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EINSTEIN AND DOSTOEVSKI

Why did Einstein say of Dostoevski: "He gives me more than any other thinker, more even than Gauss?" What could Dostoevski give to the originator of the theory of relativity?

It is certain that it is not a question of the philosophical, moral or social ideas with which he filled the thoughts and utterances of his heroes. Einstein drew from artistic literature the driving force for his research and not the elements of a scientific concept of the world. The influence of artistic creation on scientific creation was the result not of any positive answers but of the common aesthetic ground in the problems and contradictions of the earlier representation of the world and in the intensity of the artistic conception of the infinite contradictions and complexities of the origin of the world.

Such a conception transforms the contradictions of ancient science into a driving force for the new science. The power of this impulsion and its historical value are explained by the fact that it originates from an artistic and not a logical conception and that its effects are not logical but psychological.

The psychological aspect of Einstein's scientific interests is

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revealed with the greatest clarity in his autobiographical essay of 1949. In it he speaks of his inner world during his childhood and adolescence and of his growing aspiration to discover the natural and supernatural harmony of the world.

The knowledge of natural harmony leads of necessity to constant physical relationships independent of the paths followed in acquiring that knowledge, and in particular of the systems of calculation—in fact to invariable expressions (which do not change on passing from one system to another) that define the constant rules by which the world is governed.

The greater the extent to which the explanation of phenomena results from a set of general, widely applicable principles, the closer it approaches the objective harmony which makes of the universe a coherent entity. This is why a physical concept must possess "internal perfection" as well as "external justification," i.e. theory and observed characteristics must correspond. This criterion plays an important role in Einstein's work and in the origin of the physical concepts which he set out. The "internal perfection" lies in the absence of any tolerances specially created in order to explain a given fact, in the trueness to nature of the theory, in the harmony of its logic and in the coherent group of first principles which follow from the analysis of the creation of the world as a "single harmonious whole."

At the end of the last century, the experiments of Michelson showed that the speed of light does not depend on the common movement of the light source and the screen, in other words on the movement of the system within which the light is produced. Light travelling toward a moving system should, it seems, traverse this system more rapidly than light produced in a system that is stationary relative to the surrounding ether. Any variation in the speed of light should prove the movement of the system relative to the surrounding ether, which could thus pretend to the role of a universal body and replace in this sense the absolute space of Newton. But no variation in the speed of light has been recorded. On passing from a system stationary in relation to the surrounding ether, to one moving at a constant speed in relation to the latter, in spite of the transformation of the system of calculation the speed of light remains the same invariable in relation to the transformation.

Lorentz attempted to save the existence of surrounding ether and the physical composition of movement in relation to the ether by putting forward a theory of the dimensional variation of bodies moving in the ether. The speed of light varies but the variation in its speed within the moving body is compensated by a change in the dimensions of the body itself and hence in the length of the path followed by light in traversing it. This length varies in such a way that the variation in the speed of light becomes impossible to determine. This hypothesis of Lorentz possessed "external justification," i.e. it did not contradict the observed effects and corresponded to experimental results: the impossibility of recording variation in the speed of light in a moving system; the impossibility of recording the latter's movement.

But it was a question only of a reciprocal compensation between two effects of movement in the ether: the extension of the path followed and the variation in the speed of light which makes up the difference as the system moves through the ether. Such a concept did not possess "internal perfection" but had to be specially propounded in order to explain the results of Michelson's experiment; it was thus based upon an artificial hypothesis and not upon general principles.

Einstein offered quite a different explanation for the invariability of the speed of light. The movement in relation to the ether does not elude observation—it simply does not exist. It is for this reason that the ether, of which the sole function was that of a universal body, was eliminated from the description of the universe. Einstein deduced the constancy of the speed of light from general considerations concerning space and time, absolutely natural and based upon the general body of physical knowledge. He established the relativity between simultaneity and absolute time. If the instant transmission of reciprocal effects put forward by Newton does not exist, the purely spatial process which takes place instantaneously at a given point of time is no more than a fiction, and the notion of space in this case loses all its physical equivalence. If we cannot speak of absolute movement in the ether, light signals do not permit the synchronization of events which take place in different systems. In a given system light signals arising from the same source will reach equidistant

screens at the same time; but in the case of another system which is moving relative to the given system, the light must follow a longer path to reach one screen than to reach the other and as a result the arrival of the signals at the two screens will no longer constitute a simultaneous occurrence. The representation of a single instant occurring everywhere, covering the whole world, the representation of a single time extending instantaneously to the whole of universal space becomes devoid of sense.

Time is linked to space, it is impossible to separate them; the world is an assembly of events defined by three coordinates in space and one in time. Minkovsky designated as "world points" the four figures that determine the situation of an event in space and time. From these "world points" are formed the "world lines" in four dimensions which compose the four dimensional multiform that is the real world of space and time.

Einstein arrived at the theory of relativity because the criterion of "internal perfection," which he used in his research into the true reality of physical theory, was a *physical* criterion. The general postulates on which physical theory is based should in principle permit verification by experiment and the relation to observed facts. The validity in physical terms of initial concepts exists only if such a relation is possible. When the experiment leads to results that do not conform to the existing theory, the physical approach (i.e. based upon the most general premises and deducing from there the consequences and correlations by comparison with the observed phenomena) *systematically* re-examines the notions contained in the former theory, rejects those that lack the required physical logic and accepts the contradictory theory within which the new experimental result loses its paradoxical aspect and becomes natural and normal. In one of his letters to his old friend Maurice Solovine, Einstein sets out the fundamental idea of the theory of relativity as follows: "In spite of the diversity in the experimental sources of the theory of relativity, its method and its content can be defined in a few words. Even in ancient times it was known that movement can only be perceived as 'relative'. Contrary to this fact physics took as a basis the notion of absolute motion. In optics the concept of motion is based upon the idea that its characteristics are different from those elsewhere. Motion of light in the ether

was considered as such, and any motion of material bodies was related to it. Thus the ether represented the notion of absolute immobility related to a void. If this motionless ether of light which fills the whole space really existed, motion could be attributed to it and the former would then take on an absolute sense. Such a concept could be the basis for mechanics. But experiments aimed at discovering this special motion in the hypothetical ether proved a total failure. There was therefore a return to the problem of motion in the ether..." The theory of relativity is based upon the supposition of the non-existence of a special status of motion in nature and it analyses the conclusions to be reached from such a supposition. The method is analogous to that of thermodynamics, for the latter is nothing else than the systematic answer to the question: "what must be the laws of nature if perpetual motion is impossible?" Among the conclusions resulting from the absence of privileged systems of calculation or privileged absolute movements is that concerning the speed of light as the maximum speed of physical processes. An event that takes place at a certain point before light can reach the latter from a second point where another event has taken place cannot be considered a consequence of this second event. In particular the movement of a body cannot take place at a speed exceeding that of light. From this comes the law stating that the addition of speeds cannot lead to a total speed exceeding that of light. When the speed of a body approaches that of light, further impulses received by the body have a reduced effect and the result is as if the mass of the body increased as the speed increased, tending toward infinity when the speed of the body tends toward that of light. The generalization (propounded by Einstein) that the mass of a body depends on its speed represents the idea which he put forward, that the mass of a stationary body is proportional to its interior energy. Both this idea and the theory of relativity are fully confirmed in nuclear physics which depends upon the liberation of the internal energy of nuclei proportional to the variation in their mass. At the same time the proportional relationship between mass and energy makes it possible to envisage the transformation of bodies having mass into bodies without such a mass but travelling with corresponding energy. Such are the fundamental ideas of the

special theory of relativity resulting from the uniformity of physical processes in systems travelling without acceleration relative one to another, i.e. in a regular constant manner.

In the period 1912 to 1916, Einstein went on to produce the *general* theory of relativity by generalizing the principle of relativity in the case of accelerating movements. These latter, it seems, have an absolute character: when a system travels with acceleration, forces of inertia arise; for example, in a rotating container liquid is pushed toward the edges (this is the classic example given by Newton in *Mathematical Principles of Natural Philosophy*, tending to show the absolute character of rotational or simply accelerating movements). If the world rotated around the container, the liquid would not be forced up the walls; similarly in a train a man would not sense any shock if it were not the train that accelerated, but if the earth began to accelerate in relation to the train (which was either stationary or travelling at the same speed as the earth). Einstein overcame this difficulty by indicating the equivalence between the forces of inertia in an accelerating system and the forces of gravity. We can attribute the same effects to the action of the forces of gravity in a system having a regular motion, or to the action of the forces of inertia in a system having an accelerated motion but not undergoing the action of forces of attraction. Thus the absolute criterion disappears which differentiates accelerated motion from a stationary state and which makes it possible to record absolute movement according to the behaviour of the internal processes of a system having accelerated motion. In order to apply this conclusion to wider fields, Einstein introduced the motion of "curved space-time." It is easy to imagine a curved line or surface; on the other hand it is difficult to imagine the curve of a three-dimensional figure and still more so that of four-dimensional "space-time." But it is a question of a relatively simple fact: in curved space the geometrical proportions are modified, the sum of the angles of a triangle situated on the surface of the sphere is no longer equal to two right angles; in general the geometry of Euclid yields its place to a non-Euclidean geometry. Gravity makes "space-time" curved and renders it non-Euclidean, with the result that geometrical proportions are no longer Euclidean proportions but become non-Euclidean (the more so as the field of gravity

becomes stronger); gravity forces parallel lines to meet, the sum of the angles of a triangle to be other than two right angles and the square on the hypotenuse to correspond no longer to the sum of the squares on the other two sides. It is necessary to underline the difference in principle between the paradoxes of the general theory of relativity and those of non-Euclidean geometry as such. The latter are surprising by the fact that they do not contradict each other. It is difficult to imagine that statements so far removed from traditional statements and apparently from everyday experience do not contradict themselves. But it is infinitely more difficult to imagine that these statements not only correspond logically with each other but also with reality. The *physical truth of the geometrical paradox* represents something new which had never existed before, and it is this that is the essential characteristic of Einstein's ideas.

What has been said above is sufficient to trace a number of parallels between the nature of the "physical" mentality of Einstein and the characteristics of the artistic creativity of Dostoevski.

Each novel or story, each extract from the works of Dostoevski represents a polyphonic system, a multitude of voices which are hardly concealed by that of the author.[1] Perhaps, this polyphony, this multitude of voices expressing a multitude of ideas and of conceptions of the world should be likened to the whole range of systems of calculation? No, this would be not merely a superficial likeness but completely erroneous. It would lead us toward the concept of "borrowed ideas," a sterile concept in the analysis of the relationship between artistic and scientific ideas and above all improbable when it is a question of Dostoevski and Einstein. We shall come nearer to the truly probable links if we direct our attention to the "physical idea" that characterizes Einstein.

The systems of calculation are equal in validity since there exist physical regularities and corresponding physical proportions which maintain their equality when transferred to another system, for just as is the case with mechanical laws (as Galileo and Newton knew), the laws of electrodynamics function in uniform

[1] See "Problems of the Poetry of Dostoevski," by Bakhtin in *The Soviet Writers* series, Moscow 1963.

fashion when transferred from one system to another which is moving on a regular straight path in relation to the former. These are invariable relations in terms of the transformation of systems of calculation.

In the work of Dostoevski we also encounter invariables. These are by no means the ideas of his heroes and if, as an element of comparison with a scientific work we take as a starting point the invariables of Dostoevski, the thought must be immediately rejected that there exists an affinity between the ideas of Dostoevski and, on the one hand those of his heroes and on the other those of Einstein. Dostoevski passes from the ideas of Ivan Karamazov to those of Alyosha, from the ideas of Raskolnikov to those of Svidrigaïlov, from the ideas of Stavrogin to those of Stefane Verhovensky. The invariable factor in these transitions is represented by certain psychological characteristics of Dostoevski's heroes: it is not the ideas or their attitude toward those ideas; it is not the ideology but the psychology. The invariables make it possible to discover the inner world of these heores, which is the part that belongs to the author and not to themselves.

All the heroes of Dostoevski are typified by their total absorption in an idea, whatever it may be. Take the case of the discussion between the old man Zosima and Ivan Karamazov. Zosima sees that his interlocutor denies Christianity, the immortality of the soul, and God, and yet he does not deny them definitively; he doubts, he suffers. And speaking of him, the old man says: "...the noblest of hearts capable of suffering in such a fashion."[2] Alyosha also says, "He has a great but unresolved idea. It is not millions which he wants, he needs to resolve the problem of his thoughts."[3]

Regardless of their religious, moral or philosophical problems, regardless of their initial positions, of their level of knowledge, of their environment, their traditions, their moral principles, the heroes of Dostoevski are obsessed by the passion to know and to reach a decision; before it, all else fades into insignificance;

[2] Dostoevski, Collected works in ten volumes. "GOSSLITIZDAT," (GOSSudarstvennoïe LITeraturnoïe IZDATelstvo = State Publishing House for Literature), Moscow, 1956-1958, vol. IX, p. 92.

[3] *Ibid.*, p. 105.

this passion forces them to commit the basest acts or to perform great exploits and transformas the novels of Dostoevski into novels of adventure; (and when it is a question of crimes committed in the name of this same thirst to know, it is this passion that transforms his novels into detective novels). The works of Dostoevski are full of action that is basically only an experiment, and in the majority of cases a terrible and cruel experiment. Take the case of Raskolnikov relating his crime to Sonia: "I had to know something else, something drove me on; I had to know at that moment or as soon as possible whether I am only a little like the others or really a man. Shall I be able to take this step or not? Shall I have the courage to stop and pick it up or not? Am I a trembling creation or have I truly the right..."[4]

Raskolnikov hardly profited from the riches of the old woman he murdered. He received a negative reply to his problem, "Shall I be able to take this step?" And it was the end. The same is true of the other heroes of Dostoevski. They do not kill, they suffer with incredible and inhuman obstinacy, they display miraculous powers of self-denial; but always this incredible feeling, inhuman or superhuman, is to be found on the brink of destruction, of madness, of crime, sometimes beyond the brink and always with the aim of knowing, verifying, deciding. It is thus that the character common to all these heroes, who risk everything in order to know, rejoins and expresses the peculiar traits of their author's genius. It is the author who places his heroes in the situation of a cruel experiment, constricts their life at a critical moment and frees them from all that is personal, normal, everyday. He thus frees them from chance influences as regards the problem of knowledge and so, in experimental conditions of a perfect vacuum, of effort, of speed, of tension, in the instants that separate them from suicide, from murder or from madness, in fantastic situations, in a dream, in delirium—these people, who have become the bearers of moral and cosmic problems of an entirely general nature, discover themselves and at the same time discover the import of the solutions sought.

Dostoevski wrote on the subject of Edgar Allan Poe, "He almost always chooses a most exceptional reality, places his hero

[4] Dostoevski, Collected works in ten volumes. "GOSSLITIZDAT," Moscow, 1956-1958, vol. V, p. 438.

in the most external or psychological situation and then with what force of perspicacity and with what astonishing exactitude he describes the state of his hero!" What Dostoevski appreciated in the work of Poe, he himself possessed to a very great degree. The most extraordinary situations in the works of Poe appear normal by comparison with moments such as that when, in the most real of hovels somewhere near the "Obvodny" canal, or again in a provincial inn to the sound of billiard balls and popping beer-corks, the mind of a man on the verge of madness is painfully grappling with problems involving the whole creation of the world, all the history of the cosmos, its whole significance, all its harmony and disharmony, when it seems that the most fundamental problems will soon be solved in this atmosphere; it is at such instants that there begins to show through the most real of atmospheres through which one glimpses cosmic collisions. It is precisely in these collisions, in the search for truth, that are to be found the justification and the sense of the impetuous twists in the subject, in the inhuman sufferings, in the different, unexpected agitations of the hero's sick soul. It is precisely this problem of experiment and research that gives a melodious character to the novels of Dostoevski. Each time that the turning point is decided, the act accomplished, the response abandoned, whether the turn of events, the acts, the responses are unexpected, violent or paradoxical in nature, each time we feel a sense of their inescapable necessity in order to resolve the moral, philosophical and psychological problems. This melodious nature, despite the authenticity of the most brutal discords, or of the most extraordinary situations, is characteristic of any of Dostoevski's novels. *He is the artist of the genuine paradox.*

Let us underline one of the characteristic features of Dostoevski's "violent experimentalism." His heroes do not aspire to a steady accumulation of experimental proofs of their ideas. Dostoevski's experiment is decisive; it is, as they say, *"experimentum crucis"* (the crucial experiment). When Raskolnikov kills the old woman, when Ivan Karamazov leaves for Tchermashnya, placing his father's life in the hands of Smerdyakov, in each case we are in the presence of a unique experiment of a decisive character and not just of any experiment. That is why Dostoevski found a classical novel strange, with its development

of the personality and the evolution of the hero's inner world. Everything is concentrated in the decisive scene and it seems that it is in this scene that there will resound the answer to the eternal moral and philosophical question.

The characteristics of an artistic work quoted above are far removed from science. This is so as regards the basis of the problems, of the questions and the answers and, of course, the content of the experiment. But they are close to scientific work by the relationship between the thinker and the experiment, by the audacity with which the author undertakes the most extreme, the most cruel and the most paradoxical experiments, by that passion to know, by that search for the *experimentum crucis*, by the rejection from the consciousness of everything that is accidental, day-to-day, of everything that is not linked to the solution of the cosmic problem. This aspect of the problem is common to all the heroes of Dostoevski in spite of the diversity in the basis of their ideas. In it we can see the family characteristic of these heroes and not a characteristic special to each of them—it is the characteristic of the author. If polyphony is characteristic of the ideas expressed in Dostoevski's novels, if the voice of the author does not dominate those of his heroes from an ideological point of view, the work of Dostoevski is nevertheless not a dialogue but a monologue, partly because of the attitude toward experiment and knowledge and partly because of the swallowing up of conscience and individuality. It is not without reason that the heroes all speak the same language and all belong (whether rogues or honest men) to the same type of person obsessed by an idea, by a problem.

The relationship to the "crucial experiment" is the invariable in the transition from one hero to another. This relationship remains the invariable in the more general transformation: the move from an artistic work to a scientific work. It is of course obvious that the following differences must not be forgotten: the researcher absorbed in a problem of natural science forgets his own existence, while the hero of Dostoevski can hardly do so, if only because he is carrying out the experiment on himself. But after having distinguished the differences, we perceive a whole, an invariable. We shall content ourselves with this: the concentration of the problem into the *experimentum crucis*

program was characteristic of Einstein. I. E. Tamm relates a remark of Einstein concerning the problem of particles and continuity: Einstein said that it is only necessary to discover the electron in order to solve the problem; the relationship between the electron and the electro-magnetic field contains the whole of the problem.[5] The problem has not been solved and it is difficult to say at present to what extent Einstein was correct. But the tendency toward a single *experimentum crucis* is characteristic of Einstein's successful solutions. When Einstein attempted to draw the conclusions from the results of Michelson's experiment —changing the representation of space, time, movement—he paid little attention to repeating the experiment, to accumulating empirical evidence to confirm the invariability of the speed of light and in general that of the optical and electro-dynamic relationships in inertial systems. The experiment carried out upon himself by Raskolnikov the result of which crushed him, did not require the repetition or the refinement of the experiment. Beside the resemblance we see a profound difference between the moral experiment of Dostoevski and a scientific experiment. In the former, failure leads to an agonizing crisis, and very often to the destruction of the hero undergoing the experiment. In the latter any genuine result is a victory for the researcher, which brings him closer to the objective truth. Failures in science (even as tragic as that of Lorentz, who regretted not having died before the collapse of the classical principles of physics) cannot take on the bitterness of the moral-psychological catastrophes in the novels of Dostoevski. But they are sometimes very sharp, very painful, even tragic just as is the doubt of being able to attain the scientific ideal, the doubt of one's own strength or ability in solving a given problem.

The ideal of the researcher, the problems which he sets himself, the outlines of the solutions sought can fall close to the ideal of the artist, properly speaking. The attitude toward the experiment, the nature of the one who solves it, the obsession with the experiment are not the only invariable factors in the transformation which we could call by convention "transformation from Dostoevski to Einstein." What is Dostoevski seeking in the

[5] Tamm, "Einstein and Contemporary Physics," *Successes in the Physical Sciences*, vol. 59, 1956, p. 8.

world and in man? His work is a tragic search for harmony. He sees that the harmony of the world cannot be simple, "Euclidean" as Ivan Karamazov says. The latter, in his conversation with Alyosha, speaks of the universal harmony of "non-Euclidean existence." He says: "...I am as convinced as any child that sufferings will be relieved and become less, thas all the hurtful comedy of human contradictions will disappear like a feeble mirage, like an ignoble invention of the weak and the petty, like an atom of the Euclidean human mind; indeed, that at the end of the world, at the moment of the greatest harmony there will appear something so precious that it will be enough for all the hearts, for the appeasement of all the indignation, for the expiation of all the crimes of men and of all their blood which they have shed themselves."[6]

No doubt, one could pass over the direct comparison of the "non-Euclidean world" of Dostoevski with that of the general theory of relativity: everyone will understand that this "non-Euclidean" world is an entirely general symbol of the paradoxical harmony of existence. Perhaps physics will pass from non-Euclidean geometry, from the geometry of Riemann to a geometry still more general and paradoxical; perhaps it will pass on to concepts which cannot by their very principles be defined by geometry. In any case the impulsion toward a harmony in this infinitely paradoxical existence will be close to it, this impulsion which resounds not only in the words of Ivan Karamazov but also throughout the entire works of Dostoevski.

It is at this moment that the divergence appears. Ivan Karamazov does not admit this non-Euclidean harmony. "If parallel lines cross, even if I can verify it myself: I shall see it and I shall say that they have crossed but I shall not admit it."[7] Dostoevski tends to avoid these doubts which are "absolutely foreign to the intelligence created with the conception of three dimensions only." He tends toward the non-Euclidean harmony, and this thirst for harmony influences the reader independently of the philosopher who has stopped half way. The philosopher

[6] Dostoevski, Collected works in ten volumes. "GOSSLITIZDAT," Moscow, 1956-1958, vol. IX, p. 295.

[7] *Ibidem*, p. 296.

stops, the artist continues and sweeps everyone with him along the endless road of the continuous complexity of the table of the world, along that road where each new turning seems a paradox and non-Euclidean in the general sense of the word, by comparison with the previous direction.

Another characteristic links Dostoevski to Einstein. The former was interested in moral questions, the latter in physical problems. Dostoevski was absorbed in problems of duty. Einstein in problems of existence. But the problem of duty was solved in the work of Dostoevski on the basis of the problem of reality: the solution of the problem of existence provides a basis for choice in man's behaviour, and more often still man's actual behaviour and his attitude toward moral values ("Shall I take this step or not?") represent the instrument of knowledge. From another viewpoint, in Einstein's work the solution of physical problems leads to moral problems. How will the discoveries of science affect the lives of men? What is the moral duty of the researcher? Can scientific progress expiate the loss of human lives in Hiroshima? What are the conditions for harmony between scientific progress, security and the happiness of mankind? Such questions fall to the lot of contemporary scientists; sometimes they are the source of tragedies or again of moral and intellectual resurrection. Einstein was the first to realize the importance of these questions. Dostoevski's work, and in particular *The Brothers Karamazov* interested him also from an ethical point of view. He spoke of this to Ehrenburg in 1947.[8] He saw in it the demonstration of the infinite complexity of ethical problems. But these problems must be solved by the use of reason; Einstein's ethics are rationalist.

Dostoevski, enveloped in a thick and solid network of anti-intellectual tendencies, of social and national prejudices, flung himself into essentially rationalist ethics. As a philosopher he could not rid himself of irrational strings and did not seek to do so. As an artist he could not rid himself of them even up to the end and yet he sincerely desired to.

His moral solutions result from a logical and intense effort of the mind and are his weapon How close is the circle of ideas

[8] See I. Ehrenburg, "Two Portraits," *Youth*, 1965, No. 1, p. 69.

to the scientist and to his thoughts concerning his moral duty and the collision between each new item of knowledge and its rational application (first and foremost he is close to the emotions and the images of that which is crystallized in artistic work). The rationalist tendency of Dostoevski is not expressed in the ideas of the author and of his characters so much as in the artistic means, in the poetry. Dostoevski's language even, containing no trace of dialect or class accent, the expression of thought which has taken complete control of a man and driven out the rest of the world, the language which in its rationalist purity is no doubt close to the cybernetic language or the hypothetical constructions of language for communicating with extra-terrestrial beings; such language itself destroys all the anti-intellectual, irrational and especially nationalist construction of Dostoevski. The famous rationalist, heir of Descartes and Spinoza, apostle of objective and rational research into the creation of the world could obtain much from Dostoevski because the latter, though an anti-rationalist philosopher, was a rationalist artist.

The harmony to which Dostoevski aspired is rationalist. It cannot be the incarnation of faith, of tradition, of dogma and cannot be accepted as "intelligence created with the conception of three dimensions only;" but it can be recognized as non-Euclidean intelligence. For Dostoevski as a philosopher, the non-Euclidean harmony of existence was a temptation which leads astray from the traditional faith. For Dostoevski as an artist, it was the dominant thought and becomes so for all those who discover *The Brothers Karamazov, Crime and Punishment, The Idiot*, etc. Its authority was not destroyed by the conscious anti-rationalist ideology of the author; it continues to act independently of this tendency and this is why it is so powerful.

In Einstein's creations, in the summary of the addition of vectors, in his "model" constructions, in his gnosiological digressions, in his autobiographical sketches and in his journalism, a dominant theme prevails: the creation of the world is governed by an "objective ratio," and harmony reigns within it. This is expressed in the criterion of "internal perfection" in physical theory and in the concrete physical concepts. The world is not chaos, it is governed by laws acting in a constant fashion. Their constant action is expressed in the invariability of physical

relationship, in the homogeneity of "flat" or "curved" space. A single theory of space would be the highest expression of such a harmony; and it is here that Einstein encountered difficulties which he could not surmount. He saw at the same time the most repugnant and destructive expressions of social disharmony. One can imagine the importance and the necessity for Einstein of the diffusion of the brilliant, artistic defence of his researches into cosmic and moral harmony. It was the diffusion of a truly colossal and penetrating force. In particular it crossed the limits of races.

A mention of *The Brothers Karamazov* is to be found in a letter that Einstein sent from Berlin in 1920 in which he raises a question of research into a single theory, which though still at an early stage promises to become extremely difficult. Later he talks of the nationalist reaction in Germany; it was still impossible to imagine the extent of the destructive chaos to which this reaction led, but the direction was already clear. Thus Einstein speaks of *The Brothers Karamazov* between two concepts of grave intellectual and moral-political trends which are in contradiction with the ideal of harmony.[9]

Dostoevski was thus for Einstein the source of inspiration directing and augmenting his attraction for research into a scientific, social and moral harmony. This impetus neither determined nor modified the orientation of Einstein's interests but strengthened them. His course had been decided before he became acquainted with the works of Dostoevski. But the moral and intellectual influence of Dostoevski's works on the ideological life of our century appeared as a very urgent and powerful component in the direction toward which Einstein was moving.

[9] See Carl Seelig, *Albert Einstein, Leben und Werk eines Genius unserer Zeit* (*Life and Work of a Genius of Our Time*), Zurich, 1960, p. 265.