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EPISTEMIC MODAL LOGIC, UNIVERSAL PHILOSOPHICAL EPISTEMOLOGY, AND NATURAL THEOLOGY: GOD'S OMNISCIENCE AS A FORMAL-AXIOLOGICAL LAW OF THE TWO-VALUED ALGEBRA OF METAPHYSICS AS FORMAL AXIOLOGY (DEMONSTRATING THE LAW BY "COMPUTING" RELEVANT EVALUATION-FUNCTIONS)¹

The method of constructing and investigating discrete mathematical models is applied to the problem of Omniscience-by-God, which is located at the intersection of epistemology, theology, and epistemic logic. For the first time in epistemology and philosophical theology, the tenet of God's Omniscience is formulated by the artificial language of two-valued algebra of metaphysics as formal axiology, and demonstrated as a formal-axiological law of that algebra by "computing" relevant evaluation-functions.

Keywords: empirical-knowledge, a-priori-knowledge, God's-omniscience, algebra-of-metaphysics-as-formal-axiology, formal-axiological-law

If controversies were to arise, there would be no more need of disputation between two philosophers than between two accountants (*Computistas*). For it would suffice to take their pencils in their hands, to sit down to their slates (*abacos*), and to say to each other...: Let us calculate (*Calculemus*).

G.W. Leibniz

Introduction

The problem of God's omniscience has been known since ancient times: Plato [1], Augustine [2], Aquinas [3]. To introduce a logic contradiction making the problem let us consider two representative citations. The first one is from the dialogue "Parmenides" by Plato: "Would you, or would you not say, that absolute knowledge, if there is such a thing, must be a far more exact knowledge than our knowledge; and the same of the beauty and of the rest?"

Yes.

¹ **Заголовок (рус.):** Эпистемическая модальная логика, универсальная философская эпистемология и естественная теология: всеведение Бога как формально-аксиологический закон двузначной алгебры метафизики как формальной аксиологии (Обоснование этого закона «вычислением» соответствующих ценностных функций)

Аннотация (рус.): Метод конструирования и исследования дискретных математических моделей применяется к проблеме всеведения Бога, находящейся на стыке эпистемологии, теологии и эпистемической логики. Впервые в эпистемологии и философской теологии догма всеведения Бога формулируется на искусственном языке двузначной алгебры метафизики как формальной аксиологии и обосновывается в качестве формально-аксиологического закона этой алгебры путем «вычисления» соответствующих ценностных функций.

Ключевые слова (рус.): эмпирическое знание, априорное знание, всеведение Бога, алгебра метафизики как формальной аксиологии, формально-аксиологический закон

And if there be such a thing as participation in absolute knowledge, no one is more likely than God to have this most exact knowledge?

Certainly.

But then, will God, having absolute knowledge, have a knowledge of human things?

Why not?

Because, Socrates, said Parmenides, we have admitted that the ideas are not valid in relation to human things; nor human things in relation to them; the relations of either are limited to their respective spheres.

Yes, that has been admitted.

And if God has this perfect authority, and perfect knowledge, his authority cannot rule us, nor his knowledge know us, or any human thing; just as our authority does not extend to the gods, nor our knowledge know anything which is divine, so by parity of reason they, being gods, are not our musters, neither do they know the things of men.

Yet, surely, said Socrates, to deprive God of knowledge is monstrous" [1. P. 490].

The second citation is taken from "Summa Theologica" by Thomas Aquinas: "*Whether God Knows Things Other Than Himself by Proper Knowledge? <...> I answer that, Some have erred on this point, saying that God knows things other than Himself only in general, <...> But it cannot be. For to know a thing in general and not in particular, is to have an imperfect knowledge of it. <...> Hence it is manifest that God knows all things with proper knowledge, in their distinction from each other*" [3. P. 80–81].

The above citation from Plato's dialogue "Parmenides" produces a very strange impression as it manifestly establishes an unbridgeable gap between divine (absolute) knowledge and human (imperfect) one. From the classical philosophical theology viewpoint, the dualism between the mentioned kinds of knowledge is "monstrous". Certainly, it must be rejected. But how can one overcome the dualism, if existence of absolute knowledge is admitted and existence of its significant difference from the relative (human) one is admitted as well? Effectively to span the two contrary kinds of knowledge one has to have a *universal (common) for absolute and relative knowledge*. This universal is to be more general than the two particulars. The abstract concept of "knowledge in general" is to be a genus in relation to the species "absolute knowledge" and "relative knowledge". In the above citation from "Summa Theologica" not two but three different meanings of the word "knowledge" are mentioned: the *perfect* one; the *imperfect* one; and the general knowledge or knowledge-in-general [3. P. 80–81]. If, in addition to writings by Plato and T. Aquinas, one takes into an account also I. Kant's discourse of *a priori* and *a posteriori* knowledge [4, 5], then the one can arrive to the conclusion that in philosophical literature the word-homonym "knowledge" has at least three significantly different meanings, namely:

(K-1) *a priori* knowledge, which is perfect (proper) knowledge (absolute one);

(K-2) *experience* knowledge, which is imperfect (improper) knowledge (relative one) and typical for human creatures (this meaning is subject-matter of *evolutionary* epistemology and *empiricist* theory of cognition);

(K-3) general knowledge or knowledge-in-general (this meaning ought to be subject-matter of epistemic modal logic).

But, in my opinion, the so-called *normal* epistemic modal logic has missed its target as instead of studying the meaning K-3, it studies the meaning K-1. Thus, it has missed its goal because its theorem (or even axiom) “If person knows that q, then q” is valid not for any knowledge in general, but only for perfect (absolute) knowledge *a priori*. It is true that if God knows that q, then q, but it is not valid that for any q, if a human creature has a knowledge by experience that q, then q. A critique of the so-called *normal* epistemic modal logic from the viewpoint of *evolutionary* epistemology can be found, for instance, in [6]. But this remark of the *so-called normal* epistemic modal logic is not related to the problem in question directly because in the expression “God’s knowledge”, the homonym “knowledge” can have meanings K-1 or K-3, but not K-2, as *His knowledge cannot be empirical one* on principle; in relation to God, *evolutionary* epistemology is irrelevant, as *His knowledge is invariable* [3. P. 89]. Thus, indefiniteness of the meaning of expression “God’s omniscience” is a little bit diminished. The ambiguous expression “God knows everything” is explicated by “God *a priori* knows everything”. For further explicating it is indispensable to have a precise definition of the notion “*a priori* knowledge”. A precise *axiomatic* definition of this notion is given within the logically formalized universal philosophical epistemology system Σ systematically utilizing the three significantly different notions of knowledge [7], but that axiomatic definition it is not manifest (direct) one. Moreover, within the formal theory Σ , the indirect definition of “*a priori* knowledge” is done at the level of *syntaxis*. However, along with the indirect syntactic definition of the notion, it would be perfect to have also a direct semantic one. But how can it be done? Let us look at this difficult question from different sides.

Abstractly talking in principle, I think that it is a good idea to bridge the gap between the two kinds of knowledge by introducing the third kind of it (generalizing and thus synthesizing one); but there are nontrivial problems: how to make the universal philosophical epistemology exploiting the triple of knowledge-kinds a *logically consistent* theory? What are *semantic foundations* of such theory? These questions are nontrivial ones as the literature on the topic is not homogeneous and even contradictory as a whole. The immense amount of worth-mentioning modern writings on God’s omniscience is representatively exemplified by (though not reduced to) [8–22]. In some of the mentioned contemporary writings on the theme, various objections against existence of Divine omniscience were raised again and elaborated systematically in spite of the fact that many of them already had been discussed (and considered as already eliminated ones) by eminent theologians and philosophers before, for instance, by T. Aquinas [3]. This may be explained by extraordinary difficulty of the nontrivial problem of philosophical theology which is a complicated system of qualitatively different aspects. And, in spite of the immense literature on the topic, some aspects of the problem are still missed and even not recognized by researchers. The present article is devoted to indicating and investigating one of the hitherto not recognized and therefore omitted aspects of the attribute of God. To begin with, look at the following Aquinas’ sentences concerning Divine knowledge which sentences are taken from “Question XIV” of “Summa Theologica” [3. P. 75–91]:

“...God necessarily knows things other than Himself” [3. P. 79].

“...God knows things other than Himself with a proper knowledge...” [3. P. 80].

“He supremely returns to His own essence, and knows Himself” [3. P. 77].

“...He has knowledge even of things that are not” [3. P. 83].

“So also, things in potency are known by God, although they are not in act” [3. P. 83].

“...God knows future contingent things” [3. P. 87].

“It is written: *The Lord knoweth the thoughts of men* (Ps. 93.11). But enunciabile things are contained in the thoughts of men. Therefore, God knows enunciabile things” [3. P. 88].

“*I answer that*, Since the knowledge of God is His substance, as is clear from the foregoing (A. 4), just as His substance, is altogether immutable, as shown above (Q. IX. A1), so His knowledge likewise must be altogether invariable” [3. P. 89].

To understand these sentences adequately one has to have knowledge of semantics of natural language. But which semantics of it is meant? In first approximation, as a rule, people mean the descriptive-indicative one, which seems to be the only semantics in *empirical* sciences of nature (physics, chemistry, et al). However, in the natural language of *the humanities* there is also a *formal-axiological* semantics along with the descriptive-indicative one. Thus, in the humanities, the natural-language semantics consists of two necessary parts. Moreover, there is a hypothetical conception that *in its essence metaphysics is formal axiology* [23]. In the present article the hypothetical conception of *metaphysics as formal axiology* is assumed and studied by the hypothetic-deductive method systematically.

In this relation it is worth noting and even emphasizing that while discussing all-knowing-God in [8–22] the authors have concentrated almost all their attention on proper logic aspect of descriptive-indicative semantics of the natural language used in talks of His omniscience. As a rule, theologians and philosophers have discussed *statements of being or non-being* (or possibility or impossibility) of the omniscience by God. *Statements of the positive value* of His omniscience has been presumed but they do not undergo a systematical *formal-axiological* analysis using discrete mathematics, namely, two-valued algebra of formal axiology. Therefore, the present paper is targeted at filling in this blank in the literature on the topic. To make the text understandable first of all it is indispensable to introduce, precisely to define, and to instantiate the minimal set of basic definitions necessary and sufficient for proving strictly that *God's omniscience is a law of metaphysics* (i.e. a *formal-axiological law*) in the *algebraic system of formal axiology*. Therefore, let us introduce the new conceptual apparatus (unknown terms) systematically to be used below for obtaining the novel nontrivial result which has never been published hitherto.

**A two-valued algebraic system of metaphysics as formal axiology
(a set of basic definitions necessary-and-sufficient for proving
strictly that God's omniscience is a formal-axiological law
of the algebraic system)**

In this part of the paper I make the reader aware of the basic definitions of algebra of formal axiology which are already published, for instance, in [6, 23–25]. Beginning with this already published set of main definitions is necessary for understanding the significantly new result submitted in this article. The paper's

novelty is proving the metaphysical (=formal-axiological) law of God's omniscience by computing compositions of relevant evaluation-functions; this novelty is still not published elsewhere.

Two-valued algebra of formal axiology is based upon the set Δ of either acts or agents. By definition, acts are such and only such operations, which are either good, or bad ones in the abstract axiological meaning of the words "good" and "bad". In general, any elements of Δ (and, in particular, any agents) are such and only such entities which are either good, or bad ones. The set Δ is homogenized by accepting such an identity-abstraction according to which an agent is identified with the compound action uniting all acts of that agent in a whole. Thus, an agent is nothing but the complex act consisting of all the actions realized by the agent.

Algebraic operations defined on the set Δ are evaluation-functions. Evaluation-variables of these functions take their values from the set $\{g, b\}$. Here the symbols "g" and "b" stand for the abstract axiological values "good" and "bad", respectively. The functions take their values from the same set. The symbols: "x" and "y" stand for abstract-value-forms of elements of Δ . Elementary value-forms deprived of their contents are independent evaluation-variables. Compound value-forms of acts and agents deprived of their contents are evaluation-functions determined by these variables.

Let symbol Σ stand for the *evaluator*, i.e. that person (individual or collective one – it does not matter), in relation to which all evaluations are generated. In the evaluation-relativity theory, Σ is a variable: changing values of the variable Σ can result in changing evaluations of concrete acts and agents. However, if a value of the variable Σ is fixed, then evaluations of concrete acts and agents are definite.

Speaking of evaluation-functions in this paper I mean the following mappings (in the proper mathematical meaning of the word "mapping"): $\{g, b\} \rightarrow \{g, b\}$, if one speaks of the evaluation-functions determined by *one* evaluation-variable; $\{g, b\} \times \{g, b\} \rightarrow \{g, b\}$, where "x" stands for the Cartesian multiplication of sets, if one speaks of the evaluation-functions determined by *two* evaluation-variables; $\{g, b\}^N \rightarrow \{g, b\}$, if one speaks of the evaluation-functions determined by *N* evaluation-variables, where *N* is a finite positive integer.

Now let us introduce and define by tables elementary evaluation-functions directly relevant to the theme of this paper. First of all, let us consider the functions determined by *one* argument.

The *glossary* for the below evaluation-table 1: Let the symbol Ay mean the evaluation-function "*a-priori knowledge of (about) y*". The symbol Ey means the evaluation-function "*empirical knowledge of (about) y*". Vy stands for the evaluation-function "*empirical knowing by (whom) y*". Jy – the evaluation-function "*a-priori-knowing by (whom) y*". Ty – "*y's thought*" or "*thinking by y*". By – "*being of (what, whom) y*". Fy – "*future (what, who) y*", or future of (what, whom) *y*". Ny – "*non-being of y*". Zy – "*change of y*". Cy – "*contingent (what, who) y*". Dy – "*thing (what, who) y*". Gy – "*God of (what, whom) y in monotheistic world religion*". The introduced functions are defined by the table 1. (Such tabular definition of the *constant* evaluation-function Gy has been published and used in [24, 25].)

Table 1. The Functions Determined by One Argument

y	Ay	Ey	Vy	Jy	Ty	By	Fy	Ny	Zy	Cy	Dy	Gy
g	g	b	g	g	g	g	g	b	b	b	g	g
b	b	g	b	b	b	b	b	g	g	g	b	g

The *glossary* for the below evaluation-table 2: Let the symbol E_{2xy} stand for the evaluation-function “*empirical knowledge of (about) x by (whom) y*”. (The lower number-index 2 informs that the indexed capital letter stands for a function determined by *two* arguments.) The symbol A_{2xy} stands for the evaluation-function “*a priori knowledge of (about) x by (whom) y*”. The symbol F_{2xy} – “*y’s freedom from x*”. T_{2xy} – “*y’s thought (thinking) of (about) x*”. S_{2xy} – “*y’s sensation of x*” or “*y’s feeling (what, whom) x*”. C_{2xy} – “*y’s existence in (what, whom) x*”. I_{2xy} – “*y’s absolute ignorance of (about) x*, i.e. having neither *empirical* knowledge nor *a-priori* one of (about) *x*”. K_{2xy} – “*y’s having a knowledge-in-general of (about) x*, i.e. having either *empirical* knowledge, or *a-priori* one, or both *about x*” (here “or” is used in its *not-excluding* meaning). These functions are defined below by the table 2.

Table 2. The Functions Determined by Two Arguments

#	x	y	E_{2xy}	A_{2xy}	F_{2xy}	T_{2xy}	S_{2xy}	C_{2xy}	I_{2xy}	K_{2xy}
1	g	g	b	g	b	b	b	g	b	g
2	g	b	b	g	b	b	b	b	b	g
3	b	g	g	g	g	g	g	g	b	g
4	b	b	b	b	b	b	b	g	g	b

Definition DEF-1 (of the binary relation of *formal-axiological-equivalence*): in two-valued algebraic system of metaphysics as formal axiology, any evaluation-functions (value-forms of activity) ω and φ are *formally-axiologically equivalent* (this is represented by the symbol “ $\omega=+=\varphi$ ”), if and only if they acquire identical axiological values (from the set $\{g \text{ (good)}, b \text{ (bad)}\}$) under any possible combination of axiological values of their evaluation-variables.

Definition DEF-2 (of the notion “a *law of metaphysics*” or, which is the same, “a *formal-axiological law*”): in two-valued algebraic system of metaphysics as formal axiology, an evaluation-function (value-form of activity) is called *formally-axiologically good (or absolutely good)* one (or a *law of metaphysics*), if and only if it acquires the axiological value g (*good*) under any possible combination of axiological values of its variables. In other words, ω is a *law of metaphysics*, if and only if $\omega=+=g$.

Definition DEF-3: (of the notion “a *formal-axiological contradiction*”): in two-valued algebraic system of metaphysics as formal axiology, an evaluation-function is called “*formally-axiologically bad*” one or, which is the same, a “*formal-axiological contradiction*”, if and only if it acquires the axiological value b (*bad*) under any possible combination of axiological values of its variables. In other words, ω is a *formal-axiological contradiction*, if and only if $\omega=+=b$.

As now all the definitions necessary and sufficient for proving God’s omniscience (as the formal-axiological law of metaphysics) are already given, let us start constructing the proof by computing compositions of relevant functions (within the algebraic system).

Proving the formal-axiological law of God’s Omniscience by Computing Evaluation-Functions and Systematical Using the Above-Given Definitions

Taking into an account that, according to the table 1, for any y , it is true that $G_y=+=g$, the reader himself can generate and examine the following equations of the above-defined algebraic system of metaphysics.

1) $A_2xGy=+=g$: being true for any x and y , this equation establishes the universal metaphysical (=formal-axiological) law of God's a-priori-knowledge of x , where x is arbitrary. Many of the following equations are important *particular* cases of this *universal* law.

2) $A_2DxGy=+=g$: God *a priori* knows all things.

3) $A_2BxGy=+=g$: God *a priori* knows being of x .

4) $A_2NxGy=+=g$: God *a priori* knows non-being of x .

5) $A_2FxGy=+=g$: God *a priori* knows future of x .

6) $A_2FCDxGy=+=g$: God *a priori* knows any future contingent thing x .

7) $A_2TxGy=+=g$: God *a priori* knows any x 's thought.

8) $A_2GyGy=+=g$: God *a priori* knows Himself.

9) $NZA_2xGy=+=g$: nonbeing of change of God's a-priori-knowledge of x is the law.

10) $C_2E_2xyA_2xy=+=g$: existence of *a-priori* knowledge in empirical one is the law.

These equations make up a *model* of the above citations from "Summa Theologica" [3]. Certainly, some empiricist-minded philosophers could assess the equations as paradoxical ones contradicting to experience. However, in my opinion, talks of *facts* and *empirical* arguments are irrelevant here, as the equations model not *experience* but *a priori* knowledge by God. Thus, the alleged objections are to be rejected because they violate the principle known under the somewhat conventional name "Hume Guillotine" which principle forbids allegedly logical bridging the gap between *facts* (=contingent truths) and values. In any way, the model deserves discussing.

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EPISTEMIC MODAL LOGIC, UNIVERSAL PHILOSOPHICAL EPISTEMOLOGY, AND NATURAL THEOLOGY: GOD’S OMNISCIENCE AS A FORMAL-AXIOLOGICAL LAW OF THE TWO-VALUED ALGEBRA OF METAPHYSICS AS FORMAL AXIOLOGY (DEMONSTRATING THE LAW BY “COMPUTING” RELEVANT EVALUATION-FUNCTIONS).

Keywords: empirical-knowledge; a-priori-knowledge; God’s-omniscience; algebra-of-metaphysics-as-formal-axiology; formal-axiological-law

The present article continues the author’s attempts to apply the conceptual apparatus and methods of discrete mathematics to analytical theology, namely, to represent and solve difficult problems of philosophical theology by means of constructing and investigating their models at the level of artificial language of two-valued algebraic system of metaphysics as formal axiology. The author has already published a paper on discrete mathematical modeling the tenet of God’s omnipotence in [Tomsk State University Journal of Philosophy, Sociology and Political Science. 2019. Vol. 47. P. 87–93]. In comparison with the mentioned paper, the present article submits significantly new scientific results of constructing and investigating a discrete mathematical model of *another* famous attribute of God, namely, of His omniscience. In contrast to the tenet of God’s omnipotence affirming that *He is almighty*, the tenet of God’s omniscience affirms that *He knows everything*. However, the literature on philosophical theology contains indicating and discussing a set of nontrivial logical and epistemological problems concerning *All-Knowing-God*. Just these problems (and solving them at the level of their mathematical model) make up the subject-matter of the given article. The paper starts with *explicating a formal-axiological meaning* of the statement “God knows everything” by *explicating formal-axiological meanings* of the words “God”, “knows”, and “thing”. In particular, it is emphasized that the word “knowledge” is a homonym possessing at least three qualitatively different meanings, name-

ly, “*a-priori* knowledge”, “*empirical* knowledge”, and knowledge-*in-general*”. It is demonstrated that God’s knowledge is not empirical but *a-priori* one. All the *formal-axiological* meanings under discussion are considered as *evaluation-functions* and defined precisely by tables. Significantly new scientific result of the present article: for the first time in the world literature on philosophical theology, the tenet of All-Knowing God is precisely formulated by means of the artificial language of two-valued algebra of metaphysics as formal axiology, and proved as a formal-axiological law in this algebra by computing relevant evaluation-tables. The hitherto never published affirming God’s omniscience as the law of two-valued algebra of metaphysics as formal axiology is quite nontrivial and psychologically unexpected one, although from the viewpoint of mathematics proper, its proof is simple.