FORUM PHILOSOPHICUM
Facultas Philosophica *Ignatianum*
Cracovia – Kraków, 7: 2002, 153-168

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THE PROJECT ON FORMULATING AXIOMS OF EFFICIENT CAUSALITY BY MEANS OF THE PROPOSITIONAL VARIABLES CALCULUS[1]

The simplest axioms, formulated by medieval scholastics as rules of inference between potency and act, are also axioms concerning causality as they express some potency-act relations. These are: *Ab esse ad posse valet illatio. A non posse ad non esse valet illatio. A posse ad esse non valet illatio. A non esse ad non posse non valet illatio.*[2]

Using the quantified definitions of potency and act we will present them in a new garb:

I. If a subject is ascribed to an element, then it is ascribed to the set to which the element belongs;

II. If a subject is not ascribed to a set, then it is not ascribed to any element of this set;

III. If a subject is ascribed to a non-unitary set, it is not thereby ascribed to any of the elements in this set;

IV. If a subject is not ascribed to an element, it is or is not ascribable to the set which it belongs to.

To these four axioms, inherited from the scholastics, we add other four of our own:

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[1] Text selected from the J. Dorda's book: *A Study of Efficient Causality as Applied to Cosmology and Theodicy*. Cracow 2001, pp. 220-231 and translated by Stanisław Ziemiański SJ.

[2] Cfr. Aristotle, *Metaphysics*, Θ8, $1050^{b}11$-13; 9, $1051^{a}7$-14; J. J. Urráburu SJ, *Institutiones philosophicae*, I, *Logica*. Lutetiae Parisiorum – Romae, 1890, p. 311.

V. If a subject is ascribed to an unitary set, then it is ascribed to the unique element of this set.
VI. If a subject is not ascribed to an element of a non-unitary set, it need not thereby be ascribed nor be unascribed to another element of the same set.
VII. A subject cannot be ascribed to two different elements in the same set.

This axiom expresses the principle of contradiction concerning two different elements in the same set to which a subject has been ascribed.
VIII. (The principle of causality) If a subject is ascribed to an element of a non-unitary set, (i.e. to a contingent element, according to contingency definition), then there exists C (different from a subject), which implies that a subject is ascribed to the element mentioned above, and unascribed to other elements in this non-unitary set.

The project on formulating axioms of efficient causality by means of the propositional variables calculus does not mean of course that we try to create a complete theory of causality. We will, for the moment show that the quantification of the concepts „potency-act" by means of the concepts „set-element" or „parameter-specific numerical value" is very useful. We will also point out, intuitively, as an experiment, the logical operators which are linked very closely with such concepts as implication, potentiality (i.e. variability), act, set, specific numeric value.

We cannot hope and promise in advance great achievements by such slight means as the logic has to its disposal: e.g. logical constants, propositional variables. Is it possible this way to do as much as to define a „set" or a „general parameter", which are the most important in this theory, the proof of which is at least the I. axiom.

Because the symbols of a set (Z) and of the elements (a,b,c...) in this proposal are to be joined by the means of logical operators, they must be previously replaced with the propositions. (Z) will be represented through the sentence: „A subject S is ascribed to a set Z"; element (a) – through the sentence: „A subject S is ascribed to an element a". The C will signify a cause and, in accordance with the axiom VIII, represent the sentence: „C (a being) ascribes to a subject S an element a in a non-unitary set Z, to which a subject S is also ascribed". The phrase: „C ascribes an element a in a set Z" (which is composed of at least one element b different from a) will be reformulated by means of a product of two implications: $(c \supset a) \,.\, (c \supset \sim b)$, where ~b means denied b.

As we do not want to confine in advance our proceeding to the causes acting deterministically, we will be constrained to complicate that phrase by adding to it another phrase built to the contrary to the Sheffer's disjunction. This fact – as we will see – says us nearly nothing of what a cause is like, it says only that a cause must exist. After all,

this is also what the axiom VIII states. Even at the point of issue we would get entangled in difficulties in defining the set i.e. the parameter Z, if we had to enumerate all possible elements in Z. We could of course express Z in a quantified propositional function, but we would be thereby not nearer our purpose. Instead, it would bring about a considerable confusion between the set of features and the set's denotation, which would transform a propositional function in a proposition, not to mention useless complication of orthography.

We will remind here what we mean by features and by denotation of a concept. The elements of the generic concept as the set are specific differences. The elements of the species concept as the set are individual differences. Let's assume, the generic concept be diamond. Let's take e.g. equilateral quadrangle as an example. On the strength of its definition, we only need to annex a specific value, of a side, in order to get different species of diamonds, each distinguishing itself only by a side's length. These are not yet the lowest species. We get the lowest ones by annexing in each of them, as the individual differences, the quantities of the acute angles (ranging from 0^0 to 90^0). A diamond we get this way is by now, as regards its content, an individual, its side's length and quantity of its acute angles being determined. In an extreme case, a diamond becomes a square. The concept of such determined diamond (e.g. square) is the species concept, which can be realized physically, for instance in the sulphur cristals, in the infinitely great number of designations. The set of all designations of different species obtained this way is the set of designations of the generic concept „diamond". But we have noticed that another differentiation of diamonds is possible: the first according to the quantity values of the sides, the second according to the individual quantity values of the angles. Therefore the genus „diamond" can be considered as the set of features consisting in the pairs of values individualizing the concept „equilateral quadrangle" (e.g. having its side quantity 10 m, angle quantity 30^0). Having regard to such a qualitative relation: genus – individual values, we should consider a „diamond" generally taken as „potency" to a shape, and a „diamond" distinguished by the above designated values – as „act". Generally speaking we call this relation a set and an element (a general parameter and a specific value).

Now, in order to define potency as a set, let us confine our considerations to the set consisting of two different elements: a and b. To avoid a quantifier, we may assume that b is a current element, i.e. a representant of the elements other than a. But, for the present, such an intervention does not seem to be necessary, because the generality of the outcomes will not suffer any harm, if a parameter is a set of two

specific values. Yet this very fact shows that our proposal to formalize the axioms is only an initial venture.

We can utter general propositions of a parameter as a set of the specific values. The propositions define somehow the set. Such a proposition may be: $a \vee (\sim a \vee \sim b)$ or it's all the same, $a \vee (a|b)$. In the first proposition we have the alternative and the negation, in the second one – the alternative and the Sheffer's disjunction. The logical value of the propositions is the „truth". It is possible to propose another quality of the parameter Z, namely (tautologically true as well): $\sim(a.b) \supset (\sim a \vee \sim b)$. Since the axiom VII, intuitively assumed as true, says that two different elements cannot be ascribed to a subject in the same time, Z will be defined by means of the consequent of the last implication written above because according to the axiom VII the antecedent $\sim(a.b)$ is always true. Therefore, if we take whichever of the above tautological phrases as a definition of a set or of a two-value parameter (Z), or (taking into account the axiom VII) the simplest one: $\sim a \vee \sim b$ (or it's all the same: $a|b$), we will get our axioms symbolized as follows:

I. ..... $a \supset Z$: *Ab esse ad posse valet illatio.*

II. .... we get transposing the former implication: $\sim Z \supset \sim a$: *A non posse ad non esse valet illatio.*

III. .... $Z \supset (a \vee \sim a)$: A potency implies neither act nor its lack: *A posse ad non esse et ad esse non valet illatio.*

IV. ..... $\sim a \supset (Z \vee \sim Z)$: If a subject is unascribed to an element, we cannot find if this lack is privation or contradiction; the privation allows a potency to ascribe a subject to an element as to an act. *A non esse ad non posse non valet illatio.*

V. ..... $[a.(a \equiv b)] \equiv [(Z \supset a).(Z \supset b)]$. It means: If a is unique element of a set Z, then ascribing a subject S to a set implies ascribing this subject to an element.

VI. .... $(\sim a \supset b) \vee (\sim a \supset \sim b)$: If a subject is unascribed to an element a, then it neither excludes nor implies that the subject is ascribed to an element b. One interpretes purposively the alternative VI as follows: Its right side is always true intuitively (though not tautologically) because „there is nothing from nothing". If at the same time the left side were true (what is admissible in case of alternative) then the product: $(\sim a \supset b).(\sim a \supset \sim b)$, equipollent to proposition: „~a is the same as negation of principle of contradiction (b.~b)", would be true. Because unascribing of a subject to an element a is not contradictory, implication on the left side $(\sim a \supset b)$ cannot be true. It means that unascribing a subject to a does not imply necessarily (by itself) ascribing a subject to b.

VII. .... $\sim(a \equiv b) \vee \sim(a.b)$ means: Two different elements cannot be ascribed to the same subject S at the same time.

VIII. .... We will formulate this axiom at the end of our introductory considerations on the efficient cause of the ascribing a subject to an element in a non-unitary set.

The first introductory remark concerns this characteristic feature of our definition which is the consequence of the reduction, in our consideration, to the two-value parameter (set), to the set consisting of two elements a and b. First of all, it will regard the instant changes, in which an element a forces out an element b or vice-versa. Such a change is for example the substantial change of a pair of photons γ into a pair negaton-positon and vice-versa. Such a pair of elements is formed by two continuous contrary processes, e.g. warming and cooling down (that is conveying and carrying away heat), emission and absorption of photons, electromagnetic oscillation in a closed circuit endowed with its own induction and electric capacity, the change of work into kinetic energy and vice-versa.

Apart from the limiting of our considerations to the two-element sets, we cannot – as we mentioned above – omit the problem of free will causes. Regarding this, the definition at issue will be so general that apart from the existence of a cause it is scarcely possible to say anything about its nature and quality.

In order to define cause, we ponder on the application of implication of one of the logical constants. The reason of this is the analogy between cause and logical implication. By cause we mean anything what ascribes one simple element in a non-unitary set to a subject S and thereby impedes ascribing other elements to a subject. If a parameter has two possible values, the cause P converts b into a or vice-versa.

We characterize the ascribing by C to the subject S an element a in a non-unitary set by means of the propositional function: $[C\equiv(C\supset a).(C\supset\sim b)] \equiv [(C\supset\sim a).(C\supset b)]$. To facilitate the proof of this equipollence we label the left side of the Sheffer's disjunction as I, the right one as II.

We assume intuitively that the proposition $P\equiv C$ is true. We argue for the above equipollence by means of the zero-one method:

C a b	C ⊃ a	C ⊃ ~b	Product I	C ⊃ ~a	C ⊃ b	Product II	I/II
1 1 1	1	0	0	0	1	0	1
1 1 0	1	1	1	0	0	0	1
1 0 1	0	0	0	1	1	1	1
1 0 0	0	1	0	1	0	0	1

0 1 1	1	1	1	1	1	1	0
0 1 0	1	1	1	1	1	1	0
0 0 1	1	1	1	1	1	1	0
0 0 0	1	1	1	1	1	1	0

Comparing the values in the column C and in the column I/II we can see that they are equal. The correspondences between the intuitive senses of cause and chance (i.e. lack of cause) and the structure of this table are remarkable. If the value of C is 1, it means that C is a cause, if the value of C is 0, it means that C is a chance. Intuitively we name such an antecedent of implication a chance, if it implies all the possible results: ascribing and not-ascribing as well, a, ~a, b, ~b.

And so, as we look at the bottom part of the table, we can see that, because of C = 0, the value of all implications is 1. It means such a C which has as its consequence both true and false, an element and its negation.

The rows 2 and 3 at the top of the table correspond with the intuitive persuasion regarding the cause C acting deterministic way, because if C = 1, both implications on the one side of Sheffer's disjunction prove true.

If we wanted to consider the sense of each implication in the rows 1 and 4 as well as their coexistence, it would become evident that the implication concerning an element or its lack is far from being a full expression of causality and also that we should take into account an act of choice as an object of ascribing. The indeterministic causes seem to be expressed in the rows 1 and 4, namely in the row 1 *libertas specificationis* (choice of this or that), while in the row 4 *libertas indifferentiae*, i.e. positive act of keeping oneself from doing something. If namely on both sides of disjunction in the row 1 true implication in relation to a and b occurs disjunctively, this fact must be interpreted in such a way that one must choose between the elements a and b (*libertas specificationis)*. But if in the row 4 on the both sides of the disjunction we meet a true implication in relation to the lack of element a and the lack of element b, then that's sensible to interprete it as keeping oneself from choosing a or b as well. In any case, artificiality of this interpretation is not an adequate exponent of the causal influence.

It is possible, by means of the definition of cause and of the axiom V, to prove an important conclusion of the theory which affirms that the cause C cannot be an element in a non-unitary set ascribing to a subject an element a belonging to the set. In other words: no element in this set is the cause of ascribing another element to a subject.

So, let us assume that b is the cause of an element a which is actually ascribed to a subject, i.e. of which value is 1. By virtue of the axiom VIII, if we replace C with b, we get the value b = 1. But the value a is also 1, because C = b ascribes a. Then, consequently (a.b) = 1, and all the more a ≡ b, and that's the condition of a unitary set. Thus the assumption of the existence of a non-unitary set and of the fact that one of the elements is a cause of the other, results in the statement that a non-unitary set is a unitary set. Thus b cannot be the cause of a. In other words, more briefly: A cause and an effect are two different realities. If b were the cause of a, then in the same subject S there would appear two different specific values of the same set or parameter at the same time, and this is contrary to the axiom VII. So one element cannot be the cause of the other in the same set. The statement that something can be the cause of itself is considered as a misuse of terminology.

However, it is said that Spinosa used the phrase *Causa sui* to name God. It would betray that he did not try to define this term. Let us examine if the proposed above form of definition of C excludes by itself replacing the same element for C and for its effect. At first we must agree that in defining we cannot use the propositions evidently and clearly contradictory, e.g. denying the principle of identity (though considered as false). So, after the replacing a as the cause of itself, for C, we would get the formula:

$$[a \equiv (a \supset a) \,.\, (a \supset \sim b)] \mid [(a \supset \sim a) \,.\, (a \supset b)].$$

The proposition (a⊃~a) is evidently false if a has the value 1. But besides this arbitrarily stipulated criterion, in defining we can adduce the principle of *reductio ad absurdum*, assuming that a is the cause of itself. Because, if from assumption that a = 1 results ~a (i.e. negation of a), then the negation (a⊃~a) ⊃ ~a will be true.

However in the definition of a as the cause of itself we must assume a⊃~a in the third part, i.e. agree with the fact that admission of the actuality of a (value 1) implies non actuality of a (value 0). Thus the very form of our logical function, which defines the cause, excludes that an element could be the cause of itself. This truth, evident by definition, has been formulated since the dawn of human race. One has used the concept of a cause in the proposition: Nothing, before it exists, can carry itself from potency into act of existing.

Formulation of the axiom VIII, i.e. of the principle of causality:

If a subject S is ascribed to an element of a non-unitary set, then there exists something else (C), different from the subject, which makes this element specific and excludes the rest of elements in the set. The

consequent of this proposition is C, and the antecedent must express the existence of an element a of a non-unitary set, and something equivalent, under the stipulation that C is neither a subject nor any of elements in a set, as it was said lastly in the previous considerations. We express this stipulation in the proposition: It may appear that if we acknowledge C as a cause, it cannot function as a cause. Therefore we must add a part: ~(C⊃~C). The whole formula assumes the form: a.(a|b) . ~(C⊃~C) ⊃ C.

Demonstration of the last part of the antecedent results from the fact that – as the table using the zero-one-values method shows – there is always C = 0, whenever in the part complications the value 1 occurs. The bottom part of the table consists of the value 1. Thus if it happens that implication C⊃a is true and implication C⊃~a is also true at the same time, then having transposition of the last implication: a⊃~C, which together with the first one gives the syllogism, devoid of product, proving that C⊃~C, which, if not denied, implies that ~C. The proposed formula of the axiom VIII results, by means of exportation, after all, from the tautology:

a.(a|b) ⊃ [~(C⊃~C) ⊃ C]. The right side of it expresses the principle *reductio ad absurdum*.

Reducing some formulations of the principle of causality to the axiom VIII

We reduce this principle by showing how characteristic features of being's consecutiveness come under the concepts of a set and of an element, viz. under the analogical concepts of parameter and its specific value.

An effect, among other things, is characterized by indifference towards existence and non-existence (generally or specifically of any feature), composition of essence and existence, contingency of a being, coming into being, changeability of being, limited degree of existence, potentiality (potency). We shall prove that the concept of existence, in the case of a point, has always a parameter. The only question is what it is like. Let us begin with examining the most demonstrative cases. A being which has begun, has an existence linked with the time parameter. The general attribute, i.e. parameter of this being is: „to exist and have a beginning in time", whereas a particular element is: „to exist, beginning from a definite moment". Particularisation, i.e. numeral determination of this moment – as an element in a set of possible moments – is the result of an efficient cause.

If a being has a limited degree of its existence, this existence is linked with a qualitative or quantitative parameter. Then a concept of

„degree of existence" is independent of subjective valuation, i.e. it is objectively determined. So, a higher degree of existence means either that a species possesses a greater number of attributes or that within the same species there is a higher degree of qualities. For instance, there is a specific difference between the qualitative degrees of existence of inorganic, organic, conscious and spiritual beings, while qualities of intellectual talents, tensenesses of the volitive and emotional acts, velocity of movements etc. differ intensively. Instead of speaking of a qualitative degree, using the specific differences, we can employ the term „perfection", or more exactly „perfection in respect of essence".

On the ground of the parameter of graduated perfections St. Thomas constructed one of the arguments for the existence of the infinitively perfect Being. Thus it is clear that reducing this argument to the principle of causality, we assume that the existence is a parameter (in this sense that it is a set of all possible perfections, of which every kind of essence is a specific value of that parameter).

An existence linked with the parameter of quantity means simply plurality of beings belonging to the same or to different species. For example, one estimates there are at most 10^{80} protons in the universe. Because the existence of the universe comprises the general parameter „a number of protons", the specific value of this number is an element in a set („a number of protons"), this value demands an existence of a cause, which determines this number to be concrete, selected from other possible numbers. It is necessary to call reader's attention to the pleasing, but regarding their strictness mere tentative, speculations of Eddington[3] on seven universal physical constants (M, m, e, h, c, C, R), i.e. mass of proton, mass of electron, electric charge of electron, constant of action, velocity of light, gravitational constant, radius of the world's curvature. All of them are mathematically so interlocked – through the assumption of the four-dimensional space and decreasing intensity (of force, lighting etc. proportional to the increasing distance raised to the square) – with the number N of protons and just as much as of electrons in the universe, that a change of this number even by one would result in a change of all these seven natural constants and consequently of the whole structure of the universe.

The existence which contains a parameter of a potency should be especially treated. We must clarify what „potency" means. Let us recall to mind that the potency in things, events and phenomenons equals, though not univocally, attribute named changeability. Potency, gene-

[3] Cfr. *New Pathways in Science*, London 1935; *Philosophy of Physical Science*, Cambridge 1939.

rally speaking, means: a set of all relations between beings, then a set of all attributes that could be predicated or denied of a being.

Let us set aside these general considerations and take into account plurality of material beings, and only one domain of changing relation between them: a space. Material beings are in potency to all the distances and movements between each other, to coming together in the complexes having the same attribute, e.g. in atomic, molecular, or cristal structures; these beings can interact and change not only accidentally, but also substantially, as we have said before. The cases for it are: changing of photons γ into a pair negaton – positon, originating and disappearing of photons, negatons and positons in the nucleary reactions.

If a being has a potency in whatever domain, then its actual existence is always linked with a specific element in this domain, determined by an efficient cause which likewise has an existence characterized by a parameter of potency and thus an existence linked with a particular element in a set of that potency. So, if we deal with the existences characterized by potency, then the whole their set is a subject ascribed to a set of all the potencies; and as it is all the time ascribed to a particular arrangement, selected from the possible attributes, relations and actions, then it demands a cause determining this specific arrangement.

We should believe that the St. Thoma's argument for the existence of God from the series of causes consists in the proof from the parameter of potency. We have defined the potency contained in a being as a set of all changeable attributes and actions, in so far as it is comprised as the totality of posibilities given in this world, the possibilities from among which every moment only one particular instance is realized. Being is meant here collectively as the world.

To the same parameter can be reduced contingency. Contingency means that the beings can exist one time in potency, another time in act. Changeability, equal to potentiality plays very similar part, i. e. as a sign of being an effect, since it means that a being contains the attributes which are the specific values of the general parameters, i.e. they are elements in non-unitary sets.

There is still the reduction of three features of consecutiveness of beings to be discussed: the indifference to existence and non-existence, existence not belonging to essence, being's composition of essence and existence. These three features can be reduced – as we shall see – nearly in the same way to our familiar scheme of causality.

In order to find this way we must, first of all, meet a peculiar difficulty, if we don't want to make dependent three above mentioned features of consecutiveness on the other ones mentioned before too. It

is quite clear that if we want to show that a being is indifferent to existence and non-existence, we can adduce the time when this being has not existed yet or ceased to exist. In such a case – we have just talked about – we adduce the existence linked with the parameter of time.

But we can also, in order to prove the indifference of a being as regards existence, to adduce the composition of this being of essence and existence, viz. to hide this composition under the more moderate expression: „existence does not belong to essence".

The difficulty of reducing the instances above to our scheme consists in a fact that it is nonsens to consider existence and non-existence as two equal elements of the binary set, so that an efficient cause would ascribe to a being either of these elements. What sort of being would it be, a being possessing a particular value „non-existence"?

Just as it is impossible to express a form without using the general parameters, when we interpret „form" as a physical law, and yet the generality of these parameters belongs to the metaphysical ground, e.g. to potency and, owing to this, we can replace the potency with „ascribing to a set", so, in our case, as the existence is an act, and its subjective potency (i.e. its „base") is „essence", we should interprete the essence of a composed being as a capacity to receive and to lose an act of its existence. A loss (privatio) of an act of existence is by no means an annihilation, which consists in disappearing of both: act and potency; a finite efficient cause, having acted, can destroy an existence of an essence, but only on the way of substantial change, i.e. of production of the new beings, while a prime matter has been saved. A being composed of essence and existence has in its essence (which is neutral against real or ideal state) twofold relation to the act of existence, relation saved in it even under the act of existence: namely it can be deprived of its act of existence, while at most the material element passes under a new act of existence. We can see therefore, in which consists a positive content of that another element in the beings composed of existence and essence, which is named with negative term: „privation of existence"; this privation regards only one definitive existence, but on the way which permits to raise another existence, while something of a ground of former existence i. e. of a preceeding essence remains.

The question arises if we can, even leaving out the problem of the real difference between essence and existence, demonstrate that an existence in a being indifferent to existence and non-existence, is a parameter. But what is this indifference like? We ask further how to reduce „non-including an act of existence in an essence" of a being as a sign of the consecutiveness, to the pair: „set and element"?

The answer is: It suffices, generally, in order to admit the reality of potency nad act, to distinguish conceptually (*distinctio rationis cum fundamento)* elements from a set, to which they belong, provided that the real difference occurs on the other planes of composition, i.e. in the composition of a substance of matter and form, or a real composition of substance and accidents as attributs. In these cases a real act is non-existence, real potency is an essence of being, not containing in its definition such a feature as existence. However, these elements are not really different; all their difference is based on the deeper real composition. This reminds the case with points contained in a line, with lines contained in the surfaces and with surfaces contained in a three-dimensional space. Neither of these derivated from the space creations (besides of space itself) differs really from a set immediately sequent and one dimension lower. Yet we acknowledge the surface of a prism as actual, unlike its arbitrarily chosen section; its edge as more actual than its whichever imagined line on its surface or insides of it; its quoin as a point, unlike the point on an edge between quoins. Consequently, though all the points of line exist potentially in it, a quoin can be more properly named act. Similarly the edges – act of a solid's surface, while the other lines are potentially in a surface, etc.

We can see that the *distinctio rationis* between the elements potentially contained in a set doesn't preclude the actualisation of any of these elements by a properly conceived cause, provided that on the plane of the fundament of this *distinctio rationis*, a real difference and/or at least an accidental change takes place.

By the occasion of reducing the formulas of the efficient causality to the one scheme and of interpretating in terms of „set and element" or in analogical concepts of parameter and its specific values all the features manifesting the consecutiveness, we can define God as a „non-parametrical existence" because in every feature manifesting a consecutiveness the existence of a being is linked with a parameter. Thus it is obvious that the non-parametrical being equals *Actus purus*. The content of this concept is insofar new, as a new aspect of „potency", as we have proved, is a „set" and of „act" is an „element".

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PROJEKT UJĘCIA AKSJOMATÓW PRZYCZYNOWOŚCI RACHUNKIEM ZMIENNYCH ZDANIOWYCH

Streszczenie

Najprostsze aksjomaty, które scholastyka sformułowała jako prawidła inferencji między możnością i aktualnością, są także aksjomatami przyczynowości, wyrażają bowiem pewne stosunki między aktem i potencją. Są to prawidła następujące: *Ab esse ad posse valet illatio. A non posse ad non esse valet illatio. A posse ad esse non valet illatio. A non esse ad non posse non valet illatio.*

W oparciu o skwantyfikowane definicje możności i aktu J. Dorda nadaje tym prawidłom postać następującą:

I. Jeśli podmiot jest przyporządkowany elementowi, to jest przyporządkowany zbiorowi, do którego element należy.

II. Jeśli podmiot nie jest przyporządkowany zbiorowi, to nie jest przyporządkowany żadnemu elementowi tego zbioru.

III. Jeśli podmiot jest przyporządkowany zbiorowi niejednostkowemu, to nie jest jeszcze przez to przyporządkowany jakiemukolwiek elementowi tego zbioru.

IV. Jeśli podmiot nie jest przyporządkowany elementowi, to jest lub nie jest nawet przyporządkowany zbiorowi, do którego ten element się zalicza.

Do powyższych odziedziczonych po scholastyce aksjomatów dołącza następujące:

V. Jeśli podmiot jest przyporządkowany zbiorowi jednostkowemu, to jest przyporządkowany jedynemu elementowi tegoż zbioru.

VI. Brak przyporządkowania jednemu elementowi zbioru niejednostkowego nie implikuje ani istnienia, ani nieistnienia przyporządkowania innemu elementowi tegoż zbioru.

VII. Podmiot nie jest przyporządkowany dwu różnym elementom tego samego zbioru. Jest to zasada sprzeczności dla istnienia dwóch różnych elementów tego samego zbioru w jednym podmiocie.

VIII. (Zasada przyczynowości sprawczej). Jeśli podmiot jest przyporządkowany elementowi zbioru niejednostkowego (tj. elementowi przy-

godnemu wg. definicji przygodności), to istnieje C (różne od podmiotu), które implikuje przyporządkowanie powyższemu elementowi i nieprzyporządkowanie innym elementom tegoż zbioru niejednostkowego.

W celu formalizacji przyczynowości sprawczej Autor posłużył się tzw. „kwantyfikacją" pojęć „możność – akt" przez pojęcia „zbiór – element" czyli „parametr – wartość szczególna". Wskazał także użyteczność tych funktorów, które w poczuciu intuicyjnym przyczynowego wpływu są najbardziej spokrewnione z pojęciami wynikania, możności (czyli zmienności), aktu, zbioru, uszczególnionej wartości.

Symbole zbioru (Z) i elementów (a, b, c...) zastępuje zdaniami. (Z) zastępuje zdaniem: Podmiot S jest przyporządkowany zbiorowi Z; zaś element (a) zdaniem: Podmiot S jest przyporządkowany elementowi a. Przyczynę oznacza literą C i definiuje ją kontekstowo w myśl pewnika VIII zdaniem: „C (byt) przyporządkowuje podmiotowi S element a należący do zbioru niejednostkowego Z, któremu jest S przyporządkowany". Twierdzenie, że „C sprawia przyporządkowanie elementu a ze zbioru niejednostkowego" (tj. zawierającego co najmniej jeden element b różny od a), wyraża przy pomocy iloczynu dwóch implikacji: (C⊃a) . (C⊃~b). Celem określenia potencji przez zbiór, ogranicza się do zbioru z dwóch elementów różnych: a i b.

Zdaniem, które wyraża definicję parametru Z jako zbioru wartości szczególnych może być: a ∨ (~a ∨ ~b) lub: a ∨ (a | b). Wartością logiczną tych zdań jest „prawda". Inną definicją parametru Z jest zdanie: ~(a.b) ⊃ (~a ∨ ~b). Ponieważ pewnik VII intuicyjnie przyjęty opiewa, że nigdy naraz nie mogą być podmiotowi przyporządkowane dwa elementy różne, to Z definiowałby sam następnik ostatnio napisanej implikacji, gdyż wedle VII zawsze sprawdza się poprzednik ~(a.b). Na podstawie tych tautologicznych wyrażeń oraz pewnika VII Autor wyraża powyższe pewniki w postaci symbolicznej:

I... a ⊃ Z: *Ab esse ad posse valet illatio.*

II... otrzymuje się przez odwrócenie (transpozycję) implikacji ~Z ⊃ ~a: *A non posse ad non esse valet illatio.*

III... Z ⊃ (a ∨ ~a): Z możności nie wynika ani akt, jego brak.

IV... ~a ⊃ (Z ∨ ~Z): Brak przyporządkowania elementowi nie pozwala wnioskować, czy ten brak jest „privatio", czy „sprzeczność"; privatio (pozbawienie) zatrzymuje możność przyporządkowania, zaś sprzeczność posiadania aktu oznacza niemożność przyporządkowania.

V... [a.(a ≡ b)] ≡ [(Z ⊃ a).(Z ⊃ b)] czyta się: Jeśli a jest jedynym elementem zbioru Z, to przyporządkowanie podmiotu S zbiorowi pociąga za sobą przyporządkowanie S elementowi.

VI... (~a ⊃ b) ∨ (~a ⊃ ~b): Brak przyporządkowania elementowi a nie wyklucza, ani nie pociąga przyporządkowania elementowi b.

VII. ... ~ (a ≡ b) ∨ ~(a.b). To oznacza: Dwa elementy różne nie mogą być naraz przyporządkowane temu samemu podmiotowi S.
VIII.... a.(a | b).~[C ⊃ ~C] ⊃ C. Jeżeli podmiot S jest przyporządkowany elementowi zbioru niejednostkowego, to istnieje coś (C) różnego od podmiotu, co uszczególnia ten element, wykluczając resztę elementów należących do zbioru.

W celu udowodnienia tautologiczności tego aksjomatu Dorda wyszedł z równoważności: [C ≡ (C ⊃ a).(C ⊃ ~b)] | [(C ⊃ ~a).(C ⊃ b)], do sprawdzenia której posłużył się metodą zero-jedynkową. Wykazał też nieprawdziwość twierdzenia, że jakikolwiek byt może sam siebie przyczynować.

Do tego schematu Dorda sprowadził wiele sformułowań zasady przyczynowości. Za teren przyczynowania sprawczego uznał: obojętność względem istnienia i nieistnienia; złożoność z istoty i istnienia, przygodność bytu, początek istnienia, zmienność bytu, ograniczony stopień istnienia, zawartość potencjalności („możności"). Starał się wykazać, że zachodzące w tych przykładach pojęcie istnienia jest nacechowane zawsze jakimś parametrem. A więc byt mający początek ma istnienie z parametrem czasu. Własnością ogólną, czyli parametrem tego bytu jest „istnieć z początkiem w czasie", zaś elementem szczególnym jest „istnieć od liczbowo określonej chwili". Uszczególnienie tej liczbowo określonej chwili z ogółu możliwych jest dziełem przyczyny sprawczej.

Byt ograniczony co do stopnia istnienia ma istnienie obarczone, obiektywnie określonym parametrem bądź jakości, bądź ilości: wyższy stopień istnienia oznacza bądź gatunek z zawartością większej ilości cech, bądź w obrębie tego samego gatunku wyższy stopień intensywności jakości.

Fakt, że istnienie zawiera parametr możności, wyjaśnia następująco: Jeśli byt zawiera w sobie możność w jakiejkolwiek sferze, to jego istnienie aktualne jest zawsze związane ze szczególnym elementem tej sfery, zdeterminowanym przez przyczynę sprawczą, która z kolei należy do istnień nacechowanych parametrem możności i podobnie ma istnienie związane z pewnym szczególnym elementem ze zbioru owej możności. Skoro więc obracamy się wśród istnień nacechowanych możnością, cały ich zespół jest podmiotem przyporządkowanym zbiorowi wszystkich możności; a będąc w każdej chwili przyporządkowanym szczególnemu układowi spośród cech relacji, działań możliwych, wymaga przyczyny determinującej ten szczególny układ.

Do parametru możności sprowadza się przygodność; wyraża bowiem tę własność bytów, że raz są w możności, drugi raz w akcie. Pokrewne znamię skutkowości stanowi zmienność, czyli synonim potencjalności, oznacza bowiem, że byt zawiera cechy, które są wartościami szczególnymi parametrów ogólnych, czyli elementami zbiorów niejednostkowych.

W końcu omawia trzy znamiona skutkowości w bytach: obojętność względem istnienia i nieistnienia i nieprzynależność istnienia do istoty, złożenie realne z istoty i istnienia. Te trzy znamiona sprowadzają się do schematu przyczynowości. Trudność tej redukcji polega na tym, że nie można uważać za dwa równorzędne elementy zbioru dwuwyrazowego „istnienia" i „nieistnienia", z których przyczyna sprawcza miałaby przyporządkować podmiotowi jeden.

Na tę trudność Dorda odpowiada:

W przypadku, gdy aktem jest „istnienie", a potencją jego w znaczeniu „podłoża" jest „istota", trzeba w istocie bytu złożonego widzieć zdatność do otrzymania i do utracenia aktu istnienia. Byt złożony z istoty i z istnienia nosi w swej istocie dwojaki stosunek do aktu istnienia, który zachowuje się w niej nawet pod aktem istnienia: że mianowicie może być pozbawiona swego aktu istnienia, przy czym przynajmniej składnik materialny przechodzi pod nowy akt istnienia.

Samo rozróżnienie pojęciowe *(distinctio rationis cum fundamento)* elementów od ich zbioru wystarczy na ogół do realności potencji i aktu, pod tym warunkiem, że realna różnica zachodzi na innych liniach złożenia: tj, wewnątrz substancji złożenie z materii i formy substancjalnej, wewnątrz własności złożenie realne z substancji i przypadłości. Wówczas realnym aktem jest istnienie, realną potencją jest istota bytu, nie zawierająca w swej definicji cechy istnienia, a jednak nie są realnie różne, lecz różnicę czerpią z owego fundamentu złożonego realnie.

Redukcja wszystkich sformułowań zasady przyczynowości do jednego schematu oraz wszystkich znamion skutkowości do pojęcia „zbiór i element", czyli do analogii parametru i jego wartości szczególnej, pozwala na określenie Boga jako „Istnienie bezparametrowe", *Actus purus*.