

14 Emancipation

Cambridge, June, 1913–April, 1914

We returned to New Hampshire that summer and I had a good chance to rest up for the year to come and to acquaint myself further with the mountain region. The mountains were an eternal delight to me. They are beautiful even now, but in those days before the war and the threat of war, before the extensive lumbering which the two World Wars called into being, before the motorcar and its reduction of distances to nothing and much of the roadside to a rural slum, the country was beautiful indeed. As one whose physical activity is somewhat limited by his increasing years and the vicissitudes of an active life, I look back with a certain sadness to a time when the mountainsides were as nothing to my efforts, and when twenty minutes of rapid striding would carry me to a bank of lacy wood sorrel. From this bank I could look up to the boles of mighty trees, each fit to be a mast of a king's ship. I felt a sense of romantic union with the hills and the forest.

One of my chief domestic tasks was to fetch the mail and the milk. Every day I tramped two miles to the little post office at Whiteface village and two miles back again, part of it with the milk pail digging into the palms of my hands. I was eager to go for the mail because the key to adventure awaited me there: my letter of acceptance from Russell.

Professor Huntington had recommended to me two mathematical books for summer reading before starting my work with Russell. They were Bôcher's *Modern Algebra* and Veblen and Young's *Projective Geometry*. The first book did not impress me so much then, although I have reread it many times and found it most useful as an introduction to matrix theory. The second book I took to my heart as the most consistent exposition of the postulational standpoint that I had found anywhere. I worked out almost all the problems of the first volume, which was the only one existing at the time. While the book had two authors, Young of Dartmouth was already somewhat invalidated, and the personality of the book was chiefly that of

Professor Oswald Veblen of Princeton. He was the founder of the great mathematical school of Princeton as well as the scientific founder of the Institute for Advanced Study, also at Princeton. He is without doubt one of the fathers of American mathematics.

The entire family was to go abroad for the winter. We had been tempted to go earlier, and had even gone so far as to make some negotiations for tickets, but this had been at the time of the Balkan Wars, and my father had considered the political heavens too stormy to risk it. Now, however, we really did embark. We had picked a boat of the Leyland Line, a small twig of the great I.M.M. combine, which ran cattle boats and carried a few passengers between Boston and Liverpool. I can remember that in those lucky days it was possible for fifty dollars to book a cabin for oneself and to have the run of the boat.

We left Cambridge by the subway and the East Boston Tunnel for that desolate region of slums and docks known as East Boston. Here our ship was tied up. I remember that it hurt me to run across a maze of railroad tracks with heavy baggage in my hands, under the conflicting and self-contradictory orders of my father.

It was a heavenly relief to go aboard. The white-jacketed stewards served us biscuits and beef tea even before we had left the harbor. While we were still in the old familiar Boston harbor, with the Bunker Hill monument showing plain, we were already in a foreign territory: the manners of the stewards, the customs of eating and drinking, the very language that people spoke, were all new and strange to us.

My parents had maintained an almost instinctive position that the English they spoke and had learned was the only proper English language, and that all other forms of the speech had something illegitimate about them. I daresay Father would have made the adjustment to Basque or Tibetan more readily than to the change between the English of the American Boston and the English of London or of Lancashire.

For it was the English of Lancashire that predominated on the boat. It is a language that I have heard many times since; and although it is perhaps not the most beautiful of all forms of English, it has something of the winning quality of good bread and good cheese.

The passengers were few, and the radio bulletins of news of the world were not obviously obtrusive. The trip was long, uncrowded, and peaceful. The food was adequate but stodgy. There was nothing to watch except marbling waves, or the casual flirtation of an old sea captain's daughter with the wireless officer. With a little shuffleboard and a little chess, we made the

trip very comfortably. And one morning we found ourselves tied up at the landing stage in the Mersey.

The formalities of landing were simple. It was a Sunday morning, and after we had bought our tickets for London, we had a meal of bread and cheese at a pub, and took off. I looked out of the train window, and renewed the impressions of the English countryside I had seen before as a child. In particular, I recalled the ivy, the smaller farms and fields, the brick and stone buildings, the less wooded landscape, and the seemingly smaller trees.

From Euston Station we made our way to Bloomsbury, which was then even more than now the natural barracks of the academic visitor of moderate means. We put up at a hotel at Southampton Row, which I recognized many years later as the scene of one of Graham Greene's more dismal tales of refugees and espionage. With the aid of our Baedeker, we found one or two possible vegetarian restaurants. We looked up father's old friend, Israel Zangwill in his lodgings in the Temple, and made plans for my stay in Cambridge. The rest of the family was to go to Munich for the winter. Constance was to study art and Bertha was to go to a private school for teen-age girls.

Father went up with me to Cambridge. We looked up Bertrand Russell in his rooms at Trinity, and he helped us to orient ourselves. While we were in Russell's rooms a young man came in whom my father took to be an undergraduate and who excited no particular attention in us. It was G. H. Hardy, the mathematician who was to have the greatest influence on me in later years.

It appeared that it was not necessary for me to matriculate inasmuch as Harvard and Cambridge had certain agreements concerning the privileges of advanced students. I therefore could not expect to live in college and it was necessary to find a landlady for me in town. My father did not spend much effort in placing me in lodgings. In one place he asked me in the presence of the landlady what I thought of the place. I was caught. I was forced to tell him on leaving that it seemed to me one of the most miserable, dirty, and inconvenient lodgings I had seen. Instead of canceling the word-of-mouth agreement that we had made, Father trusted to the improbability of my ever meeting the landlady again, and left matters to take care of themselves. He was in a hurry to catch the train back to London. Finally I was left *faute de mieux* with another slovenly little landlady in New Square. She had made some agreement to furnish me at the minimum price with the vegetables and cheese necessary for my vegetarian life.

It was at that time impossible for the American boy with anything like a normal bringing up to be completely free from a certain Anglophobia.

The wars between the two countries, including the undeclared hostilities of our Civil War, were united with a certain latent enmity of tone in some of the English reviews in such a way as to comb a Yankee's hair the wrong way. More than all of these influences, the efforts of a few ardent American Anglophiles had the effect of making the American boy brandish the flag and let the eagle shriek.

Yet later, when I came back from England, I had learned that there was a very close and permanent bond between myself and England, and more especially between myself and Cambridge. I had learned that the English were very different from the Anglophiles in that, once one had penetrated the protective layer which they assumed against Americans and other foreigners, they were quite willing to admit that there were aspects of England in which God was not in his Heaven and something was definitely wrong with the world. I found that the English were as distrustful as I was of the Anglophiles' cure-all, which was to import English institutions to America, cut up into numbered pieces and wrapped in straw, as if they were Tudor manor houses. In short, I found that the England of the Anglophiles was a cloud-cuckoo-land existing neither on one side of the ocean nor on the other, but merely in the souls of the elect.

I came to find that among the institutions in which I had lived those which were most similar to English life and cast the most light upon it were in many cases the most specifically American institutions of my childhood. The country life of Ayer and Harvard, although it was a country life with neither squire nor established vicar, was a country life with very English roots. My New Hampshire farmer friends would probably have damned their opposite numbers in the Lake Country from here to Kingdom Come, and would have been received with similar objurgations; but despite the mutual hostile reserve and the difference in the dialects, the attitude would have been much the same on both sides. It would have taken only a few weeks of mutual contact for the one and the other to become aware that there was not terribly much difference between their attitudes or their presuppositions.

The England that I first saw was one which had not yet been shocked by World Wars and indeed which had remained at peace since the times of Napoleon, except for colonial wars and the major conflicts in the Crimea and South Africa. It was an England that was heaven for the rich and very close to hell for the poor. It was an England in which it was harder for a working man to become a scholar than it now is for a Mexican peon. This stratification and the snobbishness attendant on it—which was even more a masochism on the part of the poor than a sadism on the part of

the rich—is something which, while some elements of it may remain, has passed out of the picture as completely as the France of the *ci-devants* did at the time of the French Revolution.

My landlady gave me my first introduction to the sort of English snobishness and subservience that was then rife but which has since become much less common. She, a slovenly, mean little woman, did not approve of our neighbor two doors away. She said, "Ow, 'e's only a tridesman's son," even though the rank of tradesman was something vastly higher than any to which she could ever lay claim.

The university men of 1913 were young sprouts of the aristocracy, or at least of a well-established middle class. Since then I have seen the rise of the subsidized undergraduate. The working class boy, stunted by undernourishment in his early childhood and in the womb of his mother, with bad teeth and horny hands, wearing a hand-me-down suit and big clumping boots, has come to be supported by exhibitions and scholarships through his primary and secondary schools and his university. These are the men I now know as young dons; accepted because of their ability and character, but often cursed with a social awkwardness which they have had to unlearn with a very genuine and conscious effort. More than one of them has confided to me the pains which he had to take at the beginning to develop a good line of high-table back-chat.

The phenomenon of which I speak is spread far beyond the cloistered courts of England's university. It is a relief to me now to be able to sit on a park bench and talk with an English workingman who will neither resent me as a "toff" nor whine for some advantage. Indeed, to the present generation of Englishmen who read this book it may seem that I am accusing their predecessors of vices that are so far from their own make-up that the newer Englishman is unable to conceive them. But I can say that as I have revisited England year by year, I have seen servility decline and a universal manliness and comradeship come to the front.

So much for my reminiscent view of Cambridge. At the time of my first arrival, after spending a few days learning the lay of the land, I was hopelessly and utterly lonely. Term had not yet begun, so that there was no chance for me to make new acquaintances. I wandered about the colleges and in the Backs, and the utter beauty of the buildings and the foliage was more than a little solace to my nostalgia. Meanwhile I met one or two undergraduates: a Hindu who lodged in the same house as I and a young Englishman two houses away. They both belonged to St. Catherine's College, and they invited me to participate in the meetings of a discussion club belonging to that college.

I have no specific recollection of what was said and done at that club at St. Catherine's. I remember that I was asked to read a paper and to say a few words. I did so, and I have a dim memory that I covered myself with shame and confusion. I certainly spent the first few weeks in Cambridge in learning the English point of view, and in sloughing off some of the most impermissible of my many awkwardnesses. I know that my callow nationalism got me into more than one childish quarrel.

Nevertheless, I feel that this was a critical period in my formation, and that I owe a great deal of gratitude both to my teachers and to my undergraduate friends of those days. I found in them a receptiveness and a tolerance of ideas which had not been characteristic of Harvard, and a challenging dialectical skill in presenting them.

Although I had very good times with several of the young undergraduates in their clubs and social groups and "squashes" and at tea in their rooms, there was a group of slightly older men on the boundary between the undergraduate and the don who were particularly kind and helpful to me. One of them was F. C. Bartlett, now Sir Frederic Bartlett, and a professor of psychology at Cambridge University. My impression is that he had come from one of the more modern English universities, and that at that time his prospects for a career were not particularly bright. I found his steady quietness and his refusal to be stampeded by any argument a healthy tonic for my own impulsiveness. His criticism was always fair and not to be bribed by friendliness. I am glad that our relations have been kept up over these many decades, and that the basis for them has not changed in any essential way.

Bernard Muscio was another one of my seniors who was very kind to me and who helped me to grow up. He was born in Australia, where he had obtained his first degree. His alertness and quickness of reaction made him an important figure in the Moral Science Club, better known as the Moral Stinks Club, and more than once we joined forces in a dialectic assault on those with whom we did not agree.

Two of my early associates of a very different kind were C. K. Ogden and I. A. Richards. Ogden, who had succeeded in prolonging an undergraduate career over an unheard-of period of years, then lived above a gateway in Petty Cury, where his rooms were adorned with photographs of practically every important man in intellectual England. Among the manifold facets of his being, he was a journalist and he solicited from me an article which he published in the *Cambridge Magazine*, and whose nature I have entirely forgotten in the course of these many years. Richards and he were close companions, and I believe that during my stay in Cambridge the collaboration

which later led to the publication of *The Meaning of Meaning* had already begun. At any rate, their interest in semantics was manifest.

One of the things that most impressed me at Cambridge was the rather too cloistered atmosphere of the English university scholar. He had come from a school devoted to the needs of adolescence, which constituted the most essential and characteristic part of his education, to a university built according to a scheme closely paralleling that of his adolescence. If he were successful, a career was open for him for his whole life under much the same auspices.

The English universities, although they were no longer exclusively the celibate, clerical institutions which they had been in the earlier nineteenth century, still retained much of their monkish character. Thus the young man going into mathematics carried into his valuation of mathematical work a great deal of the adolescent “play-the-game” attitude which he had learned on the cricket field. This, although it contained much of good, and led to a devotion to scholarship difficult to find in our more worldly life, was not conducive to a fully mature attitude toward his own work.

When G. H. Hardy—as the reader may easily find in his book, *A Mathematician's Apology*—values number theory precisely for its lack of practical application, he is not fully facing the moral problem of the mathematician. It takes courage indeed to defy the demands of the world and to give up the fleshpots of Egypt for the intellectual asceticism of the pure mathematician, who will have no truck with the military and commercial assessment of mathematics by the world at large. Nevertheless, this is pure escapism in a generation in which mathematics has become a strong drug for the changing of science and the world we live in rather than a mild narcotic to be indulged by lotus eaters.

When I returned to Cambridge as a mature mathematician after working with engineers for many years, Hardy used to claim that the engineering phraseology of much of my mathematical work was a humbug, and that I had employed it to curry favor with my engineering friends at the Massachusetts Institute of Technology. He thought that I was really a pure mathematician in disguise, and that these other aspects of my work were superficial. This, in fact, has not been the case. The very same ideas that may be employed in that Limbo of the Sages known as number theory are potent tools in the study of the telegraph and the telephone and the radio. No matter how innocent he may be in his inner soul and in his motivation, the effective mathematician is likely to be a powerful factor in changing the face of society. Thus he is really dangerous as a potential armorer of the new

scientific war of the future. He may hate this, but he does less than his full duty if he does not face these facts.

In laying out my course, Russell had suggested to me the quite reasonable idea that a man who was going to specialize in mathematical logic and in the philosophy of mathematics might just as well know something of mathematics. Accordingly, I took at various times a number of mathematical courses, including one by Baker, one by Hardy, one by Littlewood, and one by Mercer. I did not continue Baker's course long, as I was ill prepared for it. Hardy's course, however, was a revelation to me. He proceeded from the first principles of mathematical logic, by way of the theory of assemblages, the theory of the Lebesgue integral, and the general theory of functions of a real variable, to the theorem of Cauchy and to an acceptable logical basis for the theory of functions of a complex variable. In content it covered much the same ground that I had already covered with Hutchinson of Cornell, but with an attention to rigor which left me none of the doubts that had hindered my understanding of the earlier courses. In all my years of listening to lectures in mathematics, I have never heard the equal of Hardy for clarity, for interest, or for intellectual power. If I am to claim any man as my master in my mathematical training, it must be G. H. Hardy.

It was while I sat in this course that I wrote the first mathematical paper which I saw in print. Looking back on this paper, I do not think it was particularly good. It was on a reordering of the positive integers in well-ordered series of large ordinal numbers. Still, it gave me my first taste of printer's ink, and this is a powerful stimulant for a rising young scholar. It appeared in the *Messenger of Mathematics*, which was published in Cambridge, and I had the satisfaction of seeing it through press on the spot.

I attended two courses of Bertrand Russell. One was an extremely elegant presentation of his views on sense data, and the other a reading course on the *Principia Mathematica*. In the first course I could not find myself able to accept his views on the ultimate nature of sense data as the raw material for experience. I have always considered sense data as constructs, negative constructs, indeed, in a direction diametrically opposite to that of the Platonic ideas, but equally constructs that are far removed from unworked-on raw sense experience. Apart from our disagreement on this particular matter, I found the course new and tremendously stimulating. In particular, I found myself introduced to Einstein's relativity, and to the new emphasis on the observer which had already revolutionized physics in Einstein's hands and which was to revolutionize it even more completely in the hands of Heisenberg, Bohr, and Schrödinger.

There were only three of us in Russell's reading course, so that we made rapid progress. For the first time I became fully conscious of the logical theory of types and of the deep philosophical considerations which it represented. I became shamefully aware of the shortcomings of my own doctoral thesis. Nevertheless, in connection with the course I did one little piece of work which I later published; and although it excited neither any particular approval on the part of Russell nor any great interest at the time, the paper which I wrote on the reduction of the theory of relations to the theory of classes has come to occupy a certain modest permanent position in mathematical logic. It was published soon after I was nineteen in the *Proceedings of the Cambridge Philosophical Society*, and this paper represents my true introduction into mathematical thinking and writing.

It is not very easy for me even at this distance to write of my contact with Bertrand Russell and of the work I did under him. My New England puritanism clashed with his philosophical defense of libertinism. There is a great deal in common between the libertine who feels the philosophic compulsion to grin and be polite while another libertine is making away with the affections of his wife and the Spartan boy who concealed the stolen fox under his cloak and had to keep a straight face when the fox was biting him. This does not endear the philosophical libertine to me. The old-fashioned rake had at least the fun of don't-care; the puritan is working within a code of known restrictions which tends to keep him out of trouble. The philosophical rake is as bound as the puritan, and has to steer a course in as narrow a channel; but it is a channel which is poorly lighted and poorly buoyed. I expressed myself very freely in this matter, and I am quite certain that Russell heard my comments to a friend one dark night when we met on the street as we were returning to his quarters. Though he never gave a sign of hearing me, this experience rendered me particularly apprehensive of his criticism.

I know that Russell regarded my Harvard thesis as inadequate, in that I did not enter sufficiently into the problem of logical types and into the paradoxes that mark the difficulties of establishing a fundamental postulational system for logic, as opposed to a derived postulational system for a specific construction with a recognized logic. As for myself, I already then felt that an attempt to state all the assumptions of a logical system, including the assumptions by which these could be put together to produce new conclusions, was bound to be incomplete. It appeared to me that any attempt to form a complete logic had to fall back on unstated but real human habits of manipulation. To attempt to embalm such a system in a completely adequate phraseology seemed to me to raise the paradoxes of

type in their worst possible form. I believe I said something to this effect in a philosophical paper which later appeared in the *Journal of Philosophy, Psychology and Scientific Method*. Bertrand Russell and the other philosophers of the time used to term this journal "the Whited Sepulchre," an allusion to the simple white paper cover in which it appeared.

My heresies of that time have been confirmed by the later work of Gödel, who has shown that within any system of logical postulates there are questions that cannot receive a positive answer through these postulates. That is, if one answer to these is consistent with the original postulates, it can be proved that the opposite answer is equally consistent with them. This treatment of the problem of decision has rendered obsolete a considerable part of the task undertaken by Whitehead and Russell in the *Principia Mathematica*.

Thus logic has had to pull in its horns. The limited logic which remains has become more nearly a natural history of what is in fact necessary for the consistent working of a system of deduction than a normative account of how it should be worked. Now, the step from a system of deduction to a deductive machine is short. The *calculus ratiocinator* of Leibnitz merely needs to have an engine put into it to become a *machina ratiocinatrix*. The first step in this direction is to proceed from the calculus to a system of ideal reasoning machines, and this was taken several years ago by Turing. Mr. Turing is now occupied in the actual construction of computing and logical machines, and has thus completed a further step in the direction of the *machina ratiocinatrix*. The remarkable thing is that I myself, quite independently of him, have recently also taken the step from my early logical work to the study of the logic of machines, and have thus again met the ideas of Mr. Turing.

To go back to my student days with Russell, although there were many points of disagreement and even of friction, I benefited enormously by them. His presentation of the *Principia* was delightfully clear; and our small class was able to get the most out of it. His general lectures on philosophy were also masterpieces of their kind. Besides his consciousness of Einstein's importance, Russell also saw the present and future significance of electron theory, and he urged me to study it, even though it was very difficult for me at that time, in view of my inadequate preparation in physics. I do not recall, however, that he was quite as explicit and accurate in his valuation of the coming importance of quantum theory. It must be remembered that the epoch-making work of Nils Bohr was very new at the time, and that in its original form, it did not lend itself particularly to a philosophical interpretation. It was only some twelve years later, in 1925, that the conflicting

currents aroused by the earlier work by Bohr began to be resolved and that the ideas of De Broglie, Born, Heisenberg, and Schrödinger showed that quantum theory was to mark as great a revolution in the philosophical presuppositions of physics as had the work of Einstein.

On the social side, the most distinctive aspect of my contact with Bertrand Russell lay in his Thursday evening parties, or as they were called in view of the number of guests, his "squashes." A very distinguished group of men foregathered there. There was Hardy, the mathematician. There was Lowes Dickinson, the author of *Letters from John Chinaman* and *A Modern Symposium*, and the bulwark of the liberal political opinion of the time. There was Santayana, who had left Harvard for good to take up his residence in Europe. Besides these, Russell himself was always an interesting talker. We heard much of his friends, Joseph Conrad and John Galsworthy.

Three of the most important moral science dons with whom I came in contact, all fellows of Trinity, were known as the Mad Tea Party of Trinity. Their identities were unmistakable. It is impossible to describe Bertrand Russell except by saying that he looks like the Mad Hatter. He has always been a very distinguished, aristocratic Mad Hatter, and he now is a white-haired Mad Hatter. But the caricature of Tenniel almost argues an anticipation on the part of the artist, even though I am told that the original of Lewis Carroll's description and Tenniel's caricature was an actual hatter at Oxford, and that his "Anglo-Saxon Attitudes" were really the effect of an industrial mercury poisoning. McTaggart, a Hegelian and the Dr. Codger of Wells's *New Machiavelli*, with his pudgy hands, his innocent, sleepy air, and his sidelong walk, could only be the Dormouse.

The third, Dr. G. E. Moore, was a perfect March Hare. His gown was always covered with chalk, his cap was in rags or missing, and his hair was a tangle which had never known the brush within man's memory. Its order and repose were not improved by an irascible habit of running his hand through it. He would go across town to his class, with no more formal footwear than his bedroom slippers, and the space between these and his trousers (which were several inches too short) was filled with wrinkled white socks. He had the peculiar habit of emphasizing his words on the blackboard by running them through with chalk-marks instead of underlining them. He used to make the most withering remarks in philosophical discussion, in a breathless but smiling and unperturbed manner. "Now really," he would say, "you can't expect any sane person to hold a view like *that!*" On at least one occasion at a meeting of the Moral Science Club, he brought to a state of tears Miss E. C. Jones, the Mistress of Girton, lovingly known as

“Mammy Jones” to the unregenerate. Yet when I came to know him and to depend on his criticism of my work, I found him kind and friendly.

There is among the dons a premium on individuality which often becomes a premium on eccentricity. I have been told by some of my Cambridge friends that they thought that certain of my less conventional habits had been adopted with a view of acquiring acclaim. At any rate, the fact is there; and while I do not think that Russell’s mannerisms (which were very slight) were any more than a genuine manifestation of his aristocratic background, I am quite certain that the untidiness of G. E. Moore and the academic unpracticalness of McTaggart had been cultivated very carefully. They had the flavor of a crusty old port—a flavor that does not reach its full perfection without the expert intervention of the cellarman.

During the term I made quite a number of acquaintances, and my mantelpiece was adorned with the cards of discussion clubs. I had an invitation to visit some friends of Mr. Zangwill, who lived about fifteen miles out in the country; and I turned up there, dusty and bedraggled, after walking the entire distance. In general, by the end of the term I was finding my social place in Cambridge. I had even begun to have a certain fondness for my new environment.

Yet most of the time I was desperately uncomfortable in a physical sense. My landlady had been paid little enough; and yet that could hardly excuse the raw carrots and inedible Brussels sprouts which she gave me in lieu of proper vegetarian meals. I eked out my diet with occasional penny bars of chocolate and the like, but the net result was that I was half starved.

In my leisure hours, and I had many of them, the Union and its library were my salvation. My membership in the Harvard Union had enabled me to make use of the facilities of its Cambridge counterpart, and I even took part in one or two of the famous undergraduate debates. Moreover, some of my friends occasionally asked me to dine at the Union, so that I learned something of the amenities of an English club.

I found the Cambridge environment far more sympathetic to me than I had found that of Harvard. Cambridge was devoted to the intellect. The pretense of a lack of interest in intellectual matters which had been a *sine qua non* of the life of the respectable Harvard scholar was only a convention and an interesting game at Cambridge, where the point was to work as hard as you could in private while pretending to exhibit a superior indifference. Furthermore, Harvard has always hated the eccentric and the individual, while, as I have said, in Cambridge eccentricity is so highly valued that those who do not really possess it are forced to assume it for the sake of appearances.

Thus when the beginning of December came and I left to spend the Christmas holiday with my family in Munich, I was both happier and more of a man than I had ever been. The trip was a lark. I crossed to the Continent by the Harwich route, and did not have a bad passage. I was up well before dawn to see the lights of the Hook of Holland, and I was pleasantly bewildered by hearing the Dutch speech of the porters. I breakfasted in the big, empty, echoing railway station, and dawn saw me well on the way toward Rotterdam. I don't know by what use of English, bad German, and gestures I persuaded a porter to take my trunks across town in a barrow to another station, but I soon found myself bound for Cologne, uncomfortably seated in a third-class compartment, all windows hermetically sealed, in an atmosphere that seemed to be made partly of commercial travelers and partly of tobacco smoke.

I arrived in Cologne in the early afternoon and found quarters for myself in a very cheap hotel, which I now believe to have been nothing more than a Kellnerheim. There was no way to get to Munich that day, so I took a walk about the town and tried to correlate my impressions with my memories of my childhood trip more than eleven years earlier. I found that in fact there was a good deal that I did remember: for example, the station, the bridge, and the cathedral.

I went to Munich the next day in a through carriage. I was delighted with everything that I saw on the way, from the forests with touches of snow on them to the villages and stations which looked to me like the illustrations accompanying the set of Anker building blocks I had played with as a child. My German was as yet insufficient to enable me to communicate with my fellow travelers, so I spent most of my attention on the landscape outside. The scenery along the Rhine was a reawakening of my memories of the former trip of my boyhood, and the wooded mountains of Franconia had not a little suggestion for me of the White Mountains.

My family met me at the Munich station and took me to the old-fashioned but centrally placed apartment that they had rented. Although the apartment house had long been invading America, I had never lived in one up to that time, and the apartment-house mode of life was to my parents something altogether undesirable. Indeed, I had been brought up to regard the city life of the apartment as a deprivation and a misfortune for the people who had to resort to it. The fact that our landlady spoke no English, and that my mother was not confident of her German, did not ease matters.

My father spent his time working at the Bavarian Court and National Library. Away from the Harvard library (where by long experience he could

put his hand on every book he wanted), and under the usual restriction of exclusion from the stacks and the eternal pinpricks of the abominable system of cataloguing which was then standard outside the United States, his work languished. Moreover he was disappointed that his name was less well known by his European colleagues than he had expected, and that he had few personal contacts with them or none at all. To some extent this was only to have been expected, for my father had a very individual way of working, and he had no hesitation in contradicting flatly the pre-suppositions of the scholars of his time and in writing in a blunt manner which was an affront to their sense of self-importance. Germany was then a hierarchical form of society, from the workingman at the bottom to the Kaiser on top; and within the greater frame the university people were a lesser hierarchy. For a mere foreigner with no place in this system to beard a whole school of learned German *Geheimrats* was a scandal beyond words. My father, who was a most sensitive man, could not fail to be aware of the atmosphere about him.

Until that time, my father had always been a great admirer of German culture and German education. Although he had resented the militarism and officialism that had developed since his own youth, he was fundamentally a German liberal of the middle of the last century. His Russian Tolstoyism was an influence that ran parallel to the German influences in his development and did not contradict them. He had for a long time looked forward to the period when he should return to Germany and be accepted as a great scholar within the German frame of things. When this did not occur, and he found himself rejected, or perhaps merely not accepted, this emotional longing turned to a hate which was as bitter as only a hate for a lost love can be.

My sisters had been properly placed in the appropriate schools. I do not remember through what vicissitudes of attempts at musical and artistic training my sister Constance had gone before she decided to work at the Kunstgewerbeschule, or school for industrial art. Bertha was placed at a fashionable and respectable girls' school, the Institut Savaète, where she made good progress in her general education and her understanding of things German. I do not remember quite how we disposed of Fritz's school time.

By now I had become sufficiently grown up to be a fairly acceptable comrade for my father. We went together to various lectures and beer-hall meetings where interesting subjects were being discussed. I remember one such meeting on international peace and understanding at which the speaker was David Starr Jordan, the famous ichthyologist and president of

Stanford University. I remember drinking my glass of beer and feeling very much the man among the German students.

My parents took me occasionally on their outings to the Plätzl and other cabarets; and I often went with my sisters to the movies, which were just beginning to give signs of their later development. There was also a small amount of visiting fairs and historical museums. However, my chief delight was the Deutsches Museum: a museum of science, engineering, and industry. Part of the exhibits were historical and old-fashioned; but the museum led the world in its demonstration of the technique of scientific experiments, which the visitor could actually work for himself behind the protecting glass cases by pulling strings or by turning knobs. There were some delightful old attendants there who were ready to put themselves at the service of the interested visitor, and to show him particular tidbits not always brought to the attention of the general public. I remember one in particular who put himself out to be nice to me; he possessed a few words of English and a most delightful Bavarian brogue.

The Deutsches Museum had an extremely modern scientific library; there I read assiduously the various works that Russell had assigned to me. I remember among them the original papers of Einstein. I have said that Russell was among the first philosophers to recognize the overwhelming importance of Einstein's work in that *annus mirabilis* 1905, in which he had originated the theory of relativity, solved the problem of the Brownian motion, and developed the quantum theory of photoelectricity.

Another delight of that vacation was the Englischer Garten, even in its snow-covered winter state. I remember the skaters on the pond near the Chinese Pagoda. I was not aware at the time that the Englischer Garten was laid out after the plans of a New England Yankee from Woburn, Massachusetts, the great and disagreeable Benjamin Thompson, Count Rumford, and paymaster for Benedict Arnold.

I returned to Cambridge in January. I felt myself already much more at home in the town, and much less lonely. I continued to distribute my time between philosophy and mathematics, and began a second paper for the Cambridge Philosophical Society. This time I tried to use the language of the *Principia Mathematica* to describe series of qualities, such as those found in the color pyramid, which escaped from a treatment of series given by Whitehead and Russell because they were not infinitely extensible in both directions. What I found necessary was a logical treatment of systems of measurement in the presence of thresholds between observations whose differences were barely noticeable. In the paper I used certain ideas related to those of Professor Whitehead, who was then at the University of London

and who had recently employed a new method of defining logical entities as constructs from entities of a primitive system possessing no particular specific properties rather than as the objects of a system of postulates. I wrote to Professor Whitehead for an appointment and visited him in his house in Chelsea, where I met the whole family. Little did I think at that time that Professor Whitehead was to end his long and useful career as my neighbor at Harvard University, and that as a very inept pupil of his daughter I was later to learn some of the rudiments of the art of rock-climbing in the crags of the Blue Hills and in the Quincy quarries.

I had intended to complete the year in Cambridge, but I found that Russell had been invited to Harvard for the second semester and that therefore I would be marking time in Cambridge during the May term. At Russell's own advice, I decided to finish the year at Göttingen, studying mathematics with Hilbert and Landau and philosophy with Husserl. I returned to Munich for the vacation between the last two terms. My father had already left for the United States, where he was consoled in his loneliness by the companionship of some younger colleagues in the German department, but my mother and the rest of the family were still in Munich.

During the year I had read that Harvard offered a number of prizes for essays by students, both undergraduate and graduate. I found that I was eligible to compete for one of the Bowdoin Prizes and submitted a rather skeptical essay, which I called "The Highest Good." It was intended as refutation, or at any rate as a denial, of all absolute ethical standards. Bartlett did not think much of it, either as a composition or as a philosophical essay, but at any rate it won one of the prizes. I am quite sure that Sir Frederic still regards this as a shortcoming of Harvard rather than as a success of my own.

My departure from England was marred by a very unpleasant experience with my landlady. When my father had made the arrangements with her, he had thought that he was committing me for a single term or less. However, by the custom of Cambridge the term is of a certain specified length, which is longer than the period known as full term, during which the students are supposed to be in residence, and all lodgings contracts are or were made for the longer period. As the second term drew to the end, I found my landlady insisting on this contract. From being demanding she became pressing, and from being pressing she became insulting. I retorted in kind, which made the matter worse. Some of my undergraduate friends with whom I consulted suggested a minor riot at my landlady's expense; but although I was foolish, I was not quite so foolish as that. When I tried to take one of my trunks out of the house on my own back, the landlady

impounded the other; and when I asked the police to help me in getting back my own property, they told me that it was a civil matter and that they could have nothing to do with it.

I had been living on an absolutely minimal sum, so that when I paid the landlady the sum necessary to redeem my trunk, I found that I did not have enough money left to get to Munich. I borrowed a small sum from the hall porter of the Union. Out of shame I borrowed too small an amount. The result was that when on the train down to Munich, I had to decide whether to have a cheese sandwich for breakfast and go hungry for lunch, or vice versa. I do not remember which way I decided it. The upshot of it all was that I landed in Munich with not a single coin in my pocket. Luckily the check room charges were paid on reclaiming the baggage, so I left my baggage at the station and walked over to our apartment.

I found matters rather in a crisis at the apartment. The smoldering friction between the landlady and my mother had burst into flame, now that my father was no longer there to help with his German. Mother went house-hunting, and after much effort we managed to find an apartment in the suburbs, well out toward the northern end of the Englischer Garten, and almost abutting on it. Here we were completely at peace.

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Ex-Prodigy: My Childhood and Youth and I Am a Mathematician: The Later Life of a Prodigy

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