

Tolstoy's Views on Science

Urmie Ray*

Writing about *What Then Must We Do* (1884-6) in his 1911 biography of Tolstoy, Romain Rolland wrote: “it is a matter for surprise that no one, during the assaults delivered in France upon the vanity of science, . . . has thought of referring to these pages” (145). It is indeed surprising that his apt analysis of science, set forth not just in that essay but also in other writings, remains little known. In particular, these bring to light the transformation of science into the semblance of a religion, a thesis even more relevant today when it has enabled the multiplication of unprecedented manmade perils than in the days of Comte’s positivism.

Contrary to common belief, Tolstoy’s criticisms have little in common with unreasoned and sterile rants holding science responsible for our woes and glorifying primitive eras. To quote *What Then Must We Do*, his most virulent essay on the subject:

Not only do I not repudiate science, that is, the reasonable activity of humanity, . . . but it is just on behalf of that reasonable activity . . . that I speak, only that it may be possible for mankind to escape from the savage state into which it is rapidly lapsing thanks to the false teaching of our time... Science ... [is] as necessary to man as food and drink and clothing—even more necessary but [it] become[s] so not because we decide that what we call science . . . [is] essential,

but only because science . . . really [is] essential to humanity (285).

In this essay, I examine his position in greater detail. It certainly deserves new attention. What follows is written from the perspective of a scientist.

To begin with, it may be helpful to remind the reader that science is the reasoned study based on reproducible and sufficiently reproduced observation of properties of the sense-perceptible world that are describable through comparison (Ray 7).

1. Science as a Spiritual and Ethical Quest

Tolstoy’s urge to fathom science arose from a growing desperation to elucidate the meaning of his life. His predicament—the cleavage between the “wish to believe in the religion of my fathers” (*Diaries* I 13 July 1854) and reason, which, from a young age, he held to be “man’s primary faculty” (17 Mar. 1847)—is not unusual in modern Europe. What is unusual is his resolution of the issue. It is common to “regard as Christianity only the tenets held by the different churches in the past and present” (*The Kingdom of God* 86). The outcome is a profound dilemma: to reject religion and adopt the belief that science will somehow tell us the meaning and purpose of life or to reject a reason- and observation-based understanding of the world. Tolstoy chose not to repudi-

* Visiting Scholar, D.A.M.T.P., University of Cambridge, Email: ur10000@cam.ac.uk; uray@cantab.net

ate Christianity—only church doctrines—nor did he repudiate science but elaborated a comprehensive vision. This he achieved by subjecting Christianity as well as science to both a rigorous rational scrutiny and a fierce ethical one.

Underscoring this spiritual quest was his search for moral guidance in circumstances where everything separated him, a count and member of the Russian nobility, from the common people trapped in poverty. Struck that their lives were not “dissipated” like those of his social class, the young Tolstoy was led to believe he had been mistaken in giving “reason a free rein” (*Diaries* I 8 Dec. 1850) and attempted to adopt their unquestioning faith in church doctrines.

Hence, as he later confessed in 1879, “I unconsciously hid from myself the contradictions and the obscurities in the religious dogma.” However, his profound honesty made it impossible for him to believe uncritically. “But there was a limit” (“Confession” 70) especially as “in faith, I found nothing other than a negation of reason” (50). Besides, he could not ignore the injustices and inhumanities perpetrated with the various churches’ support. Accordingly, as early as 1850, at the age of twenty two, he set himself the task of “founding . . . a new religion appropriate to the stage of the development of mankind” based on the teachings of Jesus (*Diaries* I 2, 3, 4 Mar. 1850).

He set out by, on the one hand, engaging in a study of Christianity, as well as theologies and philosophies from all corners of the world, and on the other, immersing himself in the study of mathematics and of the natural sciences, something he had long intended to do (17 Apr. 1847). What he referred to in his diary in 1858 as a “passion for the sciences” (13 Mar. 1858) would keep him occupied until well into the 1870s (2 Dec. 1873). The evolution of his attitude towards religion and his attitude towards science remained throughout his life closely interwoven, mutually influencing each

other and each the result of careful consideration. Until about the mid-1890s, his writings reveal much hesitation between a concept of science as an objective endeavor bringing to light a world governed by implacable laws of nature, and thus leaving little room for free will, and the need for free will without which there can be no morality, no meaning to life. However by then he had sufficiently identified the shortcomings of a scientific approach so as to gradually reverse his stance and around the turn of century had come to realize the subjectivity involved in such an approach and to provide the possibility of free will with solid justification.

2. Tolstoy’s Initial Perception of Science

Before going further, it should be pointed out that when reading Tolstoy’s texts the sense in which the term science is used has to be carefully assessed. For its Russian equivalent наука (nauka) has a far broader meaning than science in English and certainly did so in his days, when it encompassed “any field of knowledge of empirical or rational intuition” (Wenzer 1997).

Keeping this in mind, it is but natural that at a time when he was still familiarizing himself with the subject, Tolstoy’s perception should reflect the commonly accepted views of his days. In *War and Peace*, his major work of the 1860s, he in effect reiterated the definition given by foremost scientists like John Herschel (18) that the primary subject matter of the natural sciences consists of “the question of cause” (1073) and of the discovery of the laws of nature. The former answers the question ‘why’ and, as he remarked, is often too hard to tackle. Hence he came to essentially consider science the elucidation of laws describing how nature functions.

It is not that Tolstoy and his peers did not appreciate the role of observation. *War and Peace* clearly states that science can only proceed “from the point of view of observation” (1064). However, instead of taking this distinctive universal feature of

a scientific approach as the defining criterion, they chose a purpose specific to the European context. Now, it is certainly the case that the aim of science is to give unified descriptions and explanations for otherwise unrelated phenomena, but a definition based on the term 'law' is founded on strong cultural assumptions.

The form science is given in a particular culture follows necessarily from its vision of reality. In Europe, science arose within a dualist Christian framework, where the human mind is considered extraneous to a purely material nature and God external to man and nature. It is only later with quantum mechanics that it was understood that "we are not merely observers but also actors on the stage of life" to quote Werner Heisenberg (15-16). The act of observation of nature could therefore previously be supposed not to interfere with the subject observed. So knowledge of nature was taken to be objective, namely to mirror nature. Once belief in miraculous events was abandoned, nature came to be conceived as regulated by inviolable, immutable, and universal laws, imposed by an omnipotent God. Gradually the divine factor was removed without unsettling the belief in laws of nature.

Now, defining science as the study of a world governed by immutable universal laws beyond human control yet discoverable by the human mind, rather than as observation-based, obscures the importance for the data to be reproducible at will, and thus eases the inclusion of studies of human behavior within the purview of science. By Tolstoy's days, the search for these laws had become the defining purpose of the 'human sciences.'

This reasoning rests on the assumption that there is no non-material dimension to the human sphere, or the equally strong assumption that if there is, it is strictly separated from its material one. The materialist assumption had gained strength from the rapid successes of a scientific approach which was incessantly undermining the commonsense denying beliefs of organized, doctrinal Christianity.

As remarked by Tolstoy, "materialism lies in wait for people once they are freed from dogmatic Christianity" (*Diaries* II 15 Dec. 1900). The problem is that, in view of the deterministic law-perspective, it reduces humans to mere automata, and "all efforts to be good or do good are vain and pointless" (19 Dec. 1900).

Given his ethical motivation, this was impossible for Tolstoy to accept. It would have made his whole life, and life in general, meaningless in his eyes. But, the non-materialist dualist framework is equally problematic. It allows for the possibility of morality, but it cannot provide a strong justification. This was not satisfactory for Tolstoy. He would not rest until he could establish morality on solid grounds.

3. From Economics to Darwinian Evolution

Alongside an existential concern about morality, the maturation of his thinking was equally prompted by his reflection on science. This reflection was itself bound to his strong ethical concern about widespread poverty in Russia which led him to a detailed analysis of the economic situation and of the new subject of economics. Without going into details, a long tradition of maximization of profit in Europe was gradually leading to the transformation of merchant and land-based capitalism into financial capitalism, a capitalism where finance, a tool of the economy, becomes its motor, "the realities of commerce" turning into "mere shadows" (Robertson 54). Tolstoy witnessed the initial stage of this transformation, which as he denounced, only worsened impoverishment and inequalities. Because of his concern, he naturally took exception to Darwin's theory of evolution, as it served to justify their perpetuation. This theory came to act as a backdrop to his discourse on science. It was doubly interesting to him, as it touched on the question of life.

He relegated biological evolution to an assumption because "no one has ever seen how some organisms are produced from others" (*What*

Then Must We Do 118). But Darwin had provided an enormous and varied mass of indirect, yet strong, data, data that was rapidly expanded by others. Tolstoy's failure to accept Darwin's establishment of biological evolution on sound scientific grounds is unfortunate as it contributed to discredit him as adamantly anti-science. Few know of his acceptance of evolutionary ideas in his later years (*Diaries* II 27 Jun. 1907).

Assuredly, the term "evolution," as Tolstoy rapidly pointed out, is unfortunate. It reflects the influence on Darwin of the doctrine of progress in vogue in Europe since the eighteenth century, leading him to characterize natural selection as a mechanism that "works solely by and for the good of each being, [so that] all corporeal and mental environments will tend to progress towards perfection" (Darwin 489). However, as remarked in *Anna Karenina*, in the infinity of time and space such a statement is meaningless: "Evolution from what? into what?—Eternal evolution and struggle. As though there could be any sort of tendency and struggle in the eternal!" (1001).

This brings us to Tolstoy's main objection stated clearly in his 1893 essay "Religion and Morality," namely that the only cause of biological evolution is "the law of the struggle for existence and the survival of the fittest," a law he took in its most narrow form: "Each person, in order to attain his own well-being and that of his group, must be one of the fittest and make sure his group is the same, so that it is not his group but some other, less fit, that perishes" (146). Because of the undeniable ambiguity in Darwin's writings, enthusiastic but less careful followers, some of whom were otherwise prominent scientists, had indeed taken this interpretation as the only possible cause for evolution, and it was applied to the human sphere, with as we now know deleterious consequences.

This said, Tolstoy's scientific contemporaries in Russia had called into question the validity of this hypothesis and shown that evolution without

it remains a perfectly suitable and powerful theory (Todes chap. 3). It is rather surprising that he either was not familiar with or did not give credence to their work.

Tolstoy's misapprehension however led him to a detailed examination of the manner in which the Malthusian hypothesis had been given a scientific appearance. This contributed to his progressive distancing from his initial rigid standpoint and to a remarkable reassessment of science and of its limits.

4. Tolstoy's Identification of the Nature and Shortcomings of Science

As stated in *What Then Must We Do* (102-103), Malthus' hypothesis, populations invariably grow at a much faster rate than resources, the former "in geometrical" and the latter "in arithmetical progression" confirmed his doubts about the use of mathematics. By Tolstoy's days, mathematics had acquired a central position, following the changeover from merchant to financial capitalism that it had enabled, and the growing collaboration between physics and industry founded on accurate measurements. Economics was authenticated as a scientific discipline by its increasing mathematisation, in the image of the 'exact sciences.' However, an inquiry whose scientific nature is not in doubt can on occasion be made mathematical, but the converse, does not hold. Mathematization, as Tolstoy realized, cannot turn a subject into science unless the mathematical models are strongly founded on empirical data. Consequences can be damaging. For this transforms unfounded hypotheses like the Malthusian one into "indubitable truths . . . employed as axioms from which to deduce further conclusions." In other words, entire structures can be built on entirely unrealistic foundations.

Within a year of this analysis, in his essay *On Life*, Tolstoy came to fully recognize the centrality of observation if we desire our investigations of the external world to be reliable to any degree: "to

settle the laws of the universe by mere deductions of reason without experiment and observation is a false and unscientific path, that is, one that cannot yield true knowledge" (10-11). Although this was nothing new, the conclusion he drew is very much to the point and rarely set out this clearly: the natural sciences are not self-contained; they rest on "axiomatic bases" (27) as they are forced to use concepts whose essence is beyond comparative observation.

The science of physics speaks of the laws and relation of forces without setting itself the question of what force is, or trying to explain its nature. The science of chemistry speaks of the relation of matter, without setting itself the question of what matter is or trying to define its nature. The science of biology speaks of the forms of life, without setting itself the question of what life is or trying to define its essence (27).

Having established the nature of scientific theories, further examination led Tolstoy to identify reasons why they may easily become unrealistic.

To begin with, the "number of facts available for investigation is innumerable" (115). Hence a choice must be made that calls for prudence when generalizing. Science is of "great importance" as long as it remains within reasonable "generalizations about phenomena" and does not result in inappropriate deductions" (*Diaries* II 24 Nov. 1903). This he began realizing in the context of economics. "Political economy," as Levin remarks in *Anna Karenina*, "told him that the laws by which the wealth of Europe had been developed, and was developing, were universal and unvarying," when in effect in Russia, "in the majority of cases when capital is applied in the European way the produce is small" while it "is great" in many cases when methods compatible with the local culture are applied (437-438). Other passages in the novel also highlight the local nature of economics and the necessity to "annihilate that science entirely and to lay the foundation of a new

science of the relation of the people to soil," taking into account the context by empirical observation, instead of attributing universality to abstract concepts. In short, Tolstoy is here implying that a subject like economics cannot consist of the search for general laws. He rapidly realized this also holds for other studies of the human sphere, namely for "knowledge [that] . . . makes general claims about humanity after having studied only a small portion of it" (*Anna Karenina* 207).

Now, generalization being problematic and observation central, "science" he urged "should first seek the nearest, and then the more remote, causes of those phenomena which form the subject of its investigation" (*What Then Must We Do* 60). This conclusion followed from his assessment of the positivists' conception of society as an organism, extrapolated from the study of insect life and of the microscopic world. As a result, he came to agree with Edward Carpenter that "the reduction of questions of a higher order to questions of a lower order" (Tolstoy, "Modern Science" 220) is problematic since it discards essential aspects of the higher order and so turns assumptions, in particular the materialist assumption, into a fact. Hence he recommended the reverse more holistic method, especially as we know best our individual selves and all else we know from that standpoint. Indeed, he was very sensitive to the issue of extrapolations about the whole from a study of the parts in isolation, all the more so of the minutest parts.

This his contemporary scientists were also aware of. Namely, science must perforce be reductive, and this invites caution. Already in the seventeenth century, Bacon had warned: "The subtlety of nature is far beyond that of sense or of the understanding" (book 1, Aphorism X. 12). This warning had been reiterated by Tolstoy's contemporary Poincaré: "the wish to comprise nature in science" is akin "to want to put the whole into the part" (4). Hence, he had warned against emulating a "naturalist who had never studied the elephant except by means of the

microscope [but would] think himself sufficiently acquainted with that animal” (21).

However, it had been thought that the parts at least could be objectively known. Tolstoy understood that this was far from certain. His questioning of the validity of reductionism went hand in hand with his recognition that “the regularity” perceived in nature is the outcome of our senses and reasoning (*Diaries* II 24 Sep. 1895). A diary entry for 1893 clearly states: “There are no facts. Only our perception of them.” Hence what is needed, he wrote nearly a decade later in his diary, is “the sort of method which talks about perception, about impressions” (14 Apr. 1903). Several schools of thought have attempted to elaborate methods to minimize errors due to the many weaknesses inherent in a scientific approach.

Namely, science is not objective. It cannot tell us truths, or at the very least we can never know if it does. To quote Carpenter, improvements to our theories brought about notably by increasing data cannot be considered “approximations to the truth” since the “limit is at all times infinitely far-off” (58). What our ever deepening scientific understanding does is guide us away from untruths.

This is what many of their contemporaries failed to understand. As confessed by physicist Max Born, the conviction that science’s aim is ‘Truth’ continued to hold strong until well into the last century (166). Only after the development of quantum mechanics, to cite Heisenberg, did it begin to dawn that “man’s argument ... *cannot simply speak of nature ‘in itself’*. Science always presupposes the existence of man” (15).

5. Laws of Nature, Free Will, and Truth

This evolution in Tolstoy’s assessment of science was, as stated earlier, basically motivated by an acute need to establish the possibility of morality on firm grounds. Hence he had no option but to examine the question of free will.

“Consciousness of freedom” (1063-1065),

he agreed in *War and Peace*, is a deep conviction in man without which he cannot live. Yet in the deterministic framework that was then his, it seems incompatible with “reason [which] gives expression to the laws of inevitability” (1070-1072). Hence a way to “reconcile[] [it] with the law of necessity to which he [man] is subject” (1063- 1065) must be found. However because consciousness of freedom is beyond observation, science is unable to identify it, deny it, or for that matter confirm it, and so evolutionary theories are unable to tell us how to do so.

Tolstoy then went on to show, remarkably, a way out: consciousness of freedom and reason seem “mutually exclusive” only if they are considered separately, but “by uniting” them, they are seen to complement one other. Consciousness is the content examined by reason, which is thus the form, and form and content “mutually define one another” (1070-1072). Tolstoy thereby provided a new epistemological framework for European thought by adapting to its context the basic idea behind most Asian philosophies, namely that our minds, although “entirely material,” are “yet capable of coming into intimate relation with” some reality beyond the temporal one (Sinha 4). Niels Bohr, who like Tolstoy was especially attracted to Taoist thoughts, was to give greater substance to this perspective. Quantum mechanics highlights the need for a conceptual framework enabling the harmonization of apparently contradictory notions. This framework he called ‘complementarity’ and notably illustrated it with the example of “feeling” and “reason” are reminiscent of Tolstoy’s perspective. It is regrettable that it had to await quantum mechanics and its reformulation by a scientist before being given sufficient credence. Although it certainly goes without saying that Bohr’s formulation is more elaborate and general.

Tolstoy then went on to undermine the belief that “man . . . [is] entirely subject to the law of inevitability”: the conditions of both space and time

in which man “is situated” are “infinite” in number and so cannot be grasped by the human mind. The unknown being infinite, however much the domain of the scientifically known might grow, it can never encompass the entire universe (*War and Peace* 1070-1072). So we cannot draw any conclusions regarding the domain which “experimental science” (1063-1065) has not yet deciphered. Namely, “a certain measure of freedom remains” (1070-1072), in the sense that the possibility is there since we can never know.

However, Tolstoy was at this stage hesitant. Indeed not knowing does not mean there is no “law of inevitability,” and thus he kept holding on to the notion that free will in our actions is illusory and follows from our ignorance of their causes. Were it “not subject to laws,” then, he argued, it would be akin to “a free force moving the heavenly bodies” (1070-1072). No wonder that, as he later avowed in *Confession*, “[r]ational knowledge had led me to recognize that life is meaningless” (53), a conclusion reinforced by his sense of the futility of the life he and his social peers led. Yet “a negation of reason . . . was even more impossible than a denial of life” (50). For someone with his sensitivity and honesty, the outcome could only be a despair that nearly drove him to suicide.

He thus continued to fail to notice that his rigid view of laws of nature was in effect unverifiable and thus of the domain of belief. For him, as expressed in *War and Peace*, causality still meant that “under the same conditions and with the same character he [man] will do the same thing as before” (1063-1065). In other words, strict determinism, each cause inducing a unique effect, rules not only the inanimate realm but also the realm of human actions, without envisaging the impossibility of the repetition of the same conditions nor the possibility of the evolution of an individual's thinking Tolstoy thus initially upheld a position far more uncompromising than that of most scientists. Assuredly, it is only in the last century that this was clearly perceived to be a

wrong assumption, but this is already implicit in Newton's writings: “to the same natural effects we must, as far as possible, assign the same causes” (384). In other words, the same effects seem to imply the same causes, not the other way round. In fact, Newton did not affirm that causality, certainly a necessity for us, is a fact, nor did he speak for the world beyond the inanimate realm.

In his 1893 essay “Non-Acting,” Tolstoy even refuted his insights of twenty five years before, notably of the concept of infinity, based on a continuing belief in an objective science unearthing truths and therefore making them “hence-forth immovable”: “As science advances it is certain that the ideal [of the unknown, and thus variably interpretable] recedes” (100). Until well into the mid-1890s, references to “laws of nature” abound in his writings, reminiscent of Darwin's most ardent partisans whose views he decried. “The material world,” he continued to claim, “is subject to the law of the struggle for existence, and we, as material creatures, are subject to it too” (*Diaries* II 7 Sep. 1895).

This said, a diary entry for 1895 reveals his dawning realization that the non-material and the material spheres might be connected: “Man is free in the spiritual world, in that which sets the physical world in motion” (4 May 1893). Indeed, the basic issue in the Christian dualist perspective is justifying that freedom in the former can impact on actions which necessarily take place in the latter. Still, a connection still needed satisfactory justification. His step towards a justification took him away from strict rationalism. His abhorrence for Darwin's struggle hypothesis provided him with the necessary arguments. Only reason, which he still held to be man's principal asset, could overcome man's subjection to the “law of inevitability”: “Progress, in my opinion, consists in the greater and greater predominance of reason over the animal law of struggle” he noted in another diary entry for 1895 (5 Aug. 1895). Tolstoy had come to a total reversal of the conception of reason he had given in *War and*

Peace: reason was now the path to freedom.

Giving reason back its freedom was accompanied by his assessment that it is not a question of laws of nature, but of “the law of my vision” and “of my reason.” Thus by the time he came across the “splendid article by Carpenter on science” in 1896 (23 Oct. 1896) he was ready for its conclusions. In the preface of the Russian translation of Carpenter’s essay he wrote: “laws seem laws to us only because . . . we cannot detect their non-correspondence with actual fact” (*Modern Science* 220). He had come a long way from his beginnings. Or had he? In an 1863 entry in his diary can be read “the discovery of laws in science is only the discovery of a new method of looking at things” (*Diaries I* 8 Feb. 1863).

He did not rest with negative arguments in favor of freedom in our actions, which the impossibility of ascertaining the existence of laws of nature amounts to. Confirmed in his own thoughts by Carpenter’s writings, his growing reflection on “movement, matter, time, space” (2 Jul. 1904) together with his mastery of the concepts of infinity and limits led him to a remarkably positive and as rational an argument as possible for the possibility of freedom in *Calendar of Wisdom*: “You make your decisions in the present, and the present exists outside time; it is a tiny moment where two periods—the past and the future—meet. In the present you are always free to make your choice” (Aug. 10). Now, “man is always living in the present” (15 Sep. 1909). Hence the conclusion expressed in 1904 that “man is free, but seems unfree.” But because science is bound to the domain of time, for “determinists,” “the opposite” holds, namely “that man is unfree, but seems free” (20 June 1904). In another diary entry for 1909, he reiterated his conviction that all is a question of human perception, and thus that “physics (as all the other natural sciences too) has only one basis—the laws of getting to know objects by means of the external senses” (25 Oct. 1909). This is why what is needed is “the sort of method which

talks about perception, about impressions” (14 Apr. 1903). Several schools of thought have attempted to elaborate methods to minimize errors due to the many weaknesses inherent in a scientific approach. However so far, these methods have always “base[d] their conclusions on facts” (14 Apr. 1903). Tolstoy’s suggestion is that they should instead focus on our perception process, including our reasoning.

This conviction resulted in an increasing questioning of the nature of reality: “the whole world as we know it is only the product of our external senses: sight and touch . . . and our ideas,” in other words “my ever recurring impression, confirmed by the impressions of other people” (19 Feb. 1898). What is it [reality] like . . . , was he to question, “for a creature unknown to me and endowed with senses unknown to me?” (31 Oct. 1907). His reflections on the concept of time led him further. Two years later, in the August 10 *Calendar* entry cited above, he toyed with the idea that it is not a matter of our inability to know reality but of reality being an illusion. He reinterpreted his thesis about dreams, expressed as early as 1849 (*A History of Yesterday*) that in them, ‘events’ lead up to a final impression, which has a counterpart in ‘reality,’ such as a loud noise, the ‘real’ counterpart “only just happen[ing]” when you wake up, as pointing to the “illusion of time”: “time does not exist . . . we imagine everything to take place in time because this is the nature of our mind. . . . Exactly the same illusion is present in what we call real life, only with this difference that we wake up from life in death” (*Diaries II* 15 September 1909)

He had come at the end of his life to the conclusion of Vedanta philosophy, a conclusion reiterated after the quantum revolution in 1930 by Tagore: “The world is a human world—the scientific view of it . . . [being] that of the scientific man. Therefore, the world apart from us does not exist; it is a relative world, depending for its reality upon our consciousness” (“On the Nature of Reality”).

6. A Unified All-Encompassing Vision

Not only is external reality unknowable and scientific inquiries riddled with shortcomings, but the very “objects subject to inquiry” are, as Tolstoy remarked in his 1894 essay “Religion and Morality,” “incalculable.” Hence a choice has to be made and must rest on a priori criteria. These criteria follow from “the relation which is established by man between himself and the eternal, infinite world, or its beginning and prime cause. . . . Neither philosophy nor science can establish man’s relations to the world, because such a relation must be established before any philosophy or science can begin.” Tolstoy came to define this relation as religion. And indeed, the “science of each different period, and each different people, inevitably bears the stamp of the religion, from which point of view the object is being regarded” (138-139).

Religion thus defined does not require the concept of God. As his conviction in the objectivity of laws eroded, so did his conviction in an omnipotent God external to man. His conception in the 1890s became closer to that of Asian philosophies, namely that of the all pervasive self of Vedanta or of the Tao of Lao Tsu. He therefore came to shed the assumption of the separateness of each individual ‘I’ which he had previously held. Shortly before his death, in “The Law of Love and the Law of Violence,” he contended that the more you lose yourself within that unity in service to others, the more you gain in freedom. For, as would later be reiterated by Tagore (chapter II) so doing you increasingly shed your ego, that which is subjected to eventual laws of nature. This Vedantic thesis resulted in Tolstoy’s unified vision of life. In particular, he came to accept biological evolution. “I can imagine,” he wrote in 1907, “that my human ancestors have existed for the last thousand centuries, and before them their animal ancestors, and the ancestors of the animals” (*Diaries* II 27 June 1907). For what is biological evolution but our scientific way of formulating this unity?

In this vision, all approaches to knowledge

have their place, and are interdependent. Religion is essential and science is perforce dependent on it. The “whole of life” cannot be investigated by only studying “external experiment” (*On Life* 10-11). Yet religion must remain “in accordance with reason and knowledge,” so in particular with scientific knowledge, whose essentiality, we saw, was for him beyond doubt. “Even if a religion establishes a relationship between man and God, but does so through affirmations which are so contrary to the level of knowledge people have reached ..., then neither is this a religion, but merely a semblance of one” (“What is Religion” 89).

The interconnection between science and religion is indeed one of complex mutual influence. For example, since Tolstoy’s days, both physics and biology have distanced themselves from the perception of reality as a composition of separate entities governed by deterministic forces. But what reality is, what life is, what its origin is, why we are here, what our destiny is, these, as repeated over and over again in Tolstoy’s writings, are questions beyond science.

7. Science and Ethics

Now, given its dependence on religion, science must *a fortiori* be dependent on morality, since morality is “the indication and explanation of those activities of man which automatically result” from religion (“Religion and Morality” 142). Hence, Tolstoy advocated that the “welfare of society or of mankind” (*What Then Must We Do* 142-143) be the criterion for the choice among the infinitely many topics open to science. This suggestion met with virulent opposition in some quarters, although in line with a Russian tradition where increasing “human dignity” within a collective whole was considered the goal of science (Hamburg and Poole 4) as well as with the views of some scientists both in and outside Russia. Poincaré (4) immediately took up his pen to castigate Tolstoy and salvage the then dominant concep-

tion of science as existing in a hermetically sealed bubble of its own objectivity, disconnected from ethical concerns.

Assuredly, the notion of welfare, apart from being variously interpretable, taken too rigidly, is a self-defeating aim. For, as pointed out by Poincaré, it is not possible to know beforehand whether or not a given piece of research has beneficial practical consequences for humanity or not. Many studies initially undertaken for other reasons have after a period of time, sometimes a very long one, contributed to collective welfare. But did Tolstoy mean it in a rigid sense? A closer reading of his texts shows that he did not. Rather he advised that ascertaining what constitutes “man’s vocation and welfare” (*What Then Must We Do* 140) should be our primary aim: “Only a correct understanding of life gives the proper meaning and direction to science in general and to each science in particular. If the understanding of life is not as is implanted in us all, then the science itself will be false” (*On Life* 10-11)

Had ethical considerations been more widely applied, research whose only known consequences are destructive, research that only gives us “new guns and explosives” to use Tolstoy’s words (*What Then Must We Do* 142-143) could have been avoided. According to the criteria suggested by Poincaré—simplicity and beauty—there is no reason not to prefer military research over, say, solar physics. Hence these are as subjective and value laden as welfare and thus not, as he claimed, internal criteria to science.

His passionate defense of the motto “science for its own sake” (Poincaré 4) has obscured not just the ethical dependence of science but that the choice is not just one between topics but essentially one between remaining on a scientific path or deviating from it while claiming allegiance to science. Indeed, by its very nature, science takes us from unrealistic theories to less unrealistic ones and so is bound to indicate the impact of our actions on existing natural conditions, at least once these effects have become detectable by existing means. Since it holds

that human life can only continue under limited conditions, it warns us when their alterations are of such magnitude that the continuance of human life may be at risk. Namely, as recognized by Tolstoy, “true science ... cannot have a harmful . . . influence” (*On Life* 27).

8. From Science to Dogma

Indeed, Tolstoy was among the first to comprehend that science was being transformed into a creed, which as he pointed out any theory insufficiently founded on sound data can easily become. What is denounced in all his writings is this creed, not science. His writing is certainly often careless and can all too easily give the impression that his position is fervently anti-science, but a closer reading rectifies this impression. His use of the term ‘creed’ is a considered one. Religion must agree with knowledge. How to distinguish science from this creed is clearly set out in *What Then Must We Do?*: “we have a very clear standard set by science itself, by which to decide . . . whether . . . [an] activity calling itself science . . . has a right to do so” (142-143); “unfortunately” much of the activity” going on in its name “does not come under” its “definition,” a definition resting on the “scientific method,” in other words on a systematized “common sense. This “exposes it at every step” (122).

According to him, the transformation of science “is not due to stupidity but to great ingenuity” and “has a very definite aim.” The religious justification of inequality “sufficed as long as people doubted neither the direct intervention of Divinity in human affairs nor the distinction between different breeds.” But once this conviction began eroding, “new justification” was invented for its continuation: “it has latterly become . . . the aim of present-day experimental science” (102-103). A socio-economic system can no longer be sustained or justified by science once, as a result of this system, conditions necessary for human life become excessively altered.

Since a system whose motto is profit maximization demands incessant and increasing material growth, the result is incessant and increasing alterations to these conditions. If the course is maintained, there necessarily comes a point where we must rely on research that misapplies scientific methods and refutes the nature of science. This point began to be reached during the Industrial Revolution and thus Tolstoy witnessed the early years of the distortion of science, especially the transformation of the subjects related to human matters into what he qualified as positivist "pseudo-science" (67).*

Tolstoy pointed out the latter's "striking" parallels with the former distortion of Jesus' teachings into Church dogmas. Both profess to be "infallibly true" (119). In the latter case, "theological subtleties . . . remained the special knowledge of the priests" (104). Today, "the disciples" of the "priests of science," or rather of what is viewed as science, "the further they advance in th[eir] study . . . the more they become accustomed not so much to observe as to take on trust what they are told of the observation of others." The "more and more do they adopt the specialized scientific jargon . . . the farther and farther do they wander among other debris of quite unilluminated observation, the more and more do they lose capacity not only to think independently but even to understand another man's fresh human thought lying outside their Talmud" (125).

In short what Tolstoy did is relentlessly, and at the cost of his own reputation, denounce the doings of "false science" not of "[t]rue science," which, "knowing its subject, is modest and therefore powerful" (*On Life* 27).

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* The term "pseudo-science" is found in the Maude translation. The author is grateful to the referee for pointing out that in the original Russian the expression used is different from the term "semi-science" or "half science" that he used earlier in *Confession* and is better translated as "imaginary science".

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