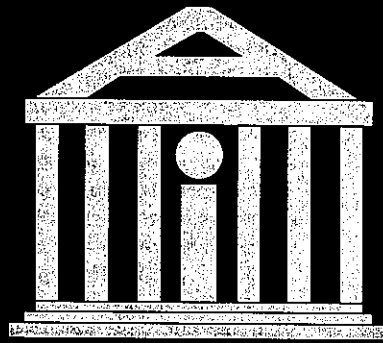


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The Systematization of Law in Terms of the Validity

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ABSTRACT

In legal praxis, it is important to decide what legal relations exist in a legal problem-event on the one hand and to decide what legal rules are applicable to decide it in terms of the validation by contract through constitution or convention on the other hand. These dimensions are strongly related with each other. This paper clarifies the logical structure of a legal system to decide the above two dimension in unified reasoning in terms of the validity of legal sentences. It provides a logical model of reasoning the validity of legal sentences for a unified legal reasoning system, in which legal relations according to the time progress of legal problem-events are decided and at the same time the applicability of relevant legal rules to decide them is decided. We demonstrate the legitimacy and efficiency of this model by applying it to concrete examples and showing how legal meta-sentences and legal meta-inference work in this model.

Keywords

Legal Reasoning, Validity of Law, Meta-rule, Meta-inference, Legal System, Systematization of Law, Basic Norm, Contract, CISG.

1. INTRODUCTION

Legal scholars have long since endeavored to systematize law as a united order. The systematization of law has been an important goal of legal science. That is the case for not only modern natural law theories¹ but also legal positivistic theories² as well as analytic legal philosophies³. According to the author's opinion, it is necessary for such a systematization of law to deal with law regulating legal relations and law regulating the application of the law in unified framework.

In legal praxis, it is important to decide what legal relations exist in a legal problem-event on the one hand and to decide what legal

¹ Cf. Pufendorf 1964, p. 208-836. In our opinion the systematization by modern natural law theories is not logically correct.

² Cf. Kelsen 1960, S. 196-282. Kelsen fails, however, to utilize precise logical methods.

³ Cf. Hart 1961, p.97-120; Raz 1980, p.93-208; Alexy 1992, p.137-197.

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rules can be applied to decide it on the other hand. The legal praxis requires dealing with the above two, substantial and procedural dimensions of reasoning not separately or independently and requests a legal theory that makes it possible to deal with them in incorporation.

The systematization of law in this sense must be also an important goal for artificial intelligence studies to construct a total legal reasoning system to decide legal (right and duty) relations by the application of law to a case and to decide the law which is to be applied to the case in united framework from contract law through constitution or convention.

This paper clarifies the logical structure of a legal system to reason the above two dimension of legal state of affairs in terms of the validity of legal sentences. It provides a logical model of reasoning the validity of legal sentences for a total legal reasoning system, in which legal relations according to time progress of legal problem-events are decided and at the same time the applicability of relevant legal rules to decide them are decided.

2. THE CONCEPT OF LEGAL SENTENCE

2.1 Types of legal sentences

Legal sentences are composed of three alternative types: legal rule and fact sentence, legal elementary and complex sentence and legal object and meta-sentences.

Legal rule sentences have the syntactic structure of rule as a hypothetical proposition, for example:

CISG⁴ Article 15(1): An offer becomes effective when it reaches the offeree.

Legal fact sentences have syntactic structure of fact as a categorical proposition, for example: "A's offer reaches offeree B at time April 8th 2010".

A legal elementary sentence is the smallest unit of legal sentence, for example: CISG Article 15(1) above cited.

A legal complex sentence is a group of legal sentences which has a unique name. For example: *CISG*.

A legal object sentence describes obligations of a person, for example: "*It is obligatory for A to deliver B the goods.*"

A legal meta-sentence describes a legal sentence, more precisely, the validity of a legal sentence, for example:

"It is obligatory for A to deliver B the goods." is valid on 2010-05-01".

⁴ CISG is common used abbreviation for *The United Nations Convention on Contracts for the International Sale of Goods*.

2.2 The Formation of Legal Sentence

The formation of a legal sentence is that the sentence is formed as a legal sentence. Whether a sentence is a legal sentence or not, is decided according to legal meta-rule sentences which regulate the formation of the legal sentence.

2.3 The Validity of Legal Sentence

In legal reasoning, legal rules must be applicable to the case. In other words, legal rules must be valid to solve the problem of the case. In law, there are many legal rules which regulate the validity of law. Legal reasoning is often executed to decide the validity of a law to a particular case. How should one systematize such rules and such legal reasoning? Answering this question is the main goal of this paper.

The concept of validity is to be conceived of as a truth concept. That a legal sentence is valid means that it is true in the legal discourse of the world. If a legal sentence which describes a legal state of affairs is valid, it means that the legal state of affairs exists in the legal world. Legal praxis works on the assumption that such a legal state of affairs exist in the legal world.

It is characteristic for law to represent this concept of truth by means of language and deal with it in legal reasoning. There are many words in law, which designate the validity of a law; "valid", "apply to", "is effective", "become effective", "enter into effect", etc.

3. THE SYSTEM OF LAW IN TERMS OF THE VALIDITY OF LEGAL SENTENCES

3.1 Systematization through legal reasoning

The system of law is created through legal reasoning. One could say, "If there is no legal reasoning, then there is no legal system." It is necessary for us to analyze the process of legal reasoning to clarify how the legal system is created through legal reasoning. The system of law is the system according to which legal sentences to solve problems are proven as valid. It is therefore necessary for us to clarify how the validity of legal sentences is to be proven through legal reasoning.

3.2 The Validity of Object Sentence

The goal of legal reasoning in the substantial law field is to decide legal relations between parties. Legal relations are composed of legal rights and obligations. To decide what kind of legal rights and obligations exist is to infer what kind of legal sentences describing such rights and obligations are valid. This must be done through application of legal meta-rule sentences which regulate the validity of legal sentences describing such rights and obligations.

A legal sentence which describes one's right is, however, not a legal object sentence but a kind of legal meta-sentence, because it is a legal sentence to afford him a legal power to settle a legal sentence. Therefore, the final target of legal reasoning is to decide what kind of legal object sentences describing obligation are valid⁵.

How is the validity of a legal object sentence grounded? To ground the validity of a legal object sentence, a legal meta-sentence which describes that the legal object sentence is valid must be proven as true.

⁵ That an obligation exists in the legal world, means that the relevant legal object sentence is valid.

3.3 The Validity of Legal Meta-sentence

The proof of a legal meta-sentence can be done through logical deduction from other valid legal sentences. In this legal reasoning, legal meta-fact and/or rule sentences are applied.

A legal meta-rule sentence, which is applied to prove that a legal meta-sentence is valid, must be also valid. How can the proof of the validity of the legal meta-rule sentence be done? This can be done through the deduction from a legal meta-fact sentence declaring that the legal meta-rule sentence is valid or by the application of other legal meta-rule sentences. Therefore, it is most important for the systematization of law to confirm legal-meta fact and rule sentences which make such deduction possible.

An inference to decide the validity of the legal rule sentence applied is called as **legal meta-inference**. Legal meta-inference controls legal reasoning to deduce an appropriate conclusion by deciding the validity of legal rule sentences which are to be applied in a legal inference⁶.

3.4 Fundamental Legal Meta-Rule Sentences

We have found several fundamental legal meta-rule sentences, which decide the validity of legal sentences, as implicit legal common sense through the study on constructing legal knowledge base. Some of legal meta-rule sentences are explained below.

Whether a legal sentence is valid is to be decided applying the following legal meta-rule sentence.

[r0]: A legal sentence is **valid** at time *T*, if and only if a legal sentence become valid before *T* and it is not the case that the sentence is terminated before *T*⁷.

This meta-rule sentence is considered as the **most fundamental legal meta-rule sentence**⁸. This rule sentence is implicitly taken for granted by all regulations. Without this rule, no statutory legal sentence can be successfully applied. This rule enables us to transform a mere collection of legal sentences into a legal system. All other legal meta-rule sentences regulate the fulfillment of the first requirement (*S becomes valid*) or the second requirement (*S is terminated*) of this rule.

There are several fundamental legal meta-rule sentences which decide the first requirement of the most fundamental legal meta-rule sentence [r0]. The following fundamental legal meta-rule sentences are to be valid:

[r01]: A legal sentence **becomes valid** if it is an element sentence of a complex sentence and the complex sentence becomes valid.

The role of a complex-sentence is to deal with the validity of many legal sentences which belong to it at once. In order for a complex sentence to become valid, the following legal meta-rule sentence must be utilized:

[r3aa1]: A complex sentence becomes valid at time *T*, if the complex sentence is formed at time *T1* and it is not the case that the complex sentence is invalid, and ((the complex sentence entails the sentence regulating the time for the complex sentence to enter into force and the time has come at *T*) or (the complex

⁶ This was discussed in: Yoshino 1995, p. 269-275.

⁷ We found this most fundamental legal meta-rule through the analysis of positive legal rule sentences getting a hint from Event Calculus. Cf. Sergot, M., et al., 1986, 370-386. Cf. Yoshino 1955, p. 269.

⁸ The logical Structure of this most fundamental meta-rule sentence must be applied not only to the legal reasoning world but also to all reasoning worlds where the validity of knowledge is to be asked. One might say that this rule represents the principle of recognition.

sentence entails the sentence regulating the condition for the complex sentence to enter into force and the condition is fulfilled at time *T*) or *T* is *T1*).

Here, it is represented that the formation is one of the requirements for a legal complex sentence to become valid. The concept of the complex sentence is an abstract concept, the sub-concept of which are contracts, judgments, administrative orders, fiats, statutory instruments, statues (codes), constitutions and conventions. One can, therefore, replace "complex sentence" in this rule sentence with its sub-concept such as "contract", "statute", "constitution", "convention" etc. to form a valuation-rule sentences for them.

[r3aa2]: If *A* has a right to require *B* to do *Z* at time *T* and *A* requires *B* to do *Z* at time *T*, then a legal sentence "It is obligatory for *B* to do *Z*" becomes valid at time *T*.

Fundamental legal meta-rule sentences which decide the internal sentence of the second requirement of [r0] are found as below:

[r02]: A legal sentence is terminated if it is an element sentence of a complex sentence and the complex sentence is terminated.

[mr4b]: A legal object sentence for one to do *X* is terminated if one performs his obligation to do *X* which is described by the legal object sentence.

3.5 Positive Legal Meta-Rule Sentences

Positive legal meta-rule sentences assist fundamental legal meta-rule sentence as its sub-rule sentence to decide the fulfillment of each requirement of the fundamental meta-rule sentences.

For example, the rule [r3aa1] represents the general logical structure of the rule sentences which regulate how a legal complex sentence becomes valid. The content of the first requirement, "formation" of the complex sentence, the second requirement, "invalidity", the third requirement, "the time for the complex sentence to enter into force" or "condition to enter into force", are to be decided according to the relevant positive complex sentence. Rule sentences which regulate these requirements are positive law rule sentences which are formed depending on the state or the international law circumstances. For example of the formation:

[CISG Article 23]: A contract is concluded when an acceptance of an offer become effective⁹.

For the systematization of law, it is important to deal with the grounding relation of a positive law from another positive law correctly. In other words, it is necessary for a legal system to deal with the level of the validity of positive legal meta-sentences so as to constitute an order of the validity. In the case that the validity of a positive legal meta-rule sentence is regulated by other positive legal meta-rule sentences, the latter belongs to the **higher meta-level** in comparison to the former.

In the case of international sale of goods, the right and duty of parties is regulated by the contract, the formation of the contract is regulated by CISG Part II and the validity of CISG Part II is regulated by CISG 1 and 99 (explained later). In state law, legal meta-rule sentences that regulate the validity of constitutions must be the highest level of legal meta-rule sentences. In the international law, legal meta-rule sentences that regulate the validity of convention must be the highest level of legal meta-rule

⁹ As to our systematization of the CISG Part II regulating formation of the contract, see: Yoshino 1998, p. 2-11.

sentence. These could be called **basic legal meta-rule sentence**, which is similar to the "Basic Norm" (Grundnorm) by Kelsen¹⁰.

4. KNOWLEDGE REPRESENTATION OF LEGAL SYSTEM OF THE VALIDITY

4.1 Compound Predicate Formula

We take a logical representation method of legal knowledge, which is oriented to the application of Prolog for the implementation. As such a method, we developed CPF (Compound Predicate Formula) and have applied this to represent legal knowledge.¹¹ In this paper, we use CPF in the simplified form eliminating its "case role"¹².

4.2 Representation of Legal Sentences

In our knowledge base, a **legal rule and fact sentence** in the case of the most fundamental meta-rule and the relevant fact sentence are represented as follows:

```
sen(r0,[ is_valid(_,[S,T])←
    become_valid(_,[S,T1]) & before(T1,T) &
    not(is_terminated(_,[S,T2])&before(T2,T)) ].
sen(f0,[ is_valid(_,[r0,T])]).
```

Below, the shell "sen(SentenceID,[SentenceContent])" is not represented, but only sentence id and content are represented.

4.3 Meta-Inference Engine

We developed a legal meta-inference engine written in Prolog.¹³ The following is the extracted listing of the legal meta-inference engine written in Prolog:

```
1 demo(A):- sen(S,[A]).
.....
5 demo(A):-
6     sen(S,[A<- B]),
7     demo(B),
.....
11 get_time_of_event(A,T),
12 demo(is_valid(_,[S,T])).
```

At every step of the success of the application of the rule to a goal, the meta-inference engine calls meta-goal¹⁴

is_valid(_,[S,T]).

This goal matches with the most fundamental legal meta-rule sentence [r0] to solve whether the sentence *S* is valid at time *T* of the goal *A*. Then subsequently, fundamental legal meta-rule sentences and positive legal meta-rule sentences are step by step applied to decide the fulfillment of the requirements of [r0].

¹⁰ Kelsen proposed the concept of "the Basic Norm" (die Grundnorm). See: Kelsen 1960, S. 204-209. This paper formalizes, beyond Kelsen, the logical structure of the basic legal meta-rule sentence and the grounding the validity of the basic legal meta-rule sentence logically.

¹¹ As to CPF, See: Yoshino and Sakurai 1993, p.298; Yoshino 1997, p. 82ff.

¹² Cf., Yoshino and Sakurai 1993, P.298

¹³ See: Yoshino 1995, p.271.

¹⁴ Cf. Line 12 of the Listing.

5. LEGAL PROBLEM AND RESOLUTION

Let's suppose that law students are asked to solve the following problem, case 8h to confirm legal relations at a designated time.

5.1 Case 8h

1) On April 1, a New York manufacturer of agricultural machines A, dispatched to the Osaka branch of a Japanese trading company B, a letter containing the following proposal: A will sell B a set of agricultural machines comprised of a tractor and a rake; the price of the tractor is \$50,000; A will deliver the machinery to B by May 10; B must pay A the price of the machinery by May 20; the machinery will be transported by an American freight vessel. 2) The proposal reached B's letter box on April 8. 3) On April 9, B telephoned A to say, "I accept your offer. However, I want the machinery transported by Japanese container ship." 4) A delivered the machinery to a Japanese container ship at the port of New York on May 1. 5) The machinery was delivered to B's Osaka branch on May 31. 6) B examined the machinery on June 5. 7) B paid A \$58,000 on May 20. (The market price of the rake was \$8,000). 8) On August 10, the machinery malfunctioned because of a defective connecting gear. 9) B notified A of the malfunction immediately. 10) On September 1, B required A that A repair the malfunction within one month. 11) A did not repair the defect by October 1. 12) On October 10, B declared the contract void.

5.2 Queries

What kind of legal relations exist between A and B on the basis of the facts of the case 8h at the following time point? (1) April 5, (2) April 15, (3) May 15, (4) June 5, (5) August 15, (6) September 15, (7) October 5 and (8) November 15.

5.3 An Example of Resolutions

One of the answers to question (6) is: "It is obligatory for A to remedy the lack of conformity of goods 'Agricultural Machinery' with the contract by repairing the connective gear of the machinery at time 2010_09_15".

6. INFERENCE PROCESS TO PROVE THE VALIDITY OF LEGAL SENTENCES

6.1 The Proof of the Validity of a Legal Meta-sentence describing the Validity of a Legal Object Sentence

To prove that the above legal object sentence is valid at time 2010_09_15, the meta-rule [r0] is applied.

[r0]: $is_valid(_ [S, T]) \leftarrow$

$become_valid(_ [S, T1]) \ \& \ before(T1, T) \ \& \ not(is_terminated(_ [S, T2]) \ \& \ before(T2, T))$

The first requirement of the rule is proven as:

$become_valid(_ ["It \ is \ obligatory \ for \ A \ to \ remedy \ the \ lack \ of \ conformity \ of \ the \ goods \ by \ repair \ the \ connective \ gear \ of \ the \ goods", 2010_09_01]) \ \& \ before(2010_09_01, 2010_09_15)$. This is proved through the application of the legal meta-rule [r3aa2] to fact 10) of the case 8h, rule [CISG 46(3)] and [r0] to the fact 8).

The second requirement of rule [r0] is proved as true according to "negation as a failure". Therefore the following is deduced:

$is_valid("It \ is \ obligatory \ for \ A \ to \ remedy \ the \ lack \ of \ conformity \ of \ the \ goods \ by \ repair \ of \ the \ connective \ gear", 2010_09_15)$.

6.2 The Proof of the Validity of the Legal Meta-rules Applied to Solve the Problem.

When the goal is proved, our inference engine tries the meta-goal whether the legal meta-rule applied is valid at time of event¹⁵: $is_valid(_ [r0, 2010_09_15])$

The validity of the most fundamental meta-rule [r0] cannot be deduced through the application of further meta-rules. The validity must be presupposed as a priori. In our knowledge base, the general validity of this rule is declared as a fact sentence:

[f0]: $is_valid(_ [r0, T])$.

This fact sentence means that rule [r0] is valid at any time.

The meta-goal matches with the above fact, so that the proof of the validity of rule [r0] is succeeded.

The validity of legal meta-rule sentences [r01], [r3aa1], [r3aa2] and [r01_c] (explained later) are also not dependent on empirical state of affairs of legal events. Therefore, in our knowledge base, the following fact sentences are set:

[f01]: $is_valid(_ [r01, T])$. [f3aa1]: $is_valid(_ [r3aa1, T])$.

[f3aa2]: $is_valid(_ [r3aa2, T])$. [f01_c]: $is_valid(_ [r01_c, T])$.

The inference engine is succeeded in proving the goal whether the relevant fundamental legal meta-rule is valid at the time of event.

CISG 46(3) must be valid at the time 2010_08_10 when the sentence "B may require A to remedy the lack of conformity of goods by repairing connective gear" becomes valid.

To prove " $is_valid(cisg46(3), 2010_08_10)$, rule [r3aa1]" is to be applied. The sub-rules which decide the first requirement of this rule, the formation of the convention, constitute substantive contents of legal basic meta-rule sentences for conventions, because it regulates the validation of a convention.

CISG 99 regulates the 4th requirement (i.e. the condition of effectiveness) of the variation rule of [r3aa1] which is formed by applying class relation "convention \subset complex sentence" to rule [r3aa1]. CISG 99 (1) regulates the condition when the CISG as a complex sentence becomes valid:¹⁶

CISG 99 (1): *This Convention enters into force, subject to the provisions of paragraph (6) of this article, on the first day of the month following the expiration of twelve months after the date of deposit of the tenth instrument of ratification, acceptance, approval or accession, including an instrument which contains a declaration made under article 92.*

[f21]: *The tenth instruments of ratification were deposited on December 11, 1986. Therefore, the CISG entered into force January 1st, 1988 according to CISG 99(1).*

The Relation of CISG 46(3) and 99 is this: the later is legal meta-rule for the former and belongs to higher level to the former.

The CISG 99 must be valid when it is applied to decide that CISG itself becomes valid. How can the validity of Article 99 be proven? To prove the validity of CISG99, we propose the following basic legal meta-rule sentence is to be valid.

¹⁵ The time of event is extracted by the sub-program of the inference engine. Cf. Line 11 of the Listing.

¹⁶ CISG 1-6 regulate the applicability of CISG articles to matters. For easy understanding, we are not dealing with the problem of the validity to the matter, but with only the validity to the time.

[r01_c]: *If an element sentence of a complex sentence is a sentence regulating the condition for the complex sentence to enter into force and the complex sentence is formed, then the element sentence becomes valid.*

[f21]: *CISG was adopted in Vienna conference on April 10th, 1980 in Vienna conference. One could say, therefore, according to [r01_c], CISG 99 became valid on 1980-04-10.*

6.3 Figurative Representation of Whole Meta-inference Process

The outline of whole process of the legal reasoning to justify the validity of law for the above query (6) in the case 8h is represented in figure 1. In rectangles, names of legal sentences and in ellipses, their contents are given. Thick allow lines designate the deduction. In the ellipse at the bottom, the final resolution, "It is obligatory for A to repair the machine" is valid at time 2010_09_15", is represented. The thick vertical allow line connected to this rectangle shows that this sentence is deduced from the premises of meta-rule [3aa2], the deduced sentence "B may require A to repair the machine" is valid on 2010-08-10." and the fact [f8] "B required A to repair the machine". This figure as a whole outlines the overall deducing process through the application of relevant legal meta-rule sentences and positive legal rule sentences from the contract through CISG up to basic legal rule sentences to the relevant legal fact sentences.

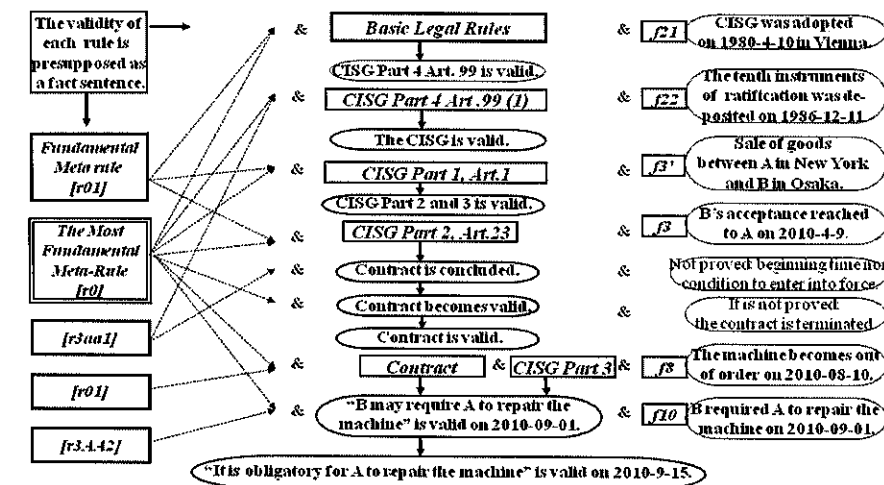


Figure 1. Outline of the Whole Process of Meta-inference of the Validity

7. CONCLUSION

This paper has presented a multi-layered logical model of a systematization of the validity of law and demonstrated that it works to construct a reasoning system of the validity of law from contracts through conventions up to basic legal rules. It would have advantages also to formalize legal reasoning corresponding to natural language expressions and praxes in law. The discussion and the implementation will be presented in future papers.

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