuristic questions that enables the annotator to find the argument form (i.e., the first two partial characteristics) of the concrete argument under scrutiny in one go. And concerning the third partial characteristic that is constitutive of the theoretical framework of the PTA, the argument substance, we extend the instructions regarding the distinction between statements of fact and statements of value.

We then relate these refinements and extensions of the annotation guidelines to the criticisms and obstacles mentioned above by pointing out how they address the issues of the low number of second-order arguments and the high number of ‘default inference’ classifications. We believe that the first issue is addressed by having provided annotation guidelines that include improved instructions for recognising second-order subject arguments and the second issue by having provided a clear decision tree for the combination of the first two partial characteristics of arguments as well as more refined instructions with respect to the third partial characteristic.

Acknowledgements

This research was supported in part by the Engineering and Physical Sciences Research Council (EPSRC) in the United Kingdom under grant EP/N014871/1.

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Mining Meta-arguments in Online Corpora

Martin Hinton, University of Łódź

While the mining of arguments from a corpus of mixed texts using simple search applications presents considerable difficulties, not least due to the various ways in which argument structures can be expressed, it is reasonable to expect that meta-argumentation, comments upon the arguments of others, will be easier to collect, provided that those employing them use the technical terms known to the field. This paper aims to set out reasons why such analysis might be useful to argumentation research, and also to investigate the practicality of conducting such studies. To that end, the paper contains a description of what might be termed a pilot study involving searches for three terms frequently used in the literature but also assumed to be in common use amongst non-academics.

Work which has been done on meta-arguments tends to involve a certain amount of theorizing and the analysis of examples taken from philosophical literature (see Finocchiaro 2013), but there are a number of good reasons for argumentation scholars to take interest in the meta-argumentation of a wider range of real world arguers. Firstly, such meta-argument opens a window onto how disputants see the process of arguing, what they find reasonable and what they object to. It also allows researchers to see the degree to which the public as a whole, or specific groups within society, understand that process and are in alignment with the research community over norms of discussions. Given that for many working in the field, argumentation study has a didactic aspect and a goal of improving standards of public argument, this information is of vital importance in assessing the success of such attempts and discovering what work still needs to be done. The very large number of ‘fallacies’ listed on the Wikipedia page (https://en.wikipedia.org/wiki/List_of_

fallacies) of that name, but almost unknown in the literature, as well as the wide variety of websites discussing fallacies and critical thinking in general, suggest a large group of people outside the academic field of argument study who take an interest in what constitutes good and bad argument.

A second reason why such empirical studies are necessary is the tendency of scholars to refer to the ‘popular’ understanding of certain terms, or to claim that one term is ‘usually’ reserved for a certain class of cases. Such claims are not generally accompanied by any evidence. This situation mirrors that in Linguistics, though on a far smaller scale, where the intuitions of linguists have frequently been used to build theories, but infrequently checked against actual evidence of language use. The possibility of checking those intuitions by means of corpora searches was discussed and modelled in Hinton (2016) and the use of corpora more generally in philosophy has been examined by Bluhm (2014).

The small scale study which follows is designed to assess the viability of the method, rather than to produce strong data on any particular issue. Three terms common in argumentation research were selected and subsequently searched for in the NOW (News on the Web) Corpus. The terms – Slippery Slope, Ad Hominem, and Straw Man – were chosen as examples of technical terms used by the public. Slippery Slope is of interest because discussion continues as to what slippery slope arguments actually are in the literature; Ad Hominem, because there are different types recognized by scholars; and Straw Man because my own intuition is that it is used frequently, and perhaps carelessly, in popular discourse.

For each term, the 50 most recent uses returned by the search engine in the corpus – which is completely up to date – are analysed using the following criteria: 1. Is the use a meta-argument? 2. Does the use correspond to the scholarly norm? 3. What is the argumentational function of the use? The operationalization of these criteria is discussed in some depth within the paper.

The results of the various searches are presented and briefly commented upon. The main focus of the discussion, however, is on the suitability of the method,

and the quality and usefulness of the data collected in this way for argumentation research. The paper ends with a discussion of the ultimate value of such studies and includes a comparison with the expert vs non-expert acceptability intuitions debate amongst linguists (see Culbertson & Gross 2009, Devitt 2010).

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Towards World Identification in Description Logics

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The main presupposition is that nominals can support the logical identification of the world at specific states within Description Logics world descriptions. Nominals are second sorts of propositional symbols and can support the more adequate identification of the world in Description Logics. This research will offer a logical and terminological analysis of world identification based on nominals in Description Logics.

Description Logics

Description Logics (DLs) are among the most widely used knowledge representation formalisms in semantics-based systems. DLs have emerged from semantic networks [13] and frame-based systems [10]. Most DLs are decidable fragments of predicate logic (PL). More specifically, DLs are PL-based terminological systems developed out of the attempt to represent knowledge, with a formal semantics, in order to establish a common ground for human and machine interplays, see [2, 14, 3, 15].

DLs represent knowledge in terms of ‘individuals’, ‘concepts’, and ‘roles’. Any concept corresponds to a distinct (conceptual) entity. Also, it can be regarded as a class of entities. Concepts and their interrelationships are—in the form of hierarchical structures—employed to create a DL-based terminology. Concepts (e.g., *Person*, *Colour*) are equivalent to unary predicates in predicate logic. Individuals (e.g., *john*, *blue*) are regarded as the instances of concepts (members of classes). Individuals are equivalent to constant symbols in predicate logic. Any role expresses

a relationship between individuals or it assigns a property to an individual. A role (e.g., *hasChild*, *isEating*) is a relation defined with some valence greater than or equal to 0. Roles are equivalent to n -ary (for $n \geq 2$) predicates in predicate logic and can be either relations or properties.

The set of main logical symbols in the Attribute Concept Language with Complements (\mathcal{ALC}) that is the Prototypical DL is: {Conjunction (\sqcap), Disjunction (\sqcup), Negation (\neg), Existential Restriction (\exists), Universal Quantification (\forall)}. In addition, \mathcal{ALC} contains: {Atomic Concepts (A), Top Concept (\top : Tautology), Bottom Concept (\perp : Contradiction)}.

Hybrid Logic and Nominals

Hybrid Logics (HL) are logics that result by adding further expressive power to ordinary modal logic, see [9]. In addition, HL can be interpreted the hybridised version of the ordinary tense logic, see [4, 5]. Actually HL has considered the phenomenon of ‘temporality’ an intrinsic and essential property of objects in the world. The history of HL goes back to Prior’s work on hybrid tense logic in the 1960s, see [11, 5]. Thus, the use of logical formulae as terms goes back to Arthur N. Prior’s work.

The most fundamental HL is obtained by introducing so-called ‘nominals’ that are new kinds of propositional symbols, see [8, 1, 5, 7]. The hybrid logic that Prior used is a language built on a set of nominals as well as on a set of ordinary propositional symbols. Note that there is a strong terminological and semantic interrelationship between nominals and the phenomenon of ‘temporality’. A nominal (like \mathbf{n}) can be true at one (and only one) possible world. In other words, \mathbf{n} is, syntactically, a marked propositional symbol that can be true at one and only one state. We can interpret \mathbf{n} the identifier of a specific state (and of time) it is true at. Hence, \mathbf{n} can address a ‘single state’. The most significant assumption is that ‘any nominal can be true at exactly one point in any semantic model’.

Example. Suppose that we know that it is raining in Copenhagen at 17:19 on Thursday 21 September 2017. I will address the proposition ‘it is raining in

Copenhagen at 17:19 on Thursday 21 September 2017' by A . In A , the nominal n stands for (and is identical to) 'in Copenhagen at 17:19 on Thursday 21 September 2017'. Therefore, n addresses a specific state that the proposition A is true at. Now suppose that the world description $R(x)$ expresses 'it is raining'. Since A is true at n , thus the world description $R(x)$ is true at the same state and, in fact, over n . In this example, n has provided a semantic reference for the world description $R(x)$ in order to express a truth (about A) in a model. We can conclude that nominals can provide logical bases for supporting the predication within a proposition. In fact, the nominal n semantically support the predicate P in order to express a truth (about the proposition behind P) at a specific state in a model.

If we are certain that A is valid, then A will be a fact that does not express a truth about itself, but about 'weather' at a specific 'state' and, in fact, at n . Actually 'having rain' is subsumed under 'having weather'. Therefore, the world description $R(x)$ —in which x expresses the variable condition of weather—becomes interpreted 'true' based on the interpretation of 'weather' at n in a semantic model. It shall be taken into account that such a truth about the individual 'weather' is not, certainly, peculiar to one state (see [12]).

Obviously, n has correlations with the tense operations G (stands for 'it will always going to be case that ...') and H (stands for 'it has always been the case that ...'). More particularly, based on our factual knowledge, n has—by addressing a specific state—expressed that the conjunction of the propositions (a) 'it will always be the case that it is raining' and (b) 'it has always been the case that it is raining' is true at (and only at) 'in Copenhagen at 17:19 on Thursday 21 September 2017'. This specific state is a possible world. HL interprets this state—that is also the conjunction of (a) and (b)—the concept of 'Now', see [6].

Research Objective

This research will focus on the formal analysis of 'One-Of Relations' in order to analyse world identification based on nominals in Description Logics. The main

objective is to offer a logical and terminological analysis of world identification based on nominals in Description Logics. It will also be analysed how the description logic \mathcal{ALCCO} (Attributive Concept Language with Complements and Nominals) is constructible.

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Investigating Argument Relatedness by Means of Frames

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Aims and Motivations

One of the main challenges of argument mining is to identify relevant statements for or against a given claim in a sample of text (for example news articles, blogs, consumer reviews). The problem of relevance is called argument relatedness. It is a central point in information retrieval and is also essential in argument mining (Mochales et al. 2009), (Peldszus et al. 2016), (Swanson et al. 2015). The aim is to mine statements which develop the same topic as the given claim and have an argumentative orientation. Broadly speaking, relatedness is a measure of the semantic and topic proximity of two text spans. They may differ lexically (via the use of synonyms or more generic terms) or syntactically (using e.g. alternations).

In (Saint-Dizier 2016), we show that establishing relatedness between an argument and a statement requires knowledge in 80% of the situations. Since supports and attacks of a claim mainly address the purposes, goals, functions or structure of the main concepts of the claim, we show that an adequate knowledge representation system is the Qualia structure of the Generative Lexicon (Pustejovsky 1995). This approach pairs domain knowledge with lexical descriptions in an efficient and principled way. However, this contribution also shows that Qualia structures are

somewhat difficult to develop and must be defined for each topic. This makes knowledge-based argument mining an approach that, although effective, is difficult to re-use over different domains.

This contribution examines and evaluates the possibility of establishing relatedness solely on the basis of linguistic factors. The development of general purpose linguistic processes and resources that characterize relatedness would make the implementation of its identification much simpler and much more re-usable over domains. This contribution explores this hypothesis and the linguistic resources which are required.

Analysis Protocol

Our analysis is based on two considerations: (1) mining for arguments is driven by the topical content of the claim and (2) the analysis is not based on standard text annotations but on the use of frames encoded in XML. The use of an XML-Frame approach is motivated by the fact that the elements found in statements and that are decisive for the analysis of relatedness may not be adjacent: this makes text annotation, which is linear, almost intractable.

XML-Frames are filled in manually by annotators. Each statement found to be related to the claim and with an argumentative orientation originates an instance of the frame. After the analysis of a number of texts, the result is a set of frames which can be organized as a tree, where the root is the frame representing the claim and the children are those statements found in texts and that introduce additional constraints on the topic. Their relations with the claim are described in each frame instance. In this contribution, we explore the linguistic nature of these relations.

Our corpus is based on texts about social issues, addressing topics such as affirmative action or the gender pay gap. To illustrate it, let us consider the following claim: *affirmative action in education is good for the economy*. This claim is composed of a topic: *affirmative action in education* and an evaluative expression: *is good for the economy*. The goal is then to mine statements which are related to

this claim in various texts. These statements must have a topic that is subsumed by the claim topic and an argumentative orientation which may support or attack the claim depending on the content of the statement. Those statements are also frequently associated with discourse structures which further develop them.

The frame template we have defined for the study of relatedness is as follows:

```
<statement> <topic> <main markers= , link-to-claim= , concepts= ,
  restrictions = , annotator-confidence= >,
  <field markers= , link-to-claim= , concepts= ,
  restrictions = , annotator-confidence= > <\topic>
<evaluative> <evmain markers= , polarity= , strength= ,
  restrictions = , annotator-confidence= >,
  <field markers= , link-to-claim= , concepts= ,
  restrictions = , annotator-confidence= > <\evaluative>
<discourse text= , type= >, % several occurrences possible
<argument-scheme type = , annotator-confidence= >
<\statement>
```

To say it briefly, this frame allows the description of most features that characterize relatedness. The topic field is composed of two parts: the main part, e.g. for the claim (*affirmative action*) and its area(s) of application that restrict it (*in education*). Statements develop subtypes of these elements. The ‘link to claim’ and ‘concepts’ attributes respectively specify the linguistic link (exact words, derivation, synonymy, etc.) and the conceptual link (function, purpose) between the statement topic and the claim topic. The same description is realized for the evaluative part with, in addition, the orientation and strength of the evaluation. The discourse tag describes adjuncts such as elaborations, illustrations, comparisons, conditions or circumstances. Finally, the annotator is invited to specify the kind of argument scheme(s) that has been used, from a standard list of arguments (Walton et al. 2008) (Feng et al 2011).

Toward a Linguistic Categorization of Relatedness

One of the goals of this investigation is to elaborate the feature ‘link to claim’ which develops, from the ‘main markers’ attribute (a list of words found in the statement that establish the relatedness) the nature of that link. To describe the linguistic and conceptual links with the claim, the annotators can use predefined categories or natural language. Then a categorization of the main linguistic operations can be carried out, and the associated resources can be developed.

The aim of this categorization is to characterize the linguistic operations behind relatedness and to evaluate its efficiency and scope, i.e. how much of relatedness analysis can be resolved via linguistic processes. The parameters which are under investigation, categorization and evaluation are as follows:

- the paradigmatic lexico-semantic transformations developed from the topic claim and its restrictions, in particular: forms of synonymy, reformulations, paraphrases, restrictions, negation, forms of inchoativity, etc., for example: *gender parity* → *gender gap*.
- the functional transformations which are related to the nature of the topic, and may induce some domain dependent lexical data,
- the local syntactic transformations on the claim topic, in particular for complex NPs,
- forms of discourse transformations such as: summarization (when the topic is long), illustration or instantiation, expression of consequence,
- the lexical data which is necessary, its structure according to lexical semantics principles (Cruse 1986), and its availability.

We argue that an accurate categorization of these elements and an evaluation of their effectiveness should contribute to overcoming the challenge of relatedness and more generally to argument mining for those systems which are based on linguistic factors.

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‘Why did you ask this question?’. Modelling polar questions processing in information-seeking dialogues

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In [4] the authors provided formal tools for analyses of polar questions processing involved in information-seeking dialogues aimed at finding solutions to a specific class of abductive problems, for which empirical evidence consisted of logs of two-player gameplays of the game *Mind Maze* by Igrology. This processing was modelled in terms of relations of sifting and funneling, for definitions of which logic of questions, situational semantics, and formal account on topic relevance were employed.

Relations of sifting and funneling were construed as guiding search process for a solution to a given problem. These solutions were interpreted as consisting in identifying key pieces of information required to account for a certain abductive puzzle. In turn, information to be processed was construed as describing certain states of affairs, or situations. Hence situational semantics was chosen as a logical basis for the analysis.

The same body of empirical data was also analysed in [5] in terms of relation of weak erotetic implication – a version of Inferential Erotetic Logic (IEL) concept of erotetic implication [6, 7] well-suited to account for bounded rationality of human agents reasoning with questions. The aim of the present paper is to compare these two approaches and to provide a unified formal account on both of them.

We devised materials for this research on the basis of *Mind Maze* tasks. This is a game by Igrology in which, according to the manual, a gamemaster “describes a strange story and the players must determine why and how the story happened”.

Solution of each of the tasks is dependent on discovering key pieces of information (which are known to the gamemaster only) by asking auxiliary polar questions. Thus the task of the player is to process a sequence of questions, posed on the basis of a story's content and subsequent answers of the gamemaster. We modified original rules of the game, in order to allow for more cooperative behaviour of a gamemaster as well as to smoothen the process of data gathering. In particular, as in the original version, we allow for only polar questions to be asked, but with addition of two admissible answers: "not important" and "it is not known". The interested reader will find the details on the setup of this research in [5]. Data obtained from *Mind Maze* gameplays form one of the three subcorpora of the Erotetic Reasoning Corpus [3]. *Mind Maze* subcorpus currently consists of 16 annotated gameplays (30.619 words), which lasted from 5 to 38 minutes. Erotetic Reasoning Corpus is publicly available at <http://ercorpus.wordpress.com/>.

In making sense of the concept of situation we shall follow Keith Devlin's claim that "situations are just that: situations" [1, p. 70], considering it as a primitive concept. We will employ Wiśniewski's [7] situational semantics, thus sharing his intuitions concerning the notion, of which the basic is that each atomic sentence refers to a set of situations: "If the relevant set is non-empty, then the set comprises all these situations in which (the claim made by) the atomic sentence holds" [7, p. 33]. We define a situational model and a concept of relevance of a topic with respect to such a model. Interpreting the concept of topic in terms of situational semantics we shall follow some general lines proposed by Van Kuppevelt, according to whom "[t]he term topic (...) refer[s] to a topic notion which concerns the 'aboutness' of (sets of) utterances" [2, p. 111]. Then we introduce IEL-concepts of erotetic implication and its weak counterpart and our main results on the relation between weak erotetic implication and the situational relations of sifting and funneling is given. This allows for direct comparison of the two formal approaches and for evaluation of their relative strengths and weaknesses. A slightly unsurprising conclusion of these is that IEL models are more computationally-friendly while situational models are more

fine-grained and cognitively adequate. We support these claims with appropriate examples.

We conclude with some sidenotes on reducibility of questions and on formal account on paraphrasing questions.

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Corpora for Argument Technology

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Argument Technology, and Argument Mining in particular, have enjoyed phenomenal growth over the past decade with significant new results reported in top AI and Computational Linguistics venues, collaborations in new sectors from healthcare to law, and live systems such as a recent application deployed in partnership with the BBC to all secondary schools in the UK. Continued growth in the area is struggling, however, with the need for corpora, and is caught between twin challenges. On the one hand, much argument technology is rooted in the philosophy of argument where empirical methods at scale remain very much the exception. On the other hand, results in argument mining have developed from general NLP techniques – but general NLP has not produced datasets that focus on the vagaries, idiosyncrasies and linguistic sophistication of argumentation. In this talk, I will explore corpora for argument technology, showing the strengths and weaknesses of current collection and annotation techniques, summarising some of the ways they have been used, and showcasing practical applications of the results that they have yielded.

Time-constrained Multi-layer Corpus Creation

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Goals of the annotation process. The paper proposes a new complex method of corpus creation under the constraint of bounded, short period of time available for the annotation process. One important consequence of such a constraint is that it does not leave time for the traditional techniques of corpus evaluation of Inter-Annotator Agreement, IAA. Therefore, we designed, tested and improved a multi-layer annotation process with each subsequent layer aiming to replace IAA with an alternative method allowing for the creation of high-quality corpus.

We built our method on two approaches to corpus creation: *iterative enhancement* (IE) which aims to improve the annotation in several iterations using automatic techniques to look for inconsistencies in the manual annotation [?], and *agile corpus creation* (ACC) which replaces the traditional, linear-phase approach with a cyclic and iterative small-step process [?, ?]. The layers in our approach can be viewed as such iterative cycles which aim to improve the result of the annotation, however, our process is also adapted to handle time-constraint and the annotation of complex linguistic phenomena (dialogical argumentation) where (semi-)automatic methods such as IE cannot be successfully applied. Moreover, the full multi-layer annotation process was iterated three times which allowed us to not only improve the corpus as in ACC, but also to improve the annotation process itself.



Figure 1: Infographics in *Argument Analytics*: like-mindedness (on the left) and divisive issues (on the right).

The annotation process was designed for a project run in 2017 in partnership with the BBC, which aimed to develop *Argument Analytics* [?, ?], a set of analytics (metrics [?]), for the BBC Radio 4 programme, *Moral Maze*. This sense-making argument technology provides infographics (i.e. an intuitive overview of the debate using graphic visualisations) presented to a large, non-expert audience in a real environment on the BBC webpages (see Figure 1 and `bbc.arg.tech`).

We worked with two radio programmes (from 2012 & 2017) and one TV programme (2017) on the morality of abortion. In order to release *Argument Analytics* in real-time, i.e. at the same time as the 2017 programmes were broadcast, they were pre-recorded allowing us to run the whole process of preparing *Argument Analytics* in the 48 hours before broadcast.

In each run for these three 45 minute programmes, the *Argument Analysis Team* (AAT) was allocated 8 hour time window to analyse a programme using OVA+ tool [?] and an annotation scheme [?] built upon Inference Anchoring Theory, IAT [?] (`arg.tech/iatguidelines`).¹ The time required for the annotation was significantly longer than 8h (estimated as 45 hours for the basic layer of annotation), thus we ran three rounds of training in IAT annotation for 60 candidates from whom 10 passed the final test and were recruited to AAT. As a result, the design of the annotation process had to address several challenges, including time-constraint, complexity of annotation scheme and newly recruited, less experienced AAT members.

¹Argument data was in this work generated manually, but the process could in principle be automated by applying argument mining techniques (*cf.* [?, ?]). Still the current state-of-the-art does not guarantee high quality of such an automatic annotation.

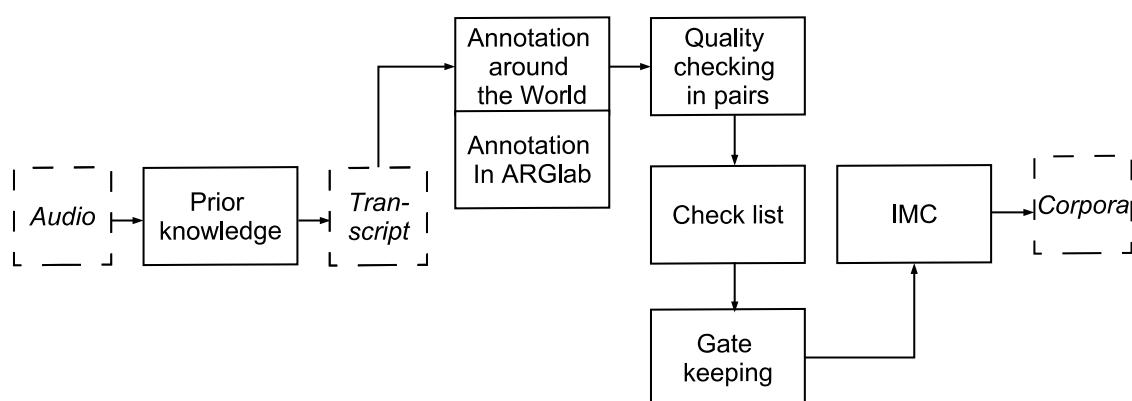


Figure 2: Six layers of time-constrained process of corpus creation.

Design of the annotation process. We developed a process of corpus creation with six layers of iterative cycles of manual annotation (see Figure 2). Argument Analysis Team consists of 18 members, including 8 AATs who were experienced in IAT analysis (6 on-site in the lab and 2 joining us remotely through an Internet communication platform), and 10 inexperienced AATs (6 on-site and 4 joining remotely). The annotators from different parts of the world helped us to slightly speed up the process by making use of different time zones, where the annotation could have started during the night in the UK where most of the team was based. The whole process was coordinated by one member of the team.

The preparatory phase, the *Prior Knowledge Layer*, aimed to capitalise on having the audio earlier than the transcript to familiarise ourselves with the content of the programmes while waiting for the transcription to be prepared. All AATs available on the late evening before the day of annotation process (i.e. at the beginning of the full 48 hours) met to listen together and discuss a programme. This helped us to create a general overview of the content which was then particularly useful when annotating smaller, isolated excerpts into which a transcript was split for annotation.

Next, in the *Basic Annotation Layer* excerpts were allocated to all AATs to be analysed around the world and then together in the lab to allow for discussing how to annotate difficult parts of the programme. The excerpts were annotated here using a standard corpus linguistic procedure applying IAT annotation scheme.

Once we had an initial set of argument maps, it was passed to the *Quality Assessing Layer*. At this point, the team was divided into smaller task groups with only some of AATs continuing basic annotation. During this phase, an author of each map was explaining to another AAT the decisions behind the annotation in order to reach an agreement on the annotation created in the previous step. Inexperienced AATs were always paired with an experienced AATs.

Then in the *Check-List Layer*, another group of annotators was going through each map to compare it against a check-list with the basic rules from IAT guidelines (arg-tech.org/IATchecklist) to avoid the most common mistakes in annotation. In order to create final versions of argument maps for each excerpt, in the *Gate Keeping Layer* the two most experienced analysts were running the last check-up on each map and apply final corrections. Finally, in the *IMC Layer* all maps were connected together in one large argument network by using our technique of Inter-Map Correspondence [5]. This network was then submitted to a corpus.

The annotation process was additionally changed and improved after each run of annotation. Between the first and the second run we focused on reducing the time of annotation and the number of errors by introducing, e.g.: the allocation of the longest excerpts to the best and fastest AATs; and the addition of the layers of Check-list and Gate-keeping. Between the second and the third run, the improvements focused on making the process more structured and controlled by: reducing the length of the excerpts to make them easier to manage; and allocating AATs to specific layers which helped them to concentrate on single task at a time.

The proposed process allows for creating high-quality corpora under the constraint of a short time available for the demanding task of argument annotation. As the standard methods of corpus evaluation were unfeasible, we improved the quality *internally* by iterative cycles of annotation at six layers, and *externally* by three cycles of full annotation process. As far as we know, this is the first time such a complex process has been tried, successfully, on real-world data from the media, and with a hard deadline for making the results available to the public.

Acknowledgments

We would like to acknowledge that the work reported in this paper has been supported in part by EPSRC in the UK under grants EP/N014871/1, EP/M506497/1, in part by the Volkswagen Foundation (VolkswagenStiftung) in Germany under grant 92 182, in part by “Ministerio de Economía y Competitividad”, “Consellería de Cultura, Educación e Ordenación Universitaria” in Spain under grants TIN2014-56633-C3-1-R and TIN2014-56633-C3-3-R (accreditation 2016-2019, ED431G/08) and Postdoctoral Fellowship (accreditation 2016/048-0, ED481B) and the European Regional Development Fund (ERDF). We would also like to thank our colleagues from Argument Analysis Team – Rory Magowan, Nicole Orr, Javier Ruiz and Teodora Udrea.

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Corpus Analysis of Appeals to Deontic Authority in the Reasoning of the Polish Administrative Courts

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Appeals to deontic authority in legal texts

Appeals to authority in argumentation and dialogue constitute a persuasively effective and thus socially important communication type [4, 5, 7]. The variety of argumentative appeals to authority encompasses not only targeting epistemic authority, e.g. the authority of someone who has knowledge about a certain domain, but also a techniques which establish, employ or attack authorities who have (or are claimed to have) deontic authority, namely powers to tell people what claims they should accept or what they should do. The legal discourse is a specific field that contains a rich repertoire of linguistic devices that target deontic authority.

One of the most interesting issues in the theory of legal interpretation is the one of binding force of interpretation. This phenomenon is particularly controversial in the context of continental legal culture where judicial decisions are not formal sources of law. However, in certain settings, legal rules assign more formal authority to certain judicial decisions which in turn become formally binding on other courts.

This paper aims at providing (i) theoretical foundations for corpus studies of

appeals to deontic authority in legal texts along with (ii) the method employed in building the first annotated corpus of appeals to deontic authority in the decisions of the Polish administrative courts. As main elements of a conceptual framework that has been employed in the process of corpora building we identify (1) legal deontic authority supports and attacks, (2) linguistic markers for deontic authority that are specific for resolutions of Polish administrative courts, (3) annotation procedure for types of authority using OVA+ (Online Visualisation of Argument).

Legal Setting and the Set of Documents

The domain of our investigations is the set of cases decided by the Supreme Administrative Court (SAC) and by the Voivodshop Administrative Courts (VACs) in connection with the application of the following rules of the Law on Proceedings before the Administrative Courts (Journal of Laws 7 June 2018 consolidated version as amended):

Art. 190. 1 (first sentence). The court to which the case was referred is bound by the interpretation of the law made in this case by the Supreme Administrative Court.

Art. 269.1 (first sentence). If any composition of the administrative court hearing the case does not share the position adopted in the resolution of the composition of seven judges, the entire Chamber or in the resolution of the full composition of the Supreme Administrative Court, it presents the legal issue to be resolved to the appropriate composition.

The set of available cases referring to these provisions, decided by the SAC or the VACs, exceeds 3.000 positions. We have analyzed a part of this set manually, searching for linguistic expressions directly related to the problem of a court being bound by an interpretation issued by the SAC.

This issue can be illustrated with Example 1 taken from the Resolution of the Supreme Administrative Court in Warsaw (1 June 2008; I FPS 1/08) [6]:

Example 1. Also the Supreme Administrative Court in this case **should respect** the content of the resolution adopted. However, it would cause the necessity of the repeal of the judgment of the Voivodship Administrative Court, which **correctly complied** with the interpretation established by the Supreme Administrative Court.

This example shows that two ways of targeting authority have been employed. The first sentence points to the fact that the SAC, like any administrative court, should adjust its decisions to the authority of the resolution (“should respect...”). So the first move shows that one legal entity should obey the authority of the resolution. In the second sentence, the judgment of VAC is claimed to be in line with the authority of the SAC (“correctly complied...”).

Another type of communication structures present in the administrative courts’ resolutions is a conflict between two deontic authorities. This structure is present in Example 2 also taken from the Resolution quoted above [6]:

Example 2. (...) in the literature, a case of **loss of binding power** by an interpretation contained in the judgment of the Supreme Administrative Court is admissible. (...) if prior to the re-examination of the case by the Voivodship Administrative Court, the Supreme Administrative Court will take a resolution in another matter pursuant to art. 269 containing a different interpretation of the law, in this respect the interpretation made in the revocation judgment **ceases to be binding**.

In the quoted part a view is expressed that authority of interpretation following from the application of art. 269 should have priority before the one following from art. 190.

Annotation

These two strategies of addressing deontic authority allow us to identify most typical linguistic markers that will allow us to identify appeals to deontic authority in legal

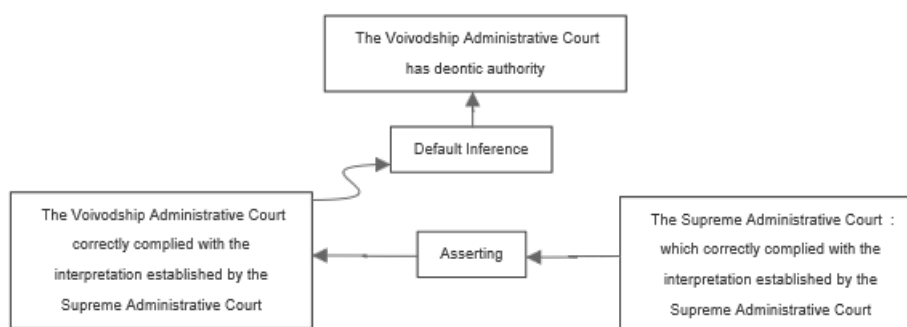


Figure 3: OVA+ representation of deontic authority support in Example 1.

texts. Amongst such cues there are Polish expressions that indicate that an entity is bound by deontic authority of another entity. Our proposal for annotating deontic authority supports and attacks consists of implementing new deontic authority nodes into the OVA+ (Online Visualisation of Arguments) software [3] which is an implementation of dialogico-inferential communication structures described by Inference Anchoring Theory (IAT) [2]. Figure 3 represents an annotation of a part of Example 1.

Figure 3 represents a typical way of annotating supports of court’s deontic authority by another court. In the resolution, the Supreme Administrative court asserts that the Voivodship Administrative Court ‘correctly complied’ with the Supreme Court’s interpretation. This propositional content supports the deontic authority node (*The Voivodship Administrative Court has deontic authority*).

Apart from representing similar deontic authority supports, Figure 4 also illustrates an annotation of a conflict between two deontic authorities Example 2.

Figure 4: This example shows that two different statements of the Supreme Administrative Court generate two types of deontic authority nodes. Each node is related to a different legal interpretation. OVA+ diagram allows us to represent this relation as a conflict between two deontic authority nodes.

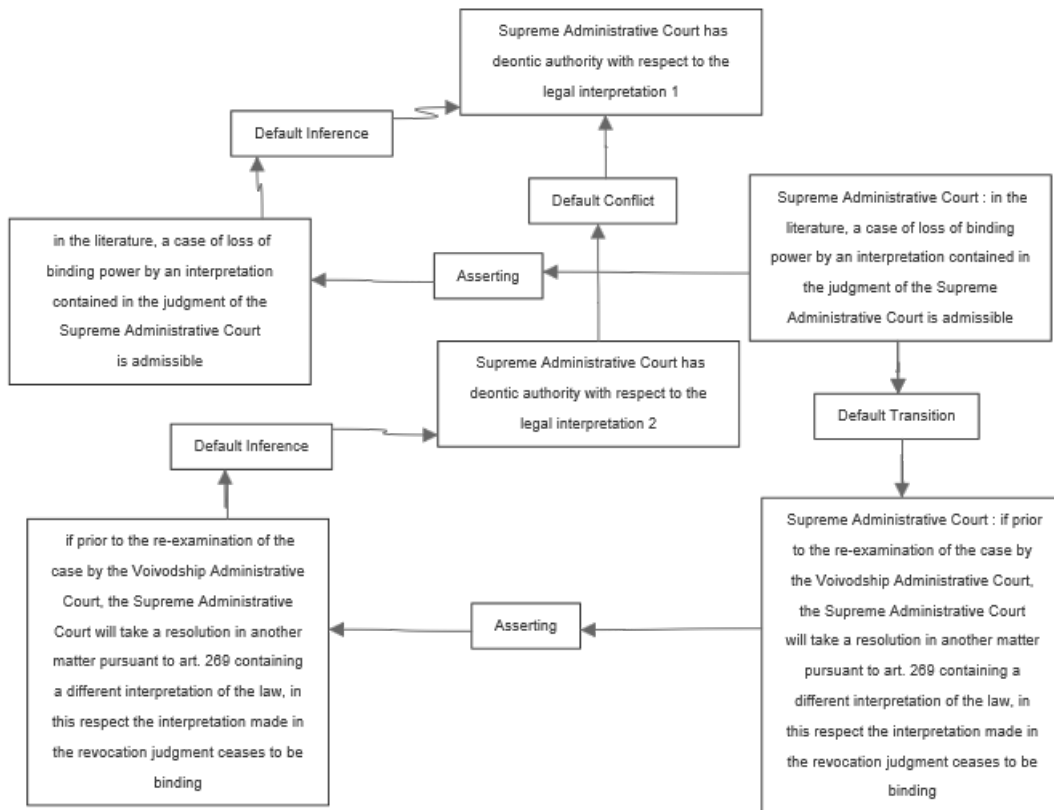


Figure 4: OVA+ representation of the conflict between two deontic authorities in Example 2.

Towards the Legal Authority Corpus (LAC)

OVA+ representations of deontic authority supports (Figures 1 and 2) and of the conflict between two deontic authorities (Figure 2) are a point of departure for proposing a method for building the first available online corpus of annotated opinions of Polish courts - Legal Authority Corpus (LAC). This corpus study may constitute a preliminary step towards an automated statistical extraction of deontic authority supports and attacks from legal texts. The future line of inquiry may consist of distinguishing particular types of deontic authority that are referred to in courts' resolutions. A possible conceptual framework for that task has been proposed in [1].

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Modifying and Rephrasing Questions in Information Seeking Dialogues – – Erotetic Reasoning Corpus Study

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The main aim of this paper is to analyse how questions are modified and rephrased in a dialogical situation. As such it stems from the research on research of query-responses in dialogue, i.e. answering to a question with a question (see [2], [3]). However, I will be interested in situations where a question is modified by one of a dialogue participants in order to facilitate the answering process, like in the following example.

A: Question six (pause) okay for anybody who's interested in eating, as we are, *pate de foie gras* is made from what?

A: Right we'll be even more specific right, a help for ya, *pate de foie gras* is made from the liver of what?

[BNC: KDC, 20–21]

As it is visible in the example, A asks the initial question and afterwards s/he replaces it with another one. What is interesting, s/he clearly states the intention behind this move: “a help for ya”. What is more s/he points out why her/his second question should facilitate the answering process: “we'll be even more specific right”.

I will use resources provided by Erotetic Reasoning Corpus (ERC, [1]), especially its TZ sub-corpus. ERC constitutes a dataset for research on natural question processing. The corpus consists of linguistic data collected in studies on the question processing phenomenon. The data are annotated with the tag set which makes it easy to browse them for the reasoning structure, pragmatic features used and the presence of normative erotetic concepts. TZ(ERC) consists of transcribed *Mind*

Maze game sessions. *Mind Maze* is a card game published by Igrology. In the game one of the players plays the role of the game master and the other one tries to solve a puzzle presented by the game master. The game master tells a short story (inspired by true events) and the objective of the player is to figure out how the story happened by asking questions to the game master. Only yes/no questions are allowed here (with two additional admissible answers: “It is not important/relevant” and “It is not known”). Such a setting brings certain interesting dialogue moves into picture—we will encounter situations where the game master will ask the player directly to modify or rephrase her/his question.

On the basis of the TZ(ERC) corpus study I will address the following research questions.

- (i) What triggers question’s modification or rephrase?
- (ii) How can we grasp the relevance of the introduced modified questions?
- (iii) Is modification and rephrasing effective with respect to the dialogue goals?

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