

In Quest of Kurt Gödel: Reflections of a Biographer

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Since the days of E. T. Bell the writing of mathematical biographies has gradually matured. Nevertheless, chronicling the life of a mathematician remains a difficult undertaking. The question of audience is paramount, and the response to it determines both the style of presentation and the level of detail. Balancing the demands of lucidity and mathematical accuracy against the constraints of popular understanding presents a particularly vexing challenge.

The observations that follow are based upon my own experiences in writing a biography of Kurt Gödel [Dawson 1997]. I hope that others who consider becoming involved in biographical endeavors may find them of value.

Who Should Write Mathematical Biographies?

Interest in the lives of mathematicians and in the history of mathematics in general has increased markedly in recent years. More mathematical biographies are now being written, they are receiving greater attention from reviewers and readers, and the standards and sophistication of the genre have improved substantially. Writing a mathematical biography has accordingly become both a more rewarding and a more demanding task—the more so the broader the audience to whom the biography is addressed.

Most mathematical biographies, unsurprisingly, are written by and for mathematicians. Some, aimed at a more general readership, have been written by journalists, among whom Constance Reid is the pre-eminent example; and there are a few, such as [Lützen 1990], whose authors are trained historians of mathematics. The latter, however, are a rare breed. In general, historians of science have displayed an astonishing lack of interest in mathematics,

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in part, perhaps, because the private nature of mathematical research is less amenable to the sociological kind of analysis that is presently so fashionable in historical studies of the natural sciences.

Because of the highly technical nature of modern mathematics one might presume that only a mathematician can adequately understand and explain the work of another. But a biography is not a textbook. It is a portrayal of a life. And recounting the life of a mathematician requires a sensitivity to human values as well as an understanding of the details of theorems and proofs.

All too often, biographical memoirs written by mathematicians are anecdotal in nature and focus on mathematical results rather than on the personality or habits of life and work of the individual in question. The authors are frequently former colleagues, now past the most productive years of their own careers (understandably enough, since few who are actively involved in mathematical research or concerned about professional advancement can afford the time to engage in serious biographical scholarship). In many cases they are or were close friends of the subject and so may be unable to evaluate the person's character and contributions objectively. They may also be too close to the mathematical subject matter, so that, despite having a thorough understanding of the technical details, they may lack historical perspective concerning the development of the underlying mathematical ideas. In particular, many mathematicians cleave to the Whiggish view that the development of mathematics has been a story of continuing and inevitable progress.

To Whom Should Mathematical Biographies be Addressed?

For the mathematical biographer there is a strong temptation to preach to the converted. To be sure, writing for an audience of mathematicians demands great precision in the description of mathematical details. But much less effort need be devoted to explaining the concepts involved, or to

developing interest in what the person in question did. And outside the mathematical community sales of any mathematical biography are likely to be few. That, however, is disturbing and suggests that there are larger purposes that mathematical biography might serve.

In that regard the biographical writings of E. T. Bell are instructive. They have been much dispraised by professional historians, both because of Bell's tendency to romanticize his subjects and because of factual errors in some of his accounts. In his *Mathematics, Queen and Servant of Science*, for example, Bell asserts that Gödel received a degree in engineering from the University of Brno—a statement that has no basis in fact. Such sloppy scholarship cannot be defended, of course. Yet the positive impact that Bell's writings have had cannot be denied either. Indeed, several mathematicians of stature have attributed the awakening of their interest in the discipline to their reading of *Men of Mathematics*. Julia Robinson, for one, recalled that she hardly knew what mathematics was until she read Bell's book. "I cannot," she declared, "overemphasize the importance of such books...in the intellectual life of a student like myself [who was] completely out of contact with research mathematicians." ([Reid 1996], p. 25)

Not all readers would share Robinson's attraction to mathematics as a career. But surely our field would benefit from a wider appreciation of what it is that mathematicians do. We are not accountants, as so many seem to think, and to combat that widespread misimpression it is important to communicate to laymen how genuinely exciting the exploration of mathematical ideas can be.

In the end, it is up to each individual author to decide what audience to address. In doing so, he or she must consider the particulars of the life to be chronicled, whether the story has been told before, and how accessible the mathematical ideas are that must be discussed. In addition, the would-be author must decide whether or not he or she is intellectually suited to the task at hand. I, for example, am too much a child of my own time to consider writing about a figure from an earlier century.

Becoming a Biographer: My Own Experience

When I began my studies of Gödel, a few years after his death, very little about him had appeared in print. I had no idea what sources might be available, no reason to expect that details of his life could be reconstructed to any considerable extent, and no intention of becoming his biographer.

Shortly before, I had achieved tenure at a two-year branch campus of Penn State. My department was supportive, I had good access to library resources, and my teaching load was not unduly heavy. But I found myself out of touch with

colleagues with whom I could discuss research questions in logic, and the joys of teaching calculus term after term had begun to pall. I felt that I was losing contact with my discipline and was no longer able to contribute productively to mathematical research.

To avoid intellectual stagnation I resolved to go back and study the works of the masters. The obvious place for a logician to start was Gödel's writings; but to my surprise, I found that no list of them had ever been compiled. Preparing an annotated bibliography of his published works thus appeared to be a worthwhile endeavor—one I felt I was capable of undertaking and that was a necessary first step toward the larger goal of compiling a comprehensive edition of those works.

I made a firm decision to take on the bibliographic task when, following a tip from my friend Fred Rickey, I discovered three short papers on geometry that Gödel had published in the 1930s, which had not been cited by any previous commentators. That so aroused my curiosity that I began a detailed search of the literature. The result was [Dawson 1983], whose appearance brought my efforts to the attention of others in the logical community and led straightaway to my complete immersion in Gödel studies. On the strength of that compilation I was invited, at almost the same time, both to become one of the editors of Gödel's *Collected Works* and to undertake the cataloguing of his *Nachlass* (literary remains) at the Institute for Advanced Study (IAS).

While compiling my list of Gödel's publications I began to wonder about his unpublished manuscripts as well. I had no idea how extensive they might be or what condition they might be in. I did know that other scholars had tried without success to gain access to them, and I had heard that many of the papers were written in some sort of shorthand; so the prospect of my making much headway with them seemed remote.

How, within a few months, I was offered the opportunity to catalog those papers is a story too long to relate in detail here. Suffice it to say that I was persistent in making inquiries to the IAS, and that, unknown to me, the mathematicians there were faced with the problem of deciding what to do with donated materials for which the IAS had no proper storage facilities. I was due for a sabbatical the coming year, so I happened to make my inquiries at just the right time.

It took me two full years to complete the cataloguing. The problem of reading Gödel's Gabelberger shorthand was overcome with the help of my wife, who volunteered to learn that now-obsolete system. Through our combined efforts I became more familiar than anyone else with the contents of Gödel's *Nachlass*, and my work on the *Collected Works* edition brought me into contact

with such scholars as Solomon Feferman and Jean van Heijenoort, whose experience and expertise immeasurably deepened my own understanding of Gödel's accomplishments.¹

I soon realized that there was no dearth of documentary sources to work with. Quite the contrary! Gödel's *Nachlass* contained a great deal of scientific interest, including correspondence, manuscripts, and research notebooks. Gödel saved much that others would have discarded, some of which, such as the library slips for books he checked out over the years, constituted important biographical resources. But there was a great deal of chaff as well (letters from cranks, luggage tags, miscellaneous memoranda slips, etc.), and there were also some notable gaps. There were, for example, no financial records after his emigration to America, and no letters to or from his mother or brother. Nor did Gödel ever keep a diary. He did, however, keep a daily record of his body temperature and milk of magnesia consumption!

In the midst of my cataloging efforts a major international logic conference took place in Salzburg, and that event gave me the opportunity both to organize a commemorative session for Gödel in his former homeland and to travel to Vienna and Brno (Gödel's birthplace), where I was able to meet his brother, to photograph sites associated with Gödel's childhood, and to become acquainted with Austrian scholars who were aware of sources unknown to me. In particular, through the efforts and generosity of Werner DePauli-Schimanovich and Eckehart Köhler I was able to obtain photocopies of Gödel's surviving letters to his mother (now preserved in the Wiener Stadt- und Landesbibliothek), of documents from the archives of the University of Vienna, of some early photographs of Gödel, and of a memoir about him by Karl Menger (eventually published posthumously, in a revised English version, as a chapter in [Menger 1994]).

In Princeton and elsewhere I also tried to interview as many as I could of those who had known Gödel personally,² knowing full well that time was of the essence if I were to do so before my informants' health and memories failed. Among those with whom I spoke was Abraham Pais, whose biography of Einstein [Pais 1982] had been published not long before. When I asked him if he had any advice for a would-be biographer, he replied simply, "Patience".

¹For a retrospective account of the Gödel Collected Works project see [Feferman 2005].

²I myself never met Gödel, nor did I ever have any correspondence with him.

The Task of Writing

By the time I returned home from Princeton I had done most of the necessary data gathering. I brought back with me many folders of photocopied material, and as a result of my cataloguing experience I had formed an overall view both of the structure of Gödel's life and of the sources available to draw upon. I knew that a great deal of reading, note-taking, and reflection lay ahead before I could commence writing. The problem was to find time for all that in the midst of my teaching responsibilities.

Those and other commitments forced me to heed Pais's advice. I spent the next seven years—the time until my next sabbatical—studying the various documentary materials, fitting pieces of the puzzle together, and, above all, developing a view of what sort of person Gödel had been.

Establishing such a viewpoint is crucial to the success of any biographical endeavor. For every biography, rightly so called, must portray a life from a definite perspective. The point of view chosen will vary from one biographer to another—that is why there can be more than one biography of the same person—and it will necessarily reflect the author's own background and biases. Accordingly, no biography can ever be the final word on its subject. But without some perspective around which to organize the narrative, the account will be an undirected chronicle of events. As with all history, biographical writing demands interpretation of the data.

By the fall of 1991, when my second sabbatical commenced, I was ready to begin writing. By then I had extracted a great many details about Gödel's life from the sources I had studied, and I felt that I must begin to assemble them into a narrative while my memory of them was still fresh. Although there were still some loose ends, I had formed a definite idea of what made Gödel tick; I could envision the chapter structure of the book quite clearly; and I knew from Gödel's own example that if I waited too long my book might never be written at all. The experience of cataloguing his *Nachlass* had also taught me an important lesson about tackling big projects: One dare not look too far ahead, lest the work remaining to be done appear too daunting. I had never written a book before, but I knew that in doing so I would have to keep my head down and concentrate on one chapter at a time.

During my sabbatical year I wrote seven of the fourteen chapters, at the rate of about one a month. I was pleased with the progress I was able to make, but only too well aware that once my teaching duties resumed my pace would slow abruptly.

In fact, it took four more years to complete the manuscript. Yet, as things turned out, had I begun earlier I would have had much rewriting to do; for,

quite by chance, in March of 1992 I discovered a new source of information that significantly enriched my knowledge of Gödel's later years: the diaries of the economist Oskar Morgenstern.

About six months earlier I had seen an announcement in the newsletter of the History of Science Society that Morgenstern's papers had been donated to the archives at Duke University. I knew that Morgenstern had had a long-standing friendship with Gödel, so I was mildly interested. But since his widow Dorothy was one of those I had interviewed during my stay in Princeton, and since she had been quite willing to share her recollections of Gödel with me and to talk about her husband's relationship with him, I didn't expect to find much in Morgenstern's papers that I didn't already know. I was not aware that he had kept any diaries, but when I later learned of their existence, I thought it unlikely that they would contain very much of relevance to my interests. It did not occur to me that his widow might not read German and so might herself have been unaware of their contents.

As luck would have it, that spring the Association for Symbolic Logic met at Duke. I took that opportunity to look at the Morgenstern papers, and quickly found a slim folder labeled "Gödel". There were only a few pages of interest in it, but the librarian suggested that references to Gödel might also be found in Morgenstern's diary entries. I requested to see them, not realizing until she said "Which volumes?" that his diaries covered a period of nearly sixty years. A cursory glance at a couple of the volumes was enough to reveal what a wealth of information about Gödel they contained. I later spent a full week examining the diaries in detail. What I found filled many gaps in the record of Gödel's life and gave me an insider's view of his final years unobtainable elsewhere.

Similarities and Contrasts Between Historical and Mathematical Research

Proving theorems is an analytical endeavor, whereas historical research is synthetic in character. Nevertheless, the standards of logical rigor to which mathematicians are accustomed have much in common with the standards of historical evidence. Nor is there any less satisfaction or excitement in settling historical questions or discovering new historical facts than there is in discovering new mathematical results. Historical research is constrained by the available data and guided by historical acuity just as mathematical research is constrained by axioms or the behavior of the real world and guided by mathematical insight. Both activities can be equally frustrating or intellectually rewarding, and if done properly, both demand equal standards of scholarship and should be accorded equal scholarly respect.

In all those regards, research in the history of mathematics should be congenial to those trained to do traditional mathematical research. What is different is the lack of finality that historical conclusions possess: the most carefully supported interpretations of historical events may be upset by the discovery of new artifacts or data, whereas the truth of a mathematical statement, once proven, is seldom called into question. Nevertheless, standards of mathematical proof do slowly change, and the recognition of that fact is perhaps what most distinguishes the viewpoint of the mathematical historian from that of most mathematical practitioners.

It is comforting to think, after proving a theorem, that one has settled a question once and for all. That feeling of security is one of the attractions of doing mathematical research, and it can be hard to turn away from that and accept the vulnerability inherent in doing historical work. Those reluctant to do so should probably leave historical studies to others. But a degree of risk can also be exciting, and to the extent that mathematical research is "safe" it is also abstractly removed from the affairs of the world.

Speaking personally, I believe that biographical or historical work can be a valuable adjunct to traditional mathematical pursuits, especially for those who are remote from centers of mathematical research and do not have regular contact with advanced students or colleagues in their discipline. I recommend it to readers who may be dissatisfied with their present situation and are seeking an alternative way to remain productive and intellectually alive.

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