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The Unlimited Gaze

Essays in Honour of Professor
Natalia Baschmakoff

Aleksanteri Series 2:2009

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Why Does Levin Read Tyndall?¹

In chapter 27, book 1 of *Anna Karenina*, Levin, newly returned from Moscow and his as yet unsuccessful courtship of Kitty Shcherbatskaia, sits down in his living room to read and think. His housekeeper Agafya Mikhailovna joins him and chatters nonstop, while he half listens to her gossip and reflections. The other participant in this little scene is the dog, Laska. Levin is reading *Heat as a Mode of Motion*, by John Tyndall, and the purpose of this article is to explain the function of this book within the chapter and the novel.

Tolstoy himself had read *Heat* in March, 1872, as part of his preparation for writing about science in his *Azbuka*. He mentions it twice in pages of a notebook filled with jottings about heat and light, and it seems to be his main source for ideas on these subjects.² John Tyndall (1820–1893), was a scientist who also wrote and spoke very well and therefore was influential in bringing scientific discoveries to the larger educated public. His book, based on a series of 12 lectures, was published in England in 1863, and came out in Russian translation in St. Petersburg a year later; it was this Russian translation that Tolstoy read.³ The book was intended to popular-

- 1 I wrote this essay sitting across from Natalya Baschmakoff in the Slavonic Library in Helsinki in summer, 2007. A Russian version of it appeared in 2008 as «Почему Левин читает Тиндаля?» Лев Толстой и мировая литература: Материалы V Международной научной конференции в Ясной Поляне 12–16 августа 2007 года. – Тула: Издательский Дом «Ясная Поляна», 2008, 209–218. I would like to thank the publishing house “Tasnaia Poliana” for permitting me to publish a revised version of the essay in English, and I would also like to thank the Slavonic Library in Helsinki for their hospitality and assistance. Arkadi Klioutchanski helped me with the final preparation of this manuscript, and I would like to thank Edwina Cruise and Robin Feuer Miller for their suggestions.
- 2 Л. Н. Толстой. Полное собрание сочинений [PSS]. 90 т. Москва: Государственное издательство «Художественная литература», 1928–1958, PSS 48, 130–162. The explicit references to Tyndall are on 148, 155, but the notebook is filled with other oblique references to his book.
- 3 The English title is *Heat considered as a mode of motion: being a course of twelve lectures delivered at the Royal institution of Great Britain in the season of 1862*, and the Russian translation is entitled “Теплота, рассматриваемая как род движения. Двенадцать лекций Джона Тиндаля.” А. П. Шимков, ред. и замечания. Спб.: Издание Харьковско-

ize the “dynamical” or “mechanical” theory of heat, which we now call ‘thermodynamics.’ As A. P. Shimkov, the editor of the Russian edition explains in his preface, heat, which most thinkers had previously considered a material substance, weightless but with its own properties, had now come to be understood as a “particular state of a substance.”⁴ The newly discovered field of thermodynamics had enormous practical implications, and at the same time, what Tyndall calls “Practical Science” aided the advancement of theory: “If the steam-engine had not been invented, we should assuredly stand below the theoretic level we now occupy.”⁵ [Без паровой машины теория наша не достигла бы той степени совершенства, на которой она теперь находится.] He means by this that scientists like James Prescott Joule (1818–1889), who coined the term ‘thermodynamics’ in 1858,⁶ refined and ultimately changed their understanding of heat from their observation of such machines. According to Tyndall, “practical” science rests upon both the evidence of the senses, available to everybody, and the generalizing and rule-making capacity of the mind.

In the study of Nature two elements come into play, which belong respectively to the world of sense and to the world of thought. We observe a fact and seek to refer it to its laws— we apprehend the law, and seek to make it good in fact. The one is theory, the other is experiment; which, when applied to the ordinary purposes of life, becomes Practical Science.

Мы изучаем природу помощью чувств и помощью рассуждений. Мы наблюдаем явление и ищем закона, по которому оно совершается, или мы высказываем закон и стараемся подтвердить его фактами. Во всех случаях действует ум, обобщающий и теоризирующий, и чувства, помощью которых мы наблюдаем явления. Таким образом, добытые сведения, примененные к практическим целям, становятся пракческою наукою.⁷

го магазина Е. С. Баллиной, 1864. The original, British version came out in 1863. In all references to this book, I cite the original American edition first, New York, D. Appleton & co., 1863, hereafter *Heat*, and then the Russian one, hereafter *Теплота*. The American edition is available on the web in Google Book Search.

4 “Что же такое теплота, если она не особенное вещество? Она есть особенное *состояние вещества*” [What is heat then, if it is not a particular substance? It is a particular state of a substance]. See *Теплота*, v (Introduction). All translations in this essay are my own.

5 *Heat*, v; *Теплота*, xi (Introduction).

6 Joule discovered the relation between heat and mechanical work.

7 *Heat*, xiv; *Теплота*, x–xi.

Earlier in book 1 of *Anna Karenina*, Tolstoy shows that he agrees with Tyndall about what constitutes sound science. In chapter 14, Levin, following Tyndall's two criteria, weighs in on the trendy topic of spiritualism. Vronsky defends it as a force like "electricity": "We grant the existence of electricity, which we don't understand; why then couldn't there be a new force of which we are still unaware, which. . ." [Мы допускаем существование электричества, которого мы не знаем; почему же не может быть новая сила, еще нам неизвестная, которая...]. Here Levin interrupts to retort that electricity in various manifestations is a phenomenon known for centuries before people began to think about its application, while spiritualists rely only on their own testimony to defend the dubious objective existence of spirits who ostensibly speak through table-turning and mediums. The advocates of spiritualism practice bad science because they lack solid, irrefutable empirical evidence to back up their claims: "Tables were writing for them and spirits coming to them, but only afterwards did they start to say that this is an unknown force" [столики им пишут и духи к ним приходят, а потом уже стали говорить, что это есть сила неизвестная]. By contrast, Levin points out, no one can deny the existence of electricity, even if they can't explain it: "With electricity, every time you rub a piece of resin against wool, you get the same reaction, while here you don't get it every time, and hence this is not a natural phenomenon" [при электричестве каждый раз, как вы потрете смолу о шерсть, обнаруживается известное явление, а здесь не каждый раз, стало быть, это не природное явление].

So Tolstoy understands and respects Tyndall's brand of science. He also sees the potential of the new science for his art. His notebook in 1872 focuses strictly on science, but in *Anna Karenina* thermodynamics acquires a poetic dimension as it becomes an important metaphor in the novel. The equation of heat and feelings of certain kinds in Tolstoy cannot be traced to his reading of Tyndall, since it is already present in *War and Peace*.⁸ The emphasis on passion as heat in *Anna Karenina* is new, however, as is the philosophical idea of a unified 'force' behind every aspect of human life. The role of 'force' in *Anna Karenina* owes much to the influence on Tolstoy from the late 1860s of Artur Schopenhauer. Tyndall's contribution to this subject was nonetheless extremely impor-

8 I refer to the discussion of "force" in both individuals and armies in wartime.

tant to Tolstoy, who, like all great writers, wanted true science and true philosophy to coincide.

Tyndall's style and language lent itself to Tolstoy's adaptation of his science. In the mid 19th century, scientists could speak with bare logical precision, and indeed the brilliance of Tyndall's book resides mostly in its clarity of language and exposition. But even for many practicing scientists, science was still understood as part of philosophy. What we now call "natural science" and especially physics was known then as "natural philosophy," and a natural philosopher was someone who objectively studied the physical world. Tolstoy himself uses this vocabulary when he names his 1872 scientific notebook "Критика. — Натур[альная] Филос[офия]."⁹

Tyndall's position on the relation of science and philosophy, or religion, was complex, and related to politics in Victorian England. On the one hand, most famously in a speech that he gave on August 19, 1874, in Belfast, as President of the British Association for the Advancement of Science, he aggressively defended the ascendancy of science over religion, and especially the established Church.¹⁰ On the other hand, Tyndall greatly admired Thomas Carlyle, the greatest Victorian advocate of transcendentalism, and himself never claimed that science could understand everything about human life or the universe.¹¹ In *Heat*, as elsewhere, he is careful to establish the limits of the task of the scientist-natural philosopher, who "as such, has nothing to do with purposes and designs."

His vocation is to inquire *what* Nature is, not *why* she is; though he, like others, and he, more than others, must stand at times rapt in wonder at the mystery in which he dwells, and toward the final solution of which his studies furnish him with no clew.

9 PSS, 48, 130. "Critique. — Natural Philosophy."

10 For a cogent description of this speech and Tyndall's "imperialist" defense of science, see Frank M. Turner, "John Tyndall and Victorian Scientific Naturalism," in W. H. Brock, N. D. McMillan and R. C. Mollan, eds., *John Tyndall, Essays on a Natural Philosopher*. Dublin, Royal Dublin Society, 1981, 169–191. Although there is no reason to think that Tolstoy read it, the speech was published in Russian. See «Речь Тиндаля, профессора в королевском институте, в собрании Британского Общества поощрения наук, в Бельфасте», *Вестник Европы*, December, 1874, *Хроника*, 834–864.

11 See Anna Therese Cosslett, "Science and Value: The Writings of John Tyndall," *op. cit.* (9), 181–192 and Stephen S. Kim, *John Tyndall's Transcendental Materialism and the Conflict between Religion and Science in Victorian England*. Lewiston, NY, Mellen University Press, 1996.

Скажу раз навсегда, что естествоиспытателю нет дела до каких бы то ни было преднамерений и целей природы. Исследуя природу он должен донскиваться, почему, а не для чего происходят различные явления в ней, и ему, чаще чем кому либо другому, приходится оглянуться съ восторгом и удивлением на чудеса, окружающие его, и сознаться, что все его исследования не могут привести к окончательному разрешению возбужденных вопросов.¹²

Although here and in general the Russian translation mutes the poetic, philosophical side of the work,¹³ Tolstoy clearly grasped both Tyndall's respect for philosophy and his understanding of the limits of science. In 1877–78, when he was planning a work in the form of a dialogue called "Interlocutors" [*Собеседники*; PSS17: 369–85], he cited Tyndall (along with John Stuart Mill, German physician and physiologist *Emil du Bois-Reymond*, and others) as the type of the "natural scientist, who recognizes the need for [metaphysical or philosophical] foundations"; and he contrasts this type to the "Positivist," who believes in "progress," but rejects the need for "foundations."¹⁴

Despite Tolstoy's respect for Tyndall as a true scientist both in "Interlocutors" and, by implication, in chapter 14, book 1 of *Anna Karenina*, in chapter 27 his character Levin recalls "his disapproval of Tyndall for his self-satisfaction at how cleverly he carried out his experiments and for the fact that he lacked a philosophical point of view" [свои осуждения Тиндалю за его самодовольство в ловкости производства опытов и за то, что ему не достает философского взгляда]. Levin's criticisms have two functions in the novel. They alert the reader to the fact that the thermodynamics which are the subject of Tyndall's

12 *Heat*, 96, 58–59.

13 In the passage just quoted, for instance, the Russian translator substitutes "естествоиспытатель" (natural scientist) for "natural philosopher," and in the introduction, where Tyndall calls his subject "the philosophy" of heat, he substitutes the word "учение" (doctrine). The editor of the Russian translation, A. P. Shimkov, born (in 1839) a generation after Tyndall, and himself a scientist who wrote his own dissertation (defended in 1868) on heat and electricity, seems to have been more strictly an empiricist. Although the unidentified translator, who certainly worked in close collaboration with Shimkov and in fact may have been him (see PSS 48, 509), reports that he has changed only a little in his translation (see *Теннота*, vii), many passages are significantly shortened and altered in ways I have just been indicating. The overall result is a more neutral, less poetic tone.

14 PSS 17, 369 «естественник, признающий необходимость основ» and «Позитивист. . . прогресс, но отрицание нужды в основ[ах].»

book might have philosophical implications that would provide a "foundation" for Tolstoy's novel; and at the same time they distance the novel from Tyndall as a possible source of that foundation. Leaving aside the anxiety of influence that Tolstoy always felt keenly, his rhetorical strategy requires that his ideas be seen as not derived from *книжки* (a derogative term for 'books'). In this sense, and to this extent, he too is an empiricist. He no doubt liked and trusted Tyndall's science precisely because over and over again Tyndall reasons from such homely facts as the one that Levin in his discussion with Vronsky adduces in his example of friction produced when tar is rubbed against wool.

A few lines after his first mention of Tyndall's book, Levin engages with one of its most important transcendental assumptions. In the very first paragraph of his opening chapter, Tyndall asserts that in nature there is an "interdependence of natural powers generally."¹⁵ Levin agrees with Tyndall, and offers an explanation of how human beings might know this outside the limits of reason.

"Well, fine, so electricity and heat are one and the same; but in solving an equation can we substitute one quantity for another? No. So what then? The connection among all the forces of nature nonetheless is felt instinctively."

«Ну хорошо, электричество и теплота одно и то же; но возможно ли в уравнении для решения вопроса поставить одну величину вместо другой? Нет. Ну так что же? Связь между всеми силами природы и так чувствуется инстинктом...»

In mathematical formulas, we cannot substitute one sum for another; science, based on mathematics and logic, therefore cannot connect directly to the unity of all in which both Tolstoy and Tyndall believe. Human beings can only appreciate this unity through what Levin calls "instinct."

15 *Heat*, 14 "For by mastering the laws and relations of heat, we make clear to our minds the interdependence of natural forces generally. Let us, then, commence our labours with heart and hope: let us familiarize ourselves with the latest facts and conceptions regarding this all-pervasive agent, and seek diligently the links of law which underlie the facts and give unity to their most diverse appearances"; *Теплота*, 1 "Узнавая законы и свойства теплоты, мы вообще уясняем себе соотношение между всеми естественными силами. Примем же за труд бодро и с надеждою, познакомимся поближе с новейшими открытиями и понятиями об этом всюду проникающем деятеле, и станем прилежно искать законов, которым подчинены явления, и единства в их разнообразии."

Tyndall's equivalent to Tolstoy's "instinct" is an "implanted" "love of order."

If we succeed here, we shall satisfy, to an extent unknown before, that love of order and of beauty which, no doubt, is implanted in the mind of every person here present.

Если мы успеем в этом деле, то этим удовлетворим, более чем это возможно было до сих пор, той любви к стройности и красоте, которая, по моему мнению, присуща каждому.¹⁶

The translator's "присуща каждому" is good, but Tolstoy's "instinct" is an even better rendering of the English 'implantation'. The Kantian suggestion in both cases is that the knowledge and love of order in human beings is not an attribute of human reason, but is directly imparted in some way by a Supreme Being.

If we now return to chapter 27, we see that it depicts both the forces of nature in life and the ways in which they can be ordered.

He listened to Agafya Mikhailovna's tale of how Prokhor had forgotten God, and with the money that Levin had given him to buy a horse, had drunk day and night and had beaten his wife almost to death; he listened and read a book and remembered the full course of the thought that the book had aroused in him. It was Tyndall's book on heat. He remembered his disapproval of Tyndall for his self-satisfaction at how cleverly he carried out his experiments and for the fact that he lacked a philosophical point of view. And suddenly a joyful thought floated up: "In two years I'll have two Dutch cows in my herd, Pava herself might still be alive, there will be twelve daughters by Berkut, and these three mixed in for show. . .Marvelous!" He took up his book again.

"Well, fine, so electricity and heat are one and the same; but in solving an equation can we substitute one quantity for another? No. So what then? The connection among all the forces of nature nonetheless is felt instinctively. . . It will be especially nice when Pava's daughter is already a red-mottled cow, and the whole herd with the three in it. . . Wonderful! I'll go out with my wife and guests to meet the herd... My wife will say, 'Kostya and I look after

¹⁶ *Heat*, 14; see *Теплота*, 1.

this calf like a baby.' 'How could this possibly be of interest to you?' asks a guest. 'Everything that interests him, interests me.' But who is she? -- And he remembered what had happened in Moscow. ... -- But what can I do?.. I'm not to blame. But from now on things will go differently. It's nonsense that life won't allow things, that the past won't allow them. You have to fight to live better, much better..." He lifted his head slightly and meditated. Old Laska, still not having spent her joy at his return and having run out into the yard to bark, returned, wagging her tail and bringing in with her the smell of fresh air, she went up to him and thrust her head under his hand, whining piteously and demanding to be patted.

Он слушал разговор Агафьи Михайловны о том, как Прохор Бога забыл, и на те деньги, что ему подарил Левин, чтобы лошадь купить, пьет без просыпу и жену избил до смерти; он слушал и читал книгу и вспоминал весь ход своих мыслей, возбужденных чтением. Это была книга Тиндаля о теплоте. Он вспоминал свои осуждения Тиндаля за его самодовольство в ловкости производства опытов и за то, что ему не достает философского взгляда. И вдруг всплывала радостная мысль: «через два года будут у меня в стаде две голландки, сама Пава еще может быть жива, двенадцать молодых Беркутовых дочерей, да подсыпать на казовый конец этих трех — чудо!» Он опять взялся за книгу.

«Ну хорошо, электричество и теплота одно и то же; но возможно ли в уравнении для решения вопроса поставить одну величину вместо другой? Нет. Ну так что же? Связь между всеми силами природы и так чувствуется инстинктом... Особенно приятно, как Павина дочь будет уже красноногою коровой, и всё стадо, в которое подсыпать этих трех... Отлично! Выйти с женой и гостями встречать стадо... Жена скажет: мы с Костей, как ребенка, выхаживали эту телку. Как это может вас так интересовать? скажет гость. Всё, что его интересует, интересует меня. Но кто она? — И он вспоминал то, что произошло в Москве... — Ну что же делать?.. Я не виноват. Но теперь всё пойдет по новому. Это вздор, что не допустит жизнь, что прошедшее не допустит. Надо биться, чтобы лучше, гораздо лучше жить...» Он приподнял голову и задумался. Старая Ласка, еще не совсем переварившая радость его приезда и бегавшая, чтобы полаять на дворе, вернулась, махая хвостом и внося с собой запах воздуха, подошла к нему, подсунула голову под его руку, жалобно подвизгивая и требуя, чтоб он поласкал ее.

In the previous chapter, Levin has examined the fine newborn calf of Pava the cow, and he is still thinking about her. Sexual energy is the most powerful "force" in the lives of animals: in this sense they are machines powered by a force equivalent in the inorganic world to heat. To establish this metaphor, in the passage above Tolstoy has Levin move twice in his thoughts directly from Tyndall's book to Pava. In the second instance, thoughts of Pava segue into dreams of married life, and Levin declares to himself that, despite Kitty's refusal of his proposal, he will fight on for marriage and happiness. Levin too is a living being, and in this fundamental way he is no different from Pava or the bull Berkut. Like all animals, we cannot exist without motion, and therefore energy. Even the process of thinking requires it; Tolstoy indicates this in the above passage with dots as his thinking shifts gears. On the other hand, the selective breeding that Levin, like his creator Tolstoy, practices in his farming, and, on another level, his desire to establish his own family, are ways that human beings, animals with big brains, organize their own energies and those of others. The breeding is a form of practical science; marriage represents the moral and social organization of sexual energy to form the basis of human society.

The actions of Laska the dog are present in the second paragraph *in order to underscore the metaphorical relation between the actions of thermodynamics and feelings*. Laska's joy at the reappearance of her master is not yet fully depleted, so she has howled it away in the yard; still her energy is not fully spent, and only after demanding caresses can she finally curl up to rest at the end of the chapter.

On the moral level, Laska's behavior is related to that of Prokhor as reported by Agafya Mikhailovna at the beginning of our passage. Given the chance, with Levin's money burning a hole in his pocket, Prokhor also spends excess energy. Unlike Laska's, though, his actions are bad; as Agafya Mikhailovna puts it, he "forgot God" [Бог забыл]. This phrase is a peasant expression for the love of, or 'instinct' for moral order that is not accessible to science, but in which both Tolstoy and Tyndall believe. When characters like Anna Karenina "forget God" in the novel, they lose access to the moral instinct that guides their feelings. This process is underway in Anna in chapters 28–30, parallel in time to the ones on Levin's estate that we are parsing, as Anna rides back to Petersburg on a train powered by the actions of thermodynamics. In contrast to Anna, Levin, back home on his farm, is still fully *compos mentis*. The "instinct" of

moral order remains fully operational in his mind: "He felt that in the depth of his soul something was settling down, taking measures, and adjusting itself [Он чувствовал, что в глубине его души что-то устанавливалось, умерялось и укладывалось]. These words describe the process of moral reasoning by which human beings, when they are listening to it, live and manage "forces" that at other times overwhelm them.

Heat as a Form of Motion – the only book about hard science that we know for sure Tolstoy read – would also have impressed him because Tyndall embraced transcendental beliefs which Tolstoy shared. Having learned about the new science of thermodynamics in 1872 from Tyndall's book, Tolstoy makes it a metaphor in *Anna Karenina* for the force of passions that may destroy human beings. With our large brains that are also, as illustrated by the actions of Levin's mind, gateways to a higher moral reality, we alone among the animals are given the means to control our own "heat." When we give up those means, we are less human for having done so. On the other hand, without passion, life could not flourish either in individuals or in the human species. In the metaphorical system of *Anna Karenina*, thermodynamics represent an equivalent to the relations of passion and moral law in the human soul, or, as Tolstoy might have put it, to moral instinct.