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LOGIC OF FAITH AND DEED. THE IDEA AND AN OUTLINE OF THE THEORETICAL CONCEPTION*

Abstract. This paper discusses the theoretical assumptions behind the conception of the logic of faith and deed (*LF&D*) and outlines its formal-axiomatic frame and its method of construction, which enable us to understand it as a kind of deductive science. The paper is divided into several sections, starting with the logical analysis of the ambiguous terms of ‚faith’ and ‚action’, and focusing in particular on the concepts of *religious faith and deed* as a type of conscious activity relating to a matter or matters of social importance. After outlining the main ideas and basic assumptions of the theoretical conception of the *LF&D* as an axiomatic theory, the author introduces some axiom systems for: 1) the logics of faith *LF* (*doxastic logics*), 2) the logic of deed *LD*, and 3) certain logics of norms *DL* (*deontic logics*) connected with „duties” and concerning actions/deeds. Lastly, the paper outlines the scientific *LF&D* based on the three types of logic 1)–3).

Keywords: faith; religious faith, basic notions in great religions, doxastic logic, deed, logic of deed, deontic logic, logic of faith and deed

1. Logical analysis of the notions of faith and deed.
2. The basic ideas of the logic of faith and deed.
3. The basic assumptions behind the conception of *LF&D*.
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* This paper is based on Part II of my study in Polish *Logika wiary i czynu. Idea i zarys koncepcji teoretycznej*, w: *Studia Theologica et Historica Silesiae Opoliensis*, red. T. Dola, Opole 2010, 81–125. I will not use here the ambiguous term “belief” in its epistemological or decision-theoretical meaning, as in standard doxastic logic. Rather, I will use it as synonymous with “faith”, which is closer to the content of this paper.

1. LOGICAL ANALYSIS OF THE NOTIONS OF FAITH AND DEED

In order to outline the scientific foundation of the logic of faith and deed ($LF\&D$) from a formal-logical perspective it is necessary to treat it as a type of formal scientific logic, that is as a deductive theory or an axiomatic theory. In other words, we must treat it as a set of theorems (or laws) justified on the basis of axioms and accepted rules of deduction. The axioms and theorems of such a logic determine precisely and describe the relevant notions of faith and deed as well as the relations between these notions.

Before essaying to establish the axioms of the $LF\&D$, it is worth explaining in more detail the key notions concerning this theory. We deal here with such notions as: (1) *man of faith*, and consequently with (1a) the notion of faith, (2) *man of deed*, and consequently with (2a) the notion of deed/action, and (3) *man of faith and deed/action*. These notions concern concrete people whom we call “man of faith”, without thinking of them as people of deed/action. Conversely, they also concern concrete people whom we call “man of deed/action”, without thinking of them as people of faith. Some people, however, can be labelled as both “men of faith and deed”.¹ Each individual belonging to these three different categories employs a corresponding logic, that is: the logic of faith, the logic of deed/action and the logic of faith and deed/action. These logics must concern the following notions: *a faith* (or *to faith*),² *a deed/an action* (*to deed/to act*) and both notions mutually correlated. What is a faith/belief, though? What is a deed/an action? After all, even a superficial, established or linguistic analysis of the words “belief/faith” and “action/deed” points to the fact that they are ambiguous words. Their logical analysis aims to

1 I mean here, primarily, Cardinal Stefan Wyszyński and Karol Wojtyła – Pope John Paul II.

2 By way of analogy with the pair of words “a belief – to believe”, I resort to using the non-existing verb “to faith”.

make their meanings precise for the purpose of a formalization, and therefore for an axiomatization of the above-mentioned logics.

The logical analysis of concepts is one of the chief tasks of analytical philosophy and it is based on logical semiotics and classical formal logic, which are sections of general logic. From a logical perspective, which is of interest to us, and also from a philosophical and Thomist perspective, the different meanings of the word “faith” are only discussed in detail under the entry *Wiara (Faith)* found in the *Leksykon filozofii klasycznej*, edited by Józef Herbut³ (see also the entry *Belief* by Eric Schwitzgebel in *The Stanford Encyclopedia of Philosophy*⁴ and the paper *Dynamic Logic of Belief Change* by Johan van Benthem & Sonja Smets⁵). In his analysis of “faith”, J. Herbut states that it: “reveals – on the one hand – its relations with knowledge and rationality, and – on the other one – with an inner experience of man, their volitional and emotional dispositions, external activity and social environment.”

Various forms of “faith” – according to Herbut – consist in “acknowledging something to be true on the basis of factors that cannot be fully justified.” The author clearly distinguishes between a general notion of ‘faith’ and the notion of ‘a religious faith’ (faith expressed in the religious language). The general notion of faith is not homogeneous: considered from a substantive, logical point of view as faith expressed through acceptance of the truthfulness of relevant sentences, ‘faith’ can be recognized in three different ways and in such a manner that each subsequent notion is less general than the preceding one (being subordinate in relation to the preceding one). Accordingly, *faith* is: “either

3 J. Herbut, *Wiara*, in: *Leksykon filozofii klasycznej*, ed. J. Herbut, Lublin 1997, 534–536.

4 E. Schwitzgebel, *Belief*, in: *The Stanford Encyclopedia of Philosophy*, ed. E.N. Zalta, <http://plato.stanford.edu/entries/belief/> (substantive revision Mon Jun 3 2019).

5 In the *Handbook of Logic for Knowledge and Belief*, College Publications, London 2014.

(1) the act of acknowledging by an individual x a sentence p to be true, in which case *the fact that x 's faith that p is true* is expressed in the context: x faiths that p

or

(2) the act of acknowledging by x that a sentence about the existence of G (somebody or something) or/and its properties is true, in which case the fact that *x 's faith that G exists and/or that it has certain properties* is expressed in the context: x faiths in G ,

or

(3) the act of acknowledging by x that the sentences delivered, expressed or somehow passed along by G are true, in which case *the fact that x 's faith that what G delivers, expresses or passes along is true* is expressed in the contexts: x faiths G or x trusts G ."

This third understanding of the notion of faith also corresponds to the act of x 's trusting G . We must differentiate the notion of *a religious faith in God* from the general and threefold framework of the notion of *faith*. The religious faith in God G is a faith expressible in the language of a given revealed religion, determining the attitude towards God G (Judaism, Christianity and Islam). It is an act of recognition of all descriptive sentences that constitute the fundamental dogma FD of such a religion. It is a metalogical rule stating that some sentences must be considered true. These include the following sentences:

- i. There exists only one, true God.
- ii. God revealed certain theorems (the so-called sentences revealed by God, collected in the *credo* of a given religion),
- iii. God is truthful and almighty.

This faith (the religious faith in God) is – as St. Thomas preached – an act of the mind (it has a certain motivation, and an incomplete justification) and is executed under the stress of the will supported by grace. The logical aspect, as a partial justification of faith (or, more

precisely, of a set of tasks forming dogma FD) is dealt with by Józef Maria Bocheński in *The Logic of Religion*.⁶

A logical analysis of the different notions of faith permits to easily notice that the notion of *religious faith* is one that is subordinate to all the variants (1)–(3) of the general notion of faith.

A man of faith is not necessarily a man of religious faith. It can be any human being who faiths in a G (e.g., a goal, an idea, a *Weltsanschauung*, an ideology) and who declares it publicly. In this work, I will restrict my analysis to the notion of a ‘man of religious faith’. To me, this is a witness to religious faith, thus a paragon of a good follower of a given religion, not only accepting its dogma FD of faith, but also expressing this acceptance, fulfilling orders of the normative dogmas ND of the ethical codex of this religion, whether connected with the religious practice and religious rituals or with his life, but not necessarily being driven in his practical activity by a faith directed in such a way that his actions should have an extra-personal, extra-family value and – in a sense – universal, social or national values. *A follower of a given religion* is a human being who upon a rational, yet incomplete justification of FD, accepts dogma FD and norms ND of the codex of this religion. Theories of such an incomplete type of justification are formulated by Bocheński.⁷ *A man of religious faith*, as a follower of a given revealed religion, believes in God and therefore that all descriptive sentences (i)–(iii) of dogma FD of this religion are true. He thus faiths in the existence of God, in His omnipotence and truthfulness and accepts the sentences which God revealed and which the Church offers as the *credo*, and through this he trusts God. The logic which a man of faith applies is thus the *logic of the religious faith in God*.

6 J.M. Bocheński, *Logic and Religion*, New York 1965; see also J. Herbut, *M.J. Bocheńskiego nowa wersja teorii hipotezy religijnej*, *Roczniki Filozoficzne* 56(2008)1, 86–99.

7 See M.J. Bocheński, *Logic and Religion*, op. cit.

An ordinary analysis of the second word which is of interest to us here – “deed”/“action” – reveals that it is often used with reference to what is done or what has been done, and what one thinks about is the action being done or the action as just been done (Latin: *actus*). This is, however, an ordinary understanding of the word, which is different from the way it is understood in science and theology. The notion of an ‘action’ has been the subject of the praxeological research of philosopher and logician Tadeusz Kotarbiński,⁸ Similarly, the word “deed” has been the object of the theological analysis of Karol Wojtyła.⁹ According to T. Kotarbiński (and also to the theological system of K. Wojtyła), an *act* is a conscious and voluntary action. And what is a deed/an action? It is something which Aristotle called *an act* – “something thanks to which this something is”. But what kind of *act* is it? It is a voluntary and conscious act, possessing a defined aim. A close analysis of human activity, which intercepts fundamental aspects of these notions in the formal language of logic that is the basis of the first axiomatic system of *deontic logic* (logic of obligation, norms of action/deed), was carried out by Georg Henrik von Wright – the founder of such a system and of the *logic of action, or act*.¹⁰ For G.H. von Wright *an action* is intentional (in accordance with the will), causing a change in the world (nature) or preventing changes to the current state of things, which can consist in stopping oneself from altering the status quo or allowing something to happen. Conceived in this way, if an *action* is conscious it is understood as an *act*.

8 See T. Kotarbiński, *Praxiology. An Introduction to the Sciences of Efficient Action*, Warszawa–Oxford 1965.

9 See K. Wojtyła, *Osoba i czyn*, Kraków 1969.

10 See G.H. von Wright, *Deontic Logic*, *Mind* 60(1951), 1–15; idem, *Norm and Action: A Logical Inquiry*, London 1963; idem, *An Essay in Deontic Logic and General Theory of Action*, *Acta Philosophica Fennica*, Fasc. 21, Amsterdam 1968. The co-founder of deontic logic is J.K. Kalinowski. See J.K. Kalinowski, *Teoria zdań normatywnych*, *Studia Logica* 1(1953), 133–146; idem, *Études de logique deontique*, Paris 1972.

A *man of deed* is a man whose dominant personality trait is to undertake to do weighty deeds from a certain point of view.¹¹ Thus, this is a man who undertakes to do conscious actions for a cause or causes which have a social value, a man who – in an independent manner – incessantly takes up some rational actions for the sake of some right cause of social relevance. The *logic of deed/action*, which the man of deed applies, is the logic of an action thus conceived.

A man of deed can also be a man of faith in the sense of the term mentioned earlier. We will then say that he is a *man of faith and deed*, when his faith determines his deeds/actions, and the deeds/actions are compliant with the canons of his faith.¹²

2. THE BASIC IDEAS OF THE LOGIC OF FAITH AND DEED

A man of faith and deed applies both the *logic of faith/belief*¹³ and the *logic of deed*. Moreover, he applies the *logic of faith and deed*. Each of the three logics is an axiomatic theory. Axioms and laws of these logics define or describe relations between sentences concerning, respectively: the very notion of faith, the very notion of deed/action and both notions simultaneously, taking into account the relations which occur between them.

The laws which are specific to the logic of faith and deed thus describe specific relations between faith and deed. That such relations must take place results from the fact that norms ND of the ethical codex of a religious faith concern – on the one hand – man himself (more precisely, what he should be like) and – on the other hand – how

11 The weightiness of these acts is typically decided by an ethical codex accepted by the community which the man belongs to; this may as well be the ethical codex of a given religion.

12 Cardinal Stefan Wyszyński and Pope John Paul II were models of such a man.

13 It is called doxastic logic in accordance with J. Hintikka's understanding of the logic of knowledge as an *epistemic logic* and the logic of belief as a *doxastic logic*; see J. Hintikka, *Knowledge and Belief: An Introduction to the Logic of the two Notions*, New York 1962.

he should act (that is, what his deed should be like). Because we know a man by his deeds, a man who wants to live according to the faith he professes must try to do so in compliance with its religious norms. Therefore, religious rearing and teaching religion consist in promoting the virtues of a human being by influencing his deeds/actions and showing which of them should be taken as paradigmatic.

People of (religious) faith and deed, who are exemplary followers of a given religion represent ideals of abiding by moral principles which are determined by the ethical codex of this religion. These principles are formulated, it seems, as norms of two types:

- a. principles dealing with the ideal man, thus showing what personality traits the ideal man should possess, what each man should be like and what he should not be like in order to acquire certain virtues, and
- b. norms of action defining which deeds are valuable (good deeds) and which are not (wicked deeds), which are obligatory and which are prohibited or without significance with respect to the ethical codex of a certain religion.

The logic which deals with norms of type b), independent of their content, is the above-mentioned *deontic logic*. There are a number of good formulations and formal theoretical frameworks for this logic. Most probably there is no logic for the norms of type a).

3. THE BASIC ASSUMPTIONS BEHIND THE CONCEPTION OF LF&D

As we have mentioned, elaborating a formal conception of the notions of faith and deed, as well as dealing with the relations between them, requires, first, accepting certain assumptions regarding the current understanding of the terms “faith” and “deed”. A theoretical conception can be designed in such a way that it should – among many ways of conceiving belief and action – take account of, specify and describe the mutual relations between such notions as ‘faith’ and ‘action’, which are used when we speak, e.g., of a religious faith

in God and, therefore, of a faith in God, trust in God and of deeds which these very faiths and trust entail, as well as of deeds which these faiths and trust strengthen or give every reason to bring about. The point here is to formalize the logic applied by every man whom we define as a paragon of the *man of faith and deed* and a witness to faith and deed. Concentrating on the *LF&D*, conceived as one of the available notions of religious faith, and the notion of deed motivated by this faith (especially by the Christian faith) requires perhaps a more reliable analysis, one that is purely philosophical, thus constituting a completely rational recognition, as well as Thomist cognition.

I accept that the *LF&D* concerns the notions of faith in G (the religious faith in God) and an action according to the understanding of deed given above. Such a logic is built upon the *logic of faith in G* (the *religious faith in God*) and the *logic of action/deed*.

The *logic of faith in G* (the *religious logic in G*) is a particular case of a certain non-standard *doxastic logic* (derived from the Greek *doxa*, denoting a common faith, or from the Latin, denoting an *opinion*), i.e. a logic of the notion ‘to faith’, specifically the notion of ‘to faith that’ in the sense of ‘profess’, ‘acknowledge that’. The well-known doxastic logics are logics of this most general notion of belief (i.e. ‘conviction’). I am not aware of doxastic logics relating to the other notions of belief, i.e. logics *LF* of faith and logics *LF(God)* of the religious faith in God. Nevertheless, their formalization can be modeled on a common doxastic logic. The axioms of logic *LF(G)* of the faith in G or *LF(God)* are the axioms of some well-known system of doxastic logic *LB* of belief,¹⁴ as well as axioms saying something about G or, applicably, about God and the dogmas of faith. The notions discussed earlier, which are subordinate to the notion ‘to faith that’, that is the notion ‘to faith in G’ (the notion of faith in sense 2)) and the notion

14 An overview of the logics of the notion *belief* is given in: W. Marciszewski, *Podstawy logicznej teorii przekonania*, Warszawa 1972; see also: M. Lechniak, *Przekonania i zmiana przekonania*, Lublin 2011; J. van Benthem, S. Smets, *Dynamic Logics of Belief Change*, in: *Handbook of Logic for Knowledge and Belief*, College Publications, London 2014.

‘to faith/to trust G’ (the notion of faith in sense 3)), where G denotes God, can be defined with the help of the primitive notion ‘to faith that’. If we do not specify precisely who or what G is, then the logic $LF(G)$ will have a more general character than the logic $LF(\text{God})$.

The specific laws of the more detailed logic of faith, that is $LF(G)$ or logic $LF(\text{God})$, must characterize the basic relations between all the above-mentioned notions of faith. The logic $LF(\text{God})$ of a revealed religion is then a specific case of the logic of faith in God-Absolute, in a philosophers’ God. Such a refined logic LF incorporates all the axioms of the common doxastic logic LF for the notion ‘to faith that’, as well as the specific definitions characterizing the notions ‘to faith in G’ (‘to faith in God’) and ‘to faith/to trust G’ (‘to trust God’). The notion of trust is connected with the acceptance of sentences (truths) announced or given by G (in particular by God). We collect the sentences into the set $credo(G)$ (*Credo* (God)).

4. SOME LOGICS OF FAITH

4.1. LOGIC LF

A formalization of logic LF is based on classical logic CL , that is LF incorporates all the laws of classical logic formulated in the language of logic LF . Its primitive term is the predicate “faiths that”. Assuming that:

- descriptive sentences are represented by the letters: p, q, \dots ,
 $p1, p2, \dots$,
- the subjects (persons) of sentences belonging to LF are indicated with : x, y, \dots ,
- sentence connectives of CL are: negation \neg , implication \rightarrow , disjunction \vee and conjunction \wedge ,
- atomic expressions have the form $F_x\phi$ (x faiths that ϕ), for any sentence ϕ of LF ,

we can accept that the specific axioms of logic **LF** are the following expressions:¹⁵

- A1. $F_x\varphi$, for each low φ of **CL**,
- A2. $F_x p \rightarrow \neg F_x \neg p$,
- A3. $F_x(p \rightarrow q) \rightarrow (F_x p \rightarrow F_x q)$,
- A4. $F_x(p \wedge q) \rightarrow (F_x p \wedge F_x q)$,
- A5. $(F_x p \wedge F_x q) \rightarrow F_x(p \wedge q)$.

The rules of inference (deduction) of logic **LF** are: the rule of substitution of any sentences of logic **LF** for sentential variables, the rule of substitution for subjective variables and also the *doxastic rule of detachment* saying that:

If the theses of this logic are the expressions of the type: $F_x(\varphi \rightarrow \varphi')$ and $F_x\varphi$, then a thesis of this logic is also the sentence of the type: $F_x\varphi'$, where φ, φ' denote here any sentences of logic **LF**.

From axioms A1 and A2, by means of the detachment rule we obtain:

Corollary 0. $(F_x p \vee F_x q) \rightarrow F_x(p \vee q)$.

Let us notice that it is not possible to accept an axiom that is the reverse implication of Corollary 0, since we assume that everybody faiths in the laws of logic **CL** and specifically that there follows the law of the excluded middle. Thus, even though it is true that everybody accepts the sentence: “God exists or God does not exist”, there are people of unrefined views on the existence of God who do not accept either the sentence “God exists” or the sentence “there is no God”.

One of the theorems of logic **LF** is the following substitution of laws **CL**:

- T1a. $F_x p \rightarrow (F_x p \vee F_x q)$,
- T1b. $F_x q \rightarrow (F_x p \vee F_x q)$.

15 Let us observe that axioms A3 and A2 correspond, respectively, to axioms K and D in doxastic logics **LB** of belief, and that they are counterparts to axioms K and D in normal modal logics.

Another theorem is, for instance:

$$T2a. F_x \neg(p \wedge q) \rightarrow F_x (\neg p \vee \neg q),$$

$$T2b. F_x \neg(p \vee q) \rightarrow (F_x \neg p \wedge F_x \neg q).$$

Theorem 2a follows from the fact that the De Morgan law for conjunction \wedge belongs to CL and A1, A3 and Corollary 0 (the predicate *faiths that* cannot be distributed with respect to disjunction \vee), while theorem 2b follows from the fact that substitutions of the De Morgan laws for the disjunction connective belong to CL , A1 and also from axioms A3 and A4.

4.2. LOGIC $LF(G)$

Logic $LF(G)$ of faith in G (in particular, logic $LF(\text{God})$ of faith in God) is a theory built on the logic of faith LF and set theory. We assume about G (about God) that it (He) exists and that it (He) has defined properties. Thus, the new primitive terms are: the name G of the subject of faith and a finite number of predicates: P_1, P_2, \dots, P_n , denoting properties of object G ($n \geq 2$).

Let us introduce the following abbreviations:

$Ex(G)$: There exists an x such that $x = G$, i.e. G exists;

$Pr(G)$: $P_1(G)$ and $P_2(G)$ and...and $P_n(G)$, that is G has the properties P_1, P_2, \dots , and P_n .

The definition of faith in G accepted in logic $LF(G)$ is the following:

D1. x *faiths in* G (symbolically: $x F G$) iff $F_x(Ex(G) \wedge Pr(G))$.

Let us note that faith in G (something or someone) is connected with the acceptance of certain axioms: $Ex(G)$ and $Pr(G)$.

In order to introduce the definition of *faith G – trust G* on the basis of logic $LF(G)$, we have to make reference to the notion of *faith in G* as we can faith /trust only somebody who exists to us and has a defined property or properties. One such properties – let us assume P_1 – should be the property *Rev-* that is, the revelation of some sentences, conceived as truths, saying that G announced

or gave or passed along some sentences-theses (since trustfulness consists in the acceptance of truths circulated by G, whom we faith, who is an authority to us). We also have to introduce the definition $D_{credo}(G)$ for the new term $credo(G)$, intuitively understood as the R-set including all sentences revealed by G and, of course, sentences $Ex(G)$ and $Pr(G)$. R-set is thus a new primitive notion added to $LF(G)$. We assume axiomatically that the R-set is finite:

ARev. $\text{card}(\text{R-set}) < \aleph_0$, and

$D_{credo}(G). \text{credo}(G) = \{Ex(G), Pr(G)\} \cup \text{R-set}$.

Now we can introduce the following conditional definition of the notion *to faith G – to trust G*:

D2. $x FG \rightarrow (x \text{ faiths } G/\text{trusts } G \text{ (symbolically: } x TG)) \text{ iff } \forall p \in \text{credo}(G) (F_x p)$.

Next, we can easily draw simple conclusions which provide a framework for the dependences between the notions of faith 1) – 3) discussed in Sec.1 above:

Corollary 1. $x FG \rightarrow F_x(Ex(G) \wedge Pr(G))$;

Corollary 2. $x FG \rightarrow \exists p, q (F_x p \wedge F_x q)$;

Corollary 3. $x FG \wedge x TG \rightarrow \forall p \in \text{credo}(G) (F_x p)$.

4.3. LOGIC $LF(\text{GOD})$

If we want the logic of faith to concern the faith in a religious God, we have to expand logic $LF(G)$ to logic $LF(\text{God})$. The specific primitive terms of the latter will be: the name *God*, the predicate Tr (to be truthful), the predicate Omp (to be omnipotent), the predicate Rev (to reveal some theorems). If one accepts the following conventions:

Convention 1. $G = \text{God}$,

Convention 2. $P1 = Rev$, $P2 = Omp$ and $P3 = Tr$;

the expression $Ex(G)$ can be replaced by:

$E_{,x}(\text{God})$: There exists only one true God,

while the definition D1 (see Sec.1, (i) – (iii)) may be modified as follows:

D1'. $x F \text{ God}$ iff $F_x(E1x(\text{God}) \wedge P1(\text{God}) \wedge P2(\text{God}) \wedge P3(\text{God}))$.

Credo (God) is then defined as follows:

Dcredo(God). $Credo(\text{God}) =$

$\{E1x(\text{God}), P1(\text{God}), P2(\text{God}), P3(\text{God})\} \cup R\text{-set}$.

It may seem that definition D1' of *faith in God* could be limited to faith in His existence and omnipotence, because from these two conditions it follows that He may have the properties P1 and P3. However, we should keep in mind that He possesses them. Thus, if we would like to limit the definiens of D1' to x 's faith that $E1x(\text{God})$ and $P2(\text{God})$, then – in accordance with FD – we should also accept the axiom:

A7. $F_x P2(\text{God}) \rightarrow F_x(P1(\text{God}) \wedge P3(\text{God}))$.

Applying definition D2 of the notion of faith G /trust G to that of faith God /trust God , we have:

D2'. $x F \text{ God} \rightarrow (x T \text{ God}$ iff $\forall p \in Credo(\text{God}) (F_x p)$).

If we also accept the axiom that if we faith that God is truthful (i.e. that $P3(\text{God})$), then we faith that all His R -set sentences are true, i.e.

A8. $F_x P3(\text{God}) \rightarrow \forall p \in R\text{-set} (F_x p)$,

then by definitions D1'1, D2', Dcredo(God) and axioms A4 and A5 we obtain the conclusion:

Corollary 4. $x F \text{ God} \rightarrow x T \text{ God}$

stating that if somebody faiths in God then he/she trusts God.

As we already know (see Sec.1), the fundamental dogma FD of the religious faith in God requires absolute recognition of the following as true sentences: the existence of God (cf. (i)), His omnipotence and truthfulness (cf. (iii)) and all the sentences revealed by God (see (ii)). Thus, according to the intuitions of a *religious faith in God* this notion is defined in logic $LF(\text{God})$ by means of the definition:

D4. x faiths religiously in God (for short: $x Fr \text{ God}$) iff $\forall x p \in Credo(\text{God}) (F_x p)$.

Let us formulate further basic, simple conclusions resulting from the axioms, definitions and earlier conclusions accepted in logic $LF(\text{God})$:

Corollary 5. $x Fr \text{ God} \rightarrow x F \text{ God}$,

Corollary 6. $x Fr \text{ God} \rightarrow x T \text{ God}$,

Corollary 7. $x Fr \text{ God} \rightarrow \forall x p \in cCredo(\text{God}) (F_x p)$,

Corollary 8. $x Fr \text{ God} \rightarrow \forall x p \in \text{R-set} (F_x p)$,

Corollary 9. $x F \text{ God} \wedge x T \text{ God} \rightarrow x Fr \text{ God}$,

Corollary 10. $x Fr \text{ God}$ iff $x F \text{ God} \wedge x T \text{ God}$.

Thus, a religious faith in God is faith in Him and trust in Him.

Remark 1. Our previous considerations concerned basic revealed religions (Judaism, Christianity and Islam) that assumed the basic dogma of FD. However, if we are interested in a particular religious faith, e.g. the Catholic one, then we must expand the concept of $Credo(\text{God})$ by accepting, for example, that the set also includes sentences about such attributes of God, which we describe using predicates such as $P4 = Cr$ (to create heaven and earth, all visual and non-visual things) and some other predicates, e.g. $P5 = M$ (to be merciful), $P6 = Ff$ (to be faithful), $P7 = Rf$ (to be just) and so on.

5. THE FOUNDATIONS OF THE LOGIC OF DEED¹⁶

A formalization of the logic of deed **LD** is based on classical logic **CL**. Hence, **LD** incorporates also all the substitutions of laws of classical logic, which are expressed in the language of logic **LD**. Its primitive (non-defined) term is the predicate *does* as it appears in simple sentences of the type: $x \text{ does } d$, where x denotes the subject of the deed and d denotes a deed (a human action). According to the assumptions listed earlier, if we say that: $x \text{ does } d$ (for short: $x D d$), we have in mind the fact that x makes a change in the world (nature) through an act d , or that x prevents a change in the state of things

¹⁶ Logic **LD** does not differ from logic **LA** concerning actions. The latter is outlined by K. Segerberg in: *A topological logic of action*, *Studia Logica* 51(1984)4, 415–419; see also idem: *Getting started: Beginnings in the logic of action*, *Studia Logica* 51(1992)3–4, 347–378.

(they prevent themselves from changing it or allow something to happen) through an act d .

We accept that:

- the subjects (agents) of the sentences of LD are denoted with:
 x, y, z, \dots
- deeds are represented by the letters: d, d', d'', \dots
- the sentence connectives of logic CL are: $\neg, \rightarrow, \wedge, \vee$;
- connectors (functors) linking variables related to deeds are:
 $non; \&; +$;
- the sentence connector (functor) of the consequence of a deed based on another deed is: \Rightarrow .

We also introduce the following abbreviations related to compound actions:

$non-d$ – a contradictory deed, that is contrary to deed d ; $d \& d'$ – the conjunction of two deeds d and d' ; $d + d'$ – the disjunction of two deeds d and d' .

Moreover, we accept that $d \Rightarrow d'$ is an abbreviation of the sentence: deed d' is the consequence of deed.

The axioms of the lattice theory for the following operations can be accepted as axioms characterizing the operations $+$ and $\&$ on the deeds of subject:

$A1^{\&}$. $d \& d = d$, idempotence

$A1^+$. $d + d = d$,

$A2^{\&}$. $d \& d' = d' \& d$, commutativity

$A2^+$. $d + d' = d' + d$,

$A3^{\&}$. $d \& (d' \& d'') = (d \& d') \& d''$,

associativity

$A3^+$. $d + (d' + d'') = (d + d') + d''$,

$A4^{\&}$. $d \& (d' + d'') = (d \& d') + (d \& d'')$,

distributivity

$A4^+$. $d + (d' \& d'') = (d + d') \& (d + d'')$.

The following expressions can be accepted as axioms characterizing the operation non :

A5^{&c}. $\text{non}-(d \ \& \ d') = \text{non}-d + \text{non}-d'$, De Morgan law

A5⁺. $\text{non}-(d + d') = \text{non}-d \ \& \ \text{non}-d'$,

A6. $d = \text{non}-\text{non}-d$.

All expressions of the following form are axioms of logic **LD**:

A^d1. $x \ D \ d \rightarrow \neg \ x \ D \ \text{non}-d$,

A^d2. $x \ D \ d \wedge (d \Rightarrow d') \rightarrow x \ D \ d'$,

A^d3. $x \ D \ (d \ \& \ d') \rightarrow x \ D \ d \wedge x \ D \ d'$,

A^d4. $x \ D \ d \wedge x \ D \ d' \rightarrow x \ D \ (d \ \& \ d')$,

A^d5. $x \ D \ (d + d') \rightarrow x \ D \ d \vee x \ D \ d'$,

A^d6. $x \ D \ d \vee x \ D \ d' \rightarrow x \ D \ (d + d')$.

The inference rule of logic **LD** is the *rule of detachment*, which says that:

*If the theses of **LD** are expressions of the type: $A \Rightarrow A'$, and x does A , then a thesis of **LD** is also a sentence of the type: x does A' , where the letters A, A' denote any deeds (simple or complex) considered in logic **LD**.*

T^d1. $d \Rightarrow d' \rightarrow (x \ D \ d \rightarrow x \ D \ d')$,

T^d2. $x \ D \ \text{non}-(d \ \& \ d') \rightarrow (x \ D \ \text{non}-d \vee x \ D \ \text{non}-d')$.

Theorem T^d1 follows immediately from axiom A^d2 and from the substitution of the laws of **CL**: commutability of conjunction and exportation. Theorem T^d2 follows from equation A^{&c}5 and axiom A^d5.

If the sentence: x does not do d is written as: $x \ D' \ d$, then it can obviously be said that:

D^d1. $x \ D' \ d \ \text{iff} \ \neg(x \ D \ d)$.

Next, from A^d1 and A6 we have:

Corollary^d1. $x \ D \ d \rightarrow x \ D' \ \text{non}-d$,

Corollary^d2. $x \ D \ \text{non}-d \rightarrow x \ D' \ d$.

In the remainder of this paper, I will discuss certain deontic logics connected with *duties* concerning deeds. First, I will outline the foundations of the logic of norms in general, and then – the logic assuming that norms are codified in the given set of norms of a codex, e.g. in the set of doctrinal norms DN of a given revealed religion.

6. DEONTIC LOGICS

6.1. LOGICS DL AND DL^+

Logics DL and DL^+ are basic deontic logics which are built over LD by J. Czelakowski.¹⁷ Specific terms of DL and DL^+ are the following deontic terms (predicates): P ; F ; O . Together with variables representing actions they form sentences. We read them as follows:

P – is permitted, *F* – is forbidden, *O* – is obligatory.

Thus, logics DL and DL^+ consider obligatory, forbidden and permitted deeds. The specific axioms of DL are expressions of the form:

A^{n1} . $Od \rightarrow Pd$,

A^{n2} . $Pd \rightarrow \neg Fd \wedge \neg Fd \rightarrow Pd$.

Logic DL^+ accepts axiom A^{n1} and the following axiom weaker than A^{n2} :

A^{n2^*} . $Pd \rightarrow \neg Fd$.

Axiom A^{n1} says that any obligatory deed is permitted (this is Kant's principle), whereas Axiom A^{n2^*} says that any permitted deed is not forbidden.

The immediate conclusions of the axioms are the following expressions:

¹⁷ These logics and their metalogical properties are investigated by J. Czelakowski in: *Freedom and Enforcement in Action*, Berlin 2015, Chapter 4, 16ff. The basic, deontic logics DL formulated by Czelakowski, which we adapt in this paper, differ from Meyer's deontic logic OS (see: J.-J.Ch. Meyer, *A Different Approach to Deontic Logic Viewed as a Variant of Dynamic Logic*, Notre Dame Journal of Formal Logic 29(1987)1, 109–136; the paper is available on the Internet). The main difference consists in their quite different understanding of the semantics of deontic operators in DL and OS . Meyer uses modal operators from dynamic logic to define deontic operators. This is not the case in DL . While action/deed variables of DL may be treated as atomic actions/deeds in Meyer's sense, it is unclear how to reconstruct DL in OS . The basic deontic logic DL cannot be treated as a fragment of Meyer's system OS .

Corollary 1. $Od \rightarrow \neg Fd$,

Corollary 2. $Fd \rightarrow \neg Pd$,

Corollary 3. $\neg Pd \rightarrow \neg Od$,

Corollary 4. $Fd \rightarrow \neg Od$,

Corollary 5. $Fd \rightarrow \neg (Pd \vee Od)$,

Corollary 6. $(Pd \vee Od) \rightarrow \neg Fd$.

According to Cor.1: any obligatory deed is not forbidden, and in compliance with Cor.4: any forbidden deed is not obligatory. According to Cor.2: any forbidden deed is not permitted either, while in compliance with Cor.6: if any deed is permitted or obligatory, then it is not forbidden.

The logics **DL** can be developed into a deontic logic including also compound deeds.¹⁸

6.2. LOGIC **DL**(DN)

Logic **DL**(DN) is a deontic logic relating to a defined *set of norms concerning human deeds*. We denote this set by DN. It can be understood as a set of doctrinal norms of a certain religion. We do not state precisely what the norms of this set are like, but only indicate the kind of norms they are.

We build logic **DL**(DN) over logic **DL**. We characterize set DN by accepting axioms $A^{DN}1a,b$ and applying the following definitions:
 $D^{DN}1a. O^{DN} = \{n \in DN: \exists d (n = Od)\}$,
 $D^{DN}1b. F^{DN} = \{n \in DN: \exists d (n = Fd)\}$.

¹⁸ Such a logic is presented in Czelakowski's paper: *Deontology of compound actions*, *Studia Logica* (2018), 1–43; (see <https://doi.org/10.1007/s11225-018-9834-4>). Actions/deeds are structured entities there – they are treated as formal languages over the alphabet composed of atomic actions. Accordingly, he distinguishes three types of actions/deeds: atomic actions, sequential actions (or words of atomic actions), and compound actions as sets of sequential actions. The deontology of compound actions presented by Czelakowski is based on ideas from formal linguistics, rather than dynamic logic. Thus, his deontology of actions differs from that of Meyer (see J.J.Ch. Meyer, *A Different Approach to Deontic Logic Viewed as a Variant of Dynamic Logic*, op.cit.).

$$A^{DN1a}. DN = O^{DN} \cup F^{DN},$$

$$A^{DN1b}. O^{DN} \neq \emptyset \wedge F^{DN} \neq \emptyset \wedge O^{DN} \cap F^{DN} = \emptyset.$$

We assume that the set O^{DN} of obligatory norms and the set F^{DN} of forbidden norms are nonempty and disjoint sets, the sum of which is the set DN of all norms.

Thus, the set of norms DN is a nonempty set composed of norms obligating certain deeds and norms forbidding other deeds. In other words, we can divide norms into two disjoint groups: the norms of type $O^{DN}a$, concerning obligatory deeds and the norms of type $F^{DN}a$, concerning forbidden deeds. Here, we denote the norm saying that the deed d is obligatory with respect to DN by $O^{DN}d$ and the norm stating that DN permits the deed d by $F^{DN}d$.

From Czelakowski's axioms for logic DL^+ we immediately obtain corollaries which are their relativization to DN:

$$\text{Corollary}^{DN1}. O^{DN}d \rightarrow P^{DN}d,$$

$$\text{Corollary}^{DN2}. P^{DN}d \rightarrow \neg F^{DN}d.$$

These corollaries state that if a deed is obligatory in the DN codex, then it is also permitted by DN and if a deed is permitted by DN, then it is not forbidden by DN.

A new, specific primitive term of logic $DL(DN)$ is the predicate "is compliant with DN". It appears in contexts of the type: deed d is compliant with DN (for short: d comp DN). The axioms which characterize this term are the following expressions:

$$A^{DN2}. \exists d (d \text{ comp DN}),$$

$$A^{DN3}. d \text{ comp DN} \rightarrow (O^{DN}d \vee \neg F^{DN}d) \vee \neg \exists d' ((d \Rightarrow d') \wedge (O^{DN}non-d' \vee F^{DN}d')),$$

$$A^{DN4}. (O^{DN}d \vee \neg F^{DN}d) \vee \neg \exists d' ((d \Rightarrow d') \wedge (O^{DN}non-d' \vee F^{DN}d')) \rightarrow d \text{ comp DN}.$$

According to A^{DN3} and A^{DN4} , a deed compliant with DN is either a deed that is obligatory in DN or one that is not forbidden in it. We can also have a case of no deed, which is its consequence, is such that a deed contrary to it, is an obligatory one, or it is forbidden in DN.

Remark 2. Let us observe that any deed compliant with DN and not forbidden can be a permitted deed with respect to DN.

Applying the following convention:

Conv. d is *not compliant with* DN (for short: d *not-comp* DN) iff $\neg(d$ *comp* DN).

From this, we can draw the following immediate conclusions:

Corollary^{DN3}. $\neg(O^{\text{DN}}d) \wedge F^{\text{DN}}d) \wedge (\exists d'(d \Rightarrow d') \wedge (O^{\text{DN}}\text{non-}d' \vee F^{\text{DN}}d'))$
 $\rightarrow d$ *not-comp* DN.

Corollary^{DN4}. d *not-comp* DN $\rightarrow \neg(O^{\text{DN}}d) \wedge F^{\text{DN}}d) \wedge (\exists d' ((d \Rightarrow d')$
 $\wedge (O^{\text{DN}}\text{non-}d' \vee F^{\text{DN}}d'))$.

7. AN OUTLINE OF THE LOGIC OF FAITH AND DEED

Logic **LF&D** of faith and deed is based on logic **LF** of faith, logic **LD** of deed and deontic logic **DL(DN)** relating to norms of DN. We also build it over logic **LF(G)** of faith in G (of religious faith in God) and logic **DL** (deontic logic). For the purpose of this work, we restrict the basic axioms to those determining the relations between a man's religious faith and his deeds motivated by the codex of norms DN of his religion. In truth, it makes sense to speak of the faith of a true follower x of a faith when it is an "active faith" connected with the fact that x faiths that norms DN of the ethical codex of the religion, as rendered in a descriptive formulation, are true – they are God's (or they are expressed by His Church), and as a devout follower of the faith he undertakes to act in accordance with the normative dimension DN of the religious code of this faith. Thus, he undertakes to do *obligatory* or *not forbidden* deeds and does not do deeds which are *not compliant with* DN, particularly deeds that are forbidden or not obligatory. At the same time, a subject x can undertake some deeds which are not conflicting with norms DN, that is deeds permitted from the point of view of DN. We do not exclude here situations in which x undertakes to do some deeds if they are realizations of sentences revealed to him by God.

Logic $LF\&D$ describes the basic relations between the notions of a religious faith in God and the deeds of a person who faiths in God in the religious sense. One of the specific axioms of $LF\&D$ should state that if all deeds of a person who faiths in God are motivated by religion then he/she is a religious believer in God. In order to preserve this axiom in the formal construction of our logic we have to introduce some abbreviations and definitions.

Let $d(x)$ denote x 's deed d , and

$M^{DN} d(x) =_{df} d(x)$ is motivated by DN.

$M^{God} d(x) =_{df} d(x)$ is motivated by an action of God.

$M^{relg} d(x) =_{df} d(x)$ is religiously motivated.

The definitions of the notions of motivation with respect to x 's deed d are the following:

$D^{F\&D1}$. $M^{DN} d(x)$ iff $x Fr God \wedge x D d \wedge d(x) comp DN$,

$D^{F\&D2}$. $M^{God} d(x)$ iff $x Fr God \wedge x D d \wedge d(x) comp God$, where

$d(x) comp God$ iff $\exists p \in R\text{-set}(x)$ ($d(x)$ is a realization of God's sentence p), and

$R\text{-set}(x) = \{p: p \text{ is a sentence revealed to } x \text{ by God}\}$.

$D^{F\&D3}$. $M^{relg} d(x)$ iff $M^{DN} d(x) \vee M^{God} d(x)$.

Axiomatically, we assume that:

$A^{F\&D1}$. $\forall d(x) ((x D d) \wedge M^{relg} d(x)) \rightarrow x Fr God$.

According to $A^{F\&D1}$, if everything that a man does is religiously motivated, and thus compliant with the norms of the religious codex DN or with God's personal action, then the man faiths religiously in God.

Remark 3. Let us notice that axiom $A^{F\&D1}$ defines only a sufficient condition for being a religious believer in God.

Let us formulate a few simple corollaries:

Corollary $^{F\&D1}$. $\forall d(x) ((x D d) \wedge M^{DN} d(x)) \rightarrow x Fr God$,

Corollary $^{F\&D2}$. $\forall d(x) ((x D d) \wedge M^{God} d(x)) \rightarrow x Fr God$.

According to Cor $^{F\&D1}$, a man who does not faiths religiously in God either does not faith in God or does not undertake a deed when such a deed is obligatory in the codex of a religion or is not forbidden

in it, and its consequences can be at variance with deeds which are obligatory or forbidden in it.

8. FINAL REMARKS

The logic of faith and deed *LF&D* sketched here is a theoretical account which obviously requires an in-depth analysis of the notions employed and the relations between them. Our theoretical conception of *LF&D* originated in the observation of natural logic applied by models of faith and deed, which without a doubt Cardinal Stefan Wyszyński and Pope John Paul II were. Its aim was to provide a detailed account of the meaning of different notions at work in the great religions (Judaism, Christianity, Islam), particularly in the Catholic religion, as well as to describe the different relations between such notions. A proper framework for this issue should be outlined in formal terms, especially with reference to the axiomatic system and reliable knowledge pertaining to studies in religion and theology. Therefore, it requires joint work between experts in religious studies, theologians and logicians.

Polish logic, as it is well-known, has had excellent traditions rooted in the Lvov-Warsaw School and in the Catholic rationalists of the Krakow Circle: Rev. Salamucha, Drewnowski, Father Bocheński. It would be advisable to effectively maintain their legacy alive. A formal account of the questions connected with the Catholic faith must be founded on Catholic theology. Let us recall that a formalization of these problems or the problems of theology itself was the driving force behind the scientific activity of Rev. Salamucha. Father Bocheński himself called Polish theologians to undertake a new axiomatization of theology, as a matter of fact conceived by St. Thomas as an axiomatic system. It seems that the task set for Catholic theology is to

establish a new Catholic theology in Poland which can rely on the great tradition of Polish logic.

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