Towards Systematic Research on Statutory Interpretation in AI and Law

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Outline

- Analysis of statutes in AI and Law
- statutory interpretation, especially in civil law countries
- The model
  - Layer one – set theoretical
  - Layer two – argumentation schemes
- A short case study
- Discussion

Statutes in AI and Law

- Pioneering work of Layman Allen (since 1957)
- Classical results of 1980s
  - Imperial College Logic Programming Group
  - Legal Expert System by Hajime Yoshino and colleagues
- Awareness of problems
  - Negation
  - Open texture3
  - Conflicts between rules

Statutes in AI and Law cont'

- 1990s
- Hybrid systems comprising rule-based reasoning and Case-Based Reasoning (CABARET)
- Focus on conflicts between rules and solving them
  - Nonmonotonic logics
  - Defeasibility
  - Explicit and implicit exceptions
- Focus on logical and computational features rather than on legal problems

Statutes in AI & Law cont.

- 2000s and further
- Automated classification and extraction of concepts, definitions and norms from statutory texts
- Representation of statutes
  - Temporal aspects
  - Validity
- Legislative semantics

Recent Research

- Argumentation schemes approach
- Ontology-based approach
- Logic of teleological reasoning

The Issue of Legal Interpretation

- The concept of interpretation: ambiguous
  - Interpretation as actitivity vs. Interpretation as a result
  - Interpretation vs. Understanding
    - Is there understanding without interpretation?
  - What is there to be interpreted?
  - Interpretation and argumentation

  - Interpretation as determination of meaning
    - Intension and extension of statutory terms

Statutory Interpretation in Civil Law Countries

- No stare decisis principle
  - Case law is relevant, however, as a source of argumentative patterns and much more
- Conceptual analysis is of high importance
  - The role of legal doctrine
- The art of legal interpretation is what constitutes legal expertise (inter alia)
  - The statutory text is easily available
  - Knowledge about legal interpretation is not

Operative vs. Abstract legal interpretation

- Operative interpretation
  - Performed or generated to resolve a concrete case
    - The most typical interpretation performer by courts
- Abstract interpretation
  - Not operative
    - Typically performed by legal doctrine
      - But also by courts

Extensional Character of Legal Interpretation

- legal systems consist of (inter alia) legal rules
- Typical rules are conditional IF [conditions] THEN [conclusion]
- Conditions of rules may be represented as sets of predicates

- Operative legal interpretation:
  - Are the facts of the case (TOKEN OBJECTS AND STATES OF AFFAIRS) within the range of predicates expressed in antecedents of legal rules?
- Abstract legal interpretation:
  - Are certain types of objects and states of affairs within the range of predicates expressed in antecedents of legal rules?
- However, we arrive at token classification only by means of certain types to which a given token belongs

Two-Layered Model

- Interpretive statements for extensional relations
- Argumentative schemes for justification of interpretive statements

Definitions

- **Rule.** a function accepting antencedents as input and conclusions as output (A, C)
- **Term Extension Framework.** Let the framework TS = (T, OP, INC) be the structure representing the extensional relations between all types of terms used in the context of the interpretation of antecedents of rules of legal system S, where:
  - T = (A, B, C…) is a set of extensions of legal terms and it encompasses two subsets:
    - extensions represented by terms used in the antecedents of statutory rules (we will refer to these terms as ATs – Antecedent Terms) and
    - extensions represented by terms not used in the antecedents of statutory rules, but used by lawyers mainly to interpret the ATs. We will refer to the terms mentioned here as ITs – Interpretive Terms);
  - OP is a set of set-theoretical operators that may be performed on these extensions (such as set-theoretical union (∪), intersection (∩), or difference (\) and
  - INC is a set of relations encompassing inclusion relation (⊂), strict inclusion relation (⊊), and equivalence relation (=).

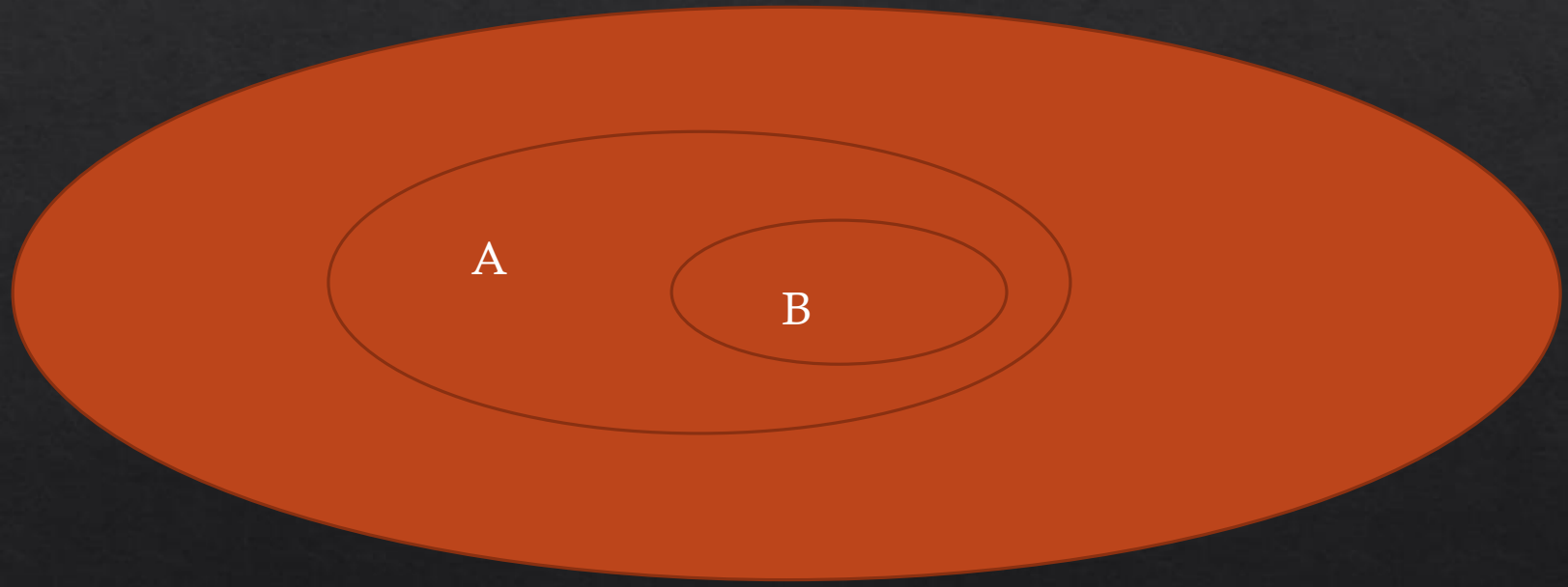
Cont’

- Universal extension U
- $-A$ = complement of A to U
  - Non-elephant

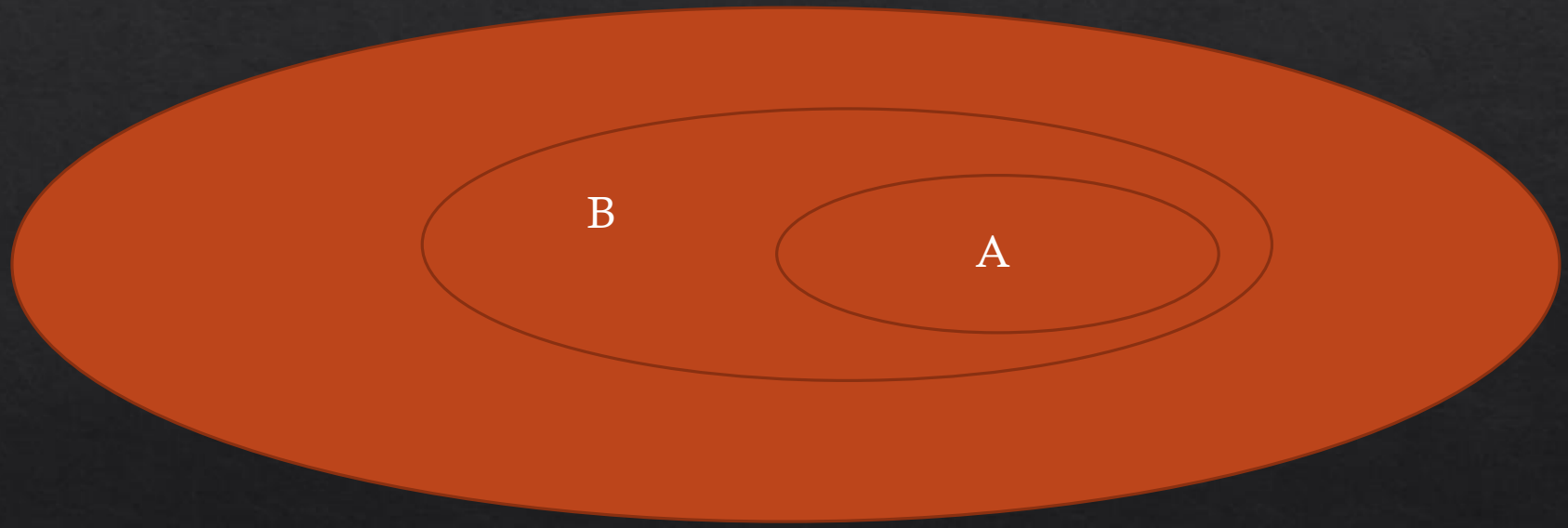
Extensional Relations between Non-empty Terms

- There are exactly seven of them
- If they are empty, things get complicated
  - One should avoid empty terms
    - Terms are empty only if they are contradictory

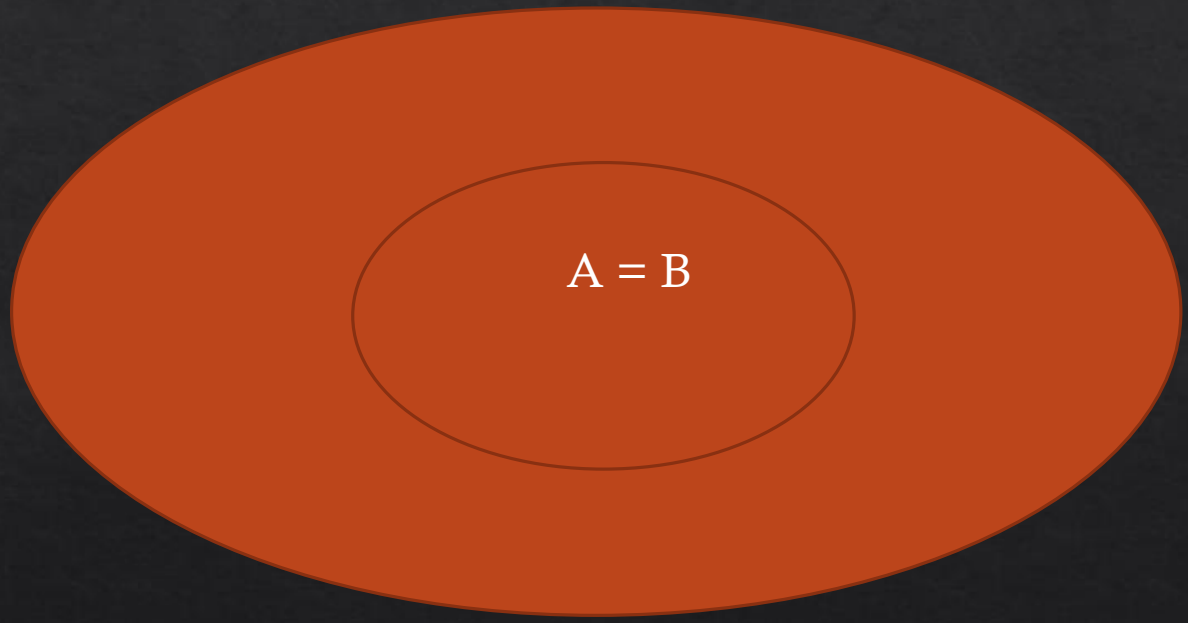
Strict Superiority



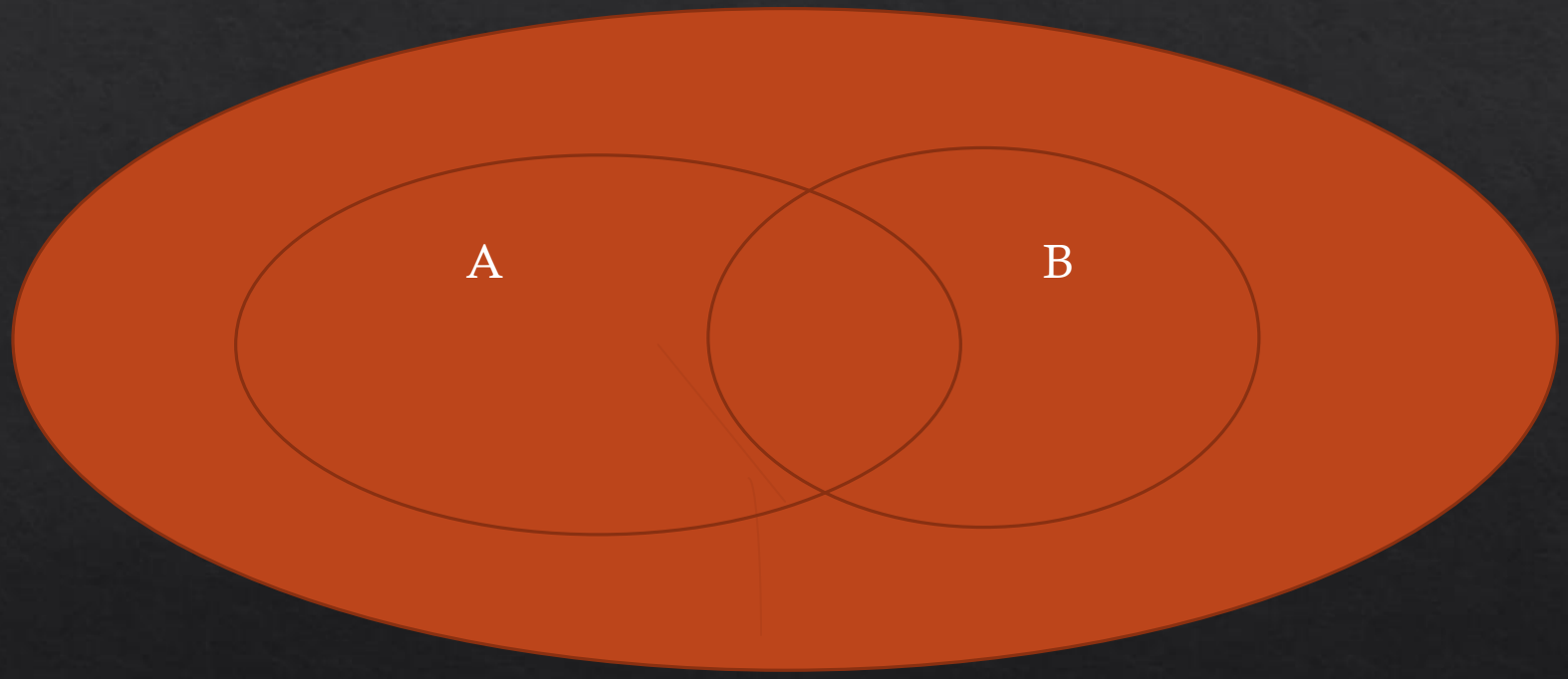
Strict Inferiority



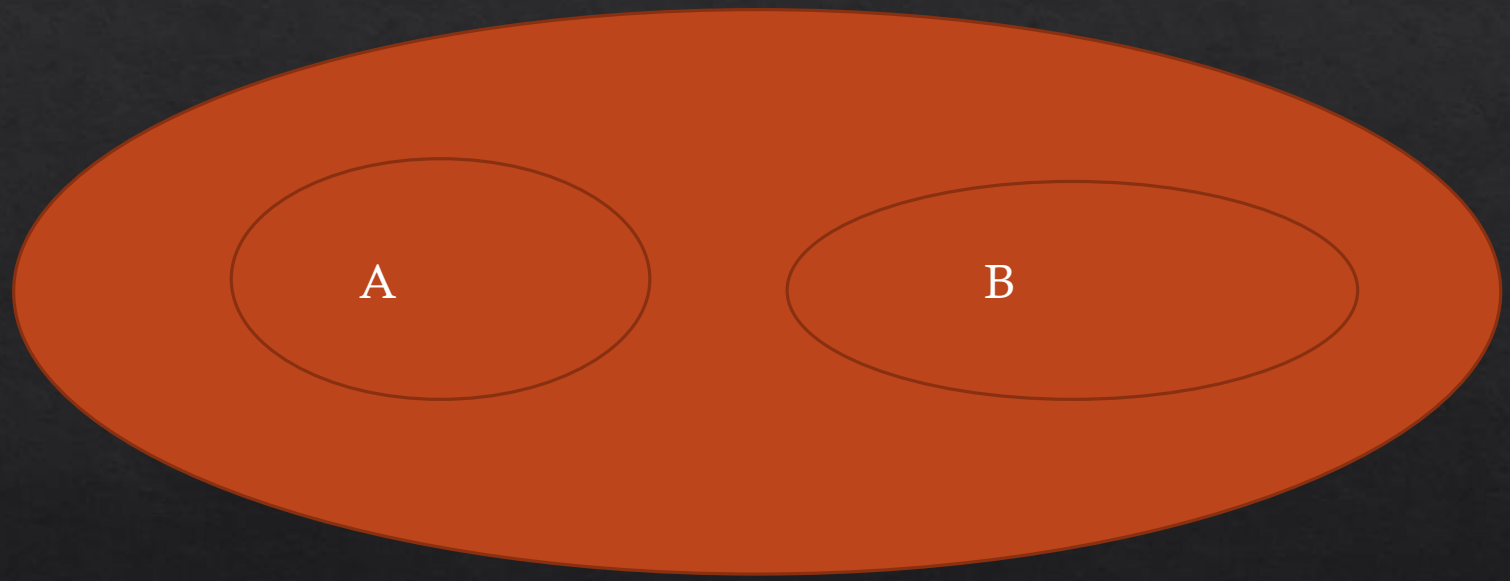
Equality



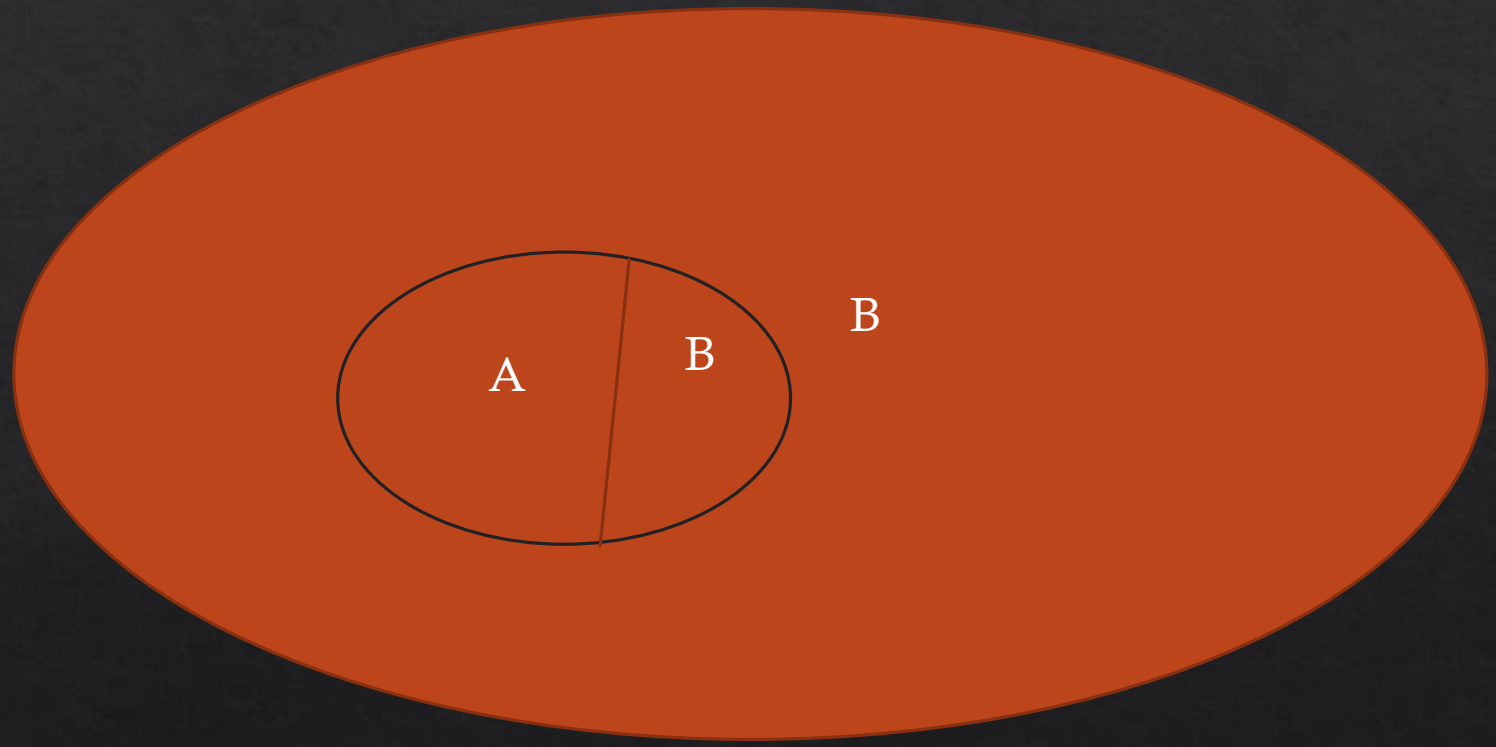
Independence



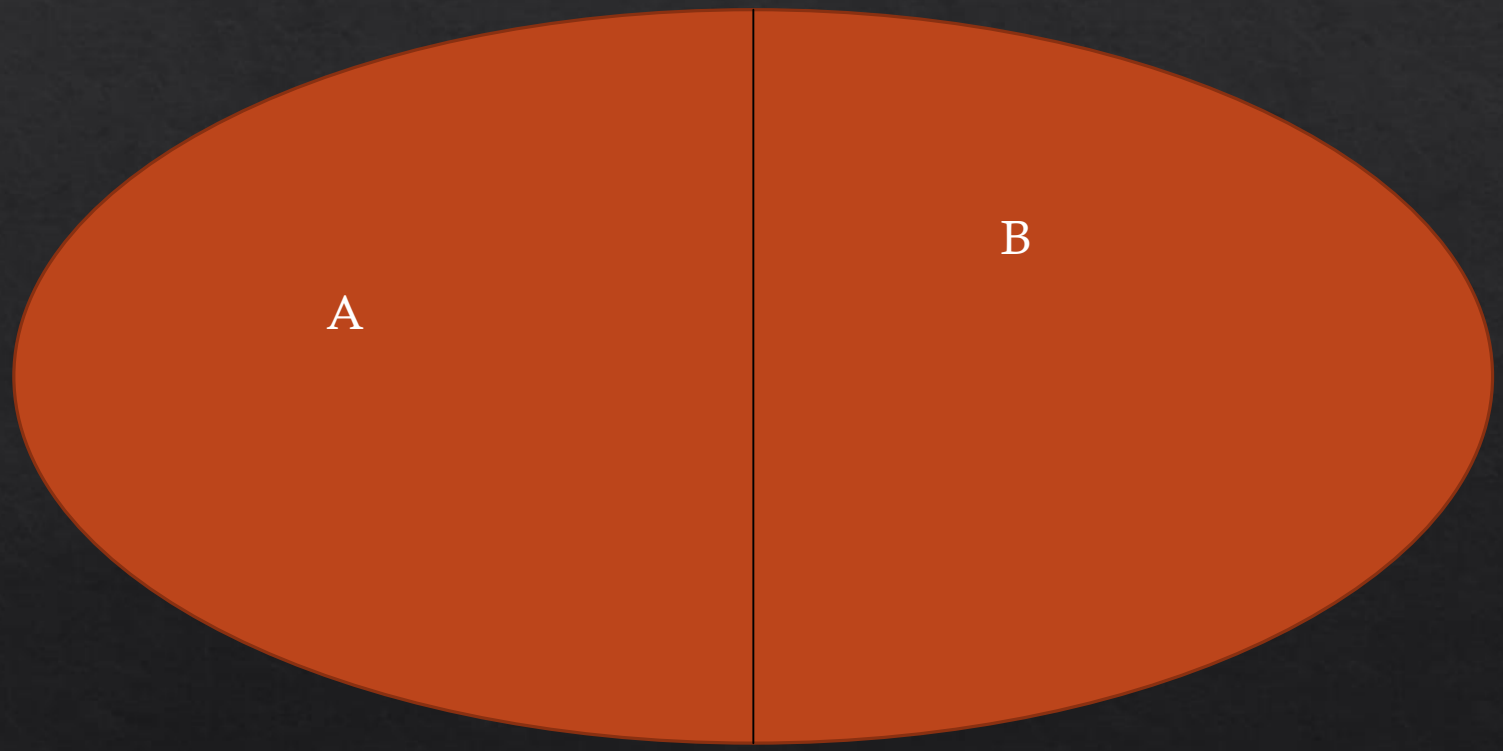
Contrariness



Subcontrariness



Contradiction



Definitions cont’

- **Extensional Statement.** An extensional statement is any formula generated by means of an equality or inclusion relation and term symbol.
  - If A and B are terms, and if ◊ may be substituted by a symbol of any of 7 extensional relations, then:
    - A = B,
    - A ⊂ B, and
    - A ◊ B
- are Extensional Statements.
- **Interpretive Statement.** An interpretive Statement is an Extensional Statement that encompasses at least one occurrence of IT.
- An AT-Interpretive Statement is an Interpretive Statement in which an occurrence of IT is on one side of the statement connective only. IT-Interpretive Statements possess occurrences of IT on both sides of statement connectives.

Cont’

- **Legal Argumentation Schemes for Interpretive Statements (LASIS).** A Legal Argumentation Scheme for Interpretive Statement is a set of propositions encompassing a set of premises and a conclusion that is an interpretive statement, accompanied by a set of critical questions. Typically, a LASIS encompasses a normative premise(s) and empirical premise(s). A meta-scheme for LASIS can be presented in the following form:
- **Normative premise.** A statutory term T should be interpreted as required by [a legally relevant reason], unless there are strong reasons to the contrary.
- **Factual premise.** According to [a legally relevant reason], a statutory term T should be interpreted in accordance with [an interpretive statement].
- **Conclusion.** A term T should be interpreted in accordance with [an interpretive statement].

An Example

- **LASIS-1. Directive of plain common meaning.**
- **Normative premise.** A statutory term T should be interpreted as required by its plain common meaning, unless there are strong reasons to the contrary.
- **Empirical premise.** According to its plain common meaning, a statutory term T should be interpreted in accordance with [an interpretive statement].
- **Conclusion.** A statutory term T should be interpreted in accordance with [an interpretive statement].

Case Study

- RULE_TAX: “Revenue generated from the sale of residential buildings is free from income tax.”
- AT-IS 1. G [amount generated by sale of the residential building] = S [stemming from the price of contract of sale of the whole real property constituting the subject of sale].
- AT-IS 2. G [amount generated by sale of the residential building] = (S \ ¬ B) = B [stemming from the price of contract of sale diminished by revenue generated by parts of the subject of sale other than the residential building—that is, the price for the building itself should count as revenue generated by sale of the residential building].

Argument #1

- **Tax Exemption Exception Argument.**
  - **Normative Premise.** If statutory rules constitute exceptions from general legal principles, they should be interpreted literally.
  - **Factual premise 1.** In tax law there is a general principle of universality of taxation, according to which if a given activity within the scope of a tax statute is not exempted from tax, then it should be a subject of taxation.
  - **Factual premise 2.** TAX is a rule that constitutes an exception to the principle of universality of taxation.
  - **Factual premise 3.** According to a literal interpretation of the antecedent of TAX:
- G = (S \ ¬ B) = B.
- **Conclusion.** Therefore, G = (S \ ¬ B) = B.

Argument #2

- **Tax Exemption Conceptual Argument.**
- **Normative Premise.** ATs should be interpreted uniformly in all branches of a legal system, unless a legal definition for a given branch or act provides otherwise.
- **Factual Premise 1.** Sale of building = sale of real property (land) with any building seated on it according to civil law.
- **Factual Premise 2.** There is no autonomous definition of the term "building" in tax law and in particular in the Personal Income Tax Act.
- **Conclusion:** Therefore: G = S.

The Supreme Administrative Court

- G = (S \ ¬ B) = B.
- The IS given above is valid independently of any context.
  - Unless the provision on which it is based is repealed or modified
- We obtain a tuple
  - (IS, LASIS, pref)

Conclusions and Future Research

- 1. As regards formal modeling and computational representation of statutory law, if developed models are to be helpful for lawyers, it is not sufficient to focus on the statutory text. It is necessary to represent interpretive statements in the knowledge base.
- 2. Interpretive Statements (ITs) may be accounted for as a subclass of Extensional Statements (ETs). The ETs may be simply and effectively represented with the use of set-theoretical notation and 7 types of extensional relations.
- 3. ITs are argued for with the use of arguments based on argumentation schemes typical for statutory legal interpretation in civil law countries. While some of these argumentation schemes are well known and described in the literature, others are not elaborated theoretically, even if often used in practice and in doctrinal writings.

Cont’

- 4. The relative weight of arguments concerning acceptance of this and not other ITs may be determined contextually, although such would not always be the case. As we could see in the tax case discussed above, the choice made by the SAC was not determined by any of the specific facts of the case for it concerned the understanding of the term G in any possible context of application of the TAX rule.
- 5. This leads us to the following formulation of structure of a knowledge base for an intelligent system dealing with statutory interpretation in civil law countries. First, we need an index of legal rules R and of their Antecedent Terms. For each AT we assign (1) a list of potential ITs for this term, (2) a list of arguments (based on LASIS) supporting or discouraging acceptance of a given AT, and (3) information on the relative weight of these arguments and therefore of a dominant AT-IS, together with contextual information (if applicable).

Thank you for your kind attention