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JAN DORDA SJ (1891–1971) SCIENTIST AND PHILOSOPHER

The year 2001 marks the thirtieth anniversary of the death of Jan Karol Dorda, a Jesuit who devoted a substantial part of his life in the priesthood to literary work (he composed religious poetry and edited several volumes of proceedings of conferences on theology and asceticism), and scientific, especially philosophical enquiry – alongside his pastoral and administrative duties in the Society of Jesus. Father Dorda held a degree in mathematics and physics, but had a special interest in philosophy. In this paper I shall be concerned with his philosophical opinions, only some of which have been published, while the majority of his unpublished manuscripts are preserved in the archives of the Southern Polish Province of the Society of Jesus in Cracow. The reason why his work has never been published is not because of low quality, but due to the difficult conditions prevalent in the post-war Communist period in Poland, and also because of the cautious attitude adopted by the censors and reviewers to whom Dorda submitted his work for assessment.

In my opinion the publication of his work would be a worthy enterprise, although several decades have already passed since it was written. Many of the ideas in Dorda's papers are as valid and relevant as before. However, before the task of publishing them is undertaken,

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it would be worthwhile devoting some attention to Father Dorda himself and his ideas and activities in philosophy.

1. Life and Work

Jan Karol Dorda was born on 31st August 1891 at Leśniów, near the town of Brody, some 80 km east of Lwów (now Lviv, currently beyond the eastern frontier of Poland). His parents, Ludwik and Rozalia née Schweiger, were smallholding farmers, who also held a number of different types of employment to maintain their eight children. Jan was sent to the local village school, and quite early on showed signs of a vocation to the priesthood. On completing primary school he passed the entrance examination for St. Jacek's Grammar School, Cracow, and was admitted. He lived in a boarding house at ulica Łobzowska 19. He was one of the best pupils, talented, attentive and hard-working, and also profoundly devout. In 1905 he became a candidate for admission to the Jesuit Order and moved to the Jesuit House in ulica Kopernika 26. After a year's residence he entered the novitiate at Stara Wieś near Brzozów. He took his first vows on 5th September 1908. In the next two years he completed the fifth and sixth forms of grammar school (then an eight-year course) privately. In August 1910 he moved to Chyrów, passed the entrance examination for the well-known Jesuit grammar school there, and completed the seventh and eighth years of the grammar-school education, taking the school leavers' examination in June 1912. He then embarked on the course of studies prescribed in Jesuit Order for candidates to the priesthood. Usually there are two stages in this course, first Philosophy, followed by Theology. Jan Dorda studied Philosophy in Nowy Sącz (1912/13), Cracow (1913-15), and in 1915 at Gräfenberg (now Jeseník, Moravia), where he found himself in outcome of the First World War. He spent a short period in military service in Dr. Hornung's sanitary division. In 1939 he was awarded the *Krzyż Zasługi* (cross of merit) by the Polish Ministry of Internal Affairs for this work. On completing the Philosophy course he was sent to Chyrów Grammar School, where he taught mathematics and physics (1915/16 and 1918). He read Mathematics and Physics (1916-18, and 1922-23) at the Jan Kazimierz University of Lwów, which had a reputation for its school of logic and the well-known mathematicians and logicians belonging to it. In the interval between his two periods of university study he completed the Jesuit course in Theology, first at Stara Wieś near Brzozów (1918-20), and subsequently in Cracow (1920-22). On 29th June 1921 he was ordained by Bishop Anatol Nowak. In 1923 he completed his honours degree course in Lwów. After graduating he started work in teaching and moral education in the Jesuit Grammar

School at Chyrów, where he also completed his third probation, that is a year of study spent on Ignatian spirituality and the Jesuit internal law. At Chyrów, too, in 1928, he took the four solemn vows making his profession and thereby being admitted to the principal group in the Jesuit community. Here also passed the examination in teaching, qualifying him to teach mathematics and physics at grammar-school level. He was a master of these subjects at Chyrów until 1939, when the school was abolished in outcome of the invasion by Nazi German and Soviet troops.

Alongside his involvement in teaching Father Dorda was also engaged in literary work. Already in 1927 Father Jan Urban, editor-in-chief of the Jesuit periodical „Przegląd Powszechny”, invited to work for this monthly magazine. In the period from 1927 to 1930 the young scholar published eight reports in this magazine on academic developments in Poland and abroad, including *Z historii badań ciał promieniotwórczych* (Episodes from the History of Radiation Research), 1927, No. 176; *Nowe obszary widma* (New Ranges of the Spectrum), 1928, No. 179; *Zagadkowe pokrewieństwo elektronów ze światłem* (A Mysterious Relation Between Electrons and Light), 1929, No. 181; *Zjawisko C.V. Ramana* (The Raman Effect), 1930, No. 185; and a scientific paper *Odległości kosmiczne w świetle najnowszych badań* (Cosmic Distances in the Light of Recent Research). Two years later, 1932-34, he was appointed Head of Chyrów Grammar School, and rendered distinguished service bringing in the reform recommended by the Ministry of Education, by which secondary education was subdivided into an initial 4-year period (*gimnazjum*), and a further 2 years (*liceum*). Using his powers as Head, Father Dorda decided the school would be organised as a *liceum* with a special mathematics and physics stream, and a special humanities stream. As head of the mathematics, physics, and astronomy section in the school, he set enthusiastically to work for the development of the physics and chemistry laboratories, and of the school's astronomical observatory. In the same period he was working on several problems in mathematics, which he treated as ancillary to physics. He also compiled a set of problems and exercises in physics (*Zbiór oryginalnych ćwiczeń z fizyki*) and a set of model solutions to the problems in Witkowski's three-volume compendium of physics. His work attracted the attention of the radio broadcasting station in Wilno, which invited him to record a series of 10-minute monthly broadcasts on issues on the border of physics and philosophy. Owing to an excessive workload he was obliged to turn down this offer, while outbreak of the Second World War put paid to his literary pursuits and other far-reaching plans. It was no wonder that he headed his diary with the

caption *Dies Irae, Calamitatis et Miseriae*.¹ During the War he was busy with pastoral duties, and from 22nd September 1939 to 27th November 1945 lectured in Dogmatic Theology for Jesuit seminarians. His books on religious subjects, such as *Szkice przemówień o Matce Bożej* (Sketches of Addresses on Our Lady, published Kraków, 1946), and *Konferencje i rozmyślenia o Najświętszym Sakramencie* (Conferences and Reflections on the Blessed Sacrament, published Kraków, 1947), as well as his satirical verse and his religious poetry (chiefly on the Blessed Virgin Mary) published in *Tobie cześć* and *Wióry i odpadki*, date back to the period of the War.

After the War, from December 1945 he lived in St. Barbara's House in Cracow (Mały Rynek 8). In February 1946 he left for Stara Wieś, where he taught physics and mathematics at grammar-school level to Jesuit seminarians from both Polish provinces, and held retreats for seminarians and nuns. From August 1947 to August 1950 he performed the duties of Superior of St. Barbara's House. At around this time he was encouraged in his scientific work by an offer addressed to him by Jan Piotr Stepa, Bishop of Tarnów, in the following letter:

Dear Father Superior,

Please accept my best wishes for your feast-day. May God bless you and keep you in good health.

I would like to take this opportunity to ask you for a favour. Father Kłósak suggested I should turn to you with this idea. On behalf of the Komisja Szkolnictwa Episkopatu (the Bishops' committee on education) I am to engage several authors to compile a set of essays on the relation between science and religion and the Catholic outlook on life. Copies of these essays are to be sent out to priests, especially catechists, throughout Poland, to help them with their work in religious instruction, the organising of religious conferences etc. As a specialist in the field, you have been selected for two topics:

- 1) The limits to the competency of scientific inquiry, and
- 2) Physics and its position on Materialism and Spiritualism.

This is a request I am addressing to you on behalf of the Commission of 8 Bishops I am head of. I hope you will be able to help us and would like to ask you to specify the time you would need

¹ Manuscript No. 3237 in the Archives of the Southern Polish Province of the Society of Jesus (Archiwum Prowincji Polski Południowej Towarzystwa Jezusowego – address: Kraków, Mały Rynek 8). This heading is a quotation from a sequence in the pre-Vatican II mass for the dead.

to complete this task. I would like to send the Bishops these materials after the vacations – if possible.

Yours sincerely,

Bishop Stepa

P.S. I have just received your letter. Thank you very much for your good wishes and for the Mass.

Father Dorda compiled the materials in question. They were published by Katolickie Wydawnictwo Veritas of Tarnów. The first of these papers was also published in the periodical „Przegląd Powszechny”, LXVI, Vol. 227, 1949, p. 233-247 & 347-356. The second paper, in a typescript entitled *Materializm i spirytualizm w świetle fizyki współczesnej* (Materialism and Spiritualism in the Light of Contemporary Physics), is in the Archives of the Southern Polish Province of the Society of Jesus in Cracow (ms. 5428, p. 325-345). Another version is entitled *Materia i duch* (Matter and Spirit). There is also a text entitled *Fizyka wobec materializmu i spirytualizmu* (Physics on Materialism and Spiritualism), with a note in the margin informing the reader it was a catechetical treatise published by the Bishop of Tarnów's Catechetical Commission. In addition Father Dorda also worked in the Metropolitan Curia of Cracow; he was also engaged in writing, chiefly on apologetics with regard to the philosophy of Materialism disseminated by the Communist authorities. One of the issues he addressed was the defence of the kinetic proof for the existence of God.

In 1950 he returned to Stara Wieś, where again he taught mathematics, physics, and aspects of astronomy. In 1952 he was appointed Rector of Stara Wieś College, and managed it throughout the hardest period of Stalinism. After 1957 he returned for good to Cracow, and settled down to intensive work on his writing and pastoral duties. In 1958 he delivered a lecture on efficient causality in the Catholic University of Lublin, and also several lectures in the Faculty of Theology at Cracow. He was an esteemed confessor and retreat chaplain.

Father Dorda's work in science has been preserved in the extant typescripts and in a series of articles, published chiefly in „Przegląd Powszechny”, „Ateneum Kapłańskie”, „Homo Dei”, and „Znak”. This highly talented Jesuit, who was an exacting teacher and a brilliant and witty speaker and debater, lived to see and celebrate his golden jubilee in the priesthood. Thereafter, however, his health declined more and more. In anticipation of approaching death, he put his notes, papers, letters and personal effects in order. After a short stay in a medical clinic, where he edified his fellow-patients spiritually, he died in the Cracow Jesuit College on 14th November 1971.

Dorda had a good knowledge of the contemporary discoveries and advancements, and applied a philosophical approach to their study. He was involved in study of all the fields of philosophy except for ethics – theory of knowledge (epistemology), metaphysics and the philosophy of God, anthropology, and cosmology. His position in the above disciplines may be summarised as follows:

2. Theory of Knowledge

Dorda addressed the following epistemological problems already in his paper *Kompetencje naukowego poznania* (The Competency of Scientific Inquiry): 1) the theory of indeterminacy, 2) critical realism, 3) the degree of correspondence between the object and knowledge of the object, 4) qualitative and quantitative description. He emphasises the role of analogy in science, which comes into play in approximation and limits to approximation. The closer one comes to the limit of a series, the more unambiguous the notion. Dorda cites many examples of analogy: the theories of geometry have their corresponding notions in mathematics; functions in the theory of variables correspond to some phenomena in arithmetic, e.g. even numbers correspond to true statements, and odd numbers to false statements. The symbol \vee corresponds to multiplication, while the symbol for equivalence (\equiv) corresponds to addition. Analogy may be applied to move from three-dimensional space into multi-dimensional space.

Reasoning by analogy fails at the subatomic level, where indeterminacy comes into play. Dorda inquires whether indeterminacy is merely a characteristic of our limited way of learning, or whether it „lies in the very nature of atoms.” He claims that if we could study just one electron or photon, the wave theory of light would prove untenable. It turned out later that Dorda was wrong; today we know that even a single electron or photon behaves like a wave. Dorda insisted that we could not ascribe indeterminacy to the nature itself of elementary particles. Theoretically, in his opinion, we could apply the notion of light as a wave of very short wavelength, which carries no energy: this would not be not logically inconsistent.

Analogy can also be applied to the sub-division of a whole into its constituent parts, he says. How far can sub-division be taken? Dorda was not aware of particles smaller than the electron. Today we know of quarks. He is interested in the question why it is that, if particles move at the speed of light, some particles move at a slower speed on the macroscopic scale. He suggests that they move in zigzag trajectories, just as in Brownian motion, and that this is why they cover the shortest effective distance more slowly. He considers energy to be an accident of substance.

Dorda endeavours to overthrow the mechanistic view of the world prevalent in modern physics, according to which everything can be reduced to the movement of particles. He was in search of the values which survived this type of reduction, and found such values in phenomena such as the difference between positive and negative electric charge, or the transformation of the photon into an electron and positron pair.

It is by means of analogy, he claims, that we formulate our objective images of the world, which include ideas like the object, substance, attribute, relation, force, action, and cause. However, this is not Kantianism. According to Dorda the first step is man's discovery of the world; only then do we reflect on our knowledge. However, the primary analogate, marking the limit to the sequence, is the content of human consciousness; all the rest is learned by analogy. Causality in the world is the secondary analogate of our causal behaviour. The Aristotelian concept of form is an analogical concept.

In his contention with the mechanistic view, however, Dorda does not wish to reduce everything to a series of forms contained one within another like boxes inside each other. The modern notion corresponding to form is the parameter. Parameters can be ordered by means of functions. Analogy is all-pervasive. There are examples of the analogous use of terminology: we *support* our bodies by *resting on* a balustrade, and we *support* our arguments or conduct by *resting on* our principles; we *spread* a tablecloth out on a table, but we also *spread* our culture; there are *higher* and *lower* storeys in our houses, but there are also *higher* and *lower* notes in music; just as there are *clear* days and *clear* ideas.

From 1957 onwards, following his return from Stara Wieś to Cracow, Dorda concentrated even more intensively on his work in science and philosophy. He engaged in a well-known debate with a group of neo-Positivist philosophers and others who held similar ideas, including the former priest W. Marciszewski, A. Grzegorzczak, and J. Narbutt. He also engaged in polemic against Father K. Kłósak. He started his involvement in the debate with the article *Pewność czy ryzyko?* (Certainty or Risk?) in „Znak”, No. 73/74 (1960). Marciszewski had queried the certainty of science in mathematics, the natural sciences, and philosophy. Narbutt discussed the problems encountered by a Catholic who wanted to remain a Christian. Dorda defended the certainty of science – at least of what today we would call „the hard core” of science (to use Imre Lakatos' term), but did not question the occurrence of uncertainty on its peripheries. He resorted to a comparison. If a cat has a scabby tail, does that mean there is no cat at all? Hypotheses might be

uncertain, but facts are certain. Dorda was an adherent of common sense. Common sense made him reject the Kantian system as a piece of fantasy and a metaphysics which had „plucked all the feathers off the object and stored them away in the subject.”

3. Metaphysics

In the 1960's Dorda published many other articles, parts of which comprised sections of his opus vitae, *Studium o przyczynowości sprawczej z zastosowaniem w kosmologii i teologii naturalnej* (A Study of Efficient Causality as Applied to Cosmology and Natural Theology – 400 pages of medium-density typescript).²

This work was ready for publication in 1970, and had been sent out to Lublin for reviewing. On 29th May 1970 Father Stanisław Mazierski sent its author the following letter:

Dear Father Dorda,

Please forgive me for not replying for such a long time to your letter about a review for your treatise on causality.

Your work is very interesting and contains a rich store of illustrative materials. However, it should be re-edited before publication to bring out the issues into even greater relief and to supplement them with the latest developments (e.g. B. Gawecki, *Zagadnienie przyczynowości w fizyce* (The Question of Causality in Physics), Warszawa, 1969).

If the need arises, I will be able to assist you by supplying with my own assessment.

Please accept my best regards,
Father Stanisław Mazierski

This opinion halted the book's publication. By that time Father Dorda was growing weaker and weaker; he was vexed by a variety of illnesses and was no longer able to re-edit the work, as recommended, before his death, which came eighteen months later.

Despite Father Mazierski's opinion, the treatise contains many cogent arguments and observations. Although in many instances new advancements have been made in physics and mathematics, Dorda's basic statements and observations on causality are still relevant and interesting today. J.B. Gawecki's book was not so revolutionary in what

² Manuscript No. 2536 in the Archives of the Southern Polish Province of the Society of Jesus (Archiwum Prowincji Polski Południowej Towarzystwa Jezusowego – address: Kraków, Mały Rynek 8).

it had to say on causality as to make Dorda's position outdated. Like Gawecki, Dorda defended causalism against functionalism, taking into account the unidirectionality of certain changes in the world. In many cases Dorda's analyses went even further than what Gawecki wrote. Publishing his work would be worthwhile, at least for the sake of enriching the philosophical discussion on subjects which have always been interesting, especially where they are concerned with the question of God.

Dorda's treatise comprises an Introduction and four parts. In it he considers the following questions:

1. Does causality apply only to human activity, or does it also extend into the remaining beings, including the inorganic world?
2. The difference between the generic and specific determination of the impact of various causes on the emergence, existence, and quality of an effect.
3. To whom or what should the designation „cause” be ascribed? To things (in other words to substances), or to events (in other words to processes)? The same question may be re-phrased: can the term „effect” be used with reference to things, or to events, or to both?
4. The definition of causal influence. Does causal influence belong to the irreversible and transitive relations? Is it connected with change, that is with the originating or emergence of beings that are either new or modified?
5. The relation between causal influence and the principle of sufficient reason: do these concepts overlap or not?
6. Another problem of definition concerns the identification of an effect on the basis of its structure.

These epistemological issues involve a series of questions on the existence and nature of causality, and hence also of action. They call for the discussion of Hume's associative theory and Kant's subjectivist category of causality; they require a position to be taken up on the views of the conditionalists and functionalists, who put forward the concepts of condition and function, in opposition to the causalists' concept of cause. Another aspect of the epistemological issues involving causality is the strange notion of „becoming without cause.” Further questions are the following: in what sense is the principle of causality an analytical proposition, and a universally applicable law of being in general; or is it perhaps only a methodological postulate, indispensable for the pursuit of the natural sciences, and continually confirmed in every experiment?

In Part I, which presents some 20th-century authors' views on causality, Jan Dorda discusses the efforts and achievements of 10 20th-

century authors (J. Geyser, T. de Régnon, M. Jaworski, M. A. Krapiec, F. Sawicki, J. Metallmann, J. Łukasiewicz, W. M. Kozłowski, S. Kobylecki, and H. Greniewski) on the subject of causality. These authors studied causality either independently, or in connection with the Aristotelian and scholastic tradition. He enumerated the following issues as typical of their inquiries into causality:

1. the subject and definition of causal influence,
2. the proof for its existence,
3. the origins of the concept of causal influence,
4. the connection between causality and variability in nature and with the metaphysical interpretation of change,
5. the dependence of attitudes on the nature of the causal link on epistemological opinions, that is its link with the nature of universals,
6. similarities and differences between causal links and time relations,
7. types of regularities in nature and the place of causality among them.
8. causal influence and the grounds for induction,
9. the formulations put forward for the principle of causality (in scholastics the designate of an idea is a thing, being, or substance having certain accidents; in the sense applied in the natural sciences the designate of the word „cause” is a „process” or an „event”).

We shall review only the most important issues from Parts II, III, and IV.

In Part II, on the methodological and epistemological assumptions for the study of causality, Chapter 1 (on the multi-layered nature of reality), Dorda takes a critical attitude to the one-sidedness of Scientism, Logicism, Neo-Positivism, which in various ways limit both man's ability to make contact with reality, and his image of reality, which is many-sided, multi-layered, and has many aspects.

He ascribes to what he calls „interpretative Realism”, in which the sensory qualities, understood as a material property of a sensory receptor, are the direct object of sensory perception, and do not differ in terms of content from a quality in external, inanimate matter, but do differ from it in terms of the modality of consciousness. He considers uniform spatial movement as identical with constant kinetic energy, that is a quality (state) modifying the substance of a material body.

Dorda mentions the classical division of beings into categories; he enumerates different kinds of predicates (the *praedicabilia*) and the transcendental concepts, along with the associated theory of analogy, which he illustrates with numerous examples.

In Chapter 2, in which he explains the concepts of potency and act and describes their dual origin, Dorda observes that these two concepts are analogical in character. He cites 6 examples of their application: 1. the geometrical shapes of bodies, 2. the quality of form in sensory observations, 3. the logical content of a concept, 4. the relationship of the statement to the subject in an affirmative judgement, and the relation of a conclusion being contained in the premises, 5. the relation between specific difference and generic concept in a real definition, and 6. the relation between a general physical law and a specific instance of its occurrence.

Dorda reinterprets the Aristotelian concepts of form and matter. For him the laws of physics correspond to Aristotle's concept of form. Potency is parallel to the set, and an act to an element from the set. By means of this approach, Dorda defines modal concepts such as possibility, actuality, contingency, and necessity. In this context he defines the working of an efficient cause as „a particularisation of general parameters and whichever constants, which for physical processes we generally refer to by the expression «to select initial values.»”

He goes on to analyse the concepts of act and potency in the context of change. The potency performs the function of a foundation, like primary matter in substantial changes, like substance in accidental changes. He discusses the problem of the reality of substantial changes, in an attempt to reconcile hylomorphism to atomism. In his discussion of accidental changes, arguing against Father Kłósak, he shows that forces may not be treated as causes, since they are passive and are subject to change only when movement is introduced into a network of bodies. In this he makes use of his own article *Błędy w krytyce dowodu kinetycznego w teodiceji* (Errors in the Criticism of the Kinetic Proof in the Theodicy), published in „Homo Dei”, 1960.

Towards the end of this chapter Dorda analyses the modes and mechanism of action, referring to the examples of human communication by means of arbitrary signs, the making of tools, and the control of body movements by the will, and he refers to the theory of J.C. Eccles.

In Part III, an outline of the theory of efficient causality, Dorda reaches the heart of the matter. In Chapter 1, on the experiential foundations of the concept of causality, he endeavours to show, contrary to Hume's claim, that there exists a real influence of cause on effect. He starts from the inner experience of the influence of the willing self, especially as exerted in our body movements, on the development of culture. On the other hand the experience of passive reception provides the grounds for the ascription of causality to external objects. He presents Piaget's study of the development of the idea of causal

influence in small children, and concludes the chapter with a quotation from E.L. Mascall's theodicy, that the concept of efficient causality turns out to be indispensable as soon as we ask not just *how* something happens, but also *why* it happens. Events are caused by other events, and things exert a mutual influence on each other.³

In Chapter 2, on the multiplicity of formulations of the principle of causality, Jan Dorda enumerates 7 different formulations encountered in the Scholastic textbooks. He does not query them. He tries only to contemporize. He analyses the causal link using the ballistic example of impinging spheres. A cause operates when there is a passive potential within its vicinity. *Actio est in patiente ut in subiecto*. The cause itself does not change, he claims.

Chapter 3 presents an introduction to the definition of the causal relation by means of abstraction, and in it the concepts of sense and structure are applied. Since they are primary concepts, Dorda introduces them by means of examples. Thus the sense of colours or of sounds is a direct item of information from the respective senses, while their structure is a wave; the structure of the formulae for the electrostatic, gravitational, and magnetic forces is similar, but their sense is different – mass, electric charge, and magnetic quantity respectively. There may exist structureless senses, e.g. a point in space.

Thanks to this explanation of the concepts of sense and structure it will be possible to define causal influence by the structural analogy between influence and an act of decision, that is the choice of one element from a set of several possible elements. Dorda performs this task in Chapter 4, which deals with potentiality as a set, and the act as an element from the set. He manages to do this without needing to bring in the concept of change; he is of the opinion that it will be enough for him to use the fact of complexity. He reinterprets the Aristotelian concepts of potency and act so as to describe potentiality as the ascription of the subject to the set of elements, and actuality as the ascription of the subject to one of the elements in the set. Thereby he extrapolates the Scholastic designates of these concepts (matter – form, substance – accident, essence – existence) into the field of spatial displacement, where, in three-dimensional space, there are potentially three categories of quantitative acts: the plane, line, and point. Next he introduces these concepts into the field of logic, where the conclusion is entailed *in potentia* in the premises, and theories in the axioms and

³ Polish translation by J.W. Zielińska, *Ten, który jest. Studium z teizmu tradycyjnego*, Warszawa, 1956, p. 100.

directives. In the field of artistic creation, the material fabric supplies the potency for the accidental form of the work or artefact.

Dorda uses van der Waals' equation of state for perfect gases to illustrate his suggested definition of causal influence. The three variable parameters, pressure, volume, and temperature, represent three sets of specific numerical values, which determine the gas' potentiality in a threefold range of specific values. Each specific value, an element of a particular set, is one of the possible acts of pressure, volume, or temperature. Finally, applying the concepts under discussion, he describes causal influence as the attribution of a specific value to general independent variables. Dorda's reasoning is reminiscent of St. Thomas' argument that all that is complex has its cause. Those things which differ radically from each other combine to give a whole under the influence of a cause which brings them together.⁴ The occurrence of a specific value suggests that some other value might have occurred instead, and therefore that the occurrence of this particular value with the substance is contingent, and hence requires an external cause.

In Chapter 5, on the axioms of efficient causality, Dorda presents the four Scholastic axioms, *Ab esse ad posse valet illatio*, *A non posse ad non esse valet illatio*, and *A posse ad esse non valet illatio*. *A non esse ad non posse non valet illatio*, in a new garb. They are remodelled as follows:

1. If a subject is ascribed to an element, then it is ascribed to the set to which the element belongs;
2. If a subject is not ascribed to a set, then it is not ascribed to any element of the set;
3. If a subject is ascribed to a non-unitary set, it need not thereby be ascribed to any of the elements in the set.
4. If a subject is not ascribed to an element, it need not be unascribable to the set.

Dorda adds 5 of his own axioms to the above three, and does not rule out the existence of further axioms.

In Chapter 6, an attempt to describe the axioms of causality by means of a calculus of propositional variables, Dorda endeavours to construct a formal theory of causality. First he formalises the axioms he has already listed. Next, by applying the implication functor, he gives the following definition of cause: „By cause P we mean something which ascribes one element of a non-unitary set to a subject S, thereby causing the absence of ascription to S of the remaining elements of the set.”

⁴ S. Th. qu. 1, a.7.

Finally he formalises Axiom VIII, in other words his principle of causality.

In Chapter 7, on the reduction of the formulae for the principle of causality presented in Chapter II to the formulation of Axiom VIII, he reinterprets the textbook formulations he has already described, applying his own new terminology.

In Chapter 8, a search for a new scheme of action, he analyses various acts of making expressed by verbs such as *to create*, *to put together* and *to take apart*, *to cause*, *to form* or *transform*, *to change*, *to arrange* or *order*, *to adapt* etc. He observes they share mutual attributes, such as unity of the action idea, and the transfer of something; however there is always something in them that is relevant to causal influence: it is the ascription of the subject to one element of the set. Here he adds Axiom IX, which expresses the synonymy between cause and effect that occurs because of imitation. He also gives an interesting reinterpretation in his scheme of „conceptual contraction”, that is the passage from the generalisation to the concrete case. „Causal influence is the reverse of thinking, if by ‘thinking’ we mean ‘abstracting of concepts’ or ‘generalising’; on the other hand ‘acting’ means particularising or instantiating a general parameter (that is a potency) with a given numerical value, or – more generally – particularising the genre by means of a specific difference.”

Chapter 9, on prospects for the further development of the theory of influence, concludes Part III. Dorda envisages prospective advances may be made in the study of the the numerical force of sets as well as the arrangement of elements in them. The corresponding task in metaphysics would be to study the essential aspect of being. Dorda proposes a fuller definition of the theory of causality by considering the transcendentals – *unum*, *verum*, and *bonum*. *Unum* operates in the already presented concept of the ascription of a subject to a set or element in a set; however this procedure can be extended to include *verum* – that which may be represented intellectually, and *bonum* – that which is of value. Dorda anticipates that one day a study will emerge of „teleologic”, which will take into account good and evil as two values.

Part IV deals with applications in the field of cosmology and theodicy, and presents a collection of suggested applications in natural philosophy and in arguments for the existence of God, of the theory described in Part III.

Chapter 1 is concerned with a definition of motion as a change of position. In it Dorda discusses the Aristotelian concept of motion. Irrespectively of whether his reinterpretation is right or wrong,⁵ he

⁵ S. Ziemiański SJ gives a different description in several articles, the most recent of

puts forward the following definitions: a body which is at rest is ascribed to a point. A body which is in motion is ascribed to a line. A field means the ascription of a body to the surface surrounding it. Finally Dorda gives the following definition: a body which is in motion is ascribed to a line in the external space which orders its points (loci) in an irreversible manner. Towards the end of this chapter Dorda reflects on the subject of time and gives the following description: „the continuous set of these moments of motion is called time.”

In Chapter 2, on the trueness of the „principle of motion,” *quidquid movetur, ab alio motum accipit* – Dorda limits his account to an analysis of local motion. First he recapitulates that the source of motion does not lie in force or forces, since forces are formal in character and constitute links between particles or groups of particles. Forces are never an action; at best they react to the occurrence of motion.

He endeavours to show that even constant motion must have a cause. The expression „a motion is determined” means that the following aspects of the motion are numerically determined: 1) the masses in the system, 2) their relative accelerations, 3) their initial positions, and 4) their initial velocities. Even if the masses and accelerations are fixed, this is still not sufficient to determine the motion until we select particular values for initial positions and velocities, which have to be specified out of an infinite number of possibilities. It is the efficient cause that determines this selection.

To avoid confusion, Dorda emphasises that the forces are the efficient cause not of the velocity, but of the acceleration. Forces only modify the motion, but they do not cause it. He also distinguishes between the situation when the body both in the given point and in its environment has a zero velocity, from the one when the body’s velocity in the point and in the environment is not zero. The former corresponds to the body being at rest; the latter to the body in motion. He puts forward a surprising statement, that the action performed by the efficient cause does not bring about any change in the cause itself, and that if we observe in a case such a change, it is because the action occurs mutually and involves all the participating bodies. The situation may be different in the sphere of psychological causality.

In Chapter 3 Dorda poses the question whether the law of conservation of energy (and mass) confirms the indestructibility and uncreatabi-

which was *Ruch przestrzenny jako stan* (Spatial motion as a State), „Forum Philosophicum”, Vol. I. 1996, p. 95-104. According to Ziemiański, motion is not the acquisition of new positions, but instead the expression of a time and spatial relations. Irreversibility occurs only on the macroscopic level due to the negligible probability of the reversal of the process of increasing chaos.

lity of these quantities. His answer – contrary to the claims of many Marxists – is that it is possible for mass and energy to disappear and reappear. In substantial changes energy does not „jump” from one substance onto another, like a flea from one dog onto another, but it has to disappear from one substance to reappear in another. Moreover energy is not a primary and elementary attribute of matter, like mass or motion, but it is a synthetic concept, composed of features such as mass and the derivatives of motion such as acceleration, velocity, and displacement, and it is used to measure a body's motion. Outside mass and motion there exists no separate reality called energy. The work differential is identical to the differential of kinetic energy. Therefore energy is not the cause of motion, since that would mean that the same thing were its own cause.

In Chapter 4, on the conditions for valid proofs for the existence of God, which are not easy to fulfil, and examples of the difficulties involved, Dorda turns to problems in theodicy. Arguments for the existence of God have the nature of reductive reasoning; they start from facts which cannot be explained by causes within the world, and proceed to the notion of God as the prime cause. Resorting to the use of an infinite series does not remove the problem. Dorda's next chapters present several arguments for the existence of God which start with facts drawn from the world of nature and human experience that cannot be explained by natural causes.

Thus Chapter 5 discusses miracles which suspend the principal laws of nature as a reductive argument. Dorda presents two types of argumentation here. The first involves phenomena which are contrary to the law of conservation of mass and energy. The examples he quotes are Christ's transformation of water into wine and the multiplication of the loaves, and also the healing of Pierre Rudder in 1875 at Ostaaeker. His second type involves the facts that exceed the laws of nature because of the speed at which a process takes place and its complexity, and the examples he gives are Christ's resurrection, and the Lourdes miracles.

In Chapter 6, on the next reductive arguments, Dorda discusses 1) the appearance of life, 2) the emergence of sensory consciousness, 3) and the emergence of human thought, which do not lie exclusively in the range of causes within the world. He criticises claims put forward in the theory of evolution. First he observes that the claim that life started by means of random occurrence is untenable, since according the calculations of the mathematician Charles Eugène Guyé, the probability of such an event is negligible. Autogenesis, says Dorda, would be self-contradictory, since the component parts of a living organism are only stable if they are part of an already complete organism. Moreover the

emergence of life would require the direction and control of the process of synthesis. But the physical forces and chemical properties of atoms become less and less able to undergo unambiguous syntheses if they are not controlled or steered for the achievement of a definite purpose (the synthesis and organisation of an organism), the greater the range of possible unfavourable syntheses proceeding from the same starting material.

The self-emergence of a thinking being is all the more inexplicable in terms of the forces of nature alone, since mind cannot be reduced to a material machine, because thinking cannot be reduced to an ultimate formalisation. This is the outcome of Gödel's limitation rules. In 1958 Ernst Nagel and James R. Newman confirmed Dorda's conclusion.

In Chapter 7 Dorda passes to anthropology and considers the ethical and eudemonistic argument. First he observes the universal occurrence of the sense of duty in human beings, which defies explanation either by social pressure or by man's hereditary hedonistic archetypes. A wrongdoer not only keeps his crime or wrongdoing a secret from others, but he also tries to justify it to himself. Neither is hedonistic calculation a sufficient explanation for this, since despite the tendency for the moral bounds to be shifted, the boundaries between good and evil are clear-cut. Likewise the desire to attain the absolute good, in other words perfect happiness, which cannot be achieved in this world, testifies to the existence of God, who put such a desire in man. On the other hand Dorda does not recognise the argument relating to man's need for a sense to life as sufficient. According to him, this human need is an outcome of the rational nature of the human mind.

Chapter 8 presents an outline of the teleological proof as based on animal instinct, with reference to research results obtained by entomologists (Fabre). The instinctive behaviour of insects is so sophisticated that it can hardly be explained as an outcome of processes of natural selection. Acquired features are not hereditary, while evolution operates within families, not between species.

Chapter 9, the last in this part of the book, is a critique of the criticism of the entropological proof. Dorda presents the argument based on increasing entropy, defending its legitimacy against counter-arguments. If the processes going on in the world were eternal, the point of thermodynamic death would have already been reached long ago. But the state of maximum entropy has not yet been achieved. Hence the world had a beginning, which shows that there must have been a cause outside the world for its creation. He refutes the following arguments against this reasoning: 1) the inadmissibility of extrapolation of this law for the whole cosmos, 2) the statistical character of the second law of thermodynamics, 3) the possibilities of regeneration

inherent in the world through a) undiscovered and unexploited sources of energy, b) the oscillatory process of expanding and shrinking universe, 4) Poincaré's phase theorem and the eternal return of worlds, 5) the differences between relativistic thermodynamics and classical thermodynamics according to Tolman.

Dorda's reply to argument 1) is that the homogeneity in the world justifies the extrapolation of regularities observed in a finite extent of our experience; he answers argument 2) by saying that the probability of the universe returning to a previous state is infinitesimally small; and argument 3) with the observation that in an oscillating universe each consecutive contraction would at most delay the moment of thermodynamic death, but would entail an overall increase of entropy. As regards argument 4), on the repetitiveness of world states as formulated mathematically by Poincaré and supplemented by Carathéodory – Dorda says the number of particles in the world is changing all the time due to disintegration and radiation. Potential energy is being exhausted in favour of kinetic energy, which is becoming more and more chaotic, as evidenced by heat. It would be extremely unlikely for this energy to assume an ordered state again. Finally, 5) Tolman's suggestions should be treated with caution, since as he himself says, they are to be treated only as hypotheses to be verified experimentally. Tolman has on many occasions stressed that he did not embark on thermodynamic studies involving statistical mechanics. Even if Tolman's conclusion on the existence of a temperature gradient required by differences in the concentration of gravitational potentials were to be experimentally confirmed, this detail could only delay the achievement of thermodynamic death in the universe, since it would merely mean a greater length of time for the achievement of equilibrium between the gravitational potentials, and hence also in temperature.

Chapter 10, the final chapter, deals with changes and their causes, the contingent nature of changeable and dependent things, and arguments for the existence of a Prime Cause on the grounds of contingency and causality. In §1 Dorda classifies the physical transformations in an attempt to establish a point of departure for the proof. First and foremost he examines examples of substantial changes, and recognises the creation and disintegration of mesons and hyperons, nuclear reactions, photon emission, and the formation and disintegration of molecules as substantial changes. In §2 he is concerned with the causes of physical transformations. First he rejects the view that all energy is a hidden type of kinetic energy. Then he returns to an idea he has already put forward, that the efficient cause of physical processes is the factor external with respect to the system which attributes

particular numerical values to the general parameters. He acknowledges the medieval principle, *Agens finitum agit per motum*. But he does not forget about potential energy.

In §3 Dorda presents an outline of the proof for the existence of the Prime Cause drawn from the existence of efficient causes in nature. This proof has three forms corresponding to three kinds of effects observed in nature: a) the transition of a body from one state of equilibrium to another, as described by the Le Chatelier-Brown principle; b) the disintegration of a system into independent systems, for which the indirect cause is the factor which earlier caused the potential energy; and c) the particularisation of an individual state of the system with general parameters; in this last case the cause is the specific system of bodies which in contact with another system will lose part of its kinetic energy to the other system.

The first form of the proof is as follows: we start with the distinction between acting and not acting energy. The former is the energy which the system retains; the latter is the energy which passes to another system. The dividing line between these two forms of energy is not fixed. How did this division arise? The answer to the question about its origins is that there must have been a Cause which of all the possibilities chose this particular one.

The second form of the proof is as follows: mass is a property constituting a general parameter which may be particularised in various numerical values. If we assume that the rest masses of different types of elementary particles mark the minimum boundary of their energy, then patently the efficient causality in their kinetic energy has a lower limit which is determined in an unexplained way if we assume the hypothesis of the range of energy being infinite. On the hypothesis of a finite mass and energy in the universe, the very fact of the existence of a particular finite total mass is fully arbitrary, and as such requires a cause existing outside the universe.

The third form of the proof is based on the logical derivation of the laws of mechanics from the principle of minimum action. Kinetic energy is a necessary condition of efficient causality, but it is not a sufficient condition. This is so because the function of action is a general parameter, open to various particular values, one of which is the minimum value. Therefore there must exist a Prime Cause beyond the universe to particularise that parameter by selecting its minimum value.

Dorda's treatise has no summing up and no synthesis of his results. Presumably he considered the application of his ideas to the arguments for the existence of God a conclusion to the book.

He appends a rather short bibliography, undoubtedly on the account of fact that most of what the book contains consists of his own ideas and his own original solutions.

One of the subjects connected with the problem of theodicy is the question of God's power to know [in advance] the deeds of humans, and the reconciliation of God's dominion with man's freedom. Jan Dorda turned his attention to this problem quite early on. Already in 1949, accepting the Bishop of Tarnów's request, he submitted a 60-page treatise on the subject to him. Subsequently he delivered several lectures on its basis in Tarnów and Nowy Sącz. On 22nd July 1958, he recorded the following entry in his spiritual diary, „*How to resolve the problem of predestination and rejection* (For the Learned Society).”⁶ In a letter dated 12th August 1958 to Father Paweł Siwek SJ he writes, „Last year I wrote a large article arguing against the book *Chrześcijaństwo i katechizm* (Christianity and the Catechism) by Stanisław Witkiewicz. It was to be published in the bimonthly *Katecheta*, but did not find favour in the eyes of the state censorship authorities. In connection with one of the problems mentioned there, I have now written a separate critique of the principles of Bannesianism and Molinism, offering my own idea of a 'flexible plan' as a replacement for these two theories.”⁷ Dorda supplemented and amended his ideas making use of the discussion that followed his two lectures. On 8th April 1960 he wrote to Father Siwek, „In December, when I was staying in Krynica, I compiled another version – the fifth – of this article. It is 14 pages long, and I intended to publish it in „*Homo Dei*”. It was a pity to spoil my holiday on it, at least for the time being it seems, as the censors are in two minds about it.”⁸

Dorda observes that there is a contradiction in the assumption both Bañez and Molina made, as regards their recognition of the reality of future contingent events (*futuribilia contingentia*). In his opinion it has not been proved that God of necessity knew in advance of his decision to create man what the decisions of man's free will would be, and that

⁶ *Dies irae, calamitatis et miseriae*, Ms. No. 3237, p. 82, Society of Jesus Archives, Kraków, Mały Rynek 8.

⁷ *Korespondencja do O. Pawła Siwka 1943-1980*, (*Correspondence to Father Paweł Siwek, 1943-1980*), *ibid.*, Ms. No. 4362, p. 146.

⁸ *Ibid.* p. 147. The typescript of this version of the text, as well as of the earlier versions, is in Ms. No. 2542 in the same Archives, along with some short, associated texts, *Odpowiedzi na zarzuty cenzora* (Reply to the Censor's Allegations), *Przypis o powodach sprzeczności futuribile* (Footnote on the reasons for the inconsistencies in the *futuribile*) and *Trudności z przeznaczeniem i teoria planu elastycznego* (Difficulties over predestination and the theory of a flexible plan) – p. 163-185 and 367-411.

this would be inherently self-contradictory. Dorda argues in the following way: prior to God's absolute decree to create them, all free creatures are God's ideas, and ideas do not make choices. The notion of an idea the existence of which has not yet been decreed making choices between a set of alternatives is a mistaken notion. The making of a choice is a personal act and may be effected only by a person, and not by the idea of a person; and a person is not a person until he/she starts to exist.⁹

Dorda puts forward the concept of „an evolutionary and flexible plan» which starts with [God's] decree to create free creatures and face them with the necessity of making choices.”¹⁰ Predestination is applicable „only to the means and conditions with which God faces each one of us, and the degrees of assistance and grace he decides to bestow on us according to his judgement. [...] For such a kind of predestination it is sufficient for him to know the potential outcomes, and to have a decree ready for each and any of these possibilities for his further action on seeing the decisions made by the creatures he has equipped with free will. In such circumstances conditional predestination will become unconditional.”¹¹

Although he makes many cogent observations on predestination, in this paper Dorda does not answer the question in what way God „sees” our actions. Since he is unchanging, he cannot passively receive information coming from the world; but if his perception is to be active, not passive, we do not know how to reconcile the existence of man's free will with God's perception of the doings of human free will. Perhaps some sort of passive perception may be ascribed to God?¹²

4. Anthropology

Dorda recorded his views on the nature of man in the paper entitled *Materia i duch* (Matter and Spirit). In it he argues against the propositions put forward in a variety of forms of Materialism. His arguments are as follows: the dependence of the human psyche on matter does not mean they are to be treated as identical. Human consciousness cannot be reduced to the material. Miraculous cures cannot be explained without the acceptance that the spirit exists. There

⁹ *Pomoc w katechezie o predestynacji* (Advice for Catechesis on Predestination), p. 5.

¹⁰ *Ibid.*, p. 6

¹¹ *Ibid.*, p. 10

¹² Cf. S. Ziemiański SJ, *Teologia naturalna. Filozoficzna problematyka Boga* (Natural Theology. The Philosophical Approach to God), Kraków, 1995, p. 321.

have been cases of spirits appearing. Alongside sensory perception there is also rational perception. The general nature of ideas is irreconcilable with the particularity of matter. The physiological processes are like a framework for man's life, but they do not make up the subject pictured in the framework.

Dorda analyses the phenomenon of consciousness. What is experienced through human consciousness cannot be transferred to the others; it is immanent to the subject and non-quantitative; while material phenomena are quantitative, transferable, and objective. Physical energy is measurable; it may be compared with or added to another subject's physical energy; but the same cannot be done with psychological energy. For example, it is impossible to measure a person's experience of a sound; identical sounds cannot be distinguished from one another, and they cannot be added together. It would be nonsensical to try to „add up” feelings – e.g. „missing a dead pet Doberman pincher + sadness on losing a glove = mourning a mother-in-law.”

He dwells somewhat on general concepts, which enable us to create our tools and our language. Thanks to them man is able to make progress and by applying analogy to proceed from observable reality to the unimaginable. Another feature that distinguishes man from the animals is free will. We have a sense of our freedom and of responsibility for our acts; we can tell the difference between being aware of consequences and the sense of guilt; we struggle inwardly to overcome our weaknesses and bad habits.

There is a gaping chasm between man and the animals. The animals act according to instinct, man determines relations and sets aims for himself.

Dorda provides arguments for the substantiality of the human soul. The soul is the foundation for the unity of man's psychological life. He also asserts the soul's immortality. Since it is a simple element, the soul is not subject to disintegration. Since it is internally independent of matter in its actions, it is also independent in its existence, and is not subject to material change. Since the soul turns to what is permanent, unchanging, and eternal, indestructibility is apparently in its nature. Further evidence is supplied by the human desire of perfect happiness, which would not be perfect if it were limited temporally. Therefore the soul must exist for ever if it is to be happy. Finally, turning to the moral order, he shows that without immortality the ability to distinguish between good and evil would be pointless.

We have already presented Dorda's views on the human person and human freedom in connection with the problem of predestination.

5. Cosmology

Apart from the already mentioned scientific articles published in „Przegląd Powszechny” before the Second World War, Dorda also wrote a few papers which have not been published and are extant in type-script form. They include *Budowa świata a Absolut* (The Structure of the World and the Absolute), *Dowody przeciw nieskończoności świata* (Evidence Against the Infinity of the World), *Pogląd Czesława Białobrzieskiego na falową naturę materii* (Czesław Białobrzieski's View on the Wave Nature of Matter), and *Zagadnienie początku i końca świata w świetle nauk fizycznych* (The Question of the Beginning and End of the World in the Light of the Physical Sciences). Perhaps the most interesting is *Krytyka tłumaczenia efektów ruchowych za pomocą specjalnej teorii względności* (A Criticism of the Explanation of Certain Movement Effects on the Grounds of the Special Theory of Relativity), which was published posthumously in the Jesuit annual „Rocznik Wydziału Filozoficznego Towarzystwa Jezusowego w Krakowie”, 1989, p. 69-106.¹³

Dorda's critique concerns two interconnected phenomena which are often described in simplified accounts of the theory of relativity, the Lorentz-Fitzgerald contraction, and time dilatation. He questions the validity of Białobrzieski's claim relating to the contraction of the lengths of the moving rods, and hence the dilatation of the time of the processes which take place in them. The apparent contraction, in Dorda's opinion, is probably some kind of illusion of perspective. The antinomies come from the fact, he says, that we do not abandon our intuitive concept of motion and velocity, while at the same time we keep three-dimensional space and time. When we construct a fourth dimension perpendicular to the three spatial dimensions, velocity becomes a vector coefficient in it, he explains. He shows what happens to the rod on a photographic plate, which replaces the observer. The vector coefficient is an expression of the postulate that the rod and the photographic plate should lie in different planes inclined with respect to each other. But in reality the rod and the plate are not inclined with respect to each other, but parallel, and hence the equivalence of the vector coefficient to the velocity cannot be taken as an equality. Dorda's mathematical calculation yields quite the opposite result: he finds that if the evaluation of relative velocity is to be unambiguous, the time effect cannot be an dilatation, but rather a contraction.

¹³ On the basis of Ms. No. 5428, p. 26-54, in the Archives of the Society of Jesus Province of Southern Poland, Cracow; another version in the same manuscript, p. 116-137.

He recognises Einstein's postulate of a maximum and constant speed of light irrespectively of its source velocity, but admits deviations from the maximum for reflection or the passage of light through non-luminous bodies. He advocates the rejection of the Lorentz transformation, and hence also rejects the relativity of length and time. To account for the negative result obtained in the Michelson-Morley experiment, he suggests another explanation than the Lorentz transformation should be found.

Towards the end of this article Dorda discusses the difference between the three ordinary spatial dimensions and the time dimension. There is no special direction in the spatial axes, whereas time has the specific property of being irreversible, that is, it is not an arbitrary matter where we place the + and the – sign on the time axis. Hence he regards the rotation of four-dimensional space through an angle of 180° as impossible, because only three of the axes may undergo such a rotation, but not the time axis, where it would have no sense. Hence the distinction of the time axis is not just a matter of some subjective category. It seems that Dorda may be wrong here, since only in macroscopic systems the time is irreversible. For individual particles time has no direction. Individual processes at the microscopic level may take place in opposite directions. So time does not „flow” and behaves like the other three dimensions. However, this point is not of crucial relevance to Dorda's work as a whole, and his achievement in criticism of the theory of relativity is undeniable.

6. Conclusion

To sum up, it has to be admitted that as an independent natural scientist and philosopher not associated with any of the groups pursuing philosophy professionally, and sometimes working in opposition to them, Jan Dorda achieved some interesting results, such as a reappraisal of the role of analogy, the certainty of human scientific cognition; a reinterpretation of the theory of potency and act; a new definition of efficient cause; a static approach to local movement; a new definition of actuality, possibility, contingency and necessity; a modernisation of the arguments for the existence of God; and an original interpretation of predestination; a defence of the spiritual aspect in man; and a critical reassessment of some of the more hackneyed or casual interpretations of the theory of relativity.

This philosopher, whose educational background in the field amounted to just the basic level acquired in the Jesuit Faculty of Philosophy, never made an active contribution to the Existentialist Thomism which was flourishing at the time in the Catholic University

of Lublin. He never conducted any of the general, typically ontological analyses associated with the construction of the concept of being. He simply assumed the validity of the concept, and also of the transcendental attributes of being, without querying them. When he had no more teaching duties, he could devote a lot of his time to personal study and reading the latest publications. He pursued an interest in astronomy and was a member of the local astronomical society (Krakowskie Towarzystwo Astronomiczne). His metaphysics and style of philosophy was similar to the Aristotelian philosophical method. Like Aristotle, Dorda was both a natural scientist and a philosopher. A similarity may also be observed in his philosophical method to the Louvain school of Scholastic philosophy, with its appreciation for theoretical issues as well as problems on the boundary of philosophy and the empirical sciences. Dorda's theodicy may be termed a scientific type of natural theology, as S. Kamiński has called it.

Dorda's education in mathematics and physics found its expression in the precision with which he presented his views, his skill in applying differential calculus, his knowledge of the latest advances in atomic physics, and in the acumen of his mind, able to pinpoint the inaccuracies or fallacies in the reasoning applied by the philosophers he was arguing with. His mathematical orientation may be discerned also in his proposition for the quantification of the concepts of potency and act, and in his successful attempt to formalise the theory of causality.

The iniquity of the times deprived this brilliant man of the chance to fully develop his talents and of the acknowledgement they deserved. Owing to the obstacles to publication he had to face, his work is still not well known enough. I hope this presentation will help to bring Jan Dorda out of oblivion and recognise his achievements.

Stanisław ZIEMIŃSKI SJ

JAN DORDA (1891–1971), PRZYRODNIK FILOZOF

Streszczenie

Jan Dorda urodził się 31 sierpnia 1891 r. w Leśniowie koło Brodów w wielodzietnej rodzinie (ośmioro dzieci). Uczęszczał do Gimnazjum św. Jacka w Krakowie. Prócz zwykłych studiów filozofii i teologii studiował ponadto matematykę i fizykę we Lwowie. Potem uczył tych przedmiotów w Gimnazjum Chyrowskim. Przez krótki czas był dyrektorem tego Gimnazjum i kierownikiem pracowni fizykalnej. W roku 1927 rozpoczął współpracę z „Przeglądem Powszechnym” redagowanym przez O. Jana Urbana. Zamieszczał tam artykuły o najnowszych odkryciach naukowych fizyki i astronomii. Inne drobne opracowania niestety w czasie wojny przepadły. Po wojnie uczył kleryków w Starej Wsi. Od 1947 do 50 był superiorem rezydencji św. Barbary w Krakowie. W tym czasie ks. bp Jan Piotr Stepa z Tarnowa zaprosił go do opracowania referatów na temat stosunku nauki do światopoglądu katolickiego. Dorda odpowiedział pozytywnie i napisał dwie rozprawy na temat: *Granice kompetencji poznania naukowego* oraz *Fizyka wobec materializmu i spirytualizmu*, powielone w wydawnictwie „Veritas” w Tarnowie. Pierwsze z tych opracowań znajduje się też w „Przeglądzie Powszechnym” z roku 1949. Drugie istnieje w maszynopisie w Archiwum Prow. Polski Poł. T.J. w Krakowie.

Dorda był obeznany z ówczesnymi odkryciami i rozpatrywał je od strony filozoficznej. Zajmował się wszystkimi działami filozofii oprócz etyki, a więc: teorią poznania, metafizyką z filozofią Boga, antropologią i kosmologią. Jego poglądy mogą przedstawić tylko w wielkim skrócie, zwracając uwagę na to, co u Dordy jest oryginalniejsze.

Teoria poznania

Już w pierwszym wspomnianym artykule: *Kompetencje naukowego poznania* Dorda zajął się następującymi problemami teoriopoznawczymi: 1) zasada nieoznaczoności, realizm krytyczny, 3) odpowiedniość poznania i rzeczy, 4) opis jakościowy i ilościowy. Dorda podkreśla rolę analogii

w nauce. Zachodzi ona między przybliżeniami i ich granicą. Im bliżej granicy ciągu, tym bardziej jednoznaczne pojęcie. Dorda podaje wiele przykładów analogii: teorie geometryczne mają odpowiedniki w matematyce, funkcje w teorii zmiennych mają odpowiedniki w arytmetyce, np. liczba parzysta odpowiada sądowi prawdziwemu, liczba nieparzysta – sądowi fałszywemu. Symbolowi \vee odpowiada mnożenie, symbolowi równoważności (\equiv) odpowiada dodawanie. Z przestrzeni trójwymiarowej można przejść drogą analogii do przestrzeni wielowymiarowych.

To rozumowanie przez analogię zawodzi na poziomie subatomowym. Pojawia się nieoznaczoność. Dorda pyta, czy jest ona tylko charakterystyką naszego sposobu poznawania, czy też „leży w samej naturze atomów”? Twierdzi przy tym, że gdybyśmy mieli do czynienia z jednym elektronem lub fotonem, to obraz falowy światła nie dałby się utrzymać. I tu okazało się, że Dorda nie miał racji, bo dziś jest już oczywiste, że nawet jeden elektron czy foton zachowuje się jak fala. Dorda obstaje przy tym, że nie możemy przyznać indeterminizmu samej natury cząstek elementarnych. Analogię stosuje się też do podziału całości na części. Jak daleko sięgają te podziały? Dorda nie znał jeszcze cząstek mniejszych od elektronu. Dziś już je znamy: są to kwarki. Energię uważa Dorda za przypadłość substancji.

Dorda usiłuje przezwyciężyć mechanistyczny obraz świata w dzisiejszej fizyce, w którym wszystko sprowadza się do ruchu cząstek. Poszukuje więc jakości, które ocalały z tej redukcji. Dostrzega je np. w różnicach między ładunkiem elektrycznym dodatnim i ujemnym, w zamianie fotonu na parę: elektron – pozyton. Za pomocą analogii – twierdzi Dorda – rzutujemy nasze ujęcia podmiotowe na świat. Do nich należą takie pojęcia jak: rzecz, substancja, przymiot, relacja, siła, działanie, przyczyna. Nie jest to jednak kantyzm. Dorda uważa, że najpierw poznajemy świat, a potem dopiero reflektujemy nad naszym poznaniem. Jednak treść naszej świadomości jest granicą ciągu (analogatem pierwszym), reszta jest poznawana przez analogię. Np. przyczynowanie w świecie jest analogatem naszego przyczynowania. Analogicznym pojęciem jest arystotelesowskie pojęcie formy.

Walcząc z mechanicyzmem, Dorda nie chce jednak sprowadzać wszystkiego do form zawartych jedne w drugich jak w pudełkach. Dziś odpowiednikiem formy jest parametr. Można je przyporządkować za pomocą funkcji. Wszędzie odgrywa rolę analogia. Przykłady analogicznego użycia słów: opieramy się o balustradę i o zasady, rozwijamy paczkę i kulturę; mamy niższe i wyższe piętra, ale też niższe i wyższe tony, są jasne dni i jasne pojęcia.

Po powrocie ze Starej Wsi do Krakowa Dorda zintensyfikował swoją pracę naukowo-filozoficzną. Znana jest jego polemika z kilkoma filozofami neopozytywistycznymi i do nich zbliżonymi, jak: W. Marci-

szewski, A. Grzegorzczak, J. Narbutt; dyskutował też z ks. K. Kłósakiem. Polemikę rozpoczął od artykułu w „Znaku” nr 73/74 (1960) pt.: *Pewność czy ryzyko?* Marciszewski kwestionował pewność nauki w dziedzinie matematyki, w naukach przyrodniczych i w filozofii. J. Narbutt rozważa trudności katolika w uwierzenie w Chrystusa. Dorda broni pewności w nauce, przynajmniej w jej zasadniczej części (dziś nazwalibyśmy ją „hard core”), nie kwestionując niepewności na peryferiach (Dziś propozycja Lakatos’a). Daje porównanie: Jeśli kot ma parszywy ogon, czy to znaczy, że nie ma kota w ogóle? Hipotezy mogą być niepewne, ale fakty są pewne. Opowiada się za zdrowym rozsądkiem. Zdrowy rozsądek każe nam odrzucić system Kanta, jako fantazjowanie i jako metafizykę, która „całe upierzenie przedmiotu oskubała i zmagazynowała w podmiocie”.

Metafizyka

W latach 60-tych Dorda publikował jeszcze wiele innych artykułów, z których pewne części weszły w pokażnej objętości (364 str. średnią interlinią) pracę pt. *Studium o przyczynowości sprawczej z zastosowaniem w kosmologii i w teologii naturalnej*. Maszynopis tego dzieła znajduje się w Archiwum Prowincji Tow. Jez. w Krakowie, mały Rynek 8, pod sygnaturą nr 2536.

Studium to było gotowe do wydania w 1970 r. i przekazane do zaopiniowania do Lublina. Opinię wydał ks. Stanisław Mazierski. Była ona zasadniczo pozytywna z tym, że Mazierski radził rozprawę jeszcze przepracować uwzględniając książkę B. Gaweckiego, *Zagadnienie przyczynowości w fizyce*. Autor widocznie nie miał już sił, aby tego dokonać. Książka więc pozostała w maszynopisie. O. Jana nękały choroby. Zmarł w Kolegium Krakowskim przy ul. Kopernika 26 po krótkim pobycie w szpitalu mieszczącym się w tym samym klasztorным budynku dnia 14 listopada 1971 r.

Rozprawa składa się z *Wprowadzenia* i czterech części: I. *Poglądy na przyczynowość u niektórych autorów XX wieku*, II. *Założenia metodyczne i epistemologiczne dla studium o przyczynowości*, III. *Zarys teorii przyczynowości sprawczej*, IV. *Zastosowania w dziedzinie kosmologii i teodycei*.

Dorda zadaje sobie w tej rozprawie następujące pytania:

1. Czy przyczynowość dotyczy tylko działania ludzkiego, czy rozciąga się także na sferę reszty bytów, nie wyłączając świata nieorganicznego?
2. Różnica między rodzajowym a gatunkowym określeniem wpływu różnych przyczyn na powstanie, na istnienie i na jakość skutku.
3. Czemu lub komu jako podmiotowi należy przypisywać orzeczenie „przyczyna”: czy rzeczom (inaczej: substancjom), czy zdarzeniom (inaczej: procesom). Konsekwentnie powtórzyć można to samo pytanie, czy

„skutek” można orzekać o rzeczach, czy o zdarzeniach, czy o jednych i drugich.

4. Definicja wpływu przyczynowego. Czy należy on do stosunków niezwrrotnych i przechodnich.

Czy wiąże się ze zmianami, czyli ze stawaniem się lub powstawaniem bytów albo nowych w nich modyfikacji.

5. Związek wpływu przyczynowego z zasadą racji dostatecznej: czy te pojęcia się pokrywają, czy nie?

6. Inny problem definicyjny dotyczy rozpoznania skutku z jego struktury.

Zagadnienia epistemologiczne dotyczące przyczynowości obejmują szereg pytań co do istnienia i istoty przyczynowości, (a tym samym działania). Trzeba przedyskutować asocjacyjną teorię Hume’a i subiektywistyczną kategorię przyczynowości u Kanta, ustosunkować się do stanowiska kondycjonalistów i funkcyjalistów, którzy zamiast przyczyny uznawanej przez kauzalistów przyjmują warunek i funkcję. Do zagadnień epistemologicznych przyczynowości należy dziwny pomysł „stawania się bezprzyczynowego”. Dalej: czy i w jakim rozumieniu zasada przyczynowości jest zdaniem analitycznym i powszechnie obowiązującym prawem bytu w ogóle, czy też jest tylko postulatem metodologicznym, nieodzownym do uprawiania naukowych badań przyrody i wciąż się potwierdzającym w każdym doświadczeniu?

W części I. omawia Dorda poglądy na przyczynowość dziesięciu autorów dwudziestowiecznych (J. Geyser, Th. de Régnon, M. Jaworski, M.A. Krapiec, Fr. Sawicki, J. Metallmann, J. Łukasiewicz, Wł. M. Kozłowski, St. Kobyłecki, H. Greniewski).

W cz. II. Dorda opowiada się za tzw. realizmem interpretacyjnym, według którego jakości zmysłowe są pojęte jako właściwość materialna receptora zmysłowego. Stanowią bezpośredni przedmiot poznania zmysłowego i nie różnią się co do treści z jakością w materii nieożywionej, a różnią się modalnością świadomości. Ruch przestrzenny jednostajny uważa za identyczny z niezmienną energią kinetyczną, czyli jakością modyfikującą jako stan substancję ciała materialnego.

Reinterpretuje arystotelesowskie pojęcia formy i materii. Odpowiednikiem arystotelesowskiej formy są prawa fizyczne. Potencja jest równoległa ze zbiorem, akt zaś – z elementem zbioru. Arystotelesowskie pojęcia możliwości i aktu reinterpretuje więc w ten sposób, że możliwość określa jako przyporządkowanie podmiotu zbiorowi elementów, a aktualność jako przyporządkowanie podmiotu jednemu elementowi zbioru. Za pomocą tych ujęć Dorda określa takie pojęcia modalne, jak: możliwość, aktualność, przygodność i konieczność. W tym kontekście

definiuje działanie przyczyny sprawczej jako „uszczególnienie parametrów ogólnych i stałych dowolnych, co zwyczajnie wyrażamy terminem: nadać wartości «początkowe», gdy chodzi o proces fizyczny”.

W polemice z ks. K. Kłósakiem dowodzi, że nie można traktować sił jako przyczyny, ponieważ są one bierne i ulegają zmianom dopiero po wprowadzeniu ruchu w układ ciał. Wykorzystuje tu wyniki artykułu pt.: *Błędy w krytyce dowodu kinetycznego w teodicei*, zamieszczonego w „Homo Dei” (1960).

W części III: *Zarys teorii przyczynowości sprawczej* Autor przechodzi do sedna sprawy. Stosując analogię pokazuje, że stosunek przyczynowy to nie tylko styk czasowo-przestrzenny dwóch zdarzeń, ale że przyczynowanie jest prawdziwym wpływem jednej substancji na drugą. W rozdziale 5 pt.: *Aksjomaty przyczynowości sprawczej* ujmując w nowej szacie cztery aksjomaty scholastyczne: *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*, które przybierają postać następującą:

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

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

3 – Jeśli podmiot jest przyporządkowany zbiorowi niejednostkowemu, to nie jest jeszcze przez to przyporządkowany jakimukolwiek elementowi tego zbioru.

4 – Jeśli podmiot nie jest przyporządkowany elementowi, to nie znaczy, że nie może być przypisany zbiorowi.

W rozdz. 6 formalizuje poszczególnie, wcześniej wymienione aksjomaty. Następnie korzystając z funktora implikacji podaje taką definicję przyczyny: „Przez przyczynę P rozumiemy coś, co przyporządkowuje podmiotowi S jeden element ze zbioru niejednostkowego, a tym samym powoduje brak przyporządkowania reszty elementów.”

W części IV, w rozdz. 1: *Definicja ruchu jako zmiany położenia* Dorda przeprowadza dyskusję nad arystotelesowskim pojęciem ruchu i proponuje w związku z tym takie definicje: Spoczynek to przyporządkowanie ciała punktowi. Ruch to przyporządkowanie ciała linii. Pole zaś to przyporządkowanie ciała powierzchni je otaczającej. Ostatecznie Dorda podaje taką definicję: Ruch jest to przyporządkowanie ciała linii w przestrzeni zewnętrznej, porządkujące jej punkty w sposób nieodwracalny.

Po sprecyzowaniu tych wszystkich pojęć Jan Dorda stara się pokazać, że ruch, nawet jednostajny, musi być uprzyczynowany. Na tym buduje swój dowód z ruchu na istnienie Boga. Wychodzi w nim z faktu determinacji ruchu. Wyrażenie: „Ruch jest zdeterminowany” znaczy, że liczbowo są określone: 1) masy układu, 2) ich wzajemne przyśpieszenie, 3) położenie początkowe mas, 4) prędkości początkowe. Mimo ustalonych

mas i przyspieszeń ruch nie jest jeszcze wystarczająco zdeterminowany, póki nie nadamy wartości szczegółowych położeniom i prędkościom początkowym, wyróżnionych spośród nieskończenie wielu możliwości. Tej determinacji i wyboru dokonuje przyczyna sprawcza. Pierwszą przyczyną sprawczą jest Bóg.

Dalej podaje Dorda argument z cudów, z powstania życia, powstania świadomości zmysłowej, powstania myśli ludzkiej. Polemizuje z teorią ewolucji, twierdząc, że zbyt małe istnieje prawdopodobieństwo, by życie i myśl powstały przypadkiem. Gdy idzie o świadomość, Dorda wykazuje na podstawie twierdzenia limitacyjnego Gödla, że nie da się sformalizować poznania ludzkiego do końca, bo zawsze będą istnieć zdania intuicyjnie prawdziwe, które nie wynikają z danego układu aksjomatów. Człowiek więc nie jest myślącą materialną maszyną (Por. artykuł: *O wniosku z twierdzenia Gödla*, „Znak” nr 79). Dorda dodaje jeszcze argument eudajmonologiczny i etyczny (z pragnienia szczęścia i z poczucia obowiązku). Wreszcie omawia argument teleologiczny z instynktu zwierząt. Przemysłne urządzenia w świecie zwierząt świadczą o inteligencji ich Twórcy. Ostatnim argumentem jest argument entropologiczny, czyli ze wzrostu entropii. Dorda broni jego prawomocności przeciw krytykom.

Antropologia

Swoje poglądy na naturę człowieka zawarł Dorda we wspomnianej na początku rozprawce pt.: *Materia i duch*. Polemizuje w niej z tezami różnych odmian materializmu. Daje takie argumenty: Czym innym jest zależność psychiki od materii, a czym innym ich utożsamianie. Do materii nie da się sprowadzić świadomości. Cudowne uzdrowienia nie dadzą się wyjaśnić bez przyjęcia istnienia ducha. Zdarzają się przypadki pojawiania się duchów. Prócz poznania zmysłowego istnieje poznanie rozumowe. Ogólność pojęć nie godzi się z konkretnością materii. Procesy fizjologiczne są jak rama dla obrazu, ale nie stanowią same treści obrazu.

Dorda analizuje zjawisko świadomości. Przeżycia świadomościowe są same w sobie nieprzekazywalne i immanentne dla podmiotu i nierozciągliwe, zjawiska materialne są rozciągłe, przekazywalne i przedmiotowe. Energia fizyczna daje się mierzyć, porównywać, dodawać, energii psychicznej tak traktować nie można.

Dłużej zatrzymuje się nad pojęciami ogólnymi. One umożliwiają nam tworzenie narzędzi i języka. Dzięki nim człowiek jest zdolny do postępu i do przechodzenia drogą analogii od rzeczywistości dostrzegalnych do niewyobrażalnych. Także wolna wola wyróżnia człowieka od świata zwierząt. Mamy poczucie wolności i odpowiedzialności za czyny, odróż-

niamy świadomość następstw od pocucia winy, toczymy walki wewnętrzne ze skłonnościami. Istnieje przepaść między zwierzętami a człowiekiem. Zwierzęta kierują się uczuciem, człowiek ujmuje stosunki, stawia sobie cele.

Dorda podaje argumenty na substancjalność duszy ludzkiej. Stanowi ona podstawę jedności życia psychicznego człowieka. Dowodzi także nieśmiertelności duszy. Jako element prosty, nie może ona ulec degradacji. Jako wewnętrznie niezawisła od materii w swoim działaniu jest też niezawisła w istnieniu, nie podlega więc przemianom materialnym. Ponieważ dusza zwraca się do tego, co trwałe, niezmiennie, wieczne, widocznie do jej natury należy niezniszczalność. Dalszy dowód wychodzi z pragnienia szczęścia doskonałego, które nie byłoby takim, gdyby było czasowo ograniczone. Dusza więc musi też trwać wiecznie, aby być szczęśliwą. Wreszcie wychodząc z porządku moralnego, wskazuje na to, że bez nieśmiertelności odróżnienie dobra i zła okazałoby się bezsensowne.

Interesujący jest pogląd Dordy na wolność człowieka w konfrontacji z problemem predestynacji. Dorda opracował ten problem dla potrzeb katechizacji. Z powodu zarzutów cenzora artykuł pt.: *Pomoc w katechezie o predestynacji* nie został opublikowany. Istnieje tylko maszynopis w Archiwum Prow. Polski Połudn. T.J. Ponadto znajdują się tam z tym związane krótkie teksty: *Odpowiedzi na zarzuty cenzora*, *Przypis o powodach sprzeczności futuribile*, *Trudności z przeznaczeniem i teoria planu elastycznego*. Dorda nie idzie za rozwiązaniem L. Moliny, uważając, że tzw. futuribilia nie mają realności, bo człowiek możliwy nie może wybierać. Sam proponuje tzw. plan elastyczny. Mianowicie Bóg w zależności od działania człowieka, naprawia to, co człowiek ewentualnie zepsuje.

Kosmologia

Poza wspomnianymi artykułami zamieszczanymi przed wojną w „Przeglądzie Powszechnym”, Dorda napisał kilka prac, które pozostały w maszynopisach, jak: *Budowa świata a Absolut*; *Dowody przeciw nieśkończoności świata*; *Pogląd Czesława Białobrzeskiego na falową naturę materii*; *Zagadnienie początku i końca świata w świetle nauk fizycznych*. Najciekawszym jednak wydaje się artykuł opublikowany pośmiertnie pt.: *Krytyka tłumaczenia efektów ruchowych za pomocą specjalnej teorii względności*, w „Roczniku Wydziału Filozoficznego Towarzystwa Jezusowego w Krakowie” 1989, Kraków 1989, str. 69-106.

Krytyka Dordy dotyczy dwóch sprzężonych ze sobą zjawisk opisywanych przez wiele popularnych ujęć teorii względności, a mianowicie skrócenia Lorentza-Fitzgeralda oraz dylatacji czasu. Dorda kwestionuje

twierdzenie Cz. Białobrzeskiego, jakoby skrócenie się długości poruszających się prętów, a konsekwentnie wydłużanie się czasu procesów w nich zachodzących było rzeczywiste. Pozór skrócenia, zdaniem Dordy, stanowi najprawdopodobniej rodzaj złudzenia perspektywicznego. „Antynomie pochodzą stąd, że nie rezygnujemy z intuicyjnego pojęcia ruchu i prędkości, zatrzymując przestrzeń trójwymiarową i czas. Gdy [...] zbudujemy rozciągłość czterowymiarową, dołączając do trzech wymiarów przestrzennych czwarty, prostopadły, prędkość otrzymuje w niej znaczenie współczynnika kierunkowego.” Dorda pokazuje poglądowo, co się dzieje z poruszającym się prętem, umieszczając go na kliszy fotograficznej, która zastępuje obserwatora. Współczynnik kierunkowy, o którym wyżej była mowa, wyraża postulat, by pręt i klisza leżały na dwóch różnych nachylonych do siebie płaszczyznach. Ale przecież w rzeczywistości klisza i pręt nie są nachylone wobec siebie, lecz równoległe, więc równoważność współczynnika kierunkowego z prędkością nie może być brana za równoznaczność. Z wyliczeń matematycznych Dorda otrzymuje wynik odwrotny: „Jeśli wyznaczenie prędkości względnej ma być jednoznaczne, efekt czasowy nie może polegać na przedłużeniu, lecz na skróceniu czasu.”

Dorda uznaje einsteinowski postulat maksymalnej i stałej prędkości światła niezależnie od ruchu jego źródła, ale dopuszcza odchylenie od tej prędkości w wypadku odbicia lub przejścia światła przez ciała nieświejące. Dorda opowiada się za odrzuceniem transformacji Lorentza, a konsekwentnie za odrzuceniem względności długości i czasu. Dla negatywnego wyniku doświadczenia Michelsona-Morleya proponuje więc szukać innego wyjaśnienia niż transformacja Lorentza.

Pod koniec artykułu Dorda omawia różnicę między zwykłymi trzema wymiarami czteroprzestrzeni, a czasem. Mianowicie tamte wymiary nie posiadają wyróżnionego kierunku, a istotną cechą czasu jest jego nieodwracalność, tzn. na osi czasowej nie jest rzeczą obojętną, gdzie położymy +, a gdzie –. W tym „fakcie” widzi niemożliwość obracania przestrzeni czterowymiarowej o 180^0 , bo tak obracać można tylko trzy osie, a dla osi czasowej obrót traci sens. A więc odróżnienie wymiaru czasowego od zwykłych trzech wymiarów nie jest sprawą jakiejś kategorii subiektywnej.

Chcąc scharakteryzować ogólnie naukową sylwetkę Jana Dordy, trzeba stwierdzić, że ten matematyk i fizyk, filozofujący niezależnie od doktryny panujących szkół filozoficznych, a czasem wbrew nim, doszedł do interesujących wyników, takich jak: dowartościowanie roli analogii, pewności ludzkiego naukowego poznania, uwspółcześnienie teorii możliwości i aktu, nowa definicja przyczyny sprawczej, ustatycznienie ruchu lokalnego, nowe zdefiniowanie aktualności, możliwości, przygod-

ności i konieczności, podważenie utartych interpretacji teorii względności. *Iniquitas temporum* sprawiła, że ten bardzo zdolny człowiek, nie mógł w pełni rozwinąć talentów, jakie posiadał, a jego dokonania są wciąż mało znane.