

Truth and Objectivity in Law and Morals

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THE CONCEPT OF TRUTH IN LAW AS THE VALIDITY*

INTRODUCTION

The concept of truth plays a decisive role in thinking, in communicating, and in debating, which are basic activities of human intelligence. This is also the case in law.

Law is applied to solve real social problems. Legal rules have to be applied to events that happen in fact at a certain time and place. The state of affairs of the event has to be grasped correctly. Sentences that describe the facts must be true. It is easily understandable that the concept of truth plays a role in legal inference where the state of affairs of the event is to be decided. In the author's opinion, the concept of truth must not only play a role in deciding the correctness of sentences based on real facts of events, but also in deciding which laws need to be applied to the events. In order to apply a law to a real social problem, the law must be valid. Only valid law is applicable; invalid law is not applicable. For a legal sentence to be valid means that it is true in the legal world. The validity in law is to be conceived as the truth in law.

In this paper the author will discuss the concept of truth in law, focusing on the validity of law from the point of view of Logical Jurisprudence. First, the author would like to explain what Logical Jurisprudence is (Part One). Then he will introduce the formal semantic definition of truth in logic, to analyze and formalize law (Part Two). Next, he will argue that validity in law should be conceived as truth in law applying the definition of truth in logic to legal sentences (Part Three). Subsequently, the author will discuss how laws linguistically represent the concept of truth as validity and how this linguistic representation of truth could be logically represented (Part Four). Finally, he will discuss how the truth as the validity of law is decided in law (Part Five). He will conclude this paper by outlining results of discussion and future tasks (Concluding Remarks).

PART ONE: WHAT IS LOGICAL JURISPRUDENCE?

In order to discuss the concept of truth in law, it is necessary to have a certain precise view point. First, the author would like to briefly present his view point of this paper, i. e., Logical Jurisprudence.

* This paper is based on the author's presentation as an invited speaker to the special workshop "Truth and Objectivity in Law and Morals" of IVR 2013. For the sake of simplicity, the author has moved the lecture's chapter on "The truth and the existence of law" to another, separated future document.

1.1 PURPOSES OF LOGICAL JURISPRUDENCE

Logical Jurisprudence is a logical theory of law created by the author. It has been developed through the study of legal philosophy and the development of legal reasoning systems (LES-2, -3, -4, -5, -6, -7, and LES-8).¹ Logical Jurisprudence analyzes the language in law logically and clarifies the structure of thoughts in law. Through this approach, the purpose of Logical Jurisprudence is to contribute to the establishment of a genuine science of law. Logical Jurisprudence is a philosophy of law as a vanguard of the science of law, in the sense that ancient Greek philosophy, when it was discussed what all things consist of, was a vanguard of the science of things, i. e., physics.²

- 1 The literature which shows the author's development of legal reasoning systems are given below in chronological order: Hajime Yoshino, 'The Application of Computer to the Reasoning in the Process of the Application of Law', *Law and Computer (Japanese)*, No. 3, 1985, pp. 77-94; Hajime Yoshino, 'Logical Structure of Law and the Possibility of Computer Aided Legal Reasoning', in: *East and West Legal Philosophies in Japan, ARSP (Archiv fuer Rechts- und Sozialphilosophie) Beihefte Nr. 30*, (ed.) Mitsukuni Yazaki, (Stuttgart / Wiesbaden, Steiner Verlag), 1986, pp. 185-202. Hajime Yoshino, 'Legal Expert System LES-2', in: *Logic Programming '86*, ed. Eiiti Wada (Berlin/Heidelberg: Springer Verlag, 1987), 34-45; Hajime Yoshino and Munenori Kitahara, 'LES-Project', in: *Expert Systems in Law. Neue Methoden im Recht*, ed. Herbert Fiedler, Fritjof Haft and Roland Traunmüller (Tübingen: Attempto Verlag, 1988), 47-65; Hajime Yoshino, Makoto Haraguchi, Seiichero Sakurai and Sigeru Kagayama, 'Towards a Legal Analogical Reasoning System: Knowledge Representation and Reasoning Methods', in: *4th ICAIL'93. Proceedings The Fourth International Conference on Artificial Intelligence and Law*, ed. Anja Oskamp and Kevin Ashley (New York (N. Y.): ACM, 1993), 110-116; Seichiro Sakurai and Hajime Yoshino, 'Identification of Implicit Legal Requirements with Legal Abstract Knowledge', in: *4th ICAIL'93. Proceedings The Fourth International Conference on Artificial Intelligence and Law*, ed. Anja Oskamp and Kevin Ashley (New York (N. Y.): ACM, 1993), 298-305; Hajime Yoshino, 'The Systematization of Legal Meta-inference', in: *5th ICAIL'95. Proceedings The Fourth International Conference on Artificial Intelligence and Law*, ed. Lindsay Thorne McCarty (New York (N. Y.): ACM, 1995), 266-275; Hajime Yoshino, 'On the Logical Foundation of Compound Predicate Formulae for Legal Knowledge Representation', *Artificial Intelligence and Law*, Vol. 5, No. 1-2, 1997, 77-96; Hajime Yoshino, 'Legal Expert Project', *Journal of Advanced Computational Intelligence*, Vol. 1, No. 2, 1997, 83-85; Hajime Yoshino, 'Logical Structure of Contract Law System - For Constructing a Knowledge Base of the United Nations Convention on Contracts for the International Sale of Goods', *Journal of Advanced Computational Intelligence*, Vol. 2, No.1, 1998, 2-11; Xu Mingqiang, Hirota Kaoru and Hajime Yoshino, 'A fuzzy theoretical approach to case-based representation and inference in: CISG', *Artificial Intelligence and Law*, Vol. 7, Issue 2-3, 1999, 259-272; Hajime Yoshino and Seiichero Sakurai, 'A Knowledge-Based Systems Approach to Educating Creative Legal Minds', in: *Proceedings of the ICAIL-05 Workshop "Artificial Intelligence and Legal Education"*, ed. Hajime Yoshino, Kevin D. Ashley and Katsumi Nitta (Bologna: ACM, 2005), 9-13; Hajime Yoshino, 'Reasoning of Legal Creation and Education for Creative Legal Mind', *Journal of Artificial Intelligence (Japanese)*, Vol. 19, No. 5, 2004, 530-536; Lluís Vila and Hajime Yoshino, 'Time in Automated Legal Reasoning', in: *Handbook of Temporal Reasoning in Artificial Intelligence*, eds. Michael Fisher, Dov M. Gabbay and Lluís Vila (Amsterdam: Elsevier, 2005), 537-557; Hajime Yoshino, 'The Systematization of Law in Terms of the Validity', in: *Proceedings Thirteenth International Conference on Artificial Intelligence and Law*, eds. Kevin D. Ashley and Tom M. van Engers (New York (N. Y.): ACM, 2011), 121-125.
- 2 The author showed the fundamentals of Logical Jurisprudence in: Hajime Yoshino, 'Tractatus Logico-Juridicus - its Basis', in: *Auf dem Weg zur Idee der Gerechtigkeit: Gedenkschrift für Ilmar Tammelo*, (eds.) Jakob Raimund, Lothar Philipps and Csaba Varga (Vienna: LIT-Verlag, 2009), 127-148.

1.2 PRIMITIVES OF LOGICAL JURISPRUDENCE

In order to establish a genuine science of law, Logical Jurisprudence should start with sound minimum elements just as classical physics did. Classical physics started with the three following **primitives**³: gravity, force, and motion. Physicists have analyzed and constructed the physical world in terms of these three primitives. Logical Jurisprudence starts with three primitives as well. Its primitives are: “**sentence**”, “**truth**,” and “**inference**.” The author’s approach tries to thoroughly analyze and reconstruct the entire legal system on the basis of these three primitives.

1.3 “SENTENCE”

Logical Jurisprudence starts with “sentences”. More precisely, it starts with “legal sentences.” Legal sentences are sentences that are formed as legal sentences in the real world.⁴ Logical Jurisprudence distinguishes between legal sentences and legal norms, whereby the latter are conceived as the meaning of legal sentences. Logical Jurisprudence does not start with the “legal norm” as a meaning, unlike most traditional continental legal philosophers, such as Hans Kelsen. Logical Jurisprudence considers the norm as a meaning to be non-existent as an inter-subjective object, because the meaning of the sentence appears only in the consciousness of the people who use the sentence, i. e., those who create or interpret it. On the contrary, the existence of sentences can be checked inter-subjectively, because the process of forming sentences is based on empirical events. Those events can be confirmed by evidence.

Logical Jurisprudence analyzes and constructs law in terms of three types of alternative fundamental legal sentences:

- Legal rule sentences and fact sentences
- Legal element sentences and complex sentences
- Legal object sentences and meta-sentences

Let us have a closer look at these three types of alternative conceptions of legal sentences.

1.3.1 Legal Rule Sentences and Fact Sentences

Legal rule sentences have the following syntactical structure:

$$(1) \forall X (a(X) \leftarrow b(X))$$

Let us have a look at an example:

$$(1') \forall X ('with\ death\ penalty'(X) \leftarrow (murder(X)))^5$$

3 The terminology of “primitives” here is used to represent fundamental concepts and components with which all is analyzed and explained.

4 The author will discuss the formation of legal sentences later in Part 5.3.3.

5 The author applies the single quotations to formalize predicates which are represented by several words together with spaces.

Legal fact sentences have the following syntactical structure:

(2) *b(x1)*

Let us have a look at an example:

(2') *murderer ('Charles Manson')*

1.3.2 Legal Element Sentences and Complex Sentences

Legal element sentences are the smallest units of legal sentences.

Let us have a look at an example:

CISG⁶ Article 15

(1) *"An offer becomes effective when it reaches the offeree."*

Legal complex sentences are a set of legal sentences that have a unique name. A code, its parts, and its chapters are legal complex sentences. An article can also be a legal complex sentence if it has more than two sections. For example, CISG Article 15 is a legal complex sentence:

CISG Article 15

(1) *An offer becomes effective when it reaches the offeree.*

(2) *An offer, even if it is irrevocable, may be withdrawn if the withdrawal reaches the offeree before or at the same time as the offer.*

Through introducing these two conceptual devices of legal element and complex sentences, Logical Jurisprudence can analyze legal sentences into their minimal elements on the one hand and reconstruct them systematically on the other hand, the way they exist in fact.

1.3.3 Legal Object Sentences and Meta-Sentences

A legal object sentence describes an object. The object in law is the obligation of a person to conduct a certain action. The law affects peoples' conducts by imposing duties on them in order to realize the purpose of law. The obligation is an object that constitutes the source of power for law to control society. Legal object sentences describe the obligations of people who should perform specific actions.

For example, the following sentences are legal object sentences:

"A murderer must be punished with the death penalty" and

"B must pay \$50,000 to A."

A legal meta-sentence describes something about a legal sentence; to be precise, it describes the validity of such a legal sentence. For example, the following sentences are legal meta-sentences:

(1) *"B must pay \$50,000 to A" is valid on April 15, 2014."*

6 "CISG" is a common abbreviation of "The United Nations Convention on Contracts for the International Sale of Goods".

(2) "This Convention applies to contracts of sale of goods between parties whose places of business are in different States [...]" (Article 1 clause (1) of the CISG).

The terminology "meta" originates from the "meta-language" of Tarski. According to Tarski, if there is another language L_2 describing something about language L_1 , L_2 is called a meta-language of L_1 .⁷ The legal sentence (1) above describes something about the sentence 'B must pay the price of \$50,000 to A,' i. e., it describes the validity of the latter sentence while the legal sentence (2) describes something about the legal sentences of the convention, i. e., the applicability of the legal sentences of the Convention. Therefore, these can be called "legal meta-sentences" in Tarski's sense.

A legal meta-sentence can also be described further by another legal-meta-sentence. The latter is a legal meta-sentence to the former legal meta-sentence, and therefore, it could be called "legal meta-meta-sentence" or simply "legal meta-sentence" as well.

1.4 "TRUTH"

The concept of truth is the second primitive of Logical Jurisprudence. This paper focuses on the concept of truth in law.

1.5 "INFERENCE"

The legal sentence itself is merely an array of symbols. The meaning of a legal sentence becomes visible only when it is used by people, i. e., created and applied by people. In other words, the legal inference activates the legal sentences as living legal norms. Logical Jurisprudence works with the "inference" as its third primitive. The theory of Logical Jurisprudence clarifies how the meaning of legal sentences can be activated through inference and how further legal sentences are developed in the process of legal reasoning.

Logical inference is based on inference rules. An inference that is based on those inference rules is a logically correct inference. The most important inference rule is the rule of "Modus Ponens":

$$((A \Rightarrow B) \& A) \Rightarrow B$$

This formula is to be read as follows (where A as well as B are propositions): If "B follows from A" is true and if "A" is also true, it logically follows that "B" is true.

7 Alfred Tarski, 'The Concept of Truth in Formalized Languages' (first publ. 1933), in: *Logic, Semantics, Metamathematics. Papers from 1923 to 1938* (Oxford: Clarendon Press, 1956), 152-278 at 167-168. Tarski called L_1 "object language". In his usage, if L_2 is described by another language L_3 , L_2 is also called an "object language" of L_3 . The relation between "object language" and "meta-language" is relative for Tarski. The author of this paper only uses "legal object sentence" for the sentence describing the obligation. Logical Jurisprudence avoids to use the word "object sentence" for the sentence which is described by a meta-sentence. The legal meta-sentence, which is described by another legal meta-sentence should not be called a "legal object sentence," but still it should be designated as a "legal meta-sentence".

The rule of Modus Ponens is a fundamental inference scheme underlying the reasoning of justification in law, especially in the application of law to given cases. Although the reasoning of the application of law does not consist only of the reasoning of justification but also of the reasoning of creation (or discovery), where inductive as well as abductive reasoning is performed, the Modus Ponens could play an important role as a constraining scheme concerning the reasoning of creation.

In summary: Logical Jurisprudence analyzes and reconstructs law in terms of these three primitives: sentences, truth, and inference.

PART TWO: THE DEFINITION OF TRUTH IN LOGIC

In order to get a sound and adequate starting point, let us discuss the concept of truth in logic and try to provide its formally correct definition in this part.

2.1 THE PROBLEM

With respect to the applicability of the concept of truth in logic to law itself, pessimistic views have been widespread. The law is traditionally conceived as a set of norms. The legal norm is seen not as descriptive but as prescriptive. This view has led many scholars to reject the application of classical logic to legal norms since the earliest discussion of the logic of norms. At the same time, philosophers were discussing the "Dilemma of Jørgensen" that originates from the following:⁸

1. Norm-sentences cannot be evaluated as true or false.
2. The system of classical logic is based on the evaluation of sentences with respect to their truth or falsehood.
3. Classical logic, therefore, cannot be applied to norm-sentences.

Here, one should correctly grasp the concept of truth in logic.

2.2 THE DEFINITION OF TRUTH IN LOGIC ON THE BASIS OF TARSKI'S VIEW

In logic, the concept of truth applies to sentences. The word "true" is applied to a sentence such as "A is true," where A is a sentence. For example: "Snow is white" is true.⁹ Here, "true" is used as a predicate. We can also say: "A is a true sentence."

The "definition" can be developed in three ways: (a) a material definition, (b) a lexical definition and (c) finally, a promissory definition.¹⁰ The material definition explains the essential meaning of the *definiendum*¹¹ of the word "truth," represented by a *definiens*¹², i. e., giving the genus and differentia of the concept. To define "truth" lexically is to describe the real usage of the term, i. e., how it is used. Finally,

8 See Jørgensen, J., Imperatives and Logic, *Erkenntnis*, 7, 1937/38, 288–296.

9 Tarski, A., 'The Concept of Truth in Formalized Languages' (n. 7), 152–278 at 154–165.

10 See Raziel Abelson, 'Definition', in: *Encyclopedia of Philosophy*, vol. 2, 2nd ed., Macmillan, 2006, 664–677.

11 "Definiendum" is the Latin term for "that what is to be defined".

12 "Definiens" is the Latin term for "that what is defining".

the promissory definition means to promise or propose the usage of the term, e. g. "Let us use the term 'truth' this or that way." In this part, the author will propose the usage of the term "truth" or "true" to coincide with the general usage of the term.¹³

The author defines the concept of truth in logic on the basis of Tarski's conception of truth, paraphrased as follows:

The truth-valuation, i. e., the assignment of truth-values, for an atomic proposition-formula, can be presented in predicate logic as described below. The following symbols will be used:

Φ : a predicate

i : an interpretation functor

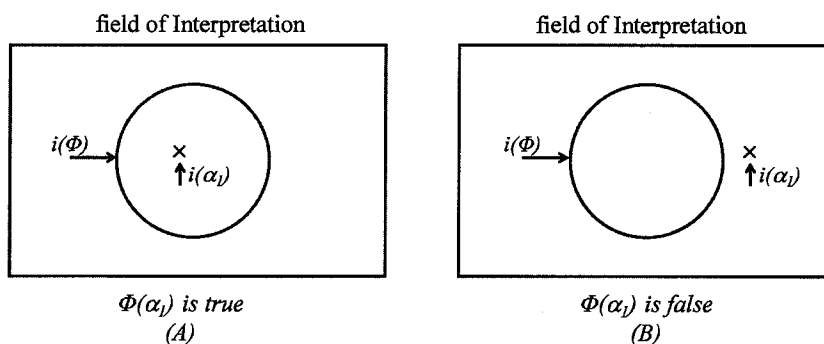
$\alpha_1, \dots, \alpha_n$: an individual constant or variable

(A) $\Phi(\alpha_1, \dots, \alpha_n)$ is true under i iff $\langle i(\alpha_1), \dots, i(\alpha_n) \rangle \in i(\Phi)$, and

(B) $\Phi(\alpha_1, \dots, \alpha_n)$ is false under i iff $\langle i(\alpha_1), \dots, i(\alpha_n) \rangle \notin i(\Phi)$

Accordingly, when an interpreted individual constant or variable is an element of the set which is the extension of the interpreted predicate, the relevant proposition-formula is true and, if not, it is false.

This relationship, in the case of a proposition with a one-term predicate, can be represented in the following figures:



2.3 THE CONSEQUENCE OF THE CONCEPT OF TRUTH IN LOGIC

On the basis of the foregoing demonstrations, one should point out that the definition of the truth-concept of logic by Tarski is constructed purely formally, without questioning the criteria by which the fulfillment must be decided. According to the definition by Tarski, the logical calculus needs, as a presupposition, nothing but the purely formal principle of bivalence, namely, that a value of two possible values is allocated to every sentence uniformly.¹⁴ In the sense above, legal sentences can be

13 See Alfred Tarski, "Truth and Proof", in *Scientific American*, Vol. 220, Issue 6, 1969, 63-70, 75-77.

14 See Hajime Yoshino, "Über die Notwendigkeit einer besonderen Normenlogik als Methode der juristischen Logik," in: *Gesetzgebungstheorie, Juristische Logik, Zivil- und Prozessrecht*, eds. Ulrich Klug, Thilo Ramm, Fritz Rittner and Burkhard Schmiedel (Berlin/Heidelberg/New York: Springer Verlag, 1978), 140-161 at 145.

evaluated as true or false according to certain criteria. A value of these two values can be allocated to every legal sentence.

PART THREE: THE DEFINITION OF TRUTH IN LAW AS THE VALIDITY OF LAW

The legal sentence is said to be valid or invalid. The validity is the key concept in law. It is very important for the theory of law to have a correct and precise concept of "validity".

Logical Jurisprudence considers the validity of legal sentences as their truth in the legal world. Being valid or invalid means that a sentence is true or false in the legal world. It is marvelous that law has represented the truth of legal sentences as "validity" and that it has provided a system to determine the validity of legal sentences.

The author would like to provide a formal semantic definition of the concept of truth as validity, on the basis of the definition of truth in logic above. The Tarski-type definition of the truth-concept described above can be applied to interpret the truth-concept as validity.

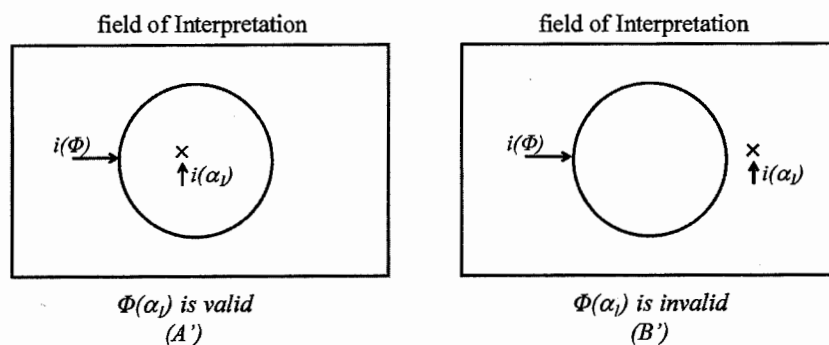
If " Φ " is applied to an atomic predicate with n -terms and if $\langle \alpha_1, \dots, \alpha_n \rangle$ is applied to an individual constant or variable, the truth-valuation, i. e., the allocation of truth-values to an atomic proposition in predicate logic, is represented as in the following:

(A') $\Phi(\alpha_1, \dots, \alpha_n)$ is valid iff $\langle i(\alpha_1), \dots, i(\alpha_n) \rangle \in i(\Phi)$ ¹⁵

(B') $\Phi(\alpha_1, \dots, \alpha_n)$ is invalid iff $\langle i(\alpha_1), \dots, i(\alpha_n) \rangle \notin i(\Phi)$

When an individual constant or variable comes under the class of the interpreted predicate, the proposition formula is "valid" (A') and otherwise it is not "valid," namely "invalid" (B').

This relationship, in the case of a proposition with a one-term predicate, can be represented in the following figures:



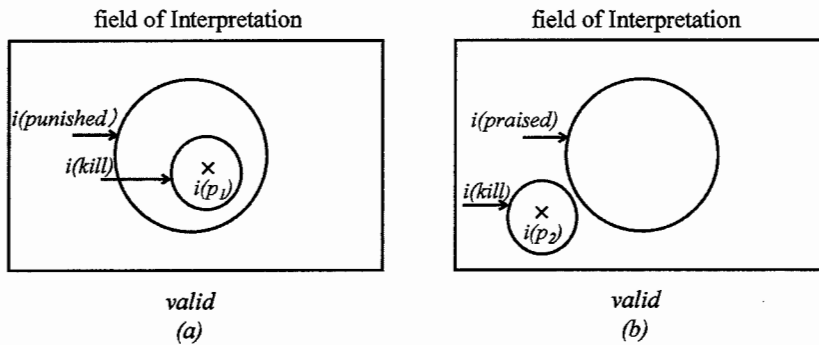
15 "iff" in the definition means "if and only if".

This definition of the concept of truth as validity can be explained understandably in the example below:

- (a) "All humans must be punished if they kill another human" is valid.
- (b) "All humans must be praised if they kill another human" is invalid.

In this norm, an individual constant or variable, which belongs to the class, "being who kills a human," on the basis of the conditional half-sentence, comes under the class of "being punished" in (a), but not under the class of "being praised" in (b). It is understandable that the sentence "All humans must be punished if they kill another human" is valid. But the sentence "All humans must be praised if they kill another human" is invalid, because it is intuitively clear that the state of affairs is not that the "individual who belongs to the class of people who kill another person" falls under the class of "people who are praised", as the sentence designates, but is to be excluded from the class. The state of affairs in (a) is "valid" and in (b) is "invalid."

This relationship can be represented in the following figures:



"All humans must be punished if they kill another human" is valid.

"All humans must be praised if they kill another human" is invalid.

PART FOUR: THE LINGUISTIC AND LOGICAL REPRESENTATION OF THE CONCEPT OF TRUTH IN LAW AS VALIDITY

The author would like to clarify first how the truth as the validity of law is linguistically represented and secondly how it can be logically represented.

The following is an example of a linguistic and logical representation of a legal rule sentence:

- r1: All persons who kill another person must be punished by the death penalty.
- r1: $\forall X(\text{person}(X) \& \text{'another person'}(Y, X) \& \text{kill}(X, Y) \rightarrow \text{'must be punished with death penalty'}(X))^{16}$

16 In this formula, the predicate "must be" is used. This is a purely predicate-logical formula and the predicate "must be" has no meaning as a deontic operator of deontic logic.

Persons who insist that this legal rule sentence is valid usually phrase this sentence directly (without using any predicate such as "valid"), as follows:

"All persons who kill another person must be punished by the death penalty."

However, if one would interpret one's speech correctly according to one's own intention, one should interpret it in terms of the validity of the sentence. If one would like to represent one's assertion correctly, using the predicate "valid," the legal rule sentence should be reformulated as follows:

r1': It is valid that all persons who kill another person must be punished by the death penalty.

The legal sentence *r1'* can be linguistically and logically reformulated as follows:

r1: "All persons who kill another person must be punished by the death penalty."

r1: $\forall X(\text{person}(X) \& \text{'another person'}(Y,X) \& \text{kill}(X,Y) \rightarrow \text{'must be punished by the death penalty'}(X))$

f1: "r1 is valid."

f1: is_valid(r1,T).

The fact sentence *f1* above describes that the legal sentence *r1* is valid. It describes the validity of a legal sentence. Therefore, the sentence *f1* is a meta-sentence to the sentence *r1* as explained above¹⁷.

If one glances at positive laws, it is clear that legal rule sentences are not represented in the type of *r1'* but only in the shape of *r1*. One cannot find any positive legal rule sentence of the type *r1'*. This suggests that the extant legal rule sentence itself does not guarantee that it is valid. However, the legal rule sentence *r1* is presented under the presupposition that it can be proven that *r1 is valid*. There must be another legal rule sentence according to which it is decided whether the relevant legal rule sentence is valid, e. g. "*r1 is valid*."

How can the sentence "*r1 is valid*" be proven as true? One cannot find any legal rule sentence in positive laws to decide that "a legal sentence is valid." There is no positive legal rule sentence that says "The legal sentence *S* is valid," i. e., "*is_valid(S,T)*"¹⁸ as the consequence part of the rule sentence. However, in order to prove that "*a legal sentence is valid*," there must be a rule sentence that has "*is_valid(S,T)*" as its consequence. As such a rule sentence cannot be found in positive legal rule sentences, one should endeavor to find such a rule sentence as an implicit common sense rule. This could start with the analysis of various expressions of legal rule sentences that refer to the validity of legal sentences.

If one looks all over and examines laws in detail, one can notice that there are many legal rule sentences that contain linguistic representations relating to "validity" such as "validity" itself, "is valid," "is in effect," "is in force," "is enforceable,"

17 See Part 1.3.3 in this paper.

18 "S" is a variable to represent legal sentences and "T" is a variable to represent time. A legal rule is not valid forever but relatively valid according to the progress of time. It is necessary for a legal rule sentence to be valid at the time point when it is to be applied and when the event occurs. Therefore, it is necessary for a legal sentence describing the validity to refer to the time point and for the logical formula to have a variable or a constant to represent the time point.

“enters into force,” “comes into force,” “becomes effective,” “goes into effect,” “is terminated,” “is expired,” “loses effect,” “goes out of force,” “is null,” “is void,” “is invalid,” and so on. Legal rule sentences that use such expressions must regulate the validity of legal sentences.

As a result of the analysis of such legal expressions in positive laws, Logical Jurisprudence proposes the following four predicates as fundamental predicates to represent legal rule sentences that decide the validity of other legal sentences:

	Linguistic Representation	Logical Representation
1)	“ <i>S is valid at time T</i> ”	<i>is_valid(S,T)</i>
2)	“ <i>S becomes valid at time T</i> ”	<i>become_valid(S,T)</i>
3)	“ <i>S becomes null at time T</i> ”	<i>become_nul(S,T)</i>
4)	“ <i>S is invalid at time T</i> ”	<i>is_invalid(S,T)</i>

According to Logical Jurisprudence, all predicates used in positive legal rule sentences to regulate the validity of laws could be classified under these four predicates. Legal rule sentences that deal with the validity of legal sentences are to be represented by using some of these four predicates.

Among these four predicates, “*is valid*” is the most fundamental predicate. Among the legal sentences being composed of these four predicates, “*S is valid*” (1) above) is the most fundamental legal sentence describing the validity.

It is to be noted that in actual laws, these predicates representing validity do not refer to the contents of legal sentences themselves, but to the names or identifiers of the legal sentences in law. Thus, that legal rule sentence *r1 is valid* is to be represented linguistically and logically in the following way, as described above:

r1: All persons who kill another person must be punished by the death penalty.

r1: $\forall X(\text{person}(X) \& \text{'another person'}(Y,X) \& \text{kill}(X,Y) \rightarrow \text{'must be punished with death penalty'}(X))$

f1: “r1 is valid.”

f1: is_valid(r1,T)

The same applies to the other three predicates of validity as follows:

	Linguistic Representation	Logical Representation
<i>f2:</i>	“ <i>r1 becomes valid</i> ”	<i>become_valid(r1,T)</i>
<i>f3:</i>	“ <i>r1 becomes null</i> ”	<i>become_null(r1,T)</i>
<i>f4:</i>	“ <i>r1 is invalid</i> ”	<i>is_invalid(r1,T)</i>

With reference to the fundamental predicates representing the validity of legal sentences presented above, the author discusses below how the truth in law as validity could be and should be decided using these fundamental predicates.

PART FIVE: HOW IS THE TRUTH IN LAW AS VALIDITY TO BE DETERMINED?

How is the truth in law as validity to be determined? It is to be decided through a legal inference. The validity of legal sentences does not last forever. It is restricted to a certain time period. The span of time during which a legal sentence is valid is to be determined through a legal inference. Whether a legal sentence is valid at a certain point in time is also determined through a legal inference.

5.1 LEGAL META-INFERENCE

The legal inference that determines the validity of legal sentences is to be called a “legal meta-inference” because it deals with legal meta-sentences that describe the validity of legal sentences.

In such an inference, a goal sentence that is to be solved is presented. The goal sentence is to be solved through the application of rule sentences as well as fact sentences. For example, in order to determine that the legal sentence $r1$ is valid at a certain time $t1$, the following goal sentence is to be presented:

r1 is valid at time t1.

is_valid(r1,t1)

If this goal sentence is proven as true, then the legal sentence $r1$ is valid at time $t1$. If it is not proven as true, then the legal sentence $r1$ is not valid. In order to decide whether this goal sentence is true, the relevant rule sentences and fact sentences are to be applied.

5.2 THE MOST FUNDAMENTAL LEGAL META-RULE SENTENCE DETERMINING THAT A LEGAL SENTENCE IS VALID

What kind of rule sentences are to be applied to decide that a legal sentence is valid at a certain point in time? The rule sentence that determines that a legal sentence is valid must correlate to the goal sentence of “a legal sentence is valid” as the consequence part of the rule sentence. But what then is the requirement part of the rule sentence? Generally speaking, that a state of affairs exists at a certain point in time means that the state has occurred on the timeline before the evaluated point in time and has not ceased to exist up to and including the evaluated point in time. This must be the case for the validity. Therefore, one could suppose the following rule sentence using other fundamental predicates of validity listed above. As a conclusion, Logical Jurisprudence has generated the following rule sentence¹⁹:

19 The author found this meta-rule sentence through the analysis of positive legal rule sentences, getting a hint from Event Calculus, see Marek J. Sergot, Fariba Sadri, Robert Kowalski, Frank R. Kriwaczek, Peter Hammond and H. Therese Cory, ‘The British nationality Act as a Logic Program’, *Communications of the ACM*, Vol. 29, No. 5, 1986, 370–386; Hajime Yoshino, ‘The Systematization of Legal Meta-inference’ (n. 1), 266–275 at 269.

[r0]: A legal sentence is valid at time T, if and only if

*the legal sentence has become valid at time T1 (which is before or at the same time as T)
and
it is not the case that the sentence has become null at T2 (which is before or at the same
time as T).*

[r0]: $\forall S \forall T \forall T1 \forall T2 \{is_valid(S, T) \leftrightarrow$
become_valid(S, T1) & before_or_same(T1, T) &
not ((become_null(S, T2) & before_or_same(T2, T)))\}.

This rule sentence is always applied whenever it is decided that a legal sentence is valid. Therefore, it is called **“the most fundamental legal meta-rule sentence”** (MFLMRS).

Here, two fundamental predicates, *“become_valid”* and *“become_null”* above, are used in the definiens (requirement) to define the definiendum (consequence), *“A legal sentence S is valid”*. The sentence *“A legal sentence S becomes valid at time T1”* means that the sentence S becomes true at the time point of T1 in the world of the legal discourse. The sentence *“the legal sentence S becomes null at time T2”* means that the sentence loses its truth or validity at the time point of T2 in the legal world.

In order that a legal sentence S is valid at time T, it is necessary at first that the sentence S becomes valid at time T1, which is before or at the same time as T. This condition is written down as the first element of the requirement in the rule sentence [r0].

The second element of the requirement of the rule sentence is written down in the third line of the rule sentence [r0]: In order that the legal sentence is valid at time T, it is necessary that it is not the case that the sentence that has become valid at time T1 has become null before or at the same time as T.

The term *“not”* in the formula of the second element of the requirement states a negation. But if this rule sentence is applied to a legal reasoning system in which the reasoning is performed on a computer, the negation is not interpreted as perfectly equal to the concept of the negation in the sense of classical logic. It is to be interpreted as a *“negation as a failure”*²⁰ in the sense of logic programming.²¹

In short, the MFLMRS (the most fundamental legal meta-rule sentence) expresses that a legal sentence is valid if and only if it has become valid and if it has not become null yet.

This rule could be called *“a principle of recognition”* in law, because it must be applied whenever one judges whether something exists in the legal world.

20 The Negation as failure (NAF) is an inference rule in logic programming according to which a proposition failed to prove true is considered as a negation of the proposition. For example, *“not (p)”* is interpreted not to hold when it fails to prove p.

21 Logic programming is a computer programming method based on horn-clause logic as a subset of predicate logic, which fits to represent legal sentences and stimulate legal inferences on a computer.

5.3 POSITIVE LEGAL META-RULE SENTENCES AND FUNDAMENTAL LEGAL META-RULE SENTENCES

How is it decided whether the first element and the second element of the requirement of the MFLMRS [r0] above are fulfilled? To make these determinations, positive legal rule sentences in positive laws are finally applied.

5.3.1 Positive Legal Meta-Rule Sentences That Contribute to Determining the Validity of Legal Sentences

In positive laws, one can easily find many **positive legal meta-rule sentences** (PLMRS) that may contribute to determining the validity of legal sentences. For example, one could find the following positive legal meta-rule sentences:

- (1) *The Act on General Rules for Application of Laws of Japan Article 2: "A law shall come into effect after the expiration of twenty days following the date of its promulgation; provided, however, that if a different effective date is provided by law, such provision shall prevail."*
- (2) *Civil Code of Japan Article 135 (1): If time of commencement of validity is assigned to a juristic act, the performance of such juristic act may not be demanded before the arrival of such time.*
- (3) *Civil Code of Japan Article 127 (1): A juristic act which is subject to a condition precedent shall become effective upon fulfillment of the condition.*
- (4) *CISG Article 23: A contract is concluded at the moment when an acceptance of an offer becomes effective²² in accordance with the provisions of this Convention.*
- (5) *CISG Article 18 (2): An acceptance of an offer becomes effective at the moment the indication of assent reaches the offeror.*
- (6) *The Constitution of Japan Article 59: A bill becomes a law on passage by both Houses, except as otherwise provided by the Constitution.*
- (7) *Civil Code of Japan Article 90: A juristic act with any purpose which is against public policy and good custom is void.*
- (8) *The Constitution of Japan Article 98: This Constitution shall be the supreme law of the nation and no law, ordinance, imperial rescript or other act of government, or part thereof, contrary to the provisions hereof, shall have legal force or validity.*
- (9) *Civil Code of Japan Article 135 (2): If time of expiration of validity is assigned to a juristic act, the validity of such juristic act shall expire upon the arrival of such time.*
- (10) *Civil Code of Japan Article 127 (2): A juristic act which is subject to a condition subsequent shall become ineffective upon fulfillment of the condition.*
- (11) *Civil Code of Japan Article 167 (1): A claim shall be extinguished if not exercised for ten years.*
- (12) *CISG Article 81 (1): Avoidance of the contract releases both parties from their obligations under it, subject to any damages which may be due.*

22 It is to be noted that it is not the predicate "valid" but "effective" that is used in these articles.

5.3.2 Positive Legal Meta-Rule Sentences Which Are Related to Determining That a Legal Sentence Becomes Valid

Among the positive legal rule sentences above, (1) The Act on General Rules for Application of Laws of Japan Article 2 regulates when a law (statute) becomes effective; (2) Civil Code of Japan Article 135 (1) regulates indirectly when a juristic act with a time of commencement of validity becomes effective; and (3) Civil Code of Japan Article 127 (1) regulates when a conditional juristic act as a law becomes effective. These positive legal meta-rule sentences decide when the relevant legal sentence becomes effective, i. e., the beginning time of its validity. Therefore, these positive legal meta-rule sentences should be taken as constituting elements of the requirements that have to be fulfilled in order that a legal sentence becomes valid. However, these legal meta-rule sentences do not provide a sufficient condition for the relevant legal sentence becoming valid; they provide only a necessary condition for that. What other conditions are necessary to be fulfilled in order that a legal sentence becomes valid? In other words, what is the necessary and sufficient condition for a legal sentence to become valid?

In order that a sentence becomes legally valid, it must first be a legal sentence. To say it precisely, the sentence must be formed as a legal sentence to become valid. No non-legal sentence can become valid. The formation of legal sentences is a necessary precondition in order that a sentence becomes valid as a legal sentence.

Among the positive legal rule sentences above, (4) CISG Article 23, (5) CISG Article 18(2) and (6) The Constitution of Japan Article 59 regulate the formation of legal sentences. CISG Article 23 regulates when and how a contract is concluded. Therefore, it can be said that this article regulates the formation of a contract as a law. CISG Article 18(2) contributes, as a sub-rule sentence of CISG Article 23, to deciding when the requirement of legal rule sentence Article 23 is fulfilled, i. e., when an acceptance of an offer becomes effective. This rule sentence also contributes to determining the formation of a contract. The Constitution of Japan Article 59 regulates when a bill becomes a law (statute). It can be said that this article regulates the formation of a statute as a law.

It is evident that these positive legal meta-rule sentences from (4) through (6) above, which regulate the formation of legal sentences, are related to determining that a legal sentence becomes valid. The formation of a legal sentence must be one of the elements of the requirement part of a legal meta-rule sentence according to which it is determined that a legal sentence becomes valid.

How are (7) Civil Code of Japan Article 90 and (8) the Constitution of Japan Article 98 related to determining the validity of legal sentences? The legal consequence of both legal meta-rule sentences is that the relevant legal sentences are **invalid**. At first glance, these legal meta-rule sentences seem to be related to determining that the legal sentences become null, namely the second element of the requirement of the MFLMRS [r0]. However, in order that a legal sentence becomes null at time T2, it has to be valid just before time T2. For, if a legal sentence is already invalid, it cannot become null, and if a legal sentence is invalid, it was invalid from the beginning. For this reason, in order that a legal sentence becomes valid, it is necessary that the legal sentence is "not invalid". In conclusion, a legal sentence not being "invalid" is a necessary condition of the requirement of the legal meta-rule

sentence that determines the first element of the requirement of the MFLMRS [r0], i. e., that a legal sentence becomes valid.

5.3.3 The Fundamental Legal Meta-Rule Sentence Determining That a Legal Sentence Becomes Valid

After clarifying the important factors of positive legal meta-rule sentences that are related to determining when a legal sentence becomes valid, one can proceed to integrate these factors. How are the above positive legal meta-rule sentences related to each other? How could they, in an integrated manner, contribute to determining that a legal sentence becomes valid? What is a necessary and sufficient condition to determine that a legal sentence becomes valid? What is a **fundamental legal meta-rule sentence** (FLMRS) that should determine the first element of the requirement part of the MFLMRS [r0], i. e., that a legal sentence becomes valid?

The answer to this question can be and should be given in the following FLMRS as a legal meta-rule sentence which must be implicitly presupposed in legal praxis:

[r3AA1]: *A legal complex sentence becomes valid at time T, if and only if the legal complex sentence is formed at time T1 and it is not the case that the complex sentence is invalid, and ((there is a clause referring to the beginning time of effectiveness of the legal sentence and the beginning time has come at T) or (there is a clause referring to the beginning condition of the effectiveness and the condition is fulfilled at time T)) or T is T1).*

The consequence of this rule sentence [r3AA1] "A legal complex sentence becomes valid at time T" has the same structure as the first element of the requirement of the MFLMRS [r0] "the legal sentence becomes valid at time T1". The difference between them is that [r0] refers to a "legal sentence," whereas [r3AA1] refers to a "legal complex sentence". The concept of a "legal sentence" is a wider general concept in comparison to that of a "legal complex sentence." The latter is a subset of the former. The concept of a "legal complex sentence" is explained in Part 1.3.2 of this paper. This concept is introduced by Logical Jurisprudence in order to represent a collective concept like a statute or a contract, which consists of many legal element sentences. Positive legal meta-rule sentences usually do not directly regulate individual legal element sentences; instead, it regulates collections of individual legal element sentences, i. e., legal complex sentences such as statutes or contracts as is the case in the above examples of legal meta-rule sentences.

The first element of the requirement of [r3AA1] is the **formation of a legal complex sentence**. In order that a legal complex sentence becomes valid, it is first necessary that it is formed as a legal complex sentence. CISG *Article 23* and *18(2)* (see (4) and (5) above) contribute to the determination on when and how a contract as a legal complex sentence is formed. The Constitution of Japan *Article 59* (see (6) above) regulates when and how a statute as a legal complex sentence is formed, as explained above. In order to solve the first element of the requirement of [r3AA1], these positive legal meta-rule sentences are applied.

The second element of the requirement of [r3AA1] is that the respective legal complex sentence is not invalid. As above explained, in order that a legal sentence

becomes valid, it is necessary that the legal sentence is "not invalid." This condition is set as the second element of the requirement of the fundamental legal meta-rule sentence [r3AA1].

The third element of the requirement of [r3AA1] determines when the relevant legal complex sentence becomes effective. The first part of this element determines it when there is a clause referring to the beginning date of the effectiveness of the legal sentence. The second part determines it when there is a condition clause for the legal sentence to become effective. The third part ("T=T1") determines that the legal complex sentence becomes effective at the time of the formation of the legal sentence, in the case that there is neither a clause referring to the beginning date of the validity nor a condition clause for the legal sentence to become effective.

5.3.4 Legal Meta-Rule Sentences Which Are Related to Determining That a Legal Sentence Becomes Null

Among the positive legal rule sentences above, (9) *Civil Code of Japan Article 135 (2)* regulates when a juristic act with a clause of a time of expiration becomes null; (10) *Civil Code of Japan Article 127 (2)* regulates when a juristic act with a clause of a condition subsequent becomes null; (11) *Civil Code of Japan Article 167 (1)* regulates that a claim becomes null when it is not exercised for ten years; and (12) *CISG Article 81 (1)* regulates that legal object sentences, which describe the obligations of parties, become null when the contract as a legal complex sentence is avoided.

There are implicit fundamental legal meta-rule sentences which regulate that a legal sentence becomes null. For example, a legal object sentence which describes one's obligation becomes null when the obligation is performed by the person, a legal object sentence becomes null when its obligation becomes unfeasible, and a legal complex sentence become null when it becomes ineffective.

One can now conclude the following: The truth of law as the validity of law is decided through a legal meta-inference in which the most fundamental legal meta-rule sentence (MFLMRS) is applied. In its application, the first element of its requirement is to be determined through a legal meta-inference where fundamental legal meta-rule sentences as well as positive legal meta-rule sentences, which regulate that a legal sentence becomes valid, are applied. The second element of its requirement is determined through a legal meta-inference where fundamental legal meta-rule sentences as well as positive legal meta-rule sentences, which regulate that a legal sentences becomes null, are applied.

CONCLUDING REMARKS

In this paper, the author has discussed on the concept of truth in law as validity, from Logical Jurisprudence's point of view. As for a conclusion, he would like to summarize this discussion while he would also like to present the objectives which are left as future tasks.

1. The author has explained briefly what Logical Jurisprudence is, namely that Logical Jurisprudence starts with three primitives: sentences, truth and inference. Logical Jurisprudence provides three fundamental sorts and structures of legal sentences through which legal systems can be analyzed and reconstructed.

2. The author focuses on that the concept of truth in law has been represented as the validity of law in legal praxis. He insists that the validity of law is to be regarded as the truth of law.
3. In order to base this assertion, the author has presented a formal semantic definition of the concept of truth in logic and clarified that the truth in logic can be applied to legal sentences. Afterwards, he provided a formal semantic foundation of the concept of validity as truth and has demonstrated that the truth of law can be regarded and represented as the validity of law from the logical point of view.
4. Furthermore, the author has discussed how the truth of law as validity is linguistically represented, and how it can be logically represented. In these discussions, he clarified the fundamental predicates that should represent the validity of legal sentences: "is valid," "becomes valid" and "becomes null."
5. Finally, the author has discussed how the truth of law as validity is determined in law. The author has pointed out that the validity of legal sentences is determined through legal inferences, precisely to say, through legal meta-inferences where legal meta-rule sentences are applied. Focusing on the process of legal meta-inference and using fundamental predicates above, the author generates the most fundamental legal meta-rule sentence as an implicit meta-rule sentence in the legal world, which determines that a legal sentence is valid at a certain time. The rule sentence is as follows: *A legal sentence is valid at time T, if and only if the legal sentence becomes valid at time T1 which is before or at the same time as T and it is not the case that the sentence becomes null at T2 which is before or at the same time as T.* The author discussed further how the fulfillment of the first and the second element of the requirement of this meta-rule sentence can be determined, and he elaborated on fundamental legal meta-rule sentences, as well as positive legal meta-rule sentences, which determine that a legal sentence becomes valid and then it becomes null. Thus, the author has presented a system of legal meta-rule sentences, which should be applied to determine the validity of legal sentences in a legal meta-inference.

As for the future tasks, the following objectives are left unsolved in this paper:

Although the author could present some examples of fundamental legal meta-rule sentences that play roles in deciding the first or second element of the requirement of the most fundamental legal meta-rule sentence, he does not insist that these fundamental legal meta-rule sentences are forming a complete set of such legal meta-rule sentences. On the contrary, he insists that one should endeavor to find other fundamental legal meta-rule sentences, which are implicitly presupposed in legal praxis, to create a sufficient list of such legal meta-rule sentences. The author would like to continue to find those further fundamental legal meta-rule sentences²³.

Logical Jurisprudence should demonstrate, in concrete examples, how the theory and the devices provided in this paper work correctly and efficiently in formalizing the legal meta-inferences that determine the validity of legal sentences. The

23 To find fundamental legal meta-rule sentences which are implicitly presupposed and applied in the reasoning of legal praxis is a task being important and meaningful for the science of law just as discovering a law of nature for natural sciences.

author will perform this task of demonstration in his next paper on the concept of truth in law.

The concept of truth in law is closely related to the concept of the existence of law, because people believe that law exists when it is proven that the law is valid. The relationship of the existence of law to the truth of law and the validity of law should be discussed further.

In this paper, the author has clarified the distinction between the formation and the validity of law, demonstrating that the former is one of the required elements for the law to become valid. From this point of view, the problem of the concept of law should be reconsidered. The author would like to work on the last two objectives as for his near-future tasks.

Finally, the author is concluding this paper by calling on readers to participate in Logical Jurisprudence in order to develop a genuine science of law. Please join Logical Jurisprudence!

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