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Natural Legal Law as Mathematics of Freedom (Four Mathematically Different Moral-Legal-Value-Functions “Freedom” and Four Ones “Slavery” Defined Precisely in Two-Valued Algebra of Formal Axiology of Ethics and Jurisprudence)

Vladimir O. Lobovikov

Institute of Philosophy and Law, Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia
E-mail: vlobovikov@mail.ru

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Abstract. The article is aimed at extracting and investigating proper algebraic aspect of the natural legal law system. The metaphorical meaning of the sentence “Law is mathematics of freedom” is transformed into literal one of exact language of rational philosophy of natural legal law. The word “freedom” is recognized as a homonym having exactly four formal-axiological meanings which are nothing but moral-legal-value-functions determined by one moral-legal-value-argument (in the proper mathematical meaning of the words “function” and “argument”). The four functions called “freedom” and the corresponding four functions called “slavery” are precisely defined by tables. Lists of formal-axiological equations of two-valued algebra of natural law-and-morals are generated. The lists make up a discrete mathematical model of the system of natural morals-and-law concerning “freedom” and “slavery”. Within the framework of submitted two-valued algebra of natural law-and-morals, interconnections between natural legal law and natural theology are addressed in general and the nontrivial question “Is God’s slave a slave?” is explicated and answered especially.

Keywords: two-valued-algebra-of-formal-axiology; moral-legal-value-function; formal-axiological-equivalence; formal-axiological-contradiction; ethics; freedom; slavery; natural-law; natural-theology; formal-axiological-law

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Естественное право как математика свободы (четыре математически различные морально-правовые ценностные функции «свобода», и четыре – «рабство», точно определенные в двузначной алгебре формальной аксиологии этики и теории права)

Владимир Олегович Лобовиков
Институт философии и права Уральского отделения РАН
г. Екатеринбург, Россия
E-mail: vlobovikov@mail.ru

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Цель статьи – выделение и изучение собственно алгебраического аспекта системы естественного права. Метафорическое значение утверждения: «Право – математика свободы» трансформируется в точном языке рациональной философии естественного права в буквальное. Слово «свобода» осознается как слово, имеющее точно четыре формально-аксиологические значения, которые суть не что иное, как морально-правовые ценностные функции, зависящие от одного морально-правового ценностного аргумента (в собственно математическом значении слов «функция» и «аргумент»). Упомянутые четыре функции «свобода» и соответствующие им четыре функции «рабство» точно определяются таблицами. Генерируются списки формально-аксиологических уравнений двузначной алгебры естественного права и морали. Эти списки образуют некую дискретную математическую модель системы естественной морали и права, относящейся к «свободе» и «рабству». В рамках предложенной двузначной алгебры естественного права и морали рассматриваются взаимосвязи между естественным правом и естественной теологией. Это рассмотрение осуществляется как в самом общем виде, так и для уточнения и решения вопроса, является ли раб Божий рабом.

Ключевые слова: двузначная алгебра формальной аксиологии, морально-правовая ценностная функция, формально-аксиологическая эквивалентность, формально-аксиологическое противоречие, этика, свобода, рабство, естественное право, естественная теология, формально-аксиологический закон

> "Classical law is a law of bodies. In the general stock composing the world it distinguishes bodily Persons and bodily Things and, like a sort of Euclidean mathematic of public life, establishes ratios between them. The affinity between mathematical and legal thought is very close". (Spengler 1928: 67)
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> "It must be emphasized then – and with all rigor – that Classical law was a law of bodies while ours is a law of functions. The Romans created a juristic static; our task is juristic dynamics. For us persons are not bodies, but units of force and will; and things are not bodies, but aims, means and creations of these units. The Classical relation between bodies was positional, but the relation between forces is called action". (Spengler 1928: 82)
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> "The future will be called upon to transpose our entire legal thought into alignment with our higher physics and mathematics. Our whole social, economic, and technical life is waiting to be understood, at long last, in this wise. We shall need a century and more of keenest and deepest thought to arrive at the goal. And the prerequisite is a wholly new kind of preparatory training in the jurist". (Spengler 1928: 83)
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> "...There are two sorts of nobility and freedom, the one absolute, the other relative." (Aristotle 1994b: 449)

1. Historical Background of Natural Law Philosophy, and Transformation of the Naturalism in Law-and-Morals into an Algebraic System of Formal Axiology

To begin with, let us clarify and define precisely meanings of the words and word-combinations used in the title of present paper. Such beginning is indispensable, as during a long time in philosophy of law, the natural-language expression "mathematics of freedom" has been used in a *metaphorical* sense; it has been recognized that the expression does not have a literal meaning in the professional languages of mathematicians and jurists. Nevertheless, at the same time it has been recognized that "mathematics of freedom" is really a beautiful metaphor in natural language of ethics and jurisprudence; the metaphor is highlighting the *similarity*: mathematics is exact (precise) discipline requiring rigorous demonstrations and legal law (limiting freedom) is exact (precise) discipline requiring rigorous demonstrations, *analogously*[1].

In addition to the remark concerning the metaphoric expression "mathematics of freedom", here it is relevant to take into an account that also in vague natural language of the humanities, the word "freedom" and the expression

[1] Certainly, the beautiful metaphor is a *complement* for legal law system; according to aesthetics and theory of fine arts, such metaphor is a *hyperbola*.

"natural law" are significantly ambiguous; they have many qualitatively different meanings. In some quite respectable sense, any law of physics (for example, the law of inertia) is a natural law. But, in the given paper, "natural law" has another meaning, namely, exactly that one which has been defined originally in natural language by Ulpian and Paul – celebrated jurists of ancient Roman Empire (Watson 1998), and then defined on a qualitatively new abstract-theoretic level by means of unambiguous *artificial language of two-valued algebra of formal axiology* of moral-legal actions by (Lobovikov 1980; 1984a; 1984b; 1988; 1998). Such custom-breaking exact definition of "natural (legal) law" using special language of discrete mathematics had been given for the first time in world literature on philosophy of law at the very beginning of 70th of XX century. Traditionally, the old-fashioned doctrine of natural law has been accused of being inexact, not concrete, too indefinite; imprecision and lack of definiteness have been considered as main and lethal (incurable) defects of the "natural (legal) law" (Rousseau 1994: 330-331; Alexeyev 2001: 421). But, in contrast to the old-fashioned jus-naturalism, its updated version armed with discrete mathematics (especially algebra) demonstrate just *precision and definiteness*. In spite of Rousseau and Alexeyev (Rousseau 1994; Alexeyev 2001), today the notion "natural (legal) law" has been *defined precisely* as a *law of algebra of formal axiology* (Lobovikov 1984; 1998; 2007). Now let us turn to clarifying and giving an exact definition to the extremely controversial and ambiguous concept of freedom.

The word "freedom" (in fuzzy natural language of the humanities and in the seemingly simple language of the everyday life of ordinary people) is a homonym possessing not one and the only but several qualitatively different meanings, the significant difference (and sometimes even opposition) of which is not recognized in overwhelming majority of cases. If actually so, then in which concrete meaning the word "freedom" is to be used in the present article? My answer to this question is the following: in the present article, the word "freedom" has not one and not two, but exactly *four* significantly different *formal-axiological meanings* which are nothing but *moral-legal-value-functions* (in the proper mathematical meaning of the word "function") defined precisely below in this article by corresponding moral-legal-value-tables. In response to my answer to the above question, the following new question arise naturally among positivists and normativism adherents: why just *axiology* (a general theory of values and valuations) is mentioned here? Positivism and normativism reduces subject-matter of jurisprudence to *norms* and *deontic* logic, exclusively, hence, according to adherents of positivism and normativism, there is no room for *axiology* in rational jurisprudence. Obviously, in fact, such one-sided attitude is very popular and even dominating in today philosophy of law all over the world. Today almost all lawyers are used to such positivistic and normative attitude, which is a culture prejudice (even social institution) of our time. However, notwithstanding the contemporary prejudice (positivism-and-normativism institution), in previous epochs the situation in law theory had been significantly different and sometimes even opposite. In this relation, it is quite relevant to address to such celebrated representatives of Ancient Roman

Law as Ulpian and Paul, who have manifestly defined "natural law" in the following way.

"A law student at the outset of his studies ought first to know the derivation of the word jus. Its derivation is from *justitia*. For, in terms of Celsus' elegant definition, the law is the art of goodness and fairness. Of that art we [jurists] are deservedly called the priests. For we cultivate the virtue of justice and claim awareness of what is good and fair, discriminating between fair and unfair, distinguishing lawful from unlawful, aiming to make men good not only through fear of penalties but also indeed under allurement of rewards, and affecting a philosophy which, if I am not deceived, is genuine, not a sham" (Watson 1998: 1).

Another celebrated representative of the Ancient Roman Law – proper jurist Paul has affirmed: "The term 'law' is used in several senses: in one sense, when law (jus) is used as meaning what is always fair and good, it is natural law (jus naturale); in the other, as meaning what is in the interest of everyone, or a majority in each civitas, it is civil law (jus civile). Nor is it the less correct that in our civitas the jus honorarium is called law. The praetor is also said to render legal right (jus) even when he makes a wrongful decree, the reference, of course, being in this case not to what the praetor has done, but to what it is right for a praetor to do" (Watson 1998: 2-3).

According to the above-cited statements by Ulpian and Paul, in the ancient Roman jurisprudence, "good" (and also "bad") were proper legal concepts. In spite of the ancient Roman Law theory, today, "good" is considered as not an exact (clear) proper legal concept but an inexact (unclear) moral *evaluation* studied by *axiology* in general and by ethics especially. Thus, nowadays, due to normativism, as a rule, axiology and state-and-law theory are separated on principle. The principle of their strict separation has been invented and imposed by the legal positivists who have reduced universal theory of law to the *empirical* theory of human-made *positive*-law-and-*positive*-state, exclusively. The human-made positive laws were considered not as common *values* (universal goods) but as state-commanded *norms*. By systematical using the compound word "moral-legal" above and below in the present paper I mean and emphasize that, according to my point of view, the natural law-and-morals make up one subject-matter of one general theory, on principle. With respect to such manifest negation of the separation principle, one can think that I suggest to move back to the "naïve" views by Ulpian and Paul, but it is an illusion of regress to the past, because the original innovation which I have made and elaborated is a result of progressive development (transformation) of the naïve natural jurisprudence (represented by ambiguous natural language exclusively) into a *systematically mathematized* abstract universal theory f*ormulated precisely in an unambiguous artificial language*. In the present article, the theory of natural law is modeled by a two-valued algebraic system of moral-legal-value-functions and their compositions. Just the proper mathematical form of existence and the proper mathematical method of application of the universal formal-axiological theory of natural law-and-morals make up the nontrivial scientific novelty of ideas presented in this article.

Neither Ulpian nor Paul had an idea of systematical using mathematics not as a theory of numbers, magnitudes, quantity relations, and spatial forms (known since Pythagoras) but as a custom-breaking theory of *abstract structures* (Boole 1854; Whitehead 1941; 1994; Bourbaki 1962; 1965; 1998; Sawyer 1964) for developing the theory of natural law (which is unhabitual and unclear for majority of contemporary lawyers but quite habitual end seemingly clear for celebrated jurists of Ancient Roma). Certainly, clarity of Ulpian's, Celsus', and Paul's views of natural legal law (as knowledge of what had been always good) had been an illusion. Vagueness of their natural law doctrine as a kind of universal axiology had been exposed later by positivists, relativists, and adherents of normativism. There were two opposite ways out from the deadlock in which naturalist-minded lawyers had arrived, namely, (1) rejection of the natural law as nothing but a metaphysical chimera, (2) salvation (new rise) and further development of the natural law doctrine by clarifying and explicating it due to systematical using mathematics (especially universal algebra) for its development and convincing explanation. In times of ancient Roman Empire, during the Middle Ages, and even in the Early Modern times, mathematics was not sufficiently mature for this role. It became mature enough (for adequate representing abstract formal axiology of universally good) only when proper mathematics as such was recognized as a theory of *abstract mathematical structures* (Boole 1854; Whitehead 1941; 1994; Bourbaki 1962; 1965; 1998; Sawyer 1964), which could be applied, in principle, to any contents, consequently, even to "the art of *goodness* and fairness" by Ulpian and Celsus (Watson 1998: 1) or to "*what is always* fair and *good*" by Paul (Watson 1998: 2-3). Only such contemporary philosophers of law which are friendly to (and possessing sufficient knowledge of) contemporary mathematics together with mathematicians interested in developing the proper theory of legal law could improve the theoretical deadlock situation significantly.

With respect to necessity of mathematization of the natural law theory for its revival, here it is relevant to note that at the level of too vague and controversial content analysis confined in ambiguous natural language exclusively (as well as at the level of *metaphorical* thinking, talking, and writing), discussions of possibilities of fruitful applying mathematics to universal philosophy of absolute good (in morals and law) have existed during long time and underwent historical changes worthy of mentioning. For example, in times of J. Locke, G.W. Leibniz, and B. Spinoza, almost all well-educated jurists proper and almost all intellectually respectable philosophers of law and morals were used to the wonderful (extraordinary) idea of proper mathematical essence, axiomatic character, and very high precision of reasoning in natural morals and law. With respect to natural morals, Locke wrote: "…I am bold to think, that *morality is capable of demonstration*, as well as mathematics: since the precise real essence of the things moral words stand for may be perfectly known, and so the congruity, or incongruity of the things themselves be certainly discovered; in which consists perfect knowledge" (Locke 1994b: 303). Concerning such Locke's standpoint, see the interesting article (Sheridan 2020). Such standpoint has not completely disappeared in contemporary world. For instance, in XX century,

analogous conception has been formulated and elaborated in challenging work titled "Mathematics and the Good" (Whitehead 1941).

With respect to precise definition of subject-matter of "the natural legal law", it is worth taking into an account a significant difference among the answers to the question "What is the natural law about?" (or "Which set of elements is the natural law a *universal for*?") already given during the long history of philosophy of law. By scrutinizing relevant writings (Plato 1994; Aristotle 1994a; 1994b; Cicero 1966; Augustine 1994; 2010; Aquinas 1994a; 1994b; Locke 1994a; Montesquieu 1994; Hobbes 1994; Leibniz 1903; 1952; 1969; 1971; Spinoza 1994; Grotius 1956; Rousseau 1994a; 1994b; Pufendorf 1991; 2005; Vattel 1960; Kant 1994; Hegel 1994; Stammler 1907; 1908; Solovyev 2001; 2012; Gessen 1902; Novgorodtsev 1902; 1904a; 1904b; 2010; 2011; Chicherin 2005; Alexeyev 2001 et al.), one could discover that during the long history of jurisprudence, the expression 'natural (legal) law" has been used in qualitatively different meanings. From the proper theoretical point of view, all the deviations from the original meanings used in Roman Law by Ulpian, Celsus, and Paul are interesting, important, and worth discussing here. In (Augustin 1994; 2010) and (Aquinas 1994a; 1994b), the relationship of the natural law to God had been added and elaborated.

Up to the Early Modern Epoch, unconscious animals were not excluded from the realm of natural legal law doctrine. According to (Kantorovich 2011), in the Middle Ages, trials of beasts had been taken seriously, but then the realm of relevant applicability of natural legal law doctrine was severely reduced to the set of *rational* beings *exclusively*; all unconscious animals were excluded from this realm as irrelevant because they were labeled as *not-rational* creatures. Thus, *only rational* beings (God and all possible human creatures) retained in the realm which had been severely reduced to the "realm of *reason*" (Rousseau 1994a; Pufendorf 1991; 2005; Kant 1994; Hegel 1994; Novgorodtsev 1902; 1904a; 1904b; 2010; 2011; Chicherin 2005; Alexeyev 2001 et al.)[1]. The original meaning of "natural (legal) law" used by the celebrated jurists of Roman Empire had been either unknown (missed), or forgotten, or ignored on principle (this is one of noteworthy aspects of the notorious "reception" of Roman Law by contemporary legal cultures). Incidentally, J.-J. Rousseau had been quite right when, concerning the natural law, he had written the following.

"Not to speak of the ancient philosophers, who seem to have done their best purposely to contradict one another on the most fundamental principles, the Roman jurists subjected man and the other animals indiscriminatedly to the same natural law, because they considered, under that name, rather the law, which nature imposes on herself than which she prescribes to others; or rather because of the particular acceptation of the term law among those jurists; who seem on this occasion to have understood nothing more by it than the general

[1] Atheist-minded thinkers had moved further: they had reduced the realm of natural jurisprudence to all possible human beings, exclusively. Thus, not only all possible unconscious animals but also all possible gods (of all possible religious confessions) were excluded from the domain of natural legal law.

relations established by nature between all animated beings, for their common preservation. The moderns, understanding by the term law, merely a rule prescribed to a moral being, that is to say intelligent, free and considered in his relations to other beings, consequently confine the jurisdiction of natural law to man, as the only animal endowed with reason" (Rousseau 1994: 330).

In my opinion, J.-J. Rousseau had been quite right when, he had recognized and highlighted the very important qualitative difference between definitions of the natural law by the celebrated Roman jurists and by the moderns. More detailed critique of the knotty situation concerning the hard problem of exact defining the notion "natural legal law" can be found in (Rousseau 1994: 330-331). However, belonging not to Romans but to *the moderns completely reducing the natural law to reason*, J.-J. Rousseau had attempted to make a conceptual compromise well-represented by the following.

"By this method also we put an end to the time-honored disputes concerning the participation of animals in natural law: for it is clear that, being destitute of intelligence and liberty, they cannot recognize that law; as they partake, however, in some measure of our nature, in consequence of sensibility with which they are endowed, they ought to partake of natural right; so that mankind is subjected to a kind of obligation even toward the brutes. It appears, in fact, that if I am bound to do no injury to my fellow-creatures, this is less because they are rational than because they are sentient beings: and this quality, being common both to men and beasts, ought to entitle the latter at least to the privilege of not being wantonly ill-treated by the former" (Rousseau 1994: 331).

In XX century, in America and Western Europe, the discussion of options of solving the hard theoretic problem of exact definition of subject-matter of natural legal law had been continued, for example, in (Entreves 1951; Fuller 1969; Radbruch 2006; Finnis 1991; 2011; Dworkin 1986; 1977; Alexi 2011 et al.). The mentioned authors had investigated possibilities of creating a handy compromise between the positive law generated by positive State and the universally valid immutable natural moral-legal law independent from positive State. The results of compromise-inventing and synthesis-making are theoretically interesting and worth-discussing. A noteworthy analysis of analytical conceptions of natural law in the modern legal naturalism has been presented in (Didikin 2014). However, in my opinion, the efforts of proper jurists undertaken in XX century with respect to the theoretic problem in question were not sufficient to vindicate jus-naturalism completely and to close the problem forever. Yet some dark aspects of the problem are not illuminated; some puzzles remain; still the natural law discourse is confined within ambiguous natural language exclusively. As limits of jurist language are limits of jurist thought, unfortunately, real possibilities of intellectual progress in today natural jurisprudence are severely limited. I think that, within the realm of metaphorical speaking, it is relevant to transform the famous statement by Galileo Galilei about the linguistic role of mathematics in physics into the following sentence: "the Nature Book of strictly universal and immutable moral-legal laws regulating activity of all leaving beings is written by Nature in a special

symbolic language of mathematics proper". For typical jurists thinking at the level of mediocre policemen possessing rich experience of fighting with crime the Nature Law book is closed forever as they more or less hate mathematics as such (since their secondary school times) and sincerely believe that *proper mathematics as universal theory of abstract structures* is utterly irrelevant to the essence of their job.

The above-mentioned nontrivial problem of precise definition of "freedom" is an important aspect of the problem of precise definition of the realm of natural legal law because freedom is neither a bodily thing nor a bodily person. In perfect accordance with the profound critical analysis of history and philosophical methodology of classical Roman Law presented in (Spengler 1928), the problem of precise definition of "freedom" is a very hard puzzle (unsolvable riddle) for the old-fashioned theory of positive law and positive State. Freedom is not a body and not a concrete state of affairs but an abstract moral-legal-value *function* (determined by some number of moral-legal-value arguments). However, positive-law-givers (individual or collective – it does not matter) are talking and writing not about *abstract functions determined by arguments*, but about concrete relations among persons, things, processes, and states of affairs. As a rule, creators and executors of human-made positive laws are not interested, not competent, and not involved in operating with abstract functions determined by arguments (this is an affair of proper mathematicians as such). Consequently, if a meaningful discourse of legal law as mathematics of freedom is not merely metaphorical but quite rational one, then it is meant (although, probably, not-well-recognized) that proper mathematics as such is related to *not positive but natural* legal law[1]. In my opinion, *exactly natural* jurisprudence actually admits and even requires fruitful applications of appropriate mathematical methods and structures to its subject-matter.

The saying "Law is Mathematics of Freedom" is very popular in creative literature on philosophy of law. The noteworthy monograph "Law – Mathematics of Freedom" (Nersesyants 1996) and the handbook for university students "Philosophy of Law" (Nersesyants 1997: 17) are representative examples of such literature. However, in philosophical discussions of law in general, and in the works by V.S. Nersesyants in particular, "Mathematics of Freedom" stands either for a *potency* (in Aristotelean meaning of "potency") or for a more or less beautiful *metaphor*. As literal understanding metaphors is not adequate, the saying under consideration is not a proper scientific solution of the problem. Notwithstanding the theoretical deadlock in discussion of the themes "Mathematics and the Good" and "Law as Mathematics of Freedom" which themes are directly related to mathematizing the natural law theory, the present article submits a paradigm-breaking attempt of *actualizing the potency*. According to the present paper, "Mathematics of Freedom" and "Natural Law" stand for *not*

[1] This explains the evident fact that positivist-minded jurists have either sceptic or negative attitude to applying mathematics to law; their attitude is in accordance with their legal positivism ignoring existence of natural legal law admitting and requiring mathematization.

potential but actual things, which do exist and are equivalent to each other in some nontrivial sense. Thus, in the given paper, the prejudice-breaking statement "Natural Law is Mathematics of Freedom" is understood literally; it is treated not only as a beautiful metaphor, but also as a true proposition of proper theory of natural legal law.

In the above discourse of "law as mathematics of freedom", attention has been focused on "mathematics". Now let us concentrate attention on "freedom (liberty)" and continue the above-started clarifying this somewhat ambiguous concept. In first approximation, many people believe that in natural language the word "liberty (freedom)" has one and the only meaning which is quite clear, hence, there is no need to clarify it. However, in second approximation, it is possible to recognize that clarity of the notion "freedom (liberty)" is a psychological (logic-linguistic) illusion. Usually (as a statistical rule), both revolution-makers and their enemies believe sincerely that they are fighting for freedom (liberty). If this is really so, then there are at least two significantly different and even opposite meanings of the word "freedom"; the word "liberty" is a *homonym*, hence, every struggle for liberty has such an important logic-linguistic aspect, ignoring or misunderstanding which heads to tragic confusions. Taking into an account plenty of empirical (in particular, historical) facts and exploiting sophisticated methods of content-analysis, intellectually respectable investigators of freedom recognize that there is a significant difference between "*negative* liberty (freedom *from*)" and "*positive* liberty (freedom *of/for*)". However, from my point of view, even the two-sided conception of freedom is a significant oversimplification of the real situation which is more complex.

Normally, people believe that liberty is a vitally important moral-legal *value*. Which value (positive or negative) has freedom? This is a nontrivial question to be explicated by reformulating it. If the *two-valued* moral-legal system (implying necessarily "either good or bad", and "*tentium non datur*") is meant, then, if "freedom" is related to *one* moral-legal-value-variable, then *there are not two but four different meanings of "freedom" in natural language*, and each of the four meanings is nothing but a *moral-legal-value function* determined by one *moral-legal-value argument*, in the proper mathematical meanings of the words: "function" and "argument". Thus, our attempting to clarify and explicate meanings of the word "liberty (freedom)" has resulted quite naturally but unexpectedly (for statistically normal lawyers of our days) in recognizing necessity of systematical using mathematical concepts and methods for teaching and developing proper theory of law. For today statistically normal jurists, this statement contains psychologically surprising, strange, and unpleasant information, but in times of J. Locke and G.W. Leibniz, such information would not be so odd, surprising, and unpleasant. Perhaps, proper jurist Leibniz (who has been active in progressive developing mathematics as such) would enjoy it. In contrast to proper lawyer G.W. Leibniz, the soviet specialist in theory of state-and-law S.S. Alexeyev (well-known in the USSR in the second half of XX century and at the very beginning of XXI century) sincerely believed (and instructed future jurists) that proper mathematics as such is irrelevant to the proper theory of State-and-law (Alexeyev 2001). In this concrete relation, I do

not agree with jurist S.S. Alexeyev alien (even rival) to mathematics[1]; I side with proper jurist G.W. Leibniz friendly to mathematics and with philosopher and historian O. Spengler who has been well-educated in mathematics and in history of law (Spengler 1928).

Quite naturally, the above-executed introduction to the present paper is not quite clear (especially in relation to "the *four* mathematically different freedoms"), as, metaphorically speaking, the introduction is "teaching how to swim, before coming into a water of swimming pool". Now, the reader has to "jump into the cool water of swimming pool", namely, to make acquaintance (at first touch, probably, not quite pleasant but irritating) with the machinery of discrete mathematics utilized in the given paper for mathematical modeling the natural law system. The acquaintance with "cool water" (boring definitions of not-well-known abstract notions) is to be made owing to the following paragraph. (It is expected that due to the acquaintance, the odd talk of "four freedoms" is to become quite clear.)

2. Algebra of the Natural Law-and-Morals

Contents of this (second) paragraph of the given article, namely, definitions of not-well-known basic notions of the two-valued algebraic system of formal axiology of moral-legal actions and actors are not completely new; they have been published by me, for instance, in (Lobovikov 2007; 2009; 2010; 2013; 2014; 2015). Including the already published definitions of not-well-known basic notions into the present paper is vindicated by giving the reader a possibility of *immediate autonomous checking* all the *actually new* formal-axiological equations (hitherto never published elsewhere) by *autonomous* computing compositions of relevant moral-legal-value-functions in strict accordance to here-repeated basic definitions. For giving the reader a real possibility systematically *to check autonomously and immediately* all the outcomes of my computations having psychologically surprising nontrivial interpretations in the domain of application (which domain is natural jurisprudence), I have either to repeat here the set of definitions of not-well-known notions or to make a set of self-references to the works in which the definitions are published. If I include into the given article neither the repetitions of exact definitions of not-well-known basic notions nor the big quantity of self-references (which make checking not quick and too difficult), then I make the reader not able

[1] Incidentally, in one of our private oral talks on vistas of applying mathematics to natural jurisprudence, Sergey Sergeyevich Alexeyev confessed to me that he was gravely disappointed by the views of mine, as while being young and thinking of a future profession, he had chosen jurist profession as he had believed at that time that in any lawyer work, there was no professional necessity in proper mathematics which he did not like as such; after the secondary school he planned to have no relation to mathematics proper. I replied that, *strategically* speaking, in a *long* run, the desire, hope, and plan (of keeping jurisprudence free from mathematics as such) were not adequate, but he did not agree with me.

perfectly to understand and systematically to check autonomously and quickly the significantly new jurisprudence discourses and prejudice-breaking statements presented in this article. Choosing between the two alternatives, I have decided to execute the article in a reader-friendly manner: I have better repeat the set of already published precise definitions (of not-well-known notions) in the paragraph 2 as this makes the hitherto never published new theoretical results exposed in this paper easily checkable by the reader. Now let us begin presenting the set of exact definitions of the not-well-known concepts psychologically unhabitual for majority of readers.

According to (Lobovikov 2007; 2009; 2010; 2013; 2014; 2015), by definition, the two-valued algebraic system of natural-law-and-morals as formal axiology is based on the set M of all such and only such *either-realized-or-not-realized actions* (elementary or complex ones – it does not matter), *or either-existing-or-not-existing agents* (individual or collective ones – it does not matter), which are *either good or bad* ones from the viewpoint of a *moral-legal evaluator* E (individual or collective one – it does not matter).

Algebraic operations defined on the set M are *moral-legal-value-functions*. *Moral-legal-value-variables* of these functions take their *moral-legal-values* from the set *{g, b}*. Here the symbols "*g*" and "*b*" stand for the *moral-legal-values* "good" and "bad", respectively. The functions take their values from the same set. Thus, in contrast to the ancient Roman Law focused on concrete moral-legal *relations among* various *elements of the set of bodily persons and bodily things*, the here-presented *qualitatively new* (substantially modernized and mathematized) natural law theory is focused on *formal-axiological relations* among various *moral-legal-value-functions*. In perfect accordance with (Spengler 1928), *not bodies* (i.e. sensual things and persons reduced to bodies) but *moral-legal actions and functions* make up the proper subject-matter of successfully reanimated and progressively developed natural jurisprudence of our time. The set of actions and agents (persons), on which the algebraic system of actions is defined, is quite homogeneous, as persons are effectively reduced to totalities of actions realized by these persons.

Speaking of *moral-legal-value-functions* I mean the following mappings (in the proper mathematical meaning of the word "mapping"):

{g,b} → {g,b}, if one speaks of the *moral-legal-value-functions* determined by *one moral-legal-value-argument*;

{g,b}×{g,b} → {g,b}, where "×" stands for the Cartesian product of sets, if one speaks of the *moral-legal-value-functions* determined by *two moral-legal-value-arguments*;

$\{g,b\}^N$ → {g,b}, if one speaks of the *moral-legal-value-functions* determined by *N moral-legal-value-arguments*, where *N* is a finite positive integer.

The symbols: "*x*" and "*y*" stand for *moral-legal-evaluation-forms* of elements of M. Moral-legal-evaluation-forms of actions and persons can be either elementary or compound ones. Elementary moral-legal-evaluation-forms deprived of their concrete contents represent independent *moral-legal-value-arguments*. Compound moral-legal-evaluation-forms deprived of their concrete contents represent *moral-legal-value-functions* determined by these arguments.

According to O. Spengler, who was a specialist in both history of mathematics and history of law-and-State, in contrast to the ancient Roman Law doctrine which had been a jurisprudence of *persons and things (bodies)*, our contemporary theory of law-and-state should be a jurisprudence of *functions* in proper mathematical meaning of the term "function" (Spengler 1928: 82). When I had been inventing and elaborating a two-valued algebraic system of formal axiology dealing with moral-legal-value-*functions* in the USSR at the very beginning of 70th of XX century (Lobovikov 1980; 1984a; 1984b), unfortunately, I had no knowledge of O. Spengler's works concerning history of mathematics and history of jurisprudence. Later, when I became acquainted with (Spengler 1928), I recognized that my creative work had been developing exactly in that direction which had been indicated by O. Spengler, namely, in direction to constructing and investigating such an algebraic system of equations of *functions* (in proper mathematical meaning of the term "function"), which (system) had been based upon a set of elements having proper moral-legal nature. Now let us instantiate the abstract discourse of moral-legal-value-*functions* by introducing and defining some functions directly related to contents of the given paper. To begin with, let us consider the functions determined by *one* argument.

The *glossary* for the below-submitted moral-legal-evaluation **table 1**: Let the symbol F_1x stand for "freedom (liberty) of/for (what, whom) *x*", or "*x*'s liberty (freedom)", or "free (what, who) *x*". The symbol F_2x stands for "freedom from (what, whom) *x*". F_3x – "*absolute freedom from* (what, whom) *x*", or "*arbitrary rule over* (what, whom) *x*". F_4x – "*absolute freedom of/for* (what, whom) *x*, i.e. *nonbeing of arbitrary rule over x*". *Ox* – "*opposite of/for* (what, whom) *x*". *Tx* – "*termination*, elimination, annihilation, corruption, destruction, abolition of (what, whom) *x*". P_1x – "*protection*, preservation (defense) *from* (what, whom) *x*". P_2x – "*protection*, preservation, defense, conservation *of/for* (what, whom) *x*". *Yx* – "*deprivation of* (what, whom) *x*", or "*depriving* (what, whom) *x*". *Nx* – "*nonbeing*, non-existence, nonrealization, death of (what, whom) *x*". *Bx* – "*being*, existence, realization, life of (what, whom) *x*". B_1x – "absolute being of (what, whom) *x*". N_1x – "absolute nonbeing of (what, whom) *x*". *Lx* – "*limitation*, restriction, definition of/for (what, whom) *x*". *Ux* – "*interest*, profit of/for (what, whom) *x*". *Ex* – "*execution*, realization of (what, whom) *x*". The mentioned one-placed moral-legal-value-functions are defined precisely by the following moral-legal-value **table 1**.

Table 1. The one-placed moral-legal-value-functions

x	F_1x	F_2x	F_3x	F_4x	*Ox*	*Tx*	P_1x	P_2x	*Yx*	*Nx*	*Bx*	B_1x	N_1x	*Lx*	*Ux*	*Ex*
g	g	b	b	g	b	b	b	g	b	b	g	g	b	b	g	g
b	b	g	b	g	g	g	g	b	g	g	b	g	b	g	b	b

The *glossary* for the below-submitted moral-legal-evaluation **table 2**: *Ix* – "an *idol* or a *god (goddess) of/for* (what, whom) *x* in a pagan, barbaric, polytheistic, local religion. *Wx* – "a *witch, wizard, incubus, daemon, sorcerer, necromancer, enchanter, evil genius, afrit of/for* (what, whom) *x*, in a barbaric (pagan), polytheistic, local religion. *Gx* – "*God of/for* (what, whom) *x* (or *x*'s God) in a universal

monotheistic religion". *Dx* – "*devil* (principal enemy of/for God) in a universal monotheistic religion". T_1x – "*self-termination*, self-destruction, suicide by (what, whom) *x*". P_3x – "*self-protection*, self-preservation, self-conservation, self-defense by (what, whom) *x*". *8x* – "infiniteness, eternity, indefiniteness of (what, whom) *x*". F_5x – "finiteness, temporality, definiteness of (what, whom) *x*". S_1x – "*service*, help to (what, whom) *x*", or "serviceman, helper, servant, relative slave, of/for (what, whom) *x*" or "*x*'s serviceman, servant, relative slave". S_2x – "serviceman, servant, relative slave (what, who) *x*" or "*x*'s being a serviceman, servant, relative slave,". S_3x – "*absolute slave*, only-a-means (what, who) *x*" or "*x*'s *being an absolute slave*, only-a-means of/for everyone". S_4x – "serviceman, servant, *slave of/for God* of (what, whom) *x*" or "*x*'s *God's slave*". M_1x – "master, ruler (who) *x*". M_2x – "master, ruler of/for (what, whom) *x*". *Vx* – "virtue, positive value (good) of/for (what, whom) *x*". *Jx* – "*judgement* (assessment), discussion and decision about (what, whom) *x*". The mentioned one-placed moral-legal-value-functions are defined precisely by the following moral-legal-value **table 2**.

Table 2. The unary moral-legal-value-functions

x	*Ix*	*Wx*	*Gx*	*Dx*	T_1x	P_3x	*8x*	F_5x	S_1x	S_2x	S_3x	S_4x	M_1x	M_2x	*Vx*	*Jx*
g	g	b	g	b	b	g	g	b	g	b	b	g	g	b	g	b
b	b	g	g	b	b	g	b	g	b	g	b	g	b	g	b	g

In two-valued algebra of natural law-and-morals as formal axiology, not only one-placed moral-legal-value-functions but also two-placed ones are considered. Let us introduce some binary moral-legal-value-functions by the following glossary for the **table 3**.

The *glossary* for the below moral-legal-value **table 3**: (In this paper the upper number-index 2 standing immediately after a capital letter informs that the indexed letter stands for a function determined by *two* arguments.) Let the symbol E^2xy stand for the binary moral-legal operation (two-placed-moral-legal-value-function) "*moral-legal equalizing* (what, whom) *x* and *y*, i.e. *identifying moral-legal values of x and y*". K^2xy stands for the binary moral-legal operation (moral-legal-value-function) "*x's being with y*" or "*x's and y's being together*", or "*joint being of x and y*", or "oneness (unity) of *x* and *y*". D^2xy – moral-legal operation "*divorce (division), separation of x and y*". Z^2xy – binary moral-legal operation "*choosing and realizing* such and *only such* an element of the set {*x*, *y*}, which element is: (1) *the best* one, if both x and y are good; (2) the least bad one, if both x and y are bad; (3) the good one, if x and y have opposite values. (Thus, Z^2xy means an excluding *moral-legal choice and realization of only the optimal* between *x* and *y*.) A^2xy – binary moral-legal operation (moral-legal-value-function) "realizing a *non-excluding-moral-legal-choice* result, i.e. (1) realizing K^2xy *if both x and y are good*, and (2) *realizing* Z^2xy *otherwise*". N^2xy – "deliberate *realizing neither x* nor *y*". R^2xy – "realizing (what, whom) *y in response to realizing* (what, whom) *x*". O^2xy – "*y*'s being an opposite of/for *x*", or "*y*'s contradiction with (opposition to) *x*". F^2xy – "*freedom (liberty) of/for* (what, whom) *y* from

(what, whom) *x*". S^2xy – "*x*'s *being a serviceman, officer, attendant, retainer, vassal, servant, valet (subject, serf, slave) of/for* (what, whom) *y*". These moral-legal-value-functions determined by two moral-legal-value-arguments are precisely defined by the following **table 3**.

Table 3. The evaluation-functions determined by two arguments

x	*y*	E^2xy	K^2xy	D^2xy	Z^2xy	A^2xy	N^2xy	R^2xy	O^2xy	F^2xy	S^2xy
g	g	g	g	b	b	g	b	g	b	b	b
g	b	b	b	g	g	g	b	b	b	b	b
b	g	b	b	g	g	g	b	g	g	g	g
b	b	g	b	g	b	b	g	g	b	b	b

The **table 3** defines precisely the moral-legal-*value-functional* sense of the binary operations of two-valued algebra of natural-law-and-morals. Now, for precise defining the *proper ontological* status of these moral-legal operations, let us make an agreement that below in the present article "[…]" means "… exists", or "… takes place", or "… is realized". Thus, in the given paper, the *proper ontological values* "exists (is realized)" and "does not exist (is not realized)" of moral-legal actions and actors are taken into an account systematically. For example, the following statements define the proper ontological aspect of moral-legal actions and actors.

DF1: [Nx] ↔¬[x].

DF2: $[K^2xy] \leftrightarrow ([x] \,\&\, [y])$.

DF3: $([N^2xy] \leftrightarrow [K^2NxNy])$. Consequently, $([N^2xy] \leftrightarrow (\neg[x] \,\&\, \neg[y])$: by the definitions DF2 and DF1.

DF4: (I) If moral values of x and y are different, then $[Z^2xy]$, if and only if the good action is realized and the bad action is not realized. (II) If both actions (*x* and *y*) have moral value good, then $[Z^2xy]$, if and only if the best action is realized and the good-but-not-the-best action is not realized. (III) If both actions (*x* and *y*) have value bad, then $[Z^2xy]$, if and only if the worst action is not realized but the least bad action is realized.

DF5: A) if both actions (*x* and *y*) have moral value good, then $([A^2xy] \leftrightarrow [K^2xy])$; B) if at least one of actions (*x* and *y*) has moral value bad, then $([A^2xy] \leftrightarrow [Z^2xy])$.

The definitions DF4 and DF5 are formulated, for instance, in (Lobovikov 1986; 1987; 1988). These definitions are necessary entanglements (intertwinements) of proper moral-legal axiology with proper philosophical ontology, epistemology and logic.

Comparing the truth-value-tables of two-valued algebra of formal logic of propositions with the moral-legal-value-tables of two-valued algebra of formal moral-legal philosophy of actions, one can notice that here is a heuristically important *analogy* between formal axiology of actions and formal logic of propositions. But the *analogy* is not an *identity* relation. Identity is an equivalence relation, which is transitive one. But, generally speaking, *analogy* is not a tran-

sitive relation. Using the *analogy*, one can create a *hypothesis* that ([A^2xy] ↔ ([x] ∨ [y])) and ([Z^2xy] ↔ ([x] ∇ [y])), where the symbol ∇ stands for the binary logic operation called "*excluding* disjunction". However, generally speaking, the hypothesis is false; it is very easy to construct a counter-example for it.

Nevertheless, the wonderful *analogy* between the truth-value-tables of two-valued algebra of formal logic of propositions and the moral-legal-value-tables of two-valued algebra of formal axiology of actions is *heuristically* fruitful. For instance, according to the above-given **table 3**, *the moral-legal-response-action R^2xy is a moral-legal-value-functional analog of the classical (Philonian) implication* (Lobovikov 2020). Being aware of the long and stormy controversy among logicians about the classical truth-functional definition of implication, by the *analogy* in question, one can predict and expect that there has been also a long and stormy controversy in natural jurisprudence, natural philosophy of morals, and natural theology about the moral-legal-value-functional sense of R^2*xy*. By content-analysis of history of philosophy of law, morals and theology, one can see that the prediction is true. The above moral-legal-value **table 3** adequately represents St. Augustine's definition of perfect moral-legal *response*-action by God (Augustine 2010: 183-184). According to the wonderful analogy, (1) *Philonian implication and Augustinian response-action are models (analogs)* of each other (Lobovikov 2020); (2) there are some other worth-mentioning, namely, nonclassical (sometimes called "heretic") options of defining moral-legal-*value-functional* sense of the response-action R^2*xy*, which "heretic" options deviate significantly from each other and also from the above-given **table 3**.

To finish formulating the two-valued algebraic system of natural law-and-morals, it is indispensable to give precise definitions of the notions: "*formal-axiological equivalence*"; "*formal-axiological contradiction*"; "*formal-axiological consequence*"; "*formal-axiological law*" (or, which is the same, "*law of natural jurisprudences and natural ethics*") in the two-valued algebraic system of formal axiology. The mentioned notions are precisely defined as follows.

Definition DF6 of the two-placed relation called "*formal-axiological-equivalence*": in the algebraic system of formal axiology, any moral-legal-value-functions Ξ and Θ are *formally-axiologically equivalent* (this is represented by the expression "Ξ=+=Θ "), if and only if they acquire identical moral-legal-values (from the set {*g (good), b (bad)*}) under any possible combination of the moral-legal-values of their moral-legal-evaluation-variables.

Definition DF7 of the notion "*formal-axiological law*": in algebra of *formal axiology of law and morals*, any evaluation-function Θ is called *formally-axiologically (or necessarily, or universally, or absolutely) good* one, or a l*aw of algebra of formal axiology* (or a "l*aw of natural jurisprudences and natural ethics*"), if and only if Θ acquires the value *g (good)* under any possible combination of the values of its moral-legal-evaluation-variables. In other words, the function Θ is *formally-axiologically (or constantly, or absolutely) good* one, "iff Θ=+=g" (good).

Definition DF8 of the notion "*formal-axiological contradiction*": in algebra of *formal axiology of law and morals*, any moral-legal-value-function Θ is called *formally-axiologically (or invariantly, or absolutely) bad* one, or a "*formal-axiological contradiction*", if and only if Θ acquires the value *b (bad)* under any

possible combination of the values of its moral-legal-evaluation-variables. In other words, the function Θ is *formally-axiologically (or necessarily, or universally, or absolutely) bad* one, iff Θ=+=b (bad).

Definition DF9 of the two-placed relation called "*formal-axiological-entailment*": in the algebraic system of *formal axiology*, for any moral-legal-value-functions Ξ and Θ, it is true that "Θ formally-axiologically follows from Ξ , if and only if, "R^2ΞΘ=+=g.

With respect to the above-given definition DF6, here it is worth mentioning and emphasizing that in the ambiguous natural language, very often the relation "Ξ=+=Θ" is represented by the words-homonyms "is", "means", "implies", "entails", "equivalence" (They may stand for the *formal-axiological equivalence* relation "=+="). As in the ordinary natural language the words "is", "means", "implies", "equivalence", etc. also may stand for the logic operations "equivalence" and "implication", there is a real possibility of confusions produced by absolute identifying and, hence, substituting for each other the substantially different notions "=+=" and logic operation "equivalence" (or "=+=" and logic operation "implication"). Such mixing and substituting are strictly forbidden in the above-defined algebra of formal axiology of law-and-morals. Ignoring this ban indispensably leads to paradoxical results.

The above-given precise definitions DF1-DF9 demonstrate convincingly that basic categories of the mathematized natural-law theory are *quite definite*, consequently, the *alleged* statement that basic notions of the natural law theory are indefinite or not quite definite on principle (Alexeyev 2001: 427) is not true; *the notions of natural law theory are quite definite*, because within the algebra of natural law, *they are precisely defined* (by DF1-DF9). With respect to the not positive but sceptic estimation of my attempt to mathematize the natural law theory (Alexeyev 2001: 427), I guess that, due to personal propensity to ignore mathematics as such, S.S. Alexeyev had not understood the mathematized conception of natural law represented in monograph (Lobovikov 1998) which he had made reference to. According to the above-given rigorous definitions, formal-axiological laws of the algebraic system of natural jurisprudence (and of natural ethics) do not depend upon possible changes of evaluator E. If Θ is a *formal-axiological law*, then Θ is good in relation to any E. Formal-axiological contradictions do not depend upon possible changes of E as well. If Θ is a *formal-axiological contradiction*, then Θ is bad in relation to every E. If there is the formal-axiological equivalence between moral-legal-value-functions Ξ and Θ, then the functions Ξ and Θ are *formally-axiologically equivalent* ones in relation to every evaluator E. Thus, in spite of the evident flexibility and obvious relativity of *empirical* moral-legal-evaluations, there are *absolute invariants* (immutable universal laws) of the moral-legal-evaluation relativity (Lobovikov 2014). This means that allegedly affirming that basic categories of natural law are not quite definite, or "are deprived of qualities of strict definiteness" (Alexeyev 2001: 421) is wrong.

Concerning the above-said there is one more theme worthy of mentioning. From the purely mathematical point of view, in the two-valued algebra of formal axiology, there are 4 (and only 4) mathematically different *unary formal-axiological operations* (namely, two mutually opposite constant-functions and

two mutually opposite not-constant-functions). However, in this article I deal with more than 4 different unary formal-axiological operations. This is so because their difference is not purely mathematical one: it comes from the field of application of the mathematical apparatus, namely, from the contents of the theory of natural law-and-morals as moral-legal action-form theory. Hence the more-than-four-element-set of unary formal-axiological operations considered in this paper is divided into four subsets, and within each of the four subsets any elements are formally-axiologically equivalent to each other. Thus, there is no inconsistency. Here it is relevant also to make the analogous remark in relation to the *binary* formal-axiological operations of the two-valued formal-axiology algebra. The more-than-sixteen-element-set of binary moral-legal operations is divided into sixteen subsets, and within each of the sixteen subsets any elements are formally-axiologically equivalent to each other (although they are identical from the viewpoint of pure mathematics proper, they are somewhat different from the viewpoint of contents of the field of application of mathematics).

To demonstrate how the above-introduced discrete mathematical method works with concrete contents of natural law-and-morals, i.e. to illustrate the above-presented abstract discourse by concrete examples, let us construct and discuss the following algebraic equations concerning the four mathematically different kinds of "freedom" and the four mathematically different kinds of moral-legal-value-functions represented in natural language by ambiguous words "service", "employ", "officer", "servant", "slave", et al. Using the above-given definitions one can obtain the following list of *formal-axiological equations* of two-valued algebra of natural law-and-morals.

1) $Bx{=}{+}{=}F_1x$: *x*'s being (life) is *x*'s freedom.

2) $NF_1x{=}{+}{=}Nx$: nonbeing of *x*'s freedom is equivalent to *x*'s nonbeing (death).

3) $YF_1x{=}{+}{=}YBx$: depriving *x*'s freedom is formally-axiologically equivalent to depriving *x*'s life.

4) $F_1x{=}{+}{=}OF_2x$: *x*'s freedom (i.e. freedom of/for *x*) is an opposite of/for freedom from (what, whom) *x*.

5) $F_2x{=}{+}{=}NF_1x$: freedom from (what, whom) *x* is formally-axiologically equivalent to nonbeing of freedom of/for (what, whom) *x*.

6) $F_3x{=}{+}{=}K^2F_1xF_2x$: absolute freedom from (what, whom) *x* is oneness (unity) of freedom of/for (what, whom) *x* and freedom from (what, whom) *x*.

7) $F_3x{=}{+}{=}K^2F_1BxF_1Nx$: absolute freedom from (what, whom) *x* is oneness (unity) of freedom of/for *x*'s being and freedom of/for *x*'s nonbeing.

8) $F_3x{=}{+}{=}OF_1Z^2xNx{=}{+}{=}OF_1A^2xNx$: absolute freedom from (what, whom) *x* is opposite of/for freedom of/for moral-legal choice.

9) $F_3x{=}{+}{=}F_1NZ^2xNx{=}{+}{=}F_1NA^2xNx$: absolute freedom from (what, whom) *x* is freedom of/for nonbeing of moral-legal choice.

10) $F_3x{=}{+}{=}F_2Z^2xNx{=}{+}{=}F_2A^2xNx$: absolute freedom from (what, whom) *x* is freedom from moral-legal choice.

11) $F_2Z^2xNx{=}{+}{=}F_2A^2xNx{=}{+}{=}$b: freedom from moral-legal choice is a formal-axiological contradiction.

12) F_3x=+=b: absolute freedom from (what, whom) *x* is a formal-axiological contradiction.

13) F_4x=+=F_1Z^2xNx=+=F_1A^2xNx: absolute freedom of/for x is freedom of/for moral-legal choice between *x* and *Nx*.

14) Z^2xNx=+=A^2xNx=+=g: moral-legal choice between *x* and *Nx* is a natural *moral-legal (formal-axiological)* law of "*tertium non datur*" (Lobovikov 1984a; 1984b).

15) F_4x=+=g: absolute freedom of/for (what, whom) *x* is a formal-axiological law (of the algebraic system of natural law-and-morals).

3. Natural Law and Natural Theology: Is God's Slave a Slave? (Answering the Question by Means of Recognizing Significant Mathematical Difference among Four Meanings of the word "Slave")

According to the discrete mathematical model of natural law under investigation, the four significantly different meanings of the word "slave (servant, serviceman)" are nothing but *moral-legal-value-functions*; the difference among them is mathematical proper. In this article, the four qualitatively different functions called "servanthood (serfdom)" are defined precisely by the above-presented **table 2**. Yet in ancient Greece it had been well-recognized that the *empirically* known *relative* slavery (service) position is neither absolute evil nor absolute virtue (Aristotle 1994b: 449). Thus, two significantly different moral-legal meanings of the word "slavery (service)" (the negative and the positive ones) had been recognized even in Antiquity (Aristotle 1994a; 1994b). However, up to the present time, the proper mathematical (algebraic) aspect of the two meanings had not been recognized as such. Since the collapse of Roman Empire, there had been a development (quality change), significant transformation (and accommodation to new realities by regress) of the Roman Law system (somewhat *conventionally* called "*reception* of the Roman Law by modern legal cultures of civilized countries") which transformation had resulted in treating "slavery (service)" as a *negative* moral-legal *constant* (absolute evil), opposed by "liberty" as a *positive* moral-legal *constant* (absolute virtue).

Thus, finally, in contrast to Antiquity, the two significantly different notions of *relative* slavery ("*service*", or "*being subjected to*") which had been understood as not moral-legal-value-*constants* (by celebrated lawyers and philosophers of Antiquity), were omitted in (or excluded from) the contemporary general theory of State and law proper, while the two moral-legal *constants* were taken into an account (included into) the general theory of proper law and State. According to that qualitatively new conception of the natural law and morals which (conception) is represented by its discrete mathematical model – algebra of formal axiology, both natural law doctrines of slavery (the ancient created by slave-owners and the contemporary created by the liberals) are *particular cases* necessary but *not sufficient* for making up an actually

universal natural legal theory of "*x*'s *service* (subalternation) to *y*". I believe that the two mutually excluding and inter-complementing theoretic extremes are to be synthesized in one universal conception deliberately taking into an account all the four significantly different meanings of the word "slavery (service)" which are nothing but *moral-legal-value-functions*.

The above-generated list of formal-axiological equations of two-valued algebra of natural law and morals is quite sufficient for illustrating (instantiating) how the discrete mathematical machinery works with the four different moral-legal-value-functions called "freedom". Now let us generate a list of formal-axiological equations modeling relations among the four mathematically different meanings of the word "service".

16) $S_2x=+=OS_1x$: *x*'s service (relative slavery) is an opposite to service to (what, whom) *x*.

17) $S_2x=+=NF_1x$: *x*'s service (relative slavery) is nonbeing of *x*'s freedom.

18) $S_2x=+=LF_1x$: *x*'s service (relative slavery) is limiting freedom of/for *x*.

19) $S_1x=+=F_1x$: service to (what, whom) *x* means freedom of/for *x*.

20) $S_1x=+=NF_2x$: service to *x* is nonbeing of freedom from (what, whom) *x*.

21) $NF_2x=+=S_1x$: nonbeing of freedom from (what, whom) *x* is being a serviceman, servant (relative slave) of/for *x*.

22) $Bx=+=BS_1x$: existence of *x* is equivalent to existence of helper (subject, slave) of/for *x*.

23) $US_1x =+=Ux$: interest of slave of/for *x* is equivalent to interest of/for *x* (Aristotle 1994b: 445-449).

24) $Bx=+=M_1x$: *x*'s being is *x*'s being a master, ruler (Aristotle 1994a; 1994b).

25) $BS_1x=+=S_1M_1x$: being of slave of/for *x* is service to master *x*.

26) $VM_1x=+= VS_1M_1x$: good (virtue) of/for master *x* is good (virtue) of/for slave of master *x* (Aristotle 1994b: 445-449).

27) $Bx=+=S^2M_2xx$: *x*'s being is service of master (ruler) of/for *x* to *x*.

28) $Gx=+=$g: God of/for *x* is a natural legal law, i.e. a formal-axiological law of the two-valued algebra of moral-legal actions.

29) $S_1Gx=+=S_4x$: service to *x*'s God is being a slave of/for *x*'s God.

30) $S_4x=+=F_4x$: *x*'s being a slave of *x*'s God is absolute freedom of/for *x*. Such a surprising (psychologically unexpected) conclusion (and its justification) had been presented at the conference (Lobovikov 2005).

31) $S_4x=+=NS_3x$: *x*'s being a slave of God is nonbeing of *x*'s absolute slavery.

32) $F_2Gx=+=S_1Dx$: freedom from *x*'s God is service to *x*'s devil.

33) $S^2xDx=+=S_3x$: *x*'s service to *x*'s devil, i.e. to main enemy of *x*'s God, is absolute slavery of *x*.

34) $S_3x=+=$b: absolute slavery of *x* is a formal-axiological contradiction.

35) $S_3x=+=N_1x$: absolute slavery of *x* is absolute nonbeing of *x*.

36) $F_4x=+=$g: absolute freedom of/for *x* is a natural law (=formal-axiological one).

37) $S_4x=+=$g: *x*'s being a slave of God is a natural law (=formal-axiological one).

38) S_4x=+=B_1x: *x*'s being a slave of God is absolute being of *x*.
39) F_4x=+=F_1Gx: absolute freedom of/for *x* is freedom of/for God of/for *x*.
40) F_1Gx=+=g: freedom of/for God of/for *x* is a natural law.

Thus, by means of the discrete mathematical model under investigation, it is easy to see that natural law and natural theology are necessarily interconnected.

4. Deductive Grounding and Justifying the Positive Constitutional Law of Division (Separation) of the Executive and the Judicial Powers of State, within Algebra of Natural Law

Above it has been demonstrated how the machinery of discrete mathematics works with concrete contents of the system of proper *natural* law-and-morals, namely, with the four mathematically different moral-legal-value-functions called "freedom" and the four ones called "slavery". Now it is quite natural and desirable to demonstrate convincingly how the above-introduced mathematical machinery works with respect to a juridical material taken from proper *positive* law. Let us take a concrete example of such material from the *positive constitutional law* (of the Russian Federation, the U.S.A., etc.).

According to the above-given tables 1 and 2, under any value of the variable *x*, the unary functions *Ex* (*execution* of *x*) and *Jx* (*judgement* about *x*) have opposite values. According to the table 3, the binary function D^2xy has the value *g* (good), if and only if x and y have opposite values. Consequently, the composition of functions D^2ExJx has the value *g* (good) under any value of the variable *x*. Consequently, according to the above-given definition DF7, the evaluation-function D^2ExJx is a natural law (formal-axiological one) of the two-valued algebra of natural law-and-morals. A translation of the expression D^2ExJx=+=*g* from the artificial language of algebra into natural one of humans is the following: division (separation) of executing (what) *x* and judging about (what) *x* is a (strictly universal and immutable) natural law, which is "always good" according to Paul – the celebrated representative of ancient Roman Law doctrine (Watson 1998: 2-3).

Hence, the famous positive constitutional law of division (separation) of the executive and judicial powers of State is successfully grounded (strictly deductively!!!) within algebra of natural law. So, the *positive* and the natural philosophies of legal law are not the ones absolutely excluding each other: the latter can be a solid proper theoretical foundation and convincing justification of the former. Thus, the concrete example, demonstrating how the algebraic system of natural law-and-morals can help significantly to substantiate a proper *positive* legal law, is given.

5. Conclusion

According to the above-said, it is quite natural that the extremely negative relation of Marxist-Leninist world-view to theology has been necessarily interconnected with definitely negative attitude of Marxist-Leninist-minded jurists and philosophers of law to the natural jurisprudence. As Marxist-Leninist nominalism (particularism) philosophy has rejected real existence of eternal and immutable *universals for* moral-legal values of proletariat and bourgeoisie classes of society, the party ideology of proletariat has rejected real existence of strictly universal and necessarily unchangeable natural legal laws of human behavior as well. However, in spite of the philosophy of proletariat, natural legal laws – eternal and immutable *universals for* human-behavior-patterns (common to any living creatures in general) do exist and may be represented adequately by appropriate mathematical structures. Thus, natural jurisprudence, and natural theology make up a coherent system of nature studies.

The significant scientific novelty of the present article is demonstration of the nontrivial statement that the set of different formal-axiological meanings of the word "freedom" is not reduced to the well-known couple (*positive* "freedom *of/for*" and *negative* "freedom *from*"): according to this article, in two-valued algebra of formal axiology, there are exactly four different formal-axiological meanings of the word "freedom", namely, the two opposite moral-legal-value-functions called "freedom", which are not constants, and the two opposite moral-legal-value-functions "freedom", which are constants. Another important aspect of scientific novelty of the given paper is demonstration of the psychologically unexpected nontrivial statement that in two-valued algebra of formal axiology, there are *exactly four* different formal-axiological meanings of the word "slavery (service)". Taking the proper mathematical difference among the four into an account systematically, by means of computation of relevant moral-legal-value-functions, it is easy to demonstrate the psychologically surprising *statement that x's being a slave of God is x's being absolutely free*. At first glance, such a nontrivial statement (which is very important for clarifying philosophical foundations of rational theology) looks odd, paradoxical (self-contradictory), but, according to the above-presented formal-axiological discourse, it *only looks* so. Thus, the above-presented two-valued algebraic system of natural law has a heuristic value in general and can have fruitful applications to philosophical theology in particular.

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ИНФОРМАЦИЯ ОБ АВТОРЕ

Владимир Олегович Лобовиков
доктор философских наук, профессор, главный научный сотрудник отдела права Института философии и права Уральского отделения РАН, г. Екатеринбург, Россия;
ORCID: http://orcid.org/0000-0001-8760-0452;
ResearcherID: K-4188-2018;
SPIN-код: 3994-4289;
E-mail: vlobovikov@mail.ru

INFORMATION ABOUT THE AUTHOR

Vladimir O. Lobovikov
Doctor of Philosophy, Professor, Chief Researcher of the Department of Law by Institute of Philosophy and Law, Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia;
ORCID: http://orcid.org/0000-0001-8760-0452;
ResearcherID: K-4188-2018;
SPIN-код: 3994-4289;
E-mail: vlobovikov@mail.ru